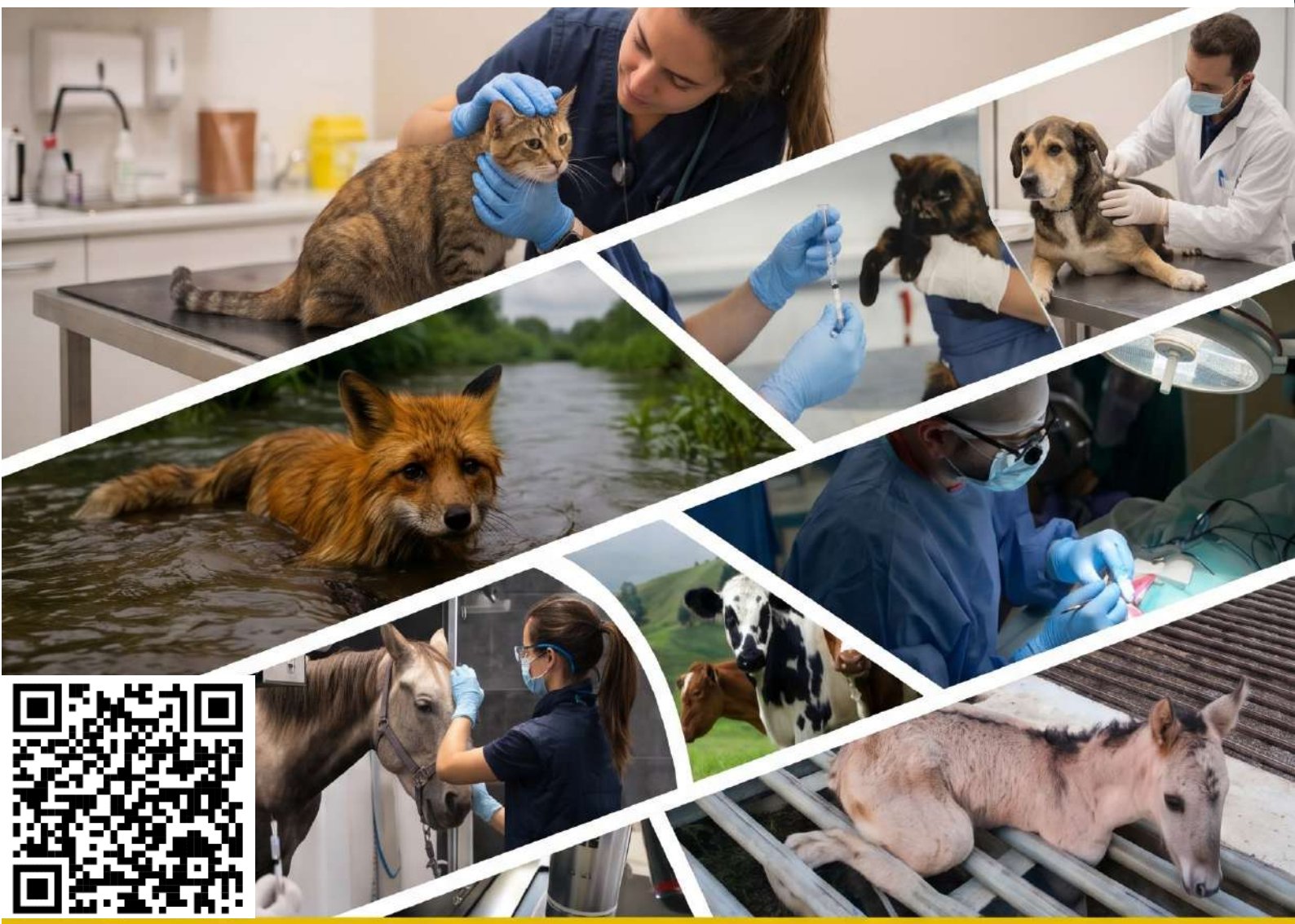
Biosecurity Manual

Standard Operating Procedures

Faculty of Veterinary Medicine · Universidade Lusófona

Code FVM-BIO-MAN · Version 1.0

Prepared for the ESEVT / EAEVE evaluation visit



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Approval of the Biosecurity Manual

This version of the Biosecurity Manual was drafted by the Health, Safety and Biosecurity Committee (HSBC) with the facility responsibles and is approved by the Dean of FVM-ULusófona after consulting the Scientific and Pedagogical Councils. It comes into force on the date of approval and is reviewed at least once a year.

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FACULDADE DE MEDICINA VETERINÁRIA
UNIVERSIDADE LUSÓFONA

Biosecurity Manual

Standard Operating Procedures

Faculty of Veterinary Medicine · Universidade Lusófona

Note: This Manual of the Faculty of Veterinary Medicine of Universidade Lusófona (FVM-ULusófona) was developed with reference to the following documents:

- **Faculty of Veterinary Medicine, University of Liège (Belgium):** *Biosecurity Standard Operating Procedures (SOPs) Applied to the Faculty of Veterinary Medicine, University of Liège* (2025).
- **Faculty of Veterinary Medicine, University of Lisbon (Portugal):** *General Biosecurity Procedures* (2026).

This Manual is complementary to the FVM-ULusófona Occupational Safety and Health (OSH) Manual (document code: FVM-OSH-MAN). Both manuals are developed, implemented and periodically reviewed under the responsibility of the same Health, Safety and Biosecurity Committee (HSBC). This integrated approach promotes coordination between health measures, occupational safety and biosecurity, supporting the continuous improvement of related policies, procedures and practices across the FVM-ULusófona.

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List of Abbreviations

A3ES	**Agência de Avaliação e Acreditação do Ensino Superior**
AMEG	Antimicrobial Advice Ad Hoc Expert Group (EMA)
AMR	Antimicrobial Resistance
ASF	African Swine Fever
BSL	Biosafety Level
CAPA	Corrective and Preventive Actions
CIAV	Centro de Informação Antivenenos
CPE	Collective Protective Equipment
DGAV	Direção-Geral de Alimentação e Veterinária
DGS	Direção-Geral da Saúde
DLCTT	Direção de Laboratórios e Centros de Transferência de Tecnologia
DSAVR	Direção de Serviços de Alimentação e Veterinária da Região (DSAVR LVT: Lisboa e Vale do Tejo)
EAEVE	European Association of Establishments for Veterinary Education
EDTA	Ethylenediaminetetraacetic acid
EHM	Equine Herpesvirus Myeloencephalopathy
EHV-1	Equine Herpesvirus 1
EMA	European Medicines Agency
ESBL	Extended-Spectrum Beta-Lactamase
ESEVT	European System of Evaluation of Veterinary Training
ESKAPE	Acronym referring to six major antimicrobial-resistant bacterial pathogens: *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter* spp.
ETSA	Empresa Transformadora de Subprodutos de Origem Animal
EU	European Union
FCV	Feline Calicivirus
FeLV	Feline Leukaemia Virus

FFP	Filtering Facepiece (classes FFP2 and FFP3)
FMD	Foot-and-mouth disease
FIV	Feline Immunodeficiency Virus
FVM	Faculty of Veterinary Medicine
GDPR	General Data Protection Regulation
GNR	Guarda Nacional Republicana
HAI	Healthcare-Associated Infection
HEPA	High-Efficiency Particulate Air
HME	Heat and Moisture Exchange
HPAI	Highly Pathogenic Avian Influenza
HSBC	Health, Safety and Biosecurity Committee
ICNF	Instituto da Conservação da Natureza e das Florestas
ICU	Intensive Care Unit
I-MVET	Research in Veterinary Medicine
INEM	Instituto Nacional de Emergência Médica
INIAV	Instituto Nacional de Investigação Agrária e Veterinária
IVMP	Integrated Vector Management Programme
LoW	European List of Waste
MAT	Microscopic Agglutination Test
MDR	Multidrug Resistance
MRSA	Methicillin-Resistant *Staphylococcus aureus*
MRSP	Methicillin-Resistant *Staphylococcus pseudintermedius*
NaDCC	Sodium dichloroisocyanurate
OSH	Occupational Safety and Health (Segurança e Saúde no Trabalho)
PCR	Polymerase Chain Reaction
PDCA	Plan–Do–Check–Act

PEMV	Veterinary Medicines Prescription System
PNCUM	National Plan for the Control of the Use of Medicines and Veterinary Medicines
PPE	Personal Protective Equipment
PSP	Polícia de Segurança Pública
QA	Quality Assurance
RT-PCR	Reverse Transcription Polymerase Chain Reaction
SDS	Safety Data Sheet
SIGQ	Sistema Interno de Garantia da Qualidade (Internal Quality Assurance System)
SNS 24	Serviço Nacional de Saúde 24 (health helpline)
SOP	Standard Operating Procedure
SSI	Surgical Site Infection
UICB	Biological Isolation and Containment Unit
UICB-EQ	Infetocontagiosas Unit of the Equine Teaching Hospital (VTH-E)
UICB-FA	Isolation Unit of the Farm Animal Teaching Hospital (VTH-FA)
UV	Ultraviolet
VRE	Vancomycin-Resistant Enterococci
VS-FCV	Virulent Systemic Feline Calicivirus
VTC-CA	Companion Animal Veterinary Teaching Clinic (Clínica Veterinária Universitária – Animais de Companhia)
VTH-CA	Companion Animal Teaching Hospital
VTH-E	Equine Teaching Hospital
VTH-FA	Farm Animal Teaching Hospital (Catapereiro)
WGS	Whole-Genome Sequencing
WOAH	World Organisation for Animal Health

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Chapter 1: General Biosecurity SOPs

This chapter contains the rules that apply in every FVM-ULusófona facility: how biological risk is classified, hand hygiene, protective equipment, dress code, medicines, waste, cleaning and disinfection, visitors, communication of infectious risks and notification of diseases.

The facility chapters that follow (Chapters 2 to 12) only add what is specific to each place and do not repeat these rules.

1.1. Purpose, Principles and Organisation

1.1.1. Biosecurity at FVM-ULusófona

At FVM-ULusófona, biosecurity is the combination of measures, behaviours and infrastructure that prevents infectious agents from reaching the animals and people in our facilities, from spreading within them and from leaving them. It is complemented by biosafety, which prevents accidental exposure of people and the environment to biological agents. Both are overseen by the Health, Safety and Biosecurity Committee (HSBC). Biosecurity is organised in five dimensions[1]:

- **Bio-exclusion:** implementing measures to prevent pathogens from entering the facilities or being introduced into animal populations.
- **Bio-compartmentation:** reducing the risk of pathogen transmission between animals or groups within the same facility, including through the separation and isolation of infected or potentially infectious animals.
- **Bio-containment:** preventing pathogens from spreading beyond the facility and reaching other animal populations or establishments.
- **Bio-prevention:** reducing the risk of exposure to biological agents among students, staff, animal owners and visitors, particularly those that may cause zoonotic infections.
- **Bio-preservation:** protecting the environment by preventing the release, persistence and dissemination of pathogens and biological contaminants.

Infection prevention and control is part of good clinical care and of good teaching. Patients, students and owners all benefit from it, and students learn by example the practices they will apply as veterinarians. The approach follows the One Health principle, which links human, animal and environmental health.

1.1.2. The Health, Safety and Biosecurity Committee (HSBC)

The Health, Safety and Biosecurity Committee (HSBC) of FVM-ULusófona is a permanent body with advisory and executive functions, appointed by the Dean. It oversees the policies and procedures that protect animals, people and the environment in all teaching, research and clinical

[1] University of Liège, Faculty of Veterinary Medicine, Faculty Biosecurity Unit. (2025) Biosecurity standard operating procedures (SOPs) applied to the Faculty of Veterinary Medicine, Liège University (FVM).

activities of the Faculty, covering biosecurity and biosafety (section 1.1.1) and occupational safety and health.

Composition

The HSBC comprises members of the Academic Board, student representatives from each year and representatives of the Pedagogical Council, and includes the occupational safety officer, the occupational physician and the radiation protection officer. The Dean is supported by a coordinator in the work of the HSBC.

Tasks

The HSBC:

- reviews biological risks and procedures in teaching, research and services, and advises on any facility where live or dead animals, animal products or biological samples are present;
- keeps the biosecurity SOPs up to date with legislation (DGAV, DGS), emerging diseases and ESEVT/EAEVE recommendations;
- promotes training for teaching staff, technical staff and students (Biosafety Day and induction sessions);
- monitors compliance through inspections, audits and incident reviews, and follows environmental contamination and antimicrobial resistance (Chapter 13);
- recommends corrective and preventive measures and evaluates their effectiveness, within the quality assurance system (Chapter 15);
- prepares and reviews crisis scenarios and contingency plans (Chapter 14);
- advises the Dean on priorities and on the human, technical and material resources required, contributes to the Faculty's strategic plan and coordinates with the relevant University services and the clinical and laboratory teams.

Operation

The HSBC meets regularly and whenever an urgent situation arises, and its decisions and recommendations are recorded in minutes. All members maintain confidentiality and declare any conflict of interest. Incident reports are reviewed in anonymised form, and sensitive matters are considered in restricted sessions by authorised members.

Relationship with the Occupational Safety and Health Manual

This manual deals with biological risks to animals, people and the environment. Occupational safety and health matters not specific to biosecurity (chemical, physical and ergonomic risks, radiation protection, fire safety, health surveillance of workers, special protection of pregnant and breastfeeding workers and minors, work accidents) are covered by the FVM-ULusófona Occupational Safety and Health (OSH) Manual (Manual de Segurança e Saúde no Trabalho, code FVM-OSH-MAN).

1.1.3. Definitions

Table 1.1: Terms used in this manual

Term	Meaning in this manual
Aerosol	Fine droplets or particles in the air that can carry microorganisms
Antiseptic	Product applied to skin or mucous membranes to kill or inhibit microorganisms without harming the tissue
Barrier precautions (hygiene lock)	Combination of PPE, dedicated equipment and practices that separate a patient at risk (Class 3–4) from people, other animals and objects
Biofilm	Layer of microorganisms attached to a surface inside a matrix they produce; protects them from disinfectants and must be removed mechanically
Biological agent	Microorganism, cell culture or biological material able to cause infection, allergy or toxicity
Cleaning	Physical removal of dirt and organic matter; does not necessarily kill microorganisms
Collective protective equipment (CPE)	Equipment that protects several people at once (e.g., biological safety cabinet, ventilation)
Contagious disease	Infectious disease that can pass between animals, between people, or between animals and people, directly or through objects and the environment
Cross-contamination	Unintended transfer of microorganisms or biological material between animals, people, samples, equipment or areas
Disinfectant / disinfection	Chemical product / process that kills or inactivates most pathogens on inanimate surfaces (not necessarily spores)
Healthcare-associated infection (HAI)	Infection not present or incubating at admission, acquired during care; often appears 48 h or more after admission, or after discharge
Multidrug resistance (MDR)	Ability of a bacterium to survive several classes of antimicrobials
Personal protective equipment (PPE)	Gloves, gowns, coveralls, masks, respirators, goggles, face shields and footwear that protect the wearer
Sterilisation	Process that destroys all forms of microbial life, including spores
Zoonosis	Disease transmissible between vertebrate animals and humans

1.2. Biological Risk

1.2.1. Risk Groups of Biological Agents

Decree-Law No 102-A/2020 (transposing Directives (EU) 2019/1833 and 2020/739)[2] classifies biological agents into four risk groups, according to their capacity to cause disease in workers, to spread and to be prevented or treated. This classification determines laboratory containment and protection of workers (Chapter 9).

Table 1.2: Risk groups of biological agents and examples relevant to FVM-ULusófona

Group	Criteria	Examples handled or likely at FVM-ULusófona
1	Unlikely to cause human disease	Non-pathogenic laboratory strains (e.g., *E. coli* K-12), *Lactobacillus* spp.

[2] Portuguese Republic. Decree-Law No 102-A/2020 of 9 December 2020, amending Decree-Law No 84/97 of 16 April and transposing Directives (EU) 2019/1833 and 2020/739. Diário da República, 1st Series, No 238. Available at https://files.dre.pt/1s/2020/12/23801/0000200050.pdf

2	Can cause human disease; unlikely to spread to the community; prevention or treatment usually available	*Salmonella* spp., *Campylobacter* spp., *Leptospira* spp., *Staphylococcus aureus* (including MRSA), *S. pseudintermedius*, *Clostridium* spp., dermatophytes, *Toxoplasma*, *Giardia*, *Cryptosporidium*, *Streptococcus equi*
3	Can cause severe human disease; may spread to the community; prevention or treatment usually available	*Brucella* spp., *Mycobacterium bovis*, *Coxiella burnetii*, *Chlamydia psittaci* (avian strains), rabies virus, highly pathogenic avian influenza H5
4	Severe human disease; high risk of spread; no prevention or treatment	Not handled at FVM-ULusófona

1.2.2. Patient Risk Classes

In the Teaching Hospitals, each patient receives a risk class at admission, based on how easily its condition spreads to other animals and whether it is zoonotic. The class decides where the patient is housed and which precautions apply, and it is shown on the cage or stall card. It is reviewed whenever the clinical picture or laboratory results change.

Table 1.3: Patient risk classes in the Teaching Hospitals

Class	Definition	Companion animal examples	Equine examples	Housing
1 – green	Not infectious, or infectious but not transmissible	Trauma, orthopaedics, elective surgery, healthy blood donors	Trauma, elective surgery, ophthalmology, healthy horses	General wards / hospitalisation corridor
2 – green	Infectious, low transmissibility, susceptible bacteria	Pyoderma, cystitis, otitis, infected wounds with susceptible bacteria	Infected wounds, pneumonia without contagious agent	General wards
3 – orange	Moderately contagious, zoonotic, or MDR bacteria (A: MDR; B: contagious/zoonotic)	MRSP/MRSA, ESBL; kennel cough; FeLV/FIV; dermatophytosis; chronic diarrhoea under investigation	Fever of unknown origin; viral respiratory signs; diarrhoea without fever; *R. equi*; MDR infections; contagious skin disease	UICB (VTH-CA); restricted-circulation cages/stalls with barrier precautions; separate pen or UICB-FA (VTH-FA)
4 – red	Highly contagious and/or serious zoonosis; notifiable disease suspected	Parvovirus, distemper, panleukopenia, VS-FCV, leptospirosis, rabies suspect, psittacosis	Strangles, acute diarrhoea with fever/leukopenia, EHV-1 neurological form, abortion, zoonoses	Isolation units: UICB (VTH-CA), Infetocontagios as Unit (VTH-E); UICB-FA (VTH-FA)

Species-specific lists and admission criteria are given in Chapter 2 (companion animals), Chapter 4 (exotic animals) Chapter 5 (equines) and Chapter 12 (ruminants, pigs and referred equids at the VTH-FA).

1.3. General Rules

1.3.1. Hand Hygiene

Hand hygiene is the single most effective measure against the spread of pathogens in a hospital. Hands are washed with water and soap when visibly dirty, and otherwise rubbed with an alcohol-based product:

- before and after each patient, and between procedures on different body sites of the same patient;
- after contact with blood, body fluids, secretions, excretions or contaminated objects, with or without gloves, and immediately after removing gloves;
- after handling samples or cultures and after cleaning cages or stalls;
- before eating, breaks or leaving work, and before and after using the toilet.

Table 1.4: Hand hygiene technique (Appendix 1)

Washing with water and soap	Alcohol-based hand rub
When: hands visibly dirty or soiled with blood or body fluids; after using the toilet; when spore-forming organisms (e.g., Clostridioides difficile) are suspected, since alcohol does not kill spores	When: hands visibly clean, at all the other moments listed above
Product: 3–5 mL of liquid soap and running water	Product: enough to cover all surfaces of both hands and wrists (about 3 mL)
Technique: (1) wet hands and wrists; (2) apply soap; (3) palm to palm; (4) palm over the back of the other hand with fingers interlaced, and vice versa; (5) palm to palm with fingers interlaced; (6) backs of the fingers against the opposite palm; (7) rotational rubbing of each thumb; (8) rotational rubbing of the fingertips in the opposite palm, including under the nails; (9) wrists; (10) rinse; (11) dry thoroughly with a single-use towel; (12) turn off a manual tap with the towel	Technique: steps (3) to (9) of hand washing, until the hands are completely dry; do not rinse or towel-dry
Duration: 40–60 s (whole procedure)	Duration: 20–30 s
Hands are completely dry before putting on gloves; gloves do not replace hand hygiene	Hands are completely dry before putting on gloves; soap and alcohol rub are not used one after the other

People in contact with patients or samples keep nails short, wear no rings, bracelets or watches on hands and arms, and cover any skin wound with a waterproof dressing.

1.3.2. Barrier Precautions and PPE

Table 1.5: Minimum PPE by situation

Situation	Minimum PPE
Routine handling of Class 1–2 patients	Facility attire; gloves for contact with body fluids, mucous membranes or wounds
Class 3 patients	Gown or coverall over attire, gloves, dedicated footwear or shoe covers
Class 4 patients and isolation units	As Class 3, plus mask, cap, and eye protection when splashes or aerosols are possible; FFP2/FFP3 according to the agent (Chapter 14)

Procedures with splashes, droplets or bone fragments (dentistry, lavage, necropsy)	Gloves, mask and goggles or face shield; waterproof apron
Cleaning areas used by infectious animals	Gloves, waterproof apron or gown, boots; eye protection if splashes
Handling carcasses of animals with possible zoonosis	Gloves (cut-resistant over nitrile when cutting), waterproof apron, mask and eye protection (Chapter 7)

- If a glove tears or is punctured: stop when safe, remove it, perform hand hygiene and put on a new one.
- Respirators (FFP2/FFP3) are used according to the risk assessment and must fit correctly. Selection and use of PPE also follow the OSH Manual (section 7.1).

1.3.3. Dress Code

Dedicated attire is the first barrier against carrying pathogens out of the clinical areas. Clinical clothing, footwear and outer garments are worn only at FVM-ULusófona or on field duty, and at least one clean spare set must be available. Reusable attire is laundered as described in Chapter 11.

Table 1.6: Attire by area

Area	Staff	Students
Companion Animal Teaching Hospital (consultations, hospitalisation)	Turquoise blue (medicine) or dark blue (surgery) scrubs for veterinarians; grey for nurses and assistants; beige for cleaning assistants (Table 2.1)	Green scrubs (Table 2.1)
Surgery (VTH-CA and VTH-E)	Surgical scrubs used only in the surgical area; cap, mask, dedicated footwear or shoe covers	Same as staff
Equine Teaching Hospital	Blue coverall or blue scrubs; green scrubs in surgery; waterproof footwear	Same as staff
Farm animals and ambulatory clinic	Coverall and rubber boots	Coverall and rubber boots
Isolation units (Class 3–4)	Disposable gown or coverall over attire (Chapters 2 and 5)	Same as staff
Farm Animal Teaching Hospital (VTH-FA)	Coverall and rubber boots used only at the hospital; disposable coverall over attire in the UICB-FA (Chapter 12)	Same as staff
Teaching laboratories and anatomy	Lab coat (closed)	Lab coat (closed); see Chapters 7 and 9
Necropsy	Coverall or scrubs, waterproof apron, rubber boots	Same as staff (Chapter 7)

In all practical classes: closed, safe and washable footwear (not porous); no shorts, and skirts only with tights or leggings; long hair tied back.

1.3.4. Patient Care and Contact Reduction

- Patients are kept clean in clean cages or stalls. Bowls and buckets are changed and cleaned regularly. Faeces or urine outside the enclosure are removed and the floor cleaned at once.
- Cages and stalls are kept tidy: no medicines, materials or personal belongings left behind; everything is put back after use.
- Touch only the patients you are responsible for; do not pet animals when passing by; enter cages and stalls only when needed. For teaching, clinicians may allow contact with several patients, with hand hygiene and equipment disinfection between them.
- Contact with contagious patients is limited to what care requires; observation without contact (including video) is preferred when possible.
- Avoid moving between services: e.g., staff and students of the VTH-E do not go to the VTH-CA on the same day, and medical teams limit visits to the surgical block. Work with higher-risk patients last.

1.3.5. Food and Drink

- No eating, drinking or storing food where animals are examined, treated or housed, where samples are handled, or where medicines are prepared or stored (including record rooms, corridors, surgery, consultation rooms and reception).
- Food is allowed in cafeterias, staff rest rooms, offices, students' on-call rooms and areas outside the clinical departments; animals, samples and medicines are not allowed there.
- Refrigerators, freezers and microwaves used for medicines, samples or animals are never used for human food.

1.3.6. Medicines

- Each hospital has a medicines store for hospitalised animals and keeps entry and exit registers as required by law. Medicines are used prudently, respecting dosages and withdrawal periods; antimicrobials follow Chapter 13.
- Veterinarians prescribe; students prepare and administer medicines only under direct supervision.
- Medicines are stored as indicated on the label (temperature, light), in order, with opened vials separated from stock. Students enter the pharmacy only when authorised or accompanied.
- Opioids, ketamine and euthanasia products are kept locked; only clinicians on duty have the key or code.
- Opened vials and fluid bags are labelled with the opening date and discarded after 24 h, or earlier if the label says so. Vial tops are wiped with alcohol before each puncture; a new sterile needle and syringe are used for each preparation, and a new needle for injection. Short-stability drugs (e.g., ampicillin, sodium penicillin) are prepared just before use; syringes not used immediately are labelled.
- **Needles are never recapped.** Hazardous drugs are prepared with the PPE indicated in their safety data sheet, away from unprotected people.
- Medicines used are recorded in the clinical software immediately. Unused medicines that cannot return to the pharmacy go to the waste container indicated in section 1.3.8.

1.3.7. Laundry and Return of Equipment

- Sharps, waste, hay, bedding and anatomical material are never mixed with laundry.
- Instruments and equipment are returned free of organic material; buckets, pumps and tubes are rinsed and free of oil.

1.3.8. Waste

Waste is sorted where it is produced, in the containers below, and collected by a licensed operator. Sharps go into puncture-proof containers immediately after use; needles are never recapped, bent or broken and containers are not filled above the fill line. Waste from isolation units is always treated as biological-risk waste [3][4](Appendix 2). The occupational safety rules for sharps and waste (PPE and vaccination of waste handlers, needlestick injuries as work accidents) are in the OSH Manual (sections 7.2, 7.3 and 9.3). Solid waste follows Table 1.7. Liquid waste (solvents, formaldehyde, dyes, acids, bases and liquids from biological analyses) is collected in jerricans labelled before use with the waste name and LoW code, filled only to the mark and closed, and is never poured down the drain (Chapter 2, Table 2.9; Chapter 9, Table 9.12).

Table 1.7: Waste groups (Appendix 2)

Group	Type	Container	Examples
I	Comparable to urban waste	Black bag	Paper, packaging, food waste from rest areas
II	Non-hazardous hospital waste	Black bag	Clean packaging of medical material, plaster, non-contaminated disposables
III ☣	Biological-risk hospital waste	White bag in green container	Material contaminated with blood or body fluids, dressings, PPE from Class 3–4 areas, non-identifiable tissues
IV	Specific hospital waste (incineration)	Red bag / yellow puncture-proof container	Sharps, cytotoxic drugs, unused medicines, infectious material

- Samples from potentially contagious patients are sent to the laboratory in sealed double packaging, labelled with the suspected risk, without contaminating the outside.
- Wounds infected by MDR bacteria are dressed in low-traffic, easy-to-disinfect areas, with barrier precautions.
- Cadavers and animal by-products are managed separately from healthcare waste, in accordance with their applicable classification under Regulation (EC) No 1069/2009[5] and Commission Regulation (EU) No 142/2011[6]. Their collection and disposal shall be carried out by appropriately authorised operators, in accordance with the procedures described in Chapter 7.

[3] Portuguese Republic. Decree-Law No 102-D/2020 of 10 December 2020, approving the General Waste Management Regime, as amended. Diário da República, 1st Series, No 239, 10 December 2020.
[4] European Commission. Commission Decision 2014/955/EU of 18 December 2014, amending the European List of Waste. Official Journal of the European Union, L 370, 30 December 2014, pp. 44–86.
[5] European Parliament and Council. Regulation (EC) No 1069/2009 of 21 October 2009, on animal by-products. Official Journal of the European Union, L 300, 14 November 2009.
[6]European Commission. Commission Regulation (EU) No 142/2011 of 25 February 2011, implementing Regulation (EC) No 1069/2009 on animal by-products. Official Journal of the European Union, L 54, 26 February 2011.

1.4. Cleaning and Disinfection

1.4.1. Principles and Standard Sequence

Organic matter inactivates most disinfectants, so cleaning always comes first. Each product must be used at the dilution and contact time on its label (usually 10–15 minutes). Anyone using detergents or disinfectants must know the products in use in their area and how they interact.

Table 1.8: Standard cleaning and disinfection sequence

Step	Action
1. Protect	Facility attire plus gloves; mask, eye protection, waterproof clothing and boots if splashes are possible; cover any skin wound
2. Remove debris	Remove all visible dirt and organic matter; avoid high-pressure water, which creates aerosols
3. Clean	Water and detergent with scrubbing to break biofilm
4. Rinse and drain	Remove detergent residues (some disinfectants are inactivated by detergents) and let surfaces drain
5. Disinfect	Wet the surface completely; respect the contact time on the label
6. Rinse or dry	Rinse or let dry as indicated before housing an animal
7. Finish	Remove PPE and wash hands

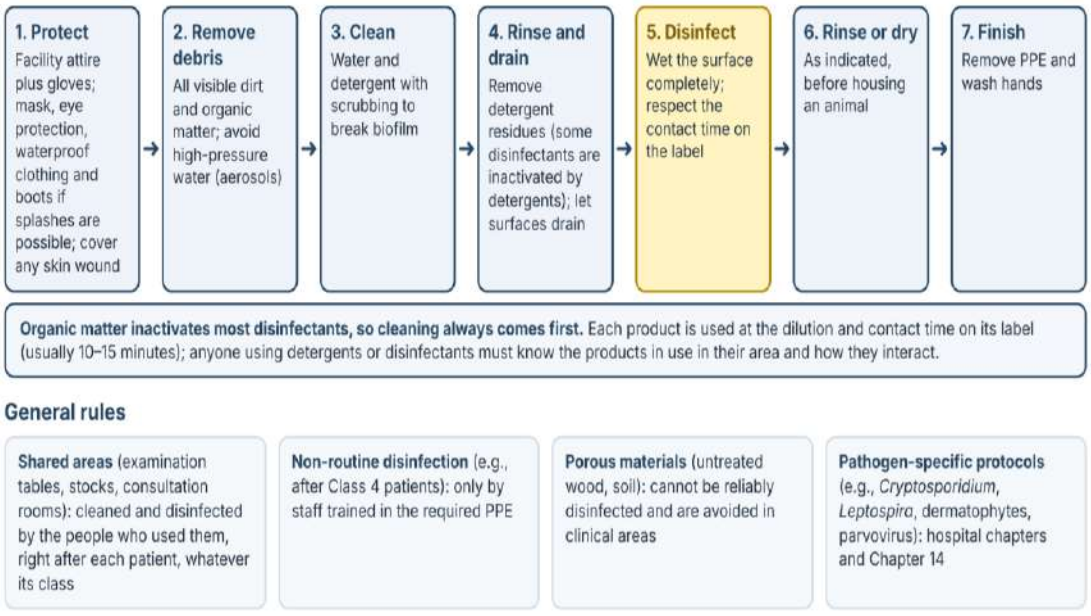


Figure 1.1: Standard cleaning and disinfection sequence and general rules

- Shared areas (examination tables, stocks, consultation rooms) are cleaned and disinfected by the people who used them, right after each patient, whatever its class.
- Non-routine disinfection (e.g., after Class 4 patients) is carried out only by staff trained in the required PPE.

- Porous materials (untreated wood, soil) cannot be reliably disinfected and are avoided in clinical areas.
- Pathogen-specific protocols (e.g., *Cryptosporidium*, *Leptospira*, dermatophytes, parvovirus) are given in the hospital chapters and in Chapter 14.

1.4.2. Disinfectants

Only biocidal products authorised in Portugal are used[7]. Products with low toxicity (alcohols, chlorhexidine, povidone-iodine) are used on skin and on materials in contact with tissues; stronger products (hypochlorite, peroxygens, phenols, quaternary ammonium compounds) are used on surfaces, footbaths and equipment. The spectrum of activity of each disinfectant group against specific agents is shown in Table 1.9.

Table 1.9: Main disinfectant groups: spectrum of activity and precautions (Adapted from the Center for Food Security and Public Health (CFSPH), Iowa State University.)[8]

Group	Mycoplasmas	Gram+ bacteria	Gram– bacteria	Pseudomonas	Rickettsiae	Enveloped viruses	Chlamydiaceae	Non-env. viruses	Fungal spores	Picornaviruses (FMD)	Parvoviruses	Mycobacteria	Bacterial spores	Coccidia	Prions	Limitations and precautions
Alcohols (70 %)	++	++	++	++	+	+	±	–	±	N	N	+	–	–	–	No residual activity; poor on dirty surfaces and non-enveloped viruses; flammable
Chlorhexidine	++	++	++	±	±	±	±	–	±	N	N	–	–	–	–	Inactivated by soaps and anionic detergents; active at pH 5–7
Povidone-iodine	++	+	+	+	+	+	+	±	+	N	N	+	+	–	–	Inactivated by organic matter; stains; may sensitise skin
Sodium hypochlorite	++	+	+	+	+	+	+	+	+	N	+	+	+	–	–	Inactivated by organic matter, detergents and light; corrosive; releases toxic gas with acids or ammonia; prepare fresh
Peroxygens	++	+	+	+	+	+	+	±	±	+	N	±	+b	–	–	Irritant powder (mask and gloves when preparing); corrosive to some metals
Accelerated hydrogen peroxide	++	+	+	+	+	+	+	±	±	+	N	±	+b	–	–	Follow label contact time; may damage some surfaces

[7] Direção-Geral de Alimentação e Veterinária (DGAV). Lista de Biocidas de Uso Veterinário Autorizados. Lisboa: DGAV; Available at: https://www.dgav.pt/wp-content/uploads/2023/06/Lista-Biocidas-Uso-Veterinario-Autorizados-MAR-2024.pdf

[8] Center for Food Security and Public Health (CFSPH), Iowa State University. Characteristics of Selected Disinfectants. Iowa State University. Available at: https://www.cfsph.iastate.edu/infection-control/disinfection/

Group	Mycoplasmas	Gram+ bacteria	Gram– bacteria	Pseudomonas	Rickettsiae	Enveloped viruses	Chlamydiaceae	Non-env. viruses	Fungal spores	Picornaviruses (FMD)	Parvoviruses	Mycobacteria	Bacterial spores	Coccidia	Prions	Limitations and precautions
Quaternary ammonium compounds	+	++	+	–	±	±	–	–	±	N	–	–	–	–	–	Weak on non-enveloped viruses and mycobacteria; inactivated by soaps and hard water
Phenolic compounds	++	++	++	++	+	±a	±	–	+	N	N	±	–	+d	–	Irritant; not for surfaces in contact with skin; toxic to cats
Aldehydes	++	++	++	++	+	++	+	+	+	+	+	+	+	–	–	Not in routine use at FVM-ULusófona; toxic and sensitising (formaldehyde is used only as a fixative, Chapter 7)
Acids	+	+	+	+	±	+	±	–	±	+	N	–	±	–	–	Not in routine use at FVM-ULusófona; corrosive
Alkalis	++	+	+	+	+	+	+	±	+	+	N	+	±	+c	–	Not in routine use at FVM-ULusófona; corrosive

++ highly effective (dark green); + effective (light green); ± limited activity (yellow); – no activity (red); N: no information available (grey). a Varies with composition; b peracetic acid is sporicidal; c ammonium hydroxide; d some phenolic compounds are active against coccidia. Removal of organic material must always precede the use of any disinfectant; product choice, dilution and contact time follow the label and Table 1.10.

- 70 % alcohol is used only for routine disinfection of clean equipment and small surfaces. It is not used alone when parvovirus, calicivirus, bacterial spores (e.g., Clostridioides) or Cryptosporidium are suspected: a product active against the agent (Table 1.9), such as hypochlorite or Virkon™ S, is used instead, at the label dilution and contact time.

The table 1.10 lists the disinfectants and antiseptics used at FVM-ULusófona. The dilution, concentration, application method and contact time of each product are defined in the cleaning and disinfection protocol of the relevant area and follow the manufacturer's instructions. Staff must follow these protocols and select a product suited to the intended purpose, taking into account its effectiveness, its compatibility with the surfaces or equipment and the safety requirements. Product information and safety data sheets must be kept available in the areas where the products are used, in a location known to the personnel concerned, and made available to users when requested.

Table 1.10: Disinfectants in use at FVM-ULusófona

Product	Where
Virkon™ S	Indoor footbaths, isolation units, surfaces (VTH-CA, VTH-E, VTH-FA) and laboratories.
Zotal®	Outdoor footbaths (VTH-E).
Sodium hypochlorite (bleach)	Terminal disinfection of stalls, pens and kennels; spill management and specific high-risk procedures (VTH-E, VTH-FA, Anatomy and Necropsy, farm visits).
Klorkleen® (NaDCC tablets)	Boot washing in the ambulatory clinic; disinfection of floors, surfaces, equipment and selected instruments in designated areas (VTH-CA, VTH-E, VTC-CA, Anatomy and Necropsy, laboratories).
CaviWipes®	Disinfection of compatible surfaces and equipment (VTH-CA, VTC-CA Diagnostic and Research Laboratories).
Mikrozid® AF Liquid	Rapid disinfection of small equipment and alcohol-compatible surfaces (VTH-CA, VTC-CA and Diagnostic and Research Laboratories).
Korsolex®	Endoscope disinfection (VTH-CA).
Chlorhexidine (soap and solution)	Hand washing; soaking of equipment (VTH-CA, VTH-E, VTH-FA and farm visits).
Povidone-iodine	Skin and wound antisepsis (VTH-E, VTH-FA).
Alcohol-based hand rub / 70% alcohol	Hands, stethoscopes, thermometers, small equipment and compatible surfaces; selected farm-visit procedures.
Ipoclor®	Disinfection of instruments, benches, rooms and other surfaces (Anatomy and Necropsy).
ThomilMatic® OXP-5	Chemical disinfection of textiles in the wash cycle (VTH-CA hospital laundry).

1.4.3. Footbaths and Foot Mats

- Pathogens are often found on floors around infected animals. Footbaths and foot mats are used every time they are found.
- Solutions are renewed every morning, and whenever they contain bedding or dirt; anyone who finds one dry or low refills it.
- Foot mats wet the soles and sides of shoes; impermeable footwear is recommended in areas where they are used.

1.4.4. Shared Equipment

- **Thermometers:** electronic only (no glass); cleaned and disinfected with alcohol or chlorhexidine after every patient; patient-dedicated in Class 3–4 areas. Temperature probes used in anaesthesia are cleaned and soaked between patients.
- **Stethoscopes:** disinfected at least daily with alcohol-based rub, immediately when soiled and after every Class 3–4 patient; patient-dedicated in isolation.
- **Endoscopes:** cleaned and disinfected after each use by authorised staff, following the manufacturer's instructions.
- Equipment specific to each species is covered in the hospital chapters.

1.5. People, Animals and Routes of Transmission

1.5.1. General Conduct

- Smoking is forbidden in the workplace. Dogs on campus are kept on a leash.
- Staff and students do not bring their own animals to FVM-ULusófona, except as patients or in the situations of section 1.5.3.
- Students who work with animals receive information on zoonotic risks before their first practical activity and in the site-specific briefings for each location (Chapter 15, Table 15.6). Tetanus vaccination is man datory before practical classes, and rabies pre-exposure vaccination is recommended (DGS Standard 01/2025); vaccination is defined in the OHS Manual (sections 7.1 and 8.3). All students are covered by the school accident insurance during curricular and practical activities, including external practical training (EPT); accidents are reported as described in Chapter 15 (section 15.5.5) and in the OHS Manual (section 9.3)

1.5.2. Visitors, Clients and Children

Table 1.11: Rules for visitors, clients and children

Group	Rules
Visitors	Report to the hospital secretariat; guided visits are arranged with the Dean's office and led by trained staff, who explain zoonotic and nosocomial risks; never enter isolation units, anaesthesia preparation, emergency or surgery areas (visiting scientists or veterinarians only with authorisation); do not gather in care areas; no eating, drinking or smoking; no animals
Clients	Free access to waiting rooms, toilets, library and cafeteria; elsewhere accompanied by staff or students; may stay alone with their animal in an examination room if the clinician agrees, never in housing areas; do not touch other animals; do not visit Class 4 patients except for euthanasia or terminal cases, with barrier precautions; respect visiting hours; are informed of zoonotic and nosocomial risks by the team in charge
Children (under 18)	Always supervised by an adult; touch only their own animal; may be excluded from patient areas by the clinician

1.5.3. Companion Animals on Campus

Animals are allowed in FVM-ULusófona facilities only as patients, blood donors, animals enrolled in approved research, or animals used in teaching, and guide dogs in training (classrooms only). They are kept apart from sick animals, are not allowed in offices, classrooms (except for teaching) or cafeterias, and owners clean up faeces and urine immediately. Breaches lead to the animal being refused on the premises.

1.5.4. Routes of Transmission

Table 1.12: Routes of transmission and main controls

Route	How it happens	Main controls
Oral (faecal–oral)	Ingestion of agents from contaminated food, water, bowls or hands; swallowing inhaled particles	Hand hygiene; segregation of diarrhoeic patients; cleaning of bowls and buckets; no food in clinical areas
Direct contact	Contact with an infected animal or person	Isolation; limiting contact; gloves

Indirect contact and fomites	Contact with surfaces or objects (door handles, keyboards, phones, clothing, thermometers, leads, brushes) contaminated with body fluids	Cleaning and disinfection; dedicated equipment; barrier precautions; working from low- to high-risk patients
Airborne / aerosols	Sneezing and coughing, high-pressure cleaning, dust (e.g., *Coxiella burnetii*); influenced by ventilation, humidity and temperature	Avoid high-pressure water; ventilation; masks or respirators; isolation
Vectors	Arthropods (fleas, ticks, mosquitoes, flies) transmitting e.g. *Dirofilaria* or West Nile virus	Pest control and repellents (Chapter 10)

1.5.5. People at Increased Risk

Young children, older people, pregnant women and immunocompromised people (due to disease such as HIV infection, diabetes, organ failure or autoimmune disease, or to treatments such as chemotherapy, radiotherapy, long-term corticosteroids or transplantation) are more vulnerable to zoonoses. Anyone in this situation, including students, should inform their supervisor before handling patients, so that activities can be adapted. This information is treated confidentially and shared only as needed to apply precautions. Specific rules for pregnant and breastfeeding workers and for minors, including students under 18, are set out in the OSH Manual (sections 8.1 and 8.2).

1.6. Communication of Infectious Risks and Admission of Suspect Cases

Clear and early communication about the infectious status of patients reduces nosocomial and zoonotic spread. The senior clinician assesses the risk of every patient and applies the corresponding measures. Every relevant hazard, known or suspected, is notified to the HSBC. This includes notifiable, zoonotic, highly contagious and highly pathogenic diseases, multidrug-resistant bacteria (for example MRSA, VRE, and ESBL- or carbapenemase-producing bacteria) and agents that persist in the environment. The infectious status of the patient, and the communication about it, are updated as the case evolves.

1.6.1. Alert to relevant staff

Anyone may raise an alert about a patient with a contagious or zoonotic risk, and it is compulsory when a patient is admitted to a Class 4 isolation unit. The alert is addressed to the Dean, the HSBC, Occupational Health and Safety, the technical staff of the Teaching Hospitals (VTH-CA, VTH-E and VTH-FA), the cleaning staff and the Diagnostic and Research Laboratories.

1.6.2. Floor Lines and Signage

Table 1.13: Floor lines

Colour	Zone and biosecurity level	Examples
Green	Clean area – low risk; free circulation	Reception, waiting areas, consultation rooms, offices, pharmacy, clean side of changing rooms
Yellow	Transition and restricted area – intermediate risk; authorised people only	Hygiene locks, antechambers and changing rooms where PPE is put on; hospitalisation and treatment areas; laboratories supporting the hospitals

Red	High-risk area – no entry without authorisation; full PPE	Isolation units (UICB, UICB-EQ, UICB-FA) and their cages or stalls; operating theatres (aseptic area); cadaver storage
Orange	Service and decontamination area – contaminated (handling after use)	Waste storage areas, decontamination rooms, vehicle and trailer disinfection areas, effluent collection

The same colours are used in every hospital and at the VTC-CA (Tables 2.2 and 5.8; sections 3.1.1 and 12.4.4). Cages and stalls of contagious patients, and their surroundings, are signed with risk class (Table 1.3), suspected or confirmed disease, zoonotic risk, barrier precautions and disinfection procedure. The team in charge makes sure that everyone who works with the patient, and the HSBC, are informed. Standard signs are shown in Chapter 14.

1.6.3. Admission of Patients with Suspected Contagious Disease

- If a client reports, in person or by phone, signs suggesting contagious disease (acute vomiting or diarrhoea, coughing, sneezing, fever, ataxia, abortion), reception books the patient in the isolation unit of the species only after a clinician agrees and a place is available, writes the complaint and 'suspected contagious disease' in the schedule, and asks the client to wait in the vehicle.
- The clinician or intern examines the animal briefly before it enters and assigns a class: examination room for Class 1–2, isolation for Class 3–4. Small animals are carried (in a carrier or on a trolley), not walked on the floor.
- If such a patient arrives directly at reception, the receptionist calls the receiving service at once to redirect the animal with the least contamination.
- The suspect patient has no contact with other patients or resident animals. Only a small number of students, chosen by the clinician, take part.
- After the patient leaves, the room and equipment are cleaned and disinfected by those in charge, and a sign prevents use until this is done.
- Students learn this protocol (seminars, practical classes, videos, Moodle) before contact with contagious patients.

1.6.4. Refusal of Admission

- A patient suspected of a notifiable disease is admitted only to the isolation unit of its species, directly.
- Admission may be refused when the risk for other patients, staff or students outweighs the benefit for the animal. Species-specific criteria are in the hospital chapters. Only clinicians (not interns) may refuse a patient.
- At the VTH-FA, a farm animal suspected of a notifiable disease is not transported to the hospital; it stays on the farm of origin and DGAV is notified (Chapter 12, section 12.3.2).

1.7. Surveillance and Notification

The surveillance programme detects and follows the spread of infectious agents in FVM-ULusófona facilities, through environmental and patient samples and the traceability of patients and contacts in the clinical software. Clinicians inform the HSBC as soon as possible of known or suspected nosocomial events; any apparent trend, even without severe consequences; and any zoonotic infection possibly acquired at FVM-ULusófona. Diagnostic testing is encouraged even

when it does not change the outcome for the patient, because trends cannot be investigated without data.

1.7.1. Diagnostic Testing

- Testing is strongly recommended whenever a contagious or zoonotic agent is in the differential diagnosis. If the owner declines testing, the patient is managed as Class 4, with the associated costs.
- The senior clinician is responsible for submitting the right samples, applying the right precautions and informing the owner about zoonotic risks and care at home.
- Testing is compulsory when any of the conditions in Table 1.14 are suspected; the HSBC is informed. Technical information is available from WOAH (disease cards, Terrestrial Code and Terrestrial Manual).

Table 1.14: Conditions for which testing is compulsory

Species	Conditions
All species	Brucellosis, campylobacteriosis, cryptosporidiosis, avian influenza, leptospirosis, rabies, salmonellosis
Dogs, cats and exotic animals	Acute diarrhoea (e.g., parvovirus, *Giardia*), canine distemper, virulent systemic feline calicivirus, avian chlamydiosis (*C. psittaci*)
Equids	Equine infectious anaemia, strangles, EHV-1 myeloencephalopathy
Ruminants	Cryptosporidiosis

1.7.2. Environmental Surveillance

- A stall or pen that housed a horse or farm animal positive for *Salmonella* is sampled after cleaning and disinfection and released only when cultures are negative; whoever cleans it, or the clinician in charge, informs the HSBC when it is vacated.
- Routine environmental sampling is done monthly in clinical areas and on equipment, by surface swabbing and contact plates; any positive result is reported to the HSBC. The full monitoring plan is in Chapter 15.

1.7.3. Multidrug-Resistant Bacteria and Antimicrobial Use

Patients infected or colonised with MDR bacteria are managed as Class 3, to prevent spread inside and outside the Faculty. Antimicrobial stewardship and resistance monitoring are described in Chapter 13. Resistance data from diagnostic samples over-represent resistant isolates and do not reflect the prevalence in the general animal population.

1.7.4. Notifiable Animal Diseases and Zoonoses

FVM-ULusófona investigates and rules out any disease notifiable to DGAV. When one is suspected or diagnosed, the Clinical Director notifies DGAV (https://spc.dgav.pt) and the coordinator of the HSBC is informed immediately (Chapter 14). The list below covers the species seen at FVM-ULusófona; the current official list is on the DGAV website[9].

[9] Direção-Geral de Alimentação e Veterinária (DGAV). Official List of Notifiable Animal Diseases and Zoonoses. Available at: https://www.dgav.pt/wp-content/uploads/2024/04/ListaDDO.pdf

Table 1.15: Notifiable animal diseases in Portugal relevant to FVM-ULusófona

Species	Diseases
Several species	Brucellosis (*B. abortus*, *B. melitensis*, *B. suis*); anthrax; blackleg; tuberculosis (*M. tuberculosis* complex); heartwater; Aujeszky's disease; epizootic haemorrhagic disease; Japanese encephalitis; equine encephalomyelitis (Eastern); echinococcosis; vesicular stomatitis; foot-and-mouth disease; and others on the DGAV list
Cattle	Anaplasmosis; babesiosis; genital campylobacteriosis; lumpy skin disease; BVD; BSE; enzootic bovine leukosis; CBPP; IBR/IPV; haemorrhagic septicaemia; theileriosis; trichomonosis
Sheep and goats	Enzootic abortion; contagious agalactia; CAE; Nairobi sheep disease; *B. ovis* epididymitis; maedi-visna; PPR; CCPP; *S.* Abortusovis; scrapie; theileriosis; sheep and goat pox
Pigs	Cysticercosis; swine vesicular disease; Nipah virus; TGE; swine influenza; erysipelas; African swine fever; classical swine fever; PRRS
Equids	Equine infectious anaemia; equine viral arteritis; dourine; Western and Venezuelan equine encephalomyelitis; equine influenza; epizootic lymphangitis; contagious equine metritis; glanders; piroplasmosis; trypanosomosis; equine rhinopneumonitis
Lagomorphs	Rabbit haemorrhagic disease; myxomatosis
Birds	Infectious bronchitis; Gumboro disease; psittacosis; fowl cholera; Newcastle disease; low and highly pathogenic avian influenza; duck viral hepatitis; infectious laryngotracheitis; avian mycoplasmosis; salmonellosis (*S.* Pullorum, Gallinarum, Arizonae and others); turkey rhinotracheitis
Zoonoses reported by the laboratory responsible	Viral: SARS-CoV-2. Bacterial: brucellosis, campylobacteriosis, VTEC, Lyme disease, salmonellosis, vibriosis, yersiniosis. Fungal: dermatophytoses. Parasitic: cysticercosis, cryptosporidiosis, echinococcosis, toxoplasmosis, trichinellosis

1.7.5. Teaching and Research Animals

Teaching and research with animals require prior approval by the FVM-ULusófona Ethics Committee and Animal Welfare Body and follow all the procedures of this manual. These animals are not housed in areas with patients, except in extraordinary circumstances or for medical reasons, and never in isolation units.

Chapter 2: Biosecurity SOPs in the Companion Animal Teaching Hospital (VTH-CA)

Patients, owners and staff of the VTH-CA are exposed to physical (heat, noise), chemical (disinfectants, cytotoxic drugs), mechanical (falls, bites) and biological hazards, including hospital-acquired infections.
This chapter sets the hospital's own procedures, from access and attire to isolation, cleaning and waste. It adds to the general rules of Chapter 1; and crisis situations Chapter 14.

2.1. Attire, Access and Circulation

2.1.1. Hospital Attire

Teaching staff, employees and students wear clean hospital scrubs, the white coat of their role, dedicated closed and easy-to-clean footwear (protection against dropped sharps, faeces and body fluids) and identification. Clinical attire and equipment, including stethoscopes, stay in the hospital. Attire is changed as needed, ideally daily, and everyone keeps a spare set on site. No jewellery or accessories that could compromise animal welfare; short nails; long hair tied back.

Table 2.1: Scrub colour code at the VTH-CA

Scrubs	Role and white coat
Turquoise blue	Veterinary surgeons of the medicine service (white coat optional)
Dark blue	Veterinary surgeons of the surgery service, outside the surgical area (white coat optional) and inside it (no white coat)
Grey	Veterinary nurses and assistants
Beige	Cleaning assistants
Green	Students in the medicine and surgical areas

These rules are presented to students from Year 4 in every course unit with practical classes at the hospital, adapted to each year, in a presentation available on Moodle at the start of the academic year.

2.1.2. Hospital Zones and Routes

Routes are defined for students, clinicians, other staff and owners, and movement between areas is kept to a minimum (floor colours as in Chapter 1, Table 1.13).

Table 2.2: Hospital zones

Zone	Areas and access
General Area (Green) – low risk	Reception, waiting areas, consultation rooms, staff dining and rest areas, clean side of the changing rooms; staff, students and clients as appropriate
Clinical Area (Yellow) – intermediate risk	Wards, treatment and recovery rooms, diagnostic imaging and endoscopy, emergency laboratory and chemotherapy room; staff and students on hospital duties only, in hospital footwear
Restricted Area (Red) – high risk	Isolation unit (UICB: triage room, transition room and dog and cat wards), surgical rooms and intensive care unit; assigned staff and, where appropriate, supervised students, with the PPE required for the area
Service and Decontamination Area (Orange) – contaminated	Waste storage area, instrument wash room and dirty-linen collection point; cleaning staff and authorised staff only

Students:

- enter on Level 0 through the student changing rooms; belongings in the lockers; change in the individual cubicles. Only stethoscope, thermometer, pocket notebook and logbook go upstairs; identification always worn;
- change outdoor shoes for hospital footwear in the marked area at the entrance to the Clinical Area (corridor to the internal stairs to Level 1);
- wait quietly upstairs until teaching staff assign them to a consultation room, and stay on the designated route under supervision;
- for surgery classes, wait next to the induction room and enter the restricted surgical area only with permission, after putting on shoe covers, mask and cap in the preparation room;
- at the end of the class or shift, retrace the route and repeat the procedure in reverse order.

Staff: enter through the staff changing rooms, leave belongings in the lockers and change into the attire of their colour, with identification and, where applicable, a dosimeter; change footwear at the entrance to the Clinical Area (separate racks for hospital and outdoor shoes); surgical staff hang up their white coat and change footwear in the surgical transition area or preparation-room anteroom; at the end of duties the procedure is reversed. Cleaning staff wear a work coat and their usual footwear on the General Route.

2.2. Reception, Consultations and Hand Hygiene

- Owners check in at reception and wait in the separate dog or cat area, where hand sanitiser is available. Suspected contagious patients follow the triage pathway of section 2.10.1.
- Every consultation room has a hand-washing basin. Examination tables, other contact surfaces and reusable equipment are cleaned and disinfected between patients; rooms are left tidy, and waste is sorted as in section 2.13. Patient contact is kept to the minimum necessary.
- Students wear a badge with their name and year; from Year 4 they carry a stethoscope, thermometer and penlight, disinfected between patients.

- Hands are washed every two hours as routine, and always: before and after each patient and between tasks on the same patient; after contact with blood, body fluids or contaminated material and after removing gloves; after cleaning cages or tables; before and after meals, breaks or leaving the hospital; and before and after using the toilet (Chapter 1, Appendix 1).
- Alcohol rub: enough product to cover all surfaces of both hands and wrists, rubbed until dry (20–30 s), without rinsing (Chapter 1, Table 1.4 and Appendix 1)
- Gloves for handling animals or body fluids and for cleaning cages and surfaces; eye protection when organic material could reach the eyes, including aerosol-generating procedures. Needle caps are never removed by mouth; sharps go straight into the sharps container.
- Shared equipment (X-ray, ultrasound) is left clean, disinfected and ready for the next user; faults in equipment or facilities are reported at once to the person responsible for maintenance.

2.3. Staff Safety, Meals and Personal Belongings

- All personnel, including students, interns and volunteers, are trained in injury prevention and infection control, and retrained when recommendations change or problems arise.
- Wounds, cuts and scratches are washed with soap and water, disinfected and covered; first-aid kits are in the corridor and at reception. Every bite or scratch is seen by a doctor the same day (OSH Manual, section 7.4); a suspected rabies exposure goes to an emergency department the same day (Chapter 14, section 14.4), and serious injuries call 112. Medical help is also sought if the person is immunocompromised. Every bite, scratch, needle-stick injury or exposure to a suspected zoonotic agent is reported to the supervising veterinarian (Chapter 15). Bites, scratches and needlestick injuries are work accidents (OSH Manual, sections 7.2, 7.4 and 9.3).
- Staff avoid touching their face. Scrubs are changed when soiled, or after contact with an animal with an infectious disease or carrying multidrug-resistant bacteria, and bagged separately.
- Belongings stay in lockers. Eating, drinking and storing food only in the staff dining and rest rooms (with refrigerator and microwave for staff food); never in wards, treatment rooms, animal areas or where samples are handled or medicines prepared or stored.
- Refrigerators for biological products, medicines, vaccines, the Animal Blood Bank or patient food are never used for human food; microwaves in clinical areas are only for animal food; medicines and biological products are kept out of the dining room.

2.4. Animal Handling, Restraint and Owners

- Contact with patients is limited to what is needed, especially with patients outside one's care; hands and equipment are cleaned between patients.
- Cats and exotic animals travel in carriers, dogs on a lead or in a carrier. A protective layer separates the patient from warming blankets or gel packs. Objects are kept out of cages; soiled cage linen is bagged separately; clipper blades are maintained to avoid skin injury.

- Isolation patients are handled last; when this is not possible, a designated veterinarian takes charge of them and does not attend other inpatients in that period. Animals from rescue organisations are examined at once and kept apart in the waiting area.
- Staff assess behaviour that may lead to bites or scratches and choose physical (muzzle, bite-resistant gloves) or chemical (sedation, anaesthesia) restraint. Physical restraint is led by a veterinarian or nurse, who decides whether the owner can help safely; owners fit muzzles and handle carriers under staff direction. Prevention of bites is the team's responsibility whatever the owner prefers. Difficulties are recorded in the patient record.
- The team explains PPE and infection-control precautions to owners. Children are supervised by an adult at all times. Visits to potentially infectious patients follow section 2.10.8. The animal's belongings are returned to the owner at admission unless the veterinarian decides otherwise.

2.5. Medicines

- Medicines are kept in the pharmacy next to the VTH-CA, clean, protected from abrupt changes of temperature and humidity, with access restricted to hospital staff. Opened opioids, ketamine and barbiturates are kept in safes inside locked cupboards in the intensive care units and induction rooms (restricted access codes). Cupboards and drawers are labelled.
- Opened medicines and fluids are labelled with the date and time of opening; filled syringes with drug, concentration, date and time (waterproof marker). Expired products and reconstituted suspensions beyond their in-use life are discarded.
- Medicines are prepared by hospital staff or under veterinary supervision, with a new sterile needle and syringe each time; toxic or hazardous medicines under controlled conditions (cytotoxic drugs: section 2.9).

2.6. Emergency Service, Wards and Intensive Care

- **Emergency service:** run by the veterinarian on duty with nurses, assistants, Hospital Activities students and interns. Patients with a high suspicion of contagious disease go directly to the isolation unit triage room, bypassing reception, waiting areas and consultation rooms; if suspicion arises during a consultation, essential procedures are completed in the room where feasible before direct transfer (section 2.10.1).
- **Wards:** the internal medicine clinicians on duty are responsible for all inpatients; only animals that need hospitalisation stay there. Gloves for every handling, then hand washing; stethoscopes and equipment wiped with 70 % alcohol or another disinfectant after use.
- Food is kept in individual airtight bags labelled with the patient's name and opening date; wet food refrigerated and discarded after 48 hours open.
- The nurse or assistant on duty prepares the cages (or supervises students doing it): each cage is checked clean before use and labelled with patient, owner and diagnosis or reason for admission. Vetbed-type bedding is preferred; blankets only in exceptional cases and towels only to restrain cats. Cages are cleaned at least every 12 hours, with the patient held outside and returned to the same cage; a vacated cage receives a '**CLEAN AND DISINFECT**' card.

- **Intensive Care Unit (ICU):** for unstable patients needing frequent monitoring and treatment, under continuous supervision by a veterinarian or nurse, with the fewest possible handlers. Equipment, including stethoscopes and thermometers, is cleaned and disinfected before and immediately after use. Contagious patients stay in the isolation unit unless they need intensive care (section 2.10.10).

2.7. Diagnostic Imaging, Endoscopy and Emergency Laboratory

- **Radiography:** only people wearing a personal dosimeter (staff, and students aged 18 or over classified for work with radiation sources) may stay in the X-ray room during an exposure; other students, minors, and pregnant or breastfeeding women may not. Owners do not stay in the room; exceptions are rare, informed and authorised by the veterinarian (OSH Manual, section 5.5.3). No part of the body in the primary beam; beam collimated to the area examined; restrainers as far as possible from scatter and restraint duties rotated. The room is left clean and ready. People helping with samples wear PPE for the procedure; observers wear the attire required for the room (radiation protection: OSH Manual, Chapter 5; imaging room hygiene: Chapter 9, section 9.11).
- **Endoscopy:** the veterinarian performing the examination prepares and packs the samples and completes the request forms, or delegates to a trained team member while keeping the responsibility. Endoscopes are reprocessed as in Table 2.6.
- **In-house emergency laboratory:** analyses under the supervision of the veterinarian on duty; scrubs or white coat, long hair tied, frequent hand washing; goggles, gloves and mask for biohazardous material. Equipment used only after reading its operating and safety instructions; staff know where extinguishers, first-aid kits, safety shower and PPE are. Benches kept clear, spills cleaned at once, flammables away from flames, walkways free, waste in the right containers; no eating, drinking or smoking (general laboratory rules: Chapter 9).

2.8. Surgery and Anaesthesia

2.8.1. Theatre Access and Attire

- The surgical suite is at one end of the hospital, away from busy routes. It is reserved for surgery and kept clean, calm and orderly; no eating, drinking or smoking. Only staff and students essential to the procedure enter; other students watch on the cameras whenever possible. Maintenance and cleaning staff follow the same rules; only pocket notebooks are allowed.
- Full scrubs, dedicated footwear with shoe covers, cap and mask covering nose and mouth, and sterile gown and gloves according to role. Theatre attire stays in the suite and is changed before re-entry if worn outside. On leaving, a white coat is put on and shoe covers removed or footwear changed. Patients go from preparation to theatre on a stretcher. Occupational risks of anaesthetic gases, surgical smoke and long procedures are covered in the OSH Manual (Table 4.4).
- Emergencies take priority over scheduled surgery, and surgery for systemic disease over elective procedures. Biological waste and sharps as in section 2.13.

2.8.2. Induction, Preparation and Recovery

- Equipment and supplies are prepared immediately before surgery; any suspected or confirmed contagious disease is written in the anaesthetic protocol. Patients enter the induction area no earlier than one hour before the procedure. Preparation and IV catheter placement are aseptic, and body temperature is maintained throughout.
- Dirt is removed with a preoperative bath; hair is clipped over an area wide enough to extend the incision, avoiding skin injury (any cut is recorded, investigated and cleaned). Antiseptic is applied with gloved hands from the incision outwards, respecting the contact time; faeces are removed at once.
- Surgeons remove jewellery from hands, wrists and arms and earrings and necklaces, wash hands and forearms with neutral soap, follow the posted surgical hand preparation for 2–5 minutes and put on sterile gown and gloves aseptically (Appendix 3).
- Antibiotic prophylaxis is indicated for contaminated and clean-contaminated surgery (its value in clean surgery is uncertain) and in laparotomies with the abdomen open for more than 90 minutes: given parenterally at induction and repeated if surgery lasts more than two half-lives of the drug (Chapter 13). Dressings are applied aseptically and left for 24–48 hours. Surgical-site infections are monitored jointly by the surgery and dermatology teams.
- Patients recover in a cage in the recovery room, except Class 3–4 patients, who recover in their own rooms. Stretchers and laryngoscopes are cleaned and disinfected between uses.

2.8.3. Decontamination of Theatres and Equipment

- Theatres and equipment are cleaned and disinfected after each patient, and all theatres at the end of the day. Used instruments go into a labelled container for contaminated instruments, sharps into a sharp's container.
- Reusable endotracheal tubes: brushed inside and out with water and neutral soap, immersed in Stabimed® enzymatic solution for 15 minutes, rinsed with warm water, cuffs checked, sealed in pouches, sterilised in the hydrogen peroxide steriliser and stored on their rack.
- Anaesthetic machines and ventilators are dismantled, cleaned and disinfected regularly (Table 2.8); breathing hoses are collected at the end of the day, immersed in Stabimed®, rinsed inside and out with warm water and left to dry; breathing bags cleaned routinely. With visible discharge or a suspected respiratory infection, the machine is fully cleaned and disinfected and HME filters are used. Skin-preparation containers are disinfected when refilled.
- Surgery of Class 3–4 patients follows section 2.10.9.

2.8.4. Instrument Sterilisation

Instruments that contact sterile tissue, body cavities or the vascular system are sterilised before use.

Table 2.3: Reprocessing and sterilisation of surgical instruments

Step	Procedure
1. Collection	Closed, labelled container to the wash room
2. Pre-cleaning	Immersion in 1 % Helizyme enzymatic cleaner for at least 5 minutes
3. Manual cleaning	Rinse and brush to remove blood and organic residues
4. Mechanical washing	Instrument washer, intensive cycle, Melaclean detergent
5. Packaging	Kits assembled and double-wrapped in packaging that lets the sterilising agent through and keeps the pack intact
6. Sterilisation	Autoclave Wdry 134 °C for instrument kits; Wdry 121 °C for gauze, gowns and compatible plastics
7. Monitoring	Temperature, pressure and time recorded for each cycle; chemical indicator tape on every pack; periodic biological indicators, results recorded
8. Transport and storage	Clean labelled container; dry, closed, dust-free cupboards; packs checked intact and dry before storage and use
9.Immediate-use sterilisation	Emergencies only, never for implants; justified, recorded and with a validated cycle

2.9. Oncology and Cytotoxic Drugs

- **Authorisation:** only trained, authorised staff handle cytotoxic drugs; the list is posted in the chemotherapy room. Staff who are pregnant, breastfeeding or in fertility treatment inform the oncology clinician and are temporarily excluded. Students take part in consultations, staging, planning, follow-up and admissions; after a safety briefing, they may observe preparation and administration under direct supervision, in long-sleeved impermeable gown, nitrile gloves, mask and eye protection, but never handle, prepare or give the drugs or dispose of their waste. Occupational protection of staff handling cytotoxic drugs follows the OSH Manual (Table 4.8 and section 7.5).
- **Storage and transport:** dedicated locked refrigerator or cabinet, cool and dry, access restricted; nitrile gloves to open storage units or supplier packages; opened vials labelled with opening and expiry dates, in a sealed zip bag inside an airtight container. Between store and chemotherapy room: sealed bag inside two airtight containers.
- **Preparation:** in the chemotherapy room, in the approved containment cabinet with a closed-system transfer device (Tevadaptor®, PhaSeal® or approved equivalent), chemotherapy-tested nitrile gloves, long-sleeved impermeable gown and disposable work pad. Tablets and capsules are dispensed intact, only until the next visit, with a cytotoxic label, instructions and gloves. Surfaces wiped with 70 % alcohol after dispensing; no eating, drinking or food storage in these areas.
- **Inpatients:** excreta and secretions are treated as contaminated for seven days after the last dose. Cages and records marked 'CHEMOTHERAPY – WEAR NITRILE GLOVES'; gloves for sampling and waste, changed after each task. Walks on soil or grass, faeces double-bagged as Group IV. Contamination of cages or floors is cleaned at once (disposable paper, nitrile gloves, gown and mask) and bagged as Group IV. Disposable bowls and pads preferred; reusable bowls and bedding handled with gloves and washed separately, followed by an empty rinse cycle.
- **Waste:** contaminated materials, used vials and other chemotherapy waste as Group IV, sharps in Group IV sharps containers.

- **Spills:** spill kits in the chemotherapy room and the pharmacy. The area is evacuated and closed until decontaminated; the person responsible and a trained staff member are called. Anyone with contaminated skin or clothing showers at once and seeks medical assessment (Chapter 15).
- **Discharge:** owners receive guidance on side effects and how to respond, safe handling and disposal of urine and faeces, precautions around pregnant people and young children, and the date of the next tests or visit.

2.10. Infectious Disease and Isolation Unit

Patients with suspected or confirmed infectious disease, including acute gastrointestinal or respiratory signs of suspected infectious origin and multidrug-resistant (MDR) infections, are managed with additional precautions; outpatient care is preferred whenever the clinical condition allows. The Biological Isolation and Containment Unit (UICB) of the VTH-CA houses infections patients who do not need intensive care.

2.10.1. Triage and Reception of Suspected Cases

- When an owner calls about acute vomiting, diarrhoea, sneezing or coughing, the clinical team is alerted and the owner waits with the animal in the vehicle until directed to the right entrance.
- High suspicion: straight to the UICB triage room through the staff entrance, bypassing reception, waiting areas and consultation rooms. Other cases: the veterinarian decides where to examine according to urgency and risk. For unannounced arrivals the nurse alerts the team at once and arranges the same pathway.
- Patients move by the shortest route, on a stretcher or in a carrier, without contact with other patients; the cage label records the signs and 'Suspected Infectious Disease' (SDI).
- If infection is suspected after history, examination or test results, the consultation room is closed and signed **'DO NOT USE – SPECIAL DISINFECTION REQUIRED'**; cleaning staff are told the suspected agent and the room stays closed until disinfected. Areas, equipment and clothing in contact are cleaned and disinfected at once, whether or not infection is confirmed. Suspected notifiable or zoonotic diseases and MDR infections are reported to the HSBC.

2.10.2. Layout, Placement and Admission

- The UICB has a preparation room (putting on PPE, records), a transition room (treatment preparation, bathing, medication) and separate dog and cat wards; feeding and treatment take place in the ward whenever possible.
- Patients are treated at home whenever possible. When hospitalised, animals with a diagnosis or signs of parvoviral disease, salmonellosis, cryptosporidiosis, giardiasis, rabies, canine distemper, tularaemia, feline respiratory disease complex, canine infectious tracheobronchitis, aspergillosis or leptospirosis go to the UICB. Only the hospital director or head of the UICB can authorise housing elsewhere. At the VTH-CA, contagious patients of both Class 3 and Class 4 (Table 1.3) are hospitalised in the UICB.

- Before admission: ward clean and a cage free (nurse called if cleaning is needed); adhesive or disinfectant mat at the entrance; empty cages kept in both wards and the cages farthest from the door used first. The patient goes directly from the vehicle or another ward, on a stretcher or in a carrier, and is examined in the UICB whenever possible.
- The UICB admission form is signed by the head of the UICB or the hospital director as soon as possible (date, patient, suspected or confirmed agent, responsible veterinarian). The veterinarian tells the nurse the agent and its zoonotic potential and alerts the cleaning staff. As few people as possible examine and treat the patient.
- Each patient has its own labelled kit (thermometer, stethoscope, scissors) and labelled carrier. Samples are sealed and labelled at once; equipment, medicines and records stay in the hospital. Surfaces soiled during the transfer are disinfected promptly; hospital carriers are signed 'DO NOT USE – SPECIAL DISINFECTION REQUIRED' with the agent and decontaminated.

2.10.3. Entering and Leaving the UICB

- Students enter only with authorisation and supervision; entry is limited to essential care and cleaning, and patients are watched through the window when possible. Staff see other patients, particularly immunocompromised ones, before entering. For plague, tularaemia or rabies, contact is restricted to the attending veterinarian and, if needed, one nurse.
- A veterinary nurse can be called for help on weekdays from 08:00 to 17:00. All supplies are taken in at once; adhesive mats along the route are replaced twice a week by cleaning staff, or at once by anyone who finds one soiled.
- In the preparation room: coat and footwear covers left in the designated place; disposable green impermeable gown or waterproof coverall, gloves, shoe covers, cap and mask put on. A fresh gown and gloves for each patient; the same rules apply to cleaning staff.
- Hands washed before entering the transition room, between patients and before leaving. Procedures that contaminate most (rectal temperature, rectal palpation, abscesses) are done last, always with disposable thermometer covers. Dedicated instruments are disinfected with 70 % isopropyl alcohol where compatible and returned to the patient's box. Clean gloves to complete forms and handle samples.
- On exit: tables and contaminated surfaces disinfected; gown removed in the transition room; cap, gloves and shoe covers discarded in the preparation room; hands washed or rubbed. Door handles are disinfected daily. Staff who handled isolation patients avoid vulnerable patients elsewhere; when assignments overlap, vulnerable patients are seen first. Isolation patients stay out of common areas and urinate or defecate in the ward, where contamination is removed promptly.

2.10.4. Disease-Specific Measures

Table 2.4: Additional measures for specific infections

Infection	Measures
Feline leukaemia virus	Empty cage between patients whenever possible; label with signs and agent; own water bowl; assigned nurses avoid other sick cats in isolation, or treat them first
Feline panleukopenia	Housed as far as possible from other cats, empty cage between patients; label with signs and agent; assigned nurses avoid other sick cats in intensive care, or treat them first

Canine parvovirus	Dogs under 18 months with vomiting, diarrhoea or leucopenia managed as suspected cases in the UICB ('Suspected parvovirus'), changed to 'Canine parvovirus infection' if confirmed; screening for viral and parasitic causes of diarrhoea and faecal culture recommended; assigned nurses avoid other at-risk dogs
MDR bacterial infections	Hospital director and head of the UICB notified promptly (incisional, catheter-associated, gastrointestinal infections); ICU patients separated as far as possible and moved only when recovered; enhanced precautions (Chapter 13)

2.10.5. Feeding, Equipment and Medicines

- Nurses feed isolation patients. Meals are prepared in the kitchen and brought in disposable containers, removed right after feeding (a dedicated metal bowl if the patient might eat the container). Metal bowls stay in the UICB and are washed there; leftover water goes down the sink and food into the white container. No food stored in the unit; no blankets or accessories in cages.
- Equipment and supplies are dedicated to each patient and kept out of general stock; disposables preferred; reusable items labelled and disinfected after each use and at discharge with the product, dilution and contact time of the cleaning plan (KlorKleen or Virkon™ S).
- Medication is prepared in the hospital treatment room and taken in disposable bags or trays; medicines used in the UICB are charged to the owner and sent home or discarded, and IV medicines and fluids never return to pharmacy stock. Specimens are sealed in plastic bags labelled outside with the suspected disease.

2.10.6. Cleaning After Discharge and Routine Cleaning

- After discharge the clinical team dismantles equipment and clears the ward so that cleaning staff can disinfect it at once; if a new admission is imminent and cleaners are not available, the clinical team does it.
- Disposables discarded, sharps into containers. For plague, tularaemia or rabies, sharps containers are sealed inside waste bags and green Group III containers sealed and left in the unit for collection.
- Containers, bowls and medical equipment disinfected; reusable equipment returned to the transition-room shelf; fluid containers discarded; infusion pumps disinfected; nebuliser reservoirs emptied and the unit, bottles and tubing disinfected, rinsed and dried.
- Nurses clean cages daily plus at the end of the day, and the transition room and soiled walls or floors; a dedicated mop and bucket are used for infectious cases. Stretchers, equipment and tables are disinfected immediately after contact with suspected cases. Laundry staff are told the suspected agent (section 2.12).

2.10.7. Wastewater

Potentially infectious wastewater from the isolation ward and the Anatomy Laboratory (blood, body fluids, leachate from carcasses) is kept apart from domestic wastewater: a separate network serves laboratory sinks, foot-washing stations, equipment wash water and the isolation ward, and leads to a treatment plant with screening, biological treatment and disinfection before discharge to the sewer.

2.10.8. Owner Visits and Samples

- Owners may see their animal through the preparation-room window with the clinician's permission. In-person visits only in exceptional cases of euthanasia, with express permission of the hospital director or head of the UICB; brief, and with the same PPE and precautions as staff.
- The senior veterinarian in charge ensures suitable samples and biosafety: same PPE as for patient care; samples sealed in plastic bags labelled outside with the suspected disease; outer surfaces kept clean; suspected agent written on every request form.

2.10.9. Diagnostic Procedures, Surgery and Transfers

- Procedures are done in the UICB whenever feasible. Transfers for imaging, surgery or intensive care are recorded on the UICB patient movement form, signed by the head of the UICB or hospital director (or the senior clinician on duty in urgent or out-of-hours cases), scheduled at the end of the day where possible, and announced to the receiving team with the agent and precautions. Equipment and areas are disinfected afterwards: ECG with 0.5 % chlorhexidine or 70 % alcohol; endoscopes as in Table 2.6; radiography equipment after the examination.
- Surgery is limited to urgent, life-saving procedures, at the end of the day. The responsible veterinarian, the Clinical Director and the head of the UICB inform the anaesthesia and surgical teams. Isolation PPE is worn for transport and separate theatre attire in the surgical area. Clipping and preparation in the cage or on the isolation table; premedication in the ward; after induction the patient goes straight to the first operating table, without stops in the anaesthesia area; recovery in its own cage whenever possible.
- After surgery: gross contamination removed, equipment disinfected and sealed in bags labelled with the agent before routine reprocessing; clothing bagged and labelled for the laundry; theatre closed and signed until disinfected; shared induction or recovery areas marked as potentially contaminated and checked before reuse. An antibacterial bath may be requested when transmission risk is high.

2.10.10. Discharge from Isolation and Isolation in the ICU

- Discharges are written on the whiteboard to alert cleaning staff. Patients leave through the staff entrance with staff in fresh PPE, avoiding other animals, owners and uninvolved staff. A nurse helps with cleaning on weekdays from 08:30 to 16:30. The attending veterinarian explains home precautions to the owner.
- A contagious patient that needs intensive care is moved to the ICU with the movement form and housed as far as possible from others, inside a red floor-tape perimeter with an adhesive mat at the boundary; disposable PPE, gloves, a dedicated thermometer and stethoscope stay inside it. Strict hand hygiene, frequent equipment disinfection, minimal handling, vulnerable patients first. If the animal must go outside, staff carry disinfectant for accidents; stretchers are used whenever possible.

- Diagnostic procedures with minimal handling, sedated if needed. Surgery after specialist assessment, pre-operative tests and written consent, with the exotics veterinarian and a veterinary anaesthetist present; minimal clipping or feather removal and wetting (heat loss); reptile skin scrubbed more thoroughly. UICB patients are prepared in their cages, operated last and returned to their ward as soon as possible.

2.11. Cleaning and Disinfection

2.11.1. Sequence and Cleaning Plan

Cleaning, disinfection and drying follow the general sequence of Chapter 1 (Table 1.8): pre-cleaning (scraping, damp sweeping, rinsing); water and detergent; rinse; disinfectant; rinse if required; air-dry. Hoses are used without creating aerosols. For some equipment, cleaning alone is enough.

- The hospital cleaning and disinfection plan covers facilities, equipment, utensils and transport vehicles, is displayed where it applies, and states surfaces and items, methods, products, tools, concentrations, contact times, frequency and responsibilities. Each task is recorded with date, area or item and signature.
- Verification is done by someone other than the cleaner, by visual inspection or microbiological and chemical tests, with results and corrective actions recorded. Environmental microbiological monitoring of clinical areas and equipment is carried out monthly (Chapter 1, section 1.7.2). The plan is reviewed when products, equipment or layout change and after works; a designated supervisor inspects equipment regularly (Chapter 15).

Table 2.5: Cleaning and disinfection products used at the VTH-CA

Product	Use	Preparation and application
KlorKleen	Chlorine tablets active against bacteria, mycobacteria, viruses and fungi: floors, walls, general disinfection, food-contact surfaces	1 tablet / 5 L (200 ppm) for general disinfection; 1 tablet / 10 L (100 ppm) for food-preparation areas and food-contact items
Virkon™ S	Facilities, surfaces and equipment	Clean first; dilute as on the data sheet until fully dissolved; keep the solution closed and away from sunlight
Mikrozid® AF Liquid	Alcohol-based, aldehyde-free disinfectant for small equipment and compatible surfaces	Clean first; ready to use
CaviWipes®	Surfaces and equipment	Ready to use
GRANOGHI	Granular absorbent for urine, faeces, vomit and blood; under bedding for urine and odours	Thin layer over the spill, collect with dustpan and brush, repeat if needed
Delfi Glass Cleaner	Glass, mirrors, polished surfaces	Small amount, wiped dry with a clean cloth or paper

- Cleaning products are stored in a closed, labelled area with restricted access, in their original labelled containers (colour-coded where applicable), with technical and safety data sheets at hand; spills are dealt with at once.

2.11.2. Routine Cleaning by Area

- **Equipment and personal instruments:** thermometers and muzzles disinfected between patients with 70 % alcohol; staff and students disinfect their own instruments. Personal stethoscopes only for non-contagious patients outside infectious areas, disinfected at the start and end of the day and at once if soiled. Disposable thermometer covers always; no glass (mercury) thermometers; electronic thermometers disinfected between patients and daily.
- **Shared areas:** examination, treatment and imaging areas, including intensive care, swept, cleaned and disinfected after use whatever the patient's status; computers and ultrasound consoles disinfected daily with KlorKleen; antiseptic mats in the theatres renewed daily. PPE when using disinfectants, removed afterwards and hands washed. Patients with fleas or ticks receive external antiparasitic treatment, charged to the owner.
- **Facilities:** debris removed, detergent at the specified concentration and time, thorough rinse (detergent residue inactivates disinfectants), drain or dry, disinfectant at the specified concentration and contact time, excess rinsed, air- or paper-dried.
- **Cages:** cleaned promptly after discharge and kept empty during cleaning; non-contagious cages at least daily and between patients. After a suspected or confirmed infectious case, the clinician or intern closes the cage and signs it **'CLEAN AND DISINFECT – DO NOT USE'**. Bedding removed, base lifted, debris removed, base, floor and walls scrubbed, rinsed and dried, disinfectant applied and left to dry; PPE, gloves and shoe covers for infectious cases; tools disinfected at the end of the day.
- **Bowls and patients:** bowls cleaned at least twice daily and disinfected between patients; fresh water at least twice daily; excreta removed from patients, which are washed and brushed as needed; no medicines or supplies around cages; faeces and urine removed at once indoors and outdoors (GRANOGHI where useful).
- **Cleaning tools:** separate kits for the General Route, the UICB and the surgical suite, plus one for urine and faeces. Buckets washed and water changed between rooms. At the end of the day cloths, mop heads and squeegees are rinsed, soaked 15 minutes in KlorKleen (4 tablets / 10 L), rinsed and air-dried. Mops with non-porous handles and removable cotton heads for hot washing; single-use cloths preferred; buckets smooth, emptied in the dirty utility area and stored inverted. Whoever uses equipment cleans it, dismantling removable parts.
- **Refrigerators:** hospital, laboratory and pharmacy refrigerator temperatures and cleanliness are checked twice a week and recorded; problems are reported to the responsible nurse, who arranges correction with the cleaning staff.

Figure 2.1 summarises cleaning and disinfection at the VTH-CA.

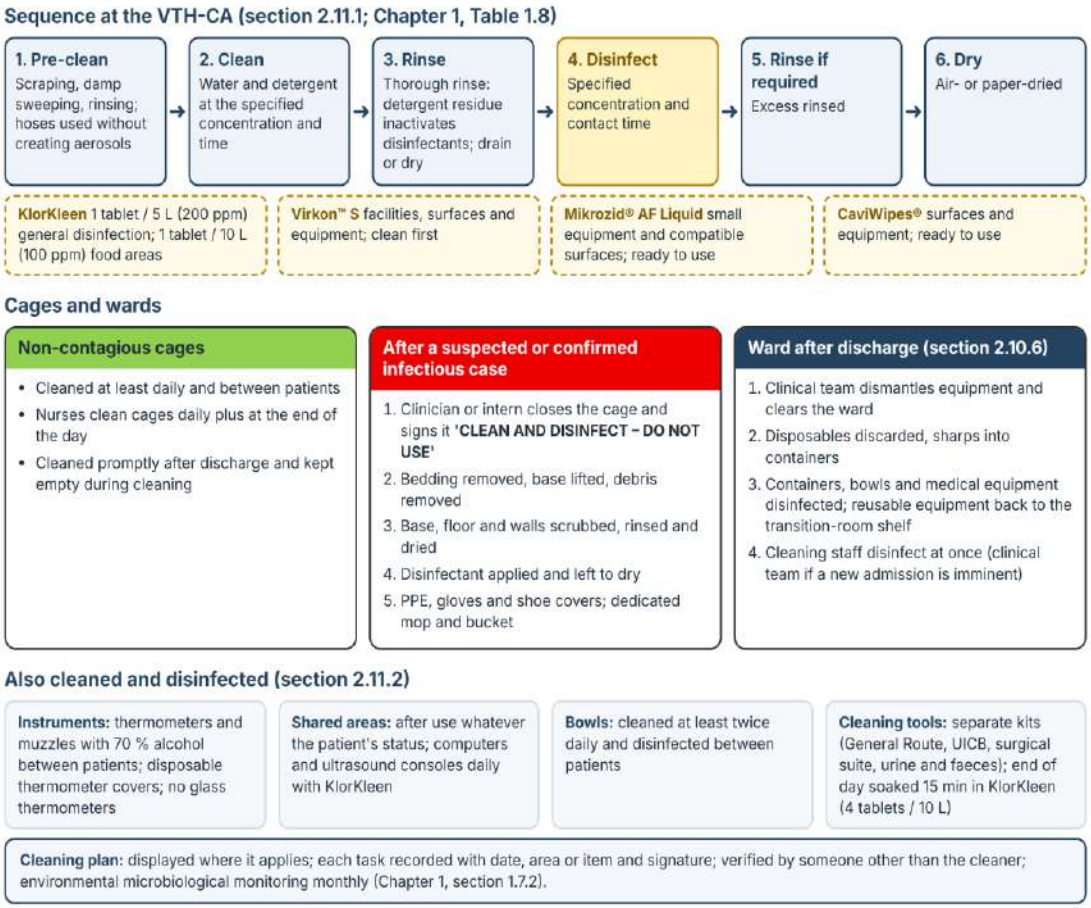


Figure 2.1: Cleaning and disinfection at the VTH-CA

2.11.3. Reprocessing of Specific Equipment

Table 2.6: Reprocessing of flexible and rigid endoscopes

Step	Procedure
1. Initial flushing	Immediately after use, water through the air/water channel for 10–15 s; wipe the exterior; clean water for a further 20–30 s
2. Initial cleaning	Detergent through suction and biopsy channels; immerse and wipe with a soft sponge; clean the distal tip, air/water opening and optics
3. Accessories off	Remove valves and clamps; clean all ports, leaving no fibres or residues
4. Channels	Flush with detergent and brush each channel through to the exit, cleaning the brush between passes
5. Rinse	Rinse exterior and channels until free of detergent; expel water with air
6. Disinfection	Full immersion, channels filled, in Korsolex (Bode®) for the contact time of the hospital protocol
7. Final rinse	Distilled water, exterior and channels
8. Drying	Compressed air or, where approved, 70 % alcohol inside the channels followed by air flushes with a 20 mL syringe
9. Storage	Distal tip protected; flexible scopes hung vertically without twisting; rigid scopes in their sheaths
10. Accessories	Brushed with detergent, rinsed, disinfected, dried and stored

Table 2.7: Cleaning of surgical monitors

Component	Procedure
Housing	Unplugged, accessories removed; soft cloth with neutral detergent, dried
Screen	Alcohol-free product compatible with the monitor
Vents and connectors	Kept free of liquids
ECG cables and clips; temperature probes	70 % alcohol where compatible, then dried
Non-invasive blood pressure cuffs	Warm water and neutral detergent as needed
Invasive pressure cables and transducers	Neutral detergent, connectors kept dry
Capnography sensor; pulse oximeter	70 % alcohol inside the sensor / on the sensor; immersible clips 10 min, dried and reattached

Table 2.8: Cleaning and reprocessing of anaesthetic machines

Step	Procedure
1. Preparation	Disconnect from oxygen supply and scavenging
2. Disassembly	Remove breathing hoses, reservoir bag, soda lime canister and inspiratory and expiratory valves
3. Soda lime	Discard; soak the canister in warm water with neutral detergent
4. Breathing hoses	Soak 30 min at 70 °C with neutral detergent, then disinfect and dry
5. Valves and discs	Discs wiped with a damp cloth; valves washed in warm water with detergent, disinfected and dried
6. Machine surfaces	As per manufacturer, keeping liquids out of electrical and gas connections
7. Reassembly and checks	Fresh soda lime, reassembly, functional checks before clinical use

2.12. Hospital Laundry

Soiled textiles from the Companion Animal Teaching Hospital (VTH-CA) are processed in the hospital laundry, located outside the hospital building near the T classrooms on campus. The collection, transport, handling, washing, drying and storage of hospital laundry must follow the procedures described in Chapter 11.

2.13. Waste Management

Waste is classified by origin, hazard and treatment: laboratory liquids by the European List of Waste (LoW; Commission Decision 2000/532/EC, as amended by Commission Decision 2014/955/EU) and hospital waste in the four groups see Chapter 1, Table 1.7. Carcasses and identifiable anatomical parts are Category 1 animal by-products. Research and diagnostic samples are incinerated or co-incinerated unless kept for reference.

Table 2.9: Laboratory liquid waste codes

LoW code	Waste
07 01 04	Non-halogenated solvents
07 03 04	Dyes
06 01 06	Acids or acidic solutions
06 02 05	Bases or alkaline solutions

18 01 03	Liquids from biological analyses

- Liquid waste goes into separate jerrycans, labelled before use (on the side opposite the opening) with description and LoW code, filled only to the mark and closed; codes are confirmed in the hospital waste register. Fluids from analysers and from animal handling or surgery are collected in labelled jerrycans and taken to the waste room by laboratory staff or nurses.

Table 2.10: Solid waste at the VTH-CA (Appendix 2)

Group	Waste	Packaging and treatment
I – municipal	Recyclable and non-recyclable general waste	Recycling containers; black bags to landfill
II – non-hazardous healthcare	Uncontaminated gloves, masks, tips, aprons, fluid containers, pads, nappies	Black bags, same route as general waste
III – biological	Contaminated PPE and consumables, blood and fluid systems, dressings, removed prostheses, non-identifiable tissues, laboratory consumables, waste from surgery, wards, isolation and necropsy	White bags in bench receptacles or green 30/60 L containers with black lids; pre-treatment (autoclave) by the licensed operator, then landfill; or incineration
IV – specific	Sharps, discarded chemicals and medicines, cytostatic drugs and their preparation and administration material	Medicines and cytostatics in red bags in red containers with black lids; sharps in yellow containers with red lids, then red transport containers; incineration
Category 1 by-products	Carcasses and identifiable anatomical parts	Black bags in cold storage, then black container with red lid; frozen carcasses handed to the licensed operator (Urbaser) for incineration

- About 20 cm of the bag is folded over the rim of Group III containers. Group III and IV bags are closed with a tie or double knot when two-thirds full and placed entirely in the container, lid secured. Transport containers stay covered, filled to three-quarters at most and sealed until collection; staff collecting Group III and IV waste wear gloves and a plastic apron, discarded as Group III.
- Waste is kept in the locked **'SALA DE RESÍDUOS'** (waste room), separate from supplies, medicines and linen, and collected by the licensed operator (Urbaser) every three days; if collection is delayed, it is refrigerated for up to seven days and the refrigeration unit is cleaned after each collection.
- Cleaning staff collect general waste; Group III in pedal bins, sharps in puncture-proof containers, cytostatic waste sealed in red bags; at the end of the day the bags go to their transport containers in the waste room.

Chapter 3: Biosecurity SOPs in the Companion Animal Veterinary Teaching Clinic (VTC-CA)

The VTC-CA provides general practice and referral consultations and scheduled oncology treatments on an outpatient basis. It has no hospitalisation or isolation facilities.

This chapter applies to staff and supervised students and covers routine precautions, referral of suspected contagious cases to the VTH-CA, outpatient oncology, cleaning, waste and records. Chapters 1 and 2 apply to everything not stated here.

3.1. Routine Outpatient Precautions

3.1.1. Booking and Admission

- Consultations are by appointment only. At booking and again at check-in, reception asks about recent vomiting, diarrhoea, coughing or sneezing and any known exposure to a contagious disease; suspected cases follow section 3.2 before entering the waiting area.
- Owners check in at the dog or cat reception and wait in the corresponding waiting area. Dogs stay on a lead or in a carrier, cats in carriers until examined. Approved disinfectants are available in both reception areas.
- Areas are marked with the floor lines of Table 1.13: green for reception, waiting areas and consultation rooms; yellow for treatment and preparation areas, including the oncology area, where only staff and supervised students circulate. The VTC-CA has no permanent red area, because it has no isolation or surgical facilities; a room used for a suspected contagious case becomes a temporary red area until it has been cleaned and disinfected (Table 3.1).

3.1.2. Hand Hygiene and Protective Equipment

Every consultation room has a hand-washing basin and approved hand hygiene products and disinfectant (Virkon™ S). Hands are cleaned before and after each patient, before clean or aseptic procedures, after contact with blood, body fluids, secretions, excretions or contaminated materials and surfaces, immediately after removing gloves, before eating or drinking and after using the toilet.

- Soap and water when hands are visibly dirty; alcohol rub when they are visibly clean (technique: Chapter 1, Table 1.4; Appendix 1)).

- Gloves changed between patients and when moving from a contaminated to a clean task; gown or apron, mask and eye protection chosen according to the expected exposure (precautions for contagious cases and oncology in sections 3.2 and 3.3).

3.1.3. Consultation Rooms

- The attending veterinarian or nurse directs restraint and limits handling to essential personnel.
- Only the equipment and supplies needed for the appointment are brought in; personal belongings and unnecessary materials stay outside patient areas.
- Between patients, all contact surfaces and reusable equipment are cleaned and disinfected before the next patient enters: organic material first, then disinfectant at the dilution, method and contact time of the label.
- Needles and sharps go straight into a puncture-resistant container, never recapped, bent or manipulated.

3.1.4. Attire, Students and Break Room

- Staff and students change into clean scrubs and closed, washable footwear reserved for clinical use before entering patient areas, and wear identification throughout. Colours as at the VTH-CA (Table 2.1): students green; medicine clinicians turquoise blue (white coat optional); nurses and assistants grey; cleaning assistants beige. Outdoor clothing and bags stay in the lockers.
- Everyone keeps a spare set of scrubs on site and changes when clothing is soiled or contaminated; long hair tied back, short nails, no jewellery that interferes with care or hand hygiene.
- Student identification shows name and year. Students wait for their supervisor to assign a room, enter clinical areas only as directed, work under supervision and touch only their assigned patients. From Year 4 they bring a stethoscope, thermometer and penlight, disinfected between patients, plus a pocket notebook and their logbook. Observation of oncology follows section 3.3.
- Eating, drinking and food storage only in the break room, whose refrigerator and microwave are for human food only; medicines and biological products never there, and clinical refrigerators only for their designated use.

3.1.5. Accidents and Exposure

Bites, scratches, needle-stick injuries and any exposure to blood, body fluids or a suspected zoonotic agent are washed and treated at once and reported to the supervising veterinarian, who records the incident (Chapter 15). Work accidents follow the OSH Manual (section 9.3).

3.2. Suspected Contagious Cases

The VTC-CA does not hospitalise contagious patients: the attending veterinarian assesses urgency and arranges transfer to the VTH-CA. Meanwhile the patient is kept apart from other animals and traffic of people, patients and equipment through the area is kept to a minimum. Suspected notifiable or zoonotic diseases are reported to the HSBC (crisis diseases: Chapter 14).

Table 3.1: Management of a suspected contagious case at the VTC-CA

Step	What to do
Suspicion before arrival	Reception alerts the veterinarian and gives the owner instructions; where appropriate the owner goes straight to the VTH-CA after the receiving team is notified. An owner already outside waits in the vehicle only if the patient's condition and the temperature allow
Patient already inside	Stays in the consultation room; from reception, moved by the shortest route to a designated room, clear of other animals, in a carrier or on a stretcher. The room becomes a temporary red area: door closed, restricted-access sign outside, essential staff only. Gloves, gown and respiratory or eye protection according to the suspected route of transmission; equipment dedicated to the patient until decontaminated
Referral and transport	The veterinarian phones the VTH-CA before departure (suspected disease or signs, exposures, clinical status, treatment given), confirms the entrance and handover, and decides whether stabilisation or supported transport is needed. The owner or transport team is told how to contain the animal and where to report; the animal leaves by the shortest route (VTH-CA triage: Chapter 2, section 2.10.1)
Decontamination and reopening	Room kept closed; the person responsible for cleaning is told the agent and the exposed areas. Room, equipment, the clinic's carrier or stretcher and surfaces along the route are cleaned and disinfected (section 3.4) with a product effective against the agent; the room returns to normal use after the contact time and any rinsing and drying. The veterinarian records the referral and any exposure; the cleaner records the room clearance

3.3. Outpatient Oncology

- Only trained, authorised staff handle cytotoxic medicines, contaminated equipment and cytotoxic waste. The oncology lead keeps the list of authorised staff and any restrictions on duties (pregnancy, breastfeeding, fertility treatment: as in Chapter 2, section 2.9). Students only observe, under direct supervision and with the required PPE.
- Cytotoxic medicines are kept in a dedicated, secure cabinet or refrigerator as per the manufacturer. Treatments take place in a designated area. Injectable drugs are prepared on site only when the containment equipment, staff competence and approved procedure are in place; otherwise, the clinic receives labelled, sealed, ready-to-administer doses from its approved preparation service. Doses are moved in closed, leak-resistant secondary containment.
- Before treatment, staff check patient and prescription, assemble supplies and make sure the spill kit and cytotoxic waste containers are within reach. The work surface is covered with an absorbent pad with impermeable backing.
- Chemotherapy-tested gloves and a disposable, impermeable, long-sleeved gown, with extra protection according to the task and splash risk. Injectable doses through the approved system, with a closed-system transfer device where specified; tablets and capsules dispensed intact.
- Sharps straight into the cytotoxic sharps container; pads, tubing and other disposables into the cytotoxic waste stream. Surfaces and reusable items decontaminated by the hazardous-drug procedure; routine disinfection done separately. Urine, faeces and vomit that may be contaminated are handled with the same PPE and waste route.

- **Spills:** reported at once, access restricted, cleaned by trained staff with the cytotoxic spill kit and procedure. An exposed person follows the safety data sheet and the occupational exposure procedure and seeks prompt medical assessment; spill and exposure are recorded.
- **Discharge:** written instructions to the owner on expected adverse effects, when and whom to call, how long precautions last, safe handling of oral medicines and of contaminated urine, faeces, vomit or bedding, precautions for children and pregnant or breastfeeding household members, and the next appointment.

3.4. Cleaning and Disinfection

The product is the one set in the clinic's cleaning plan for the surface, the equipment and the suspected pathogen; label and equipment instructions decide compatibility, dilution, contact time, rinsing and drying. The sequence is:

- **Prepare:** patient out, clean supplies put away, PPE on, disposables and sharps sorted; gross contamination removed with disposable absorbent material, without high-pressure sprays.
- **Clean:** detergent from cleaner to dirtier areas; detergent residue and excess water removed so the disinfectant works at its intended concentration.
- **Disinfect and dry:** surface kept wet for the full contact time, rinsed if the label requires, dried before reuse; different products used separately; PPE removed and hands cleaned at the end.

Table 3.2: Frequency of cleaning and disinfection at the VTC-CA

Area or item	When
Examination and treatment surfaces	After each patient, when visibly soiled and after suspected contagious cases
Reusable patient-contact equipment	After each patient; removable parts as per the device instructions; electrical items wiped with a compatible product and kept dry
Reception and waiting areas (dog and cat)	High-touch surfaces and floors on the daily schedule and when soiled; exposed areas decontaminated before reuse
Oncology surfaces and equipment	After treatment and immediately after a spill, under the hazardous-drug procedure; dedicated cleaning tools stay in the oncology area
Cleaning tools	Cloths, mop heads and buckets cleaned and dried after use; separate supplies for oncology and for areas used by suspected contagious cases

Users clean reusable equipment after use; the designated staff member cleans the rooms and records it on the clinic checklist. Damaged items or equipment that cannot be cleaned safely are removed from use and reported to the clinic lead.

3.5. Waste, Records and Training

- General, infectious (Group III), sharps and cytotoxic (Group IV) waste are separated at the point of use into the labelled containers of the clinic's waste plan (Chapter 1, Table 1.7), closed at the fill mark and kept in the secure area until collected by the authorised operator. Cytotoxic waste and clean-up material stay in the cytotoxic stream.
- Soiled reusable textiles are bagged where used and ; textiles possibly contaminated with cytotoxic drugs are kept apart and handled under the hazardous-drug procedure.

- The clinic lead briefs staff on this chapter before they work independently and whenever procedures change. The clinic keeps cleaning checklists, patient transfer records, chemotherapy treatment and discharge records, and reports of spills, exposures and corrective actions (Chapter 15).

Chapter 4: Biosecurity SOPs for Exotic Companion Animals

Birds, rabbits, rodents, reptiles and other exotic pets arrive in great variety, often with an unknown health and vaccination history, and several of them carry zoonotic agents (Chlamydia psittaci, avian influenza, Salmonella, Encephalitozoon cuniculi). This chapter adds to Chapters 1 and 2 the rules specific to the exotic animal service of the Companion Animal Teaching Hospital (VTH-CA).

4.1. Scope and Specific Risks

The exotic animal service follows the general rules of Chapter 1 and the VTH-CA rules of Chapter 2. The additional measures below address: the diversity of species, with different housing and handling needs; the frequency of zoonotic agents; the lack of known health status; the possibility of notifiable diseases (avian influenza, Newcastle disease, rabbit haemorrhagic disease); and agents that persist in the environment or are non-enveloped.

4.2. Attire and Personal Hygiene

- Scrubs and name tag for consultations; dark blue surgical scrubs for surgery; disposable gowns at the entrance of the surgical area for some procedures. Changing and lockers as in Chapter 2.
- Closed, washable dedicated footwear or clogs, preferably waterproof, disinfected during the day.
- Hands are washed or rubbed before and after each patient, when entering and leaving hospitalisation or isolation, and after removing gloves; gloves are changed between animals.
- Gloves for suspected infectious cases; goggles when handling parrots suspected of chlamydiosis and when performing necropsy of hares or rabbits.
- Phones and other personal items do not enter consultation, hospitalisation or holding rooms (only pens, coats and badges).
- Students bring their own basic kit (scissors, thermometer, stethoscope, torch, forceps), cleaned and disinfected routinely. Parasites (fleas, ticks) found on a patient are treated as prescribed by the clinician.
- No food or drink in the service; only in the kitchen and staff offices.

4.3. Cleaning and Disinfection

- General sequence of section 1.4. Contact time 10–20 minutes, at the longer end when non-enveloped viruses are suspected; disinfectant is removed before housing an animal.

- Examination tables are cleaned and disinfected after every patient, and rooms by those who used them; no patient enters a room before table and equipment have been disinfected; no one enters a room during a consultation.
- Items that enter sterile tissue, body cavities or the vascular system are sterilised before each use (Chapter 2, section 2.8.4). Specula, mouth gags and endotracheal tubes are washed and disinfected with 0.5 % chlorhexidine after each patient and sterilised daily (oven or steriliser) when the material allows; collars are washed and disinfected after each patient. Materials are never shared between cages.
- Cages are cleaned daily and at discharge with the institutional product (Klorkleen®) and with Virkon™ S when avian influenza or Newcastle disease is suspected. Contaminated waste goes to Group III containers.
- Non-routine disinfection (e.g., hydrogen peroxide misting) is done only by trained staff in PPE.

4.4. Consultations and Hospitalisation

4.4.1. Booking and Reception

- Except in emergencies, consultations are booked during the hours of the veterinarian responsible for the exotics service.
- When booking, staff ask about respiratory, feather, neurological and digestive signs and about recent mortality, to triage suspected cases before arrival (notifiable diseases are covered in Chapter 1).
- The clinical record is opened in the hospital software before the animal is handled, with owner, referring veterinarian and a full description. Genus and species are recorded in Latin, and staff help to identify reptiles. Patients arrive in carriers suited to their species.
- Venomous species are not accepted.
- Birds are never taken out of their cage without a staff member present. Other animals are examined by the clinician, or by students under direct supervision when the animal's condition and temperament allow; otherwise a staff member does it. Aggressive or dangerous animals are handled only by the exotics veterinarian and authorised staff, with sedation when needed.
- Any suspicion of serious contagious disease is reported to the team at once.

4.4.2. Inpatients

- Cages are assigned by the team on duty; heated isolation cages are used whenever possible.
- All clinical data and treatments are recorded in the hospital software on standard sheets.
- Only small amounts of bedding, forage and grain are kept in the ward; fresh water unless otherwise prescribed; leftovers discarded; appetite recorded.
- At discharge, the owner is informed about infectious risks at home, and the animal goes home in its own carrier, cleaned and disinfected by the students on the case. Cages of suspect or confirmed infectious patients are signed **'DO NOT USE – SPECIAL CLEANING REQUIRED'** with the agent written on white tape until disinfected.

4.5. Suspected Contagious Disease

4.5.1. General Rules

- Nothing leaves a consultation or hospitalisation room without a staff member's approval. Feathers, beaks, skulls and other animal parts are never taken away.
- When a highly contagious disease is suspected (Newcastle disease, HPAI, RHD), the patient never goes to the waiting room: birds stay in their carriers, separated from other animals, while awaiting examination; cats go to the UICB feline room; at the VTC-CA the animal waits in its carrier in a closed room (Chapter 14, section 14.5.1). Rooms used by the patient are closed until cleaning and disinfection are complete.
- Suspected contagious cases are booked at quiet times and go straight to a consultation room, which stays closed until it has been decontaminated.
- Any doubt is reported immediately to a staff member. Disease-specific measures follow the WOAH Terrestrial Code and the Faculty's crisis procedures (Chapter 14).

4.5.2. Specific Diseases

Table 4.1: Precautions for specific diseases of exotic animals

Disease	Precautions
Newcastle disease / HPAI (high mortality, neurological or other alarming signs)	Staff member in charge; nothing leaves the room; shoe soles disinfected, clothes washed, no contact with other birds for 6 days; compulsory samples to the reference laboratory and notification to DGAV (Chapter 14); disinfection with Virkon™ S; only sampling and euthanasia allowed on suspect birds; no movements
Rabbit haemorrhagic disease	No contact with susceptible animals until shoe soles are disinfected and clothes washed; no movements
Chlamydiosis (*C. psittaci*)	Gloves, goggles and mask for psittacines unless confirmed negative; no anaesthesia of parrots with dyspnoea or diarrhoea without prior testing, except in extreme emergency; anyone with flu-like illness 1–3 weeks after contact tells their doctor about possible psittacosis
Encephalitozoonosis (*E. cuniculi*)	Risk mainly for immunocompromised people; bed pads changed every 12 h; cages cleaned and disinfected; rabbits with compatible signs tested (serology)
MDR bacteria	Enhanced precautions and separation; early discharge; no antibiotics without susceptibility testing (at the owner's expense); no fluoroquinolones or human-reserved antibiotics without a control antibiogram (Chapter 13)

4.5.3. Testing and Samples

- The owner is told about the suspicion and the need for testing; testing for Newcastle disease and HPAI is compulsory and follows the legal procedure.
- Samples are double-packed in sealed bags (e.g., Whirl-Pak®), without contaminating the outer bag, labelled, and the suspected disease written on the request form.
- Any change to these measures must be approved by a veterinarian.

4.6. Isolation of Exotic Patients

- Small contagious exotic patients are housed in the Isolation and Biological Containment Unit (UICB) of the VTH-CA, in heated isolation cages when possible, in enclosures suited to the species.
- The confirmed disease is written on a notice on the cage. Visitors never enter isolation.
- A disposable gown, mask, cap and shoe covers are compulsory in hospitalisation and isolation areas and are never worn outside them. Hands are cleaned on entering and leaving.
- Equipment for these patients stays in a labelled bag by the cage and is not used on another patient before cleaning and disinfection or sterilisation.
- Ultrasound, radiography or CT of suspected patients is limited to life-threatening situations.

4.7. Surgery and Anaesthesia

- Attire and rules of the surgical area as in Chapter 2 (section 2.8). No more than three students in exotic surgery at the same time.
- Clean gloves for catheters, endotracheal tubes and examination of mucous membranes; gloves changed and hands disinfected between patients; faeces removed from preparation areas at once.
- Anaesthesia requests are completed the day before when possible, with any suspected infection noted. Feathers are not plucked and animals not clipped without a staff member's authorisation; feathers and hair go straight to the waste container.
- Contagious patients are operated on only in life-threatening emergencies or after diagnosis, according to the exotic team, with full decontamination afterwards; chlorhexidine bathing may be required by the surgeon.
- Patients return to their cage once recovered; anaesthesia equipment is cleaned and disinfected immediately after the procedure.

4.8. Necropsy, Visitors and Children

- Animals received for necropsy are treated as high-risk and are not unpacked in the clinic; necropsies are done in the necropsy room (Chapter 7). Necropsy instruments are cleaned, disinfected, rinsed and sterilised daily.
- Visitors only under a veterinarian's supervision; visiting scientists by arrangement with the Head of Department or Hospital Director; never in isolation.
- Children are not allowed in hospitalisation areas, except owners' children with their animal and supervised by an adult. Other pets are not allowed in the service or to visit patients.

Chapter 5: Biosecurity SOPs in the Equine Teaching Hospital (VTH-E)

Horses arrive at the Equine Teaching Hospital (VTH-E) from many different yards, often with incomplete vaccination and health records, and some of the most contagious equine pathogens (EHV-1, equine influenza, Streptococcus equi, Salmonella) spread easily through people, equipment and stalls.

This chapter sets out the rules that apply to everyone working at the VTH-E in Santo Estêvão: attire, hygiene, admission and risk classification, housing, isolation, surgery, cadavers, visitors and the ambulatory clinic.

5.1. Scope and Organisation

This chapter applies to all clinicians, interns, nurses, grooms, technical staff, teachers, students and contractors who work at the VTH-E, and to the ambulatory equine clinic. Reading it is compulsory before the first activity at the hospital, and every new person receives an induction on how the hospital works and on basic biosecurity, even if permanently supervised. Biosecurity at the VTH-E is coordinated by the Clinical Director, supported by the Equine Hospital Biosecurity Group, which works with the HSBC of FVM-ULusófona. The Group includes the Clinical Director of the VTH-E (coordinator), a representative of the hospital clinical staff, representatives of the Equine Academic Division and representatives of Parasitology, Pathology and Microbiology.

The Group meets regularly and whenever an infectious event requires it, and reports to the Dean. Suspected or confirmed notifiable or zoonotic diseases are reported promptly to the HSBC, and crisis situations (for example EHV-1 or salmonellosis) follow Chapter 14.

5.2. Attire, Entry and Exit

Table 5.1: Attire required at the VTH-E

Area / activity	Attire	Notes
General hospital (stalls, examination, imaging)	Clean blue coverall or blue scrubs; closed, waterproof, easily disinfected footwear used only at the hospital	Identification badge visible
Operating theatre and preparation rooms	Green scrubs used only in this area; dedicated footwear or shoe covers; cap and mask in theatre	Caps, masks, gowns and shoe covers never worn outside these rooms
Class 3 stalls	Disposable gown or coverall and gloves over hospital attire	Kept at the entrance of the area
Infectious Unit (Class 4)	Disposable coverall, cap, mask, double gloves, unit boots and shoe covers	See Table 5.7
Ambulatory clinic	Coverall or scrubs and washable rubber boots	See section 5.18

- No rings, bracelets or watches on hands or arms; long hair tied up; short nails.
- Hospital clothing is personal, kept apart from street clothes after use A spare clean set must be available; soiled clothing is changed before the next patient.
- People change into and out of hospital attire in the changing room, which is also where personal belongings are kept.
- Hands are disinfected with alcohol-based rub on entering and leaving the hospital. Personal equipment brought in or taken out (stethoscope, thermometer, phone) is wiped with alcohol.
- Owners and visitors are always accompanied by a member of staff (section 5.18).

5.3. Hand Hygiene, Gloves and Footbaths

- Hands are disinfected with alcohol-based rub before and after each patient. After contact with faeces, wounds or other organic material, hands are washed with water and chlorhexidine soap at the washbasins (Chaper 1, Appendix 1).
- Disposable examination gloves are worn to examine and treat hospitalised horses, and are compulsory for wound care, ophthalmic treatment, catheter placement, endoscopy, and any contact with mucous membranes, blood, urine, faeces or secretions. Gloves are changed between patients; hands are disinfected after removing them.
- Footbaths are used every time one is found. Refilling a dry or dirty footbath is the duty of whoever finds it.

Table 5.2: Footbaths at the VTH-E

Location	Product	Renewal
Outdoor footbaths	Phenolic disinfectant 5 % (Zotal®)	Daily, or earlier if soiled or low
Indoor footbaths (operating theatre, Infetocontagiosas Unit, stall doors of Class 3–4 patients)	Virkon™ S 1 % (1:100; e.g., 150 g in 15 L)	Daily, or earlier if soiled or low

5.4. Food and Drink

Eating and drinking are allowed only in the kitchen and other signposted rest areas. The kitchen refrigerator and microwave are for human food only; medicines, samples and clinical material are never stored there, and food is never stored in clinical refrigerators.

5.5. Admission and Risk Classification

5.5.1. Admission

- The owner waits with the horse in or next to the trailer until a clinician has assessed it. The clinician takes a short history (fever, cough, nasal discharge, diarrhoea, neurological signs, abortion, contact with sick horses, recent events or transport) and a quick clinical impression, and assigns a risk class (Table 5.3).
- According to the class, the horse is unloaded and taken to an examination room, to the hospital stalls, or directly to the Infetocontagiosas Unit by the isolation access.
- The horse's official documents (passport) are requested at admission and kept at the hospital during the stay; vaccination and deworming history are recorded.

- Outpatients are not taken into hospitalisation areas whenever this can be avoided.
- Trailers are parked only in the signposted parking area and must never block hospital access.
- Owners take home bandages, boots and other personal equipment; only halters, lead ropes and rugs may stay. When needed, the hospital supplies its own equipment, which stays at the patient's stall and is cleaned and disinfected after discharge.

5.5.2. Risk Classes

The VTH-E uses the four risk classes of the manual (Chapter 1). The class is written on the stall card and in the clinical record and is updated whenever the clinical picture changes.

Table 5.3: Risk classes at the VTH-E

Class	Definition	Typical equine cases	Housing and circulation
1 – Green	Non-infectious condition, or infection not transmissible to animals or people	Trauma and wounds; elective and post-operative cases (except complicated colic); ophthalmology; non-infectious neonates; no fever or respiratory signs in the last 6 months	Hospitalisation corridor; normal circulation
2 – Green	Infection with low transmissibility, susceptible bacteria	Infected wounds or corneal ulcers with susceptible bacteria; bacterial pneumonia or pleuropneumonia without a contagious agent	Hospitalisation corridor; normal circulation
3 – Orange (A: multidrug-resistant bacteria; B: moderately contagious or zoonotic agent)	Moderate risk of transmission and/or zoonotic potential	Fever or leukopenia of unknown cause; viral respiratory signs (cough, nasal discharge < 2 weeks); *Rhodococcus equi* in foals < 10 months; diarrhoea without fever or leukopenia; reflux with fever/leukopenia or haemorrhagic reflux; MDR infections; contagious skin disease (dermatophytosis, *Dermatophilus*, mites, lice)	Separated stalls with empty stalls on each side and taped barrier; restricted circulation; no walks
4 – Red	Highly contagious agent and/or serious zoonosis	Suspected strangles (enlarged submandibular lymph nodes, discharge, fever, guttural pouch empyema); acute diarrhoea with fever and/or leukopenia; acute or rapidly progressing neurological disease, especially with fever (EHV-1); abortion (150–300 days); unexplained perinatal death (> 300 days); any zoonotic disease	Infetocontagiosas Unit; if occupied, a closed hospital stall with the same precautions

5.6. Housing Areas and Patient Flow

Clinicians and grooms decide where each new horse is housed; students always confirm the stall with them before moving a horse.

Table 5.4: Use of the housing areas

Area	Patients
Hospitalisation corridor	Class 1–2 horses after short elective surgery (e.g., arthroscopy) or longer surgery, horses with other medical problems (ophthalmology, endocrinology, foals) and healthy horses (e.g., reproduction). In an outbreak (e.g., influenza) part of the corridor can be closed for Class 3 cases.
Intensive care corridor	Foals with their dams in neonatal intensive care; colic and other emergencies; padded stall for neurological horses or horses unable to stand (Class 1–2).
Infetocontagiosas Unit	Class 4 horses, and Class 3 horses that need Class 4 precautions. Always separate from Class 1–2 horses.
Walking area and paddocks (behind the hospital)	Only Class 1–2 horses, with the clinician's permission (section 5.15).

5.7. Clinical Records and Stall Cards

- A hospitalisation sheet is completed at admission with the horse's identification, diet (type and frequency of forage and concentrate) and whether it drinks from buckets or automatic drinkers.
- A stall card shows the risk class so that everyone knows which precautions apply. Diagnosis, infectious status, treatment orders and the expected discharge date are written on the clinical board in the consultation support room and kept up to date.
- Records are confidential: visitors and owners only see their own horse's information. Records do not leave the consultation support room; those of Class 4 horses never enter the Infetocontagiosas Unit.
- Medicines are stored in the pharmacy, labelled with the patient's name when dispensed. Medicines and fluids taken into Class 3–4 areas are never returned to the pharmacy: they are sent home with the owner (and invoiced) or discarded.

5.8. Stall and Corridor Hygiene

5.8.1. Daily Routine

- Horses are kept clean: brushed, hooves picked, faeces and discharges removed.
- Stalls and corridors are cleaned every day; only material needed for feeding, handling and cleaning stays in the stall area.
- Faeces or urine outside the stall are removed at once; where there is diarrhoea, the area is also disinfected and left to dry.
- Neonatal stalls: faeces and wet bedding are removed immediately (by the groom, or by students and clinicians out of hours).
- Water and feed buckets are kept clean, fresh water is checked at least three times a day, and buckets are disinfected between patients.
- Gloves, mask and suitable clothing are worn when preparing or applying surface disinfectants.

5.8.2. Terminal Cleaning and Disinfection of a Stall

Before a new horse enters a stall that has been vacated:

- Remove all bedding.

- Wet the surfaces and scrub with an anionic detergent to remove organic film; disinfectants do not work on dirty surfaces.
- Rinse well: detergent residues inactivate bleach.
- Apply diluted bleach (2–4 % of the commercial product) and leave for at least 10 minutes; rinse.
- Spray walls and floor with the hospital disinfectant at the label dilution and contact time; rinse and let the stall dry as much as possible before use.
- Treat buckets and drinkers the same way; brooms, shovels and squeegees are brushed, their heads soaked in 2 % bleach and handles wiped.

Stalls that housed Class 3–4 horses, or a horse that died of a suspected infectious disease, carry the sign **'DO NOT USE – DISINFECTION REQUIRED'** until terminal disinfection is complete. For pathogens such as *Salmonella*, the HSBC may require double disinfection and negative environmental cultures before re-use (Chapters 14 and 15). Always check the safety data sheet and material compatibility of each product and use the dilution on the label: a stronger solution is not more effective.

Figure 5.1 summarises stall cleaning and disinfection at the VTH-E.

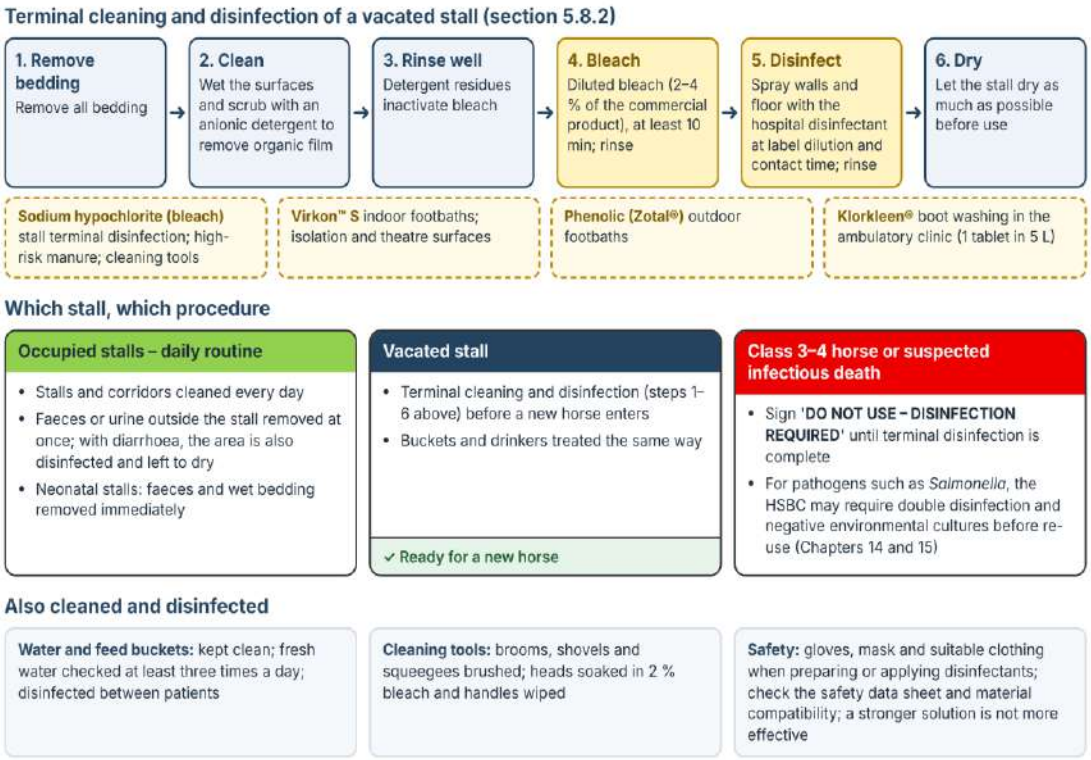


Figure 5.1: Stall cleaning and disinfection at the VTH-E

5.9. Equipment and Materials

Equipment is cleaned, disinfected, dried and put away right after use. Horses at high risk (Class 3–4) have their own set, kept at the stall and disinfected at discharge.

Table 5.5: Cleaning and disinfection of equipment

Item	Routine	High-risk patients
Halters and lead ropes (waterproof preferred)	Wash with detergent; soak in chlorhexidine weekly	Individual halter; soak immediately after use; full disinfection at discharge
Twitch, brushes, curry combs, hoof picks	Wash with detergent; soak in chlorhexidine or alcohol regularly	Individual set. Skin parasites: treat brushes with permethrin; ringworm: with an antifungal, then disinfect
Thermometers (electronic only)	Personal thermometers allowed in Class 1–2 areas; clean faecal material, then alcohol or chlorhexidine	Hospital thermometer assigned to the horse
Stethoscopes	Clean and wipe with alcohol after each patient	Class 3: personal stethoscope allowed if disinfected before and after; Class 4: unit stethoscope
Nasogastric and endotracheal tubes	Wash, use enzymatic detergent if debris persists, soak in chlorhexidine	Dedicated tube or sterilisation
Ultrasound probes, X-ray plates, endoscopes	Manufacturer's instructions; probes and plates wiped with alcohol-compatible products	Protective cover; disinfect before leaving the area
Surgical instruments	Enzymatic cleaning, then sterilisation	Clean and sterilise immediately

5.10. Disinfectants Used at the VTH-E

General properties of disinfectant groups are described in Chapter 1. Table 5.6 lists only the products in routine use at the VTH-E.

Table 5.6: Disinfectants in routine use

Product	Main uses	Practical notes
Alcohol-based rub / 70 % alcohol	Hands; stethoscopes, thermometers, small equipment	Fast, no residue, flammable; not effective on dirty surfaces
Chlorhexidine	Hand washing (soap); soaking of halters, tubes, mouth gags, surgical pads	Limited activity against viruses; inactivated by soaps; works at pH 5–7
Povidone-iodine	Skin and wounds	Inactivated by organic matter; can sensitise skin
Sodium hypochlorite (bleach)	Stall terminal disinfection; cleaning tools	Inactivated by organic matter, detergents and light; never mix with acids or ammonia; corrosive
Virkon™ S (peroxygen)	Indoor footbaths; isolation and theatre surfaces	Wear mask and gloves when preparing; corrosive to some metals and rubber
Phenolic (Zotal®)	Outdoor footbaths	Irritant; not for surfaces in contact with skin; not used in the presence of animals (product label); toxic to cats (Table 1.9)
Quaternary ammonium compounds	General surfaces	Inactivated by soaps and hard water; weak on non-enveloped viruses
Klorkleen® (sodium dichloroisocyanurate)	Boot washing in the ambulatory clinic	1 tablet in 5 L of water

5.11. Waste, Bedding and Manure

- Work surfaces are cleaned and disinfected as soon as a procedure ends, by the people who performed it.
- Waste is sorted into Groups I–IV as in Chapter 1: soiled dressings and contaminated material in Group III (white bags in green containers); sharps in yellow puncture-proof containers in every room where medicines are prepared or given. Gloves are worn to handle containers.
- Used yellow containers are removed from the operating theatre and never left there.
- Bedding and manure from Class 1–2 horses go to the manure heap, removed according to local rules. Faeces and bedding from Class 3–4 horses are bagged as Group III, never go to the manure heap and must never contaminate other areas; where Chapter 14 sets a specific rule for an agent, that rule applies.

5.12. Class 3 and Class 4 Patients

5.12.1. Rules for All Contagious Cases

- Gloves for every contact; hands washed or rubbed after each patient; contaminated surfaces cleaned at once by the people responsible for the horse.
- Only the people needed enter; procedures on the most contaminated sites (mucous membranes, infected wounds, rectal temperature) are done last.
- Students and interns assigned to the case clean and disinfect surfaces, renew footbaths and remove waste; everyone helps without waiting for a technician.
- No food or drink in Class 3–4 areas. Door handles are disinfected regularly. Bedding and faeces are never dragged into corridors.
- Material used in these areas is not shared with the general hospital and is marked with the colour of the class; anything that cannot be discarded is fully disinfected before leaving.
- At discharge, the owner receives instructions on infection risks and control at home.

5.12.2. Class 3 – Restricted Circulation

- The horse goes straight from the trailer to the designated stall, avoiding other areas, people and horses.
- The stall area is marked with tape, with empty stalls on both sides whenever caseload allows, and a box of disposable PPE at its entrance.
- A thermometer, brush and hoof pick of the hospital are assigned to the horse and kept in a box next to the stall.

5.12.3. Class 4 – Infetocontagiosas Unit

The Infetocontagiosas Unit is a separate, locked unit with its own changing room, consultation support room, atrium and isolation box, and independent sewage. The key is held by the responsible veterinarian. PPE, cleaning products and disinfectants are stored inside the unit, and medicines for the patient are kept in the unit's cabinet.

- The box is prepared (bedding, water, hay) before the horse arrives. The horse is unloaded in the isolation area and taken directly into the unit.

- Transfer from inside the hospital is done by two people: one prepares the box; the other, already in PPE, receives the horse at the box gate. Surfaces soiled on the way are disinfected immediately and the stall left behind is signed **'DO NOT USE – DISINFECTION REQUIRED**'.
- A stethoscope, thermometer, brush and hoof pick stay in the unit for the whole stay and are disinfected at discharge.
- Feeding, watering and bedding are done inside the unit by the people responsible for the case, in PPE. The horse does not leave the unit.

Table 5.7: Entry and exit sequence

	Class 3 stall	**Infectious Unit (Class 4)**
Entering	Footbath → hand rub → disposable gown/coverall (at the entrance) → gloves	Unlock door → shoe covers → footbath → changing room: unit boots over shoe covers, mask, cap, coverall and leg protectors → footbath → wash hands with feet in footbath → air-dry → two pairs of gloves → prepare material → footbath at the box
Leaving	Wipe non-assigned equipment with alcohol → hand rub → remove disposable clothing into container → footbath → complete the monitoring sheet	Wash boots at the atrium boot washer → footbath → disinfect gloved hands → clean thermometer and stethoscope, store in cabinet → remove PPE, then gloves → footbath → change boots (discard shoe covers after the last footbath, Group III) → hand rub → leave through footbath, lock door, return key

5.13. Communication, Signage and Floor Lines

- The clinician in charge assesses the infectious risk of every patient and decides the control measures. Every known or suspected contagious risk is communicated to staff, students and owners, and the information is updated as the case evolves.
- The HSBC is informed of notifiable, zoonotic, highly contagious or multidrug-resistant cases; notifiable diseases are reported to DGAV by the Clinical Director (Chapter 14).
- The stall, its surroundings and the horse are signed with: risk class, suspected or confirmed disease, zoonotic risk, barrier precautions and disinfection procedure.

Table 5.8: Floor lines at the VTH-E

Colour	**Meaning**	**Examples**
Green	Free circulation	Reception, waiting area, corridors to offices
Yellow	Authorised personnel only	Hospitalisation area, laboratory
Red	No entry without the clinician's authorisation	Operating theatre, Infetocontagiosas Unit, cadaver area

5.14. Students and Suspected Contagious Cases

- When booking or receiving a case, students describe the complaint ('acute diarrhoea', 'acute cough') and add 'suspected contagious disease' where relevant.

- The owner is asked to keep the horse outside until a clinician has triaged it and assigned a class.
- Only a few students, chosen by the clinician, follow examinations of suspect cases; contact with the patient and with other horses is kept to a minimum.
- As soon as the room is free, everything soiled is cleaned and disinfected by those responsible for the case, and a sign on the door prevents use until this is done.
- Students learn these procedures (Biosafety Day, Moodle, videos) before they are allowed near contagious cases.

5.15. Feeding, Bedding, Walking and Paddocks

- Concentrates and supplements (including those brought by owners) are stored in closed, labelled containers; bedding, forage and feed are kept in small quantities to limit contamination and pests.
- Corridor floors are cleaned before feed is distributed. Diet and feeding times are written on the board at the feed area.
- Occupied stalls are mucked out and re-bedded every morning by the groom; when a stall is very dirty or wet during the day, students, interns and clinicians do it.

Table 5.9: Walking and grazing by risk class

Class	Walking (area behind the hospital)	Paddocks (behind the hospital)
1–2	Allowed with the clinician's permission, individually and supervised	Allowed with the clinician's permission
3	Only to go to examinations; no walks	Not allowed
4	Never leaves the Infetocontagiosas Unit	Not allowed

Faeces left in the walking area or paddocks are removed as soon as possible.

5.16. Anaesthesia and Surgery

5.16.1. Access and Attire

- The operating theatre and preparation rooms are 'clean areas' behind the red floor line, entered only through the pre-surgery room by authorised people in green scrubs and dedicated footwear or shoe covers. Rooms next to them (e.g., sterilisation) require clean scrubs or a white coat and clean footwear.
- No more than six students in the operating theatre at the same time; non-essential people do not enter.
- Cleaning and maintenance staff follow the same attire rules.

5.16.2. Preparation of the Patient

- The pre-anaesthetic form is completed, if possible, the day before, and records any known or suspected contagious disease.
- The surgical site is not clipped before the day of surgery.
- Before entering the induction area, the horse is brushed or washed, its mouth rinsed, shoes removed if needed and hooves scrubbed with chlorhexidine (with gloves). Dirty rugs and bandages are replaced by clean ones.

- The horse arrives at the induction area about one hour before the procedure. Catheters are placed aseptically with sterile gloves; clean gloves are used to place endotracheal tubes.
- Faeces are removed from induction, recovery and preparation areas immediately; the floor is cleaned and disinfected between patients.

5.16.3. Surgical Hand Antisepsis

- Cap covering all hair and mask on; no jewellery.
- Chlorhexidine scrub for 3–5 minutes covering hands, forearms and elbows, hands kept above elbows, rinse; or alcohol-based surgical rub (e.g., Sterilium®) for the time stated by the manufacturer, on clean dry hands. The technique is shown in Appendix 3.
- Dry with sterile towel from fingertips to elbows; repeat if hands touch a non-sterile surface.

5.16.4. Recovery and Cleaning

- The horse returns to its stall as soon as it is safe; the recovery box is swept and cleaned between cases.

Table 5.10: Cleaning of anaesthesia equipment and theatre

Item / moment	Procedure
Oxygen insufflation hose and endotracheal tubes	Brush inside and outside with mild soap; soak in chlorhexidine for 15 min; rinse with warm water without touching the sink; hang to dry; any tube that touches the floor is disinfected again
Anaesthesia machine (between cases)	Valves and domes cleaned with water and dried; Y-pieces, reservoir bags and tubing rinsed, soaked 15 min in chlorhexidine, rinsed and dried
Mouth gag, surgical pads, ropes, halters	Scrub with soap; soak in chlorhexidine (mouth gag 15 min after each use)
Anaesthesia machines and ventilators (periodic)	Disassembled, fully cleaned and disinfected; recorded on the cleaning sheet with date and time
Theatre – after each procedure	Remove equipment, trolleys and shelves and clean them; remove blood and organic waste; rinse and scrub the floor with detergent
Theatre – end of day or after a contaminated procedure (enterotomy, sinus or abscess drainage)	As above, plus hose walls and floor, disinfect, rinse and dry; clean trolley wheels before returning; remove yellow containers; doors kept closed
Theatre – weekly	Empty the room; scrub walls to body height; clean and disinfect drains; dust surfaces and lights
Environmental monitoring	Samples from theatre and recovery for culture and counts (Chapter 15)

5.16.5. Surgical Patients with Contagious Diseases

- Students and interns on the case flag known or suspected contagious disease on the forms.
- Surgery of Class 3–4 horses are avoided when possible; if needed, it is scheduled as the last of the day. Class 4 horses are sedated in the Infetocontagiosas Unit, protected with waterproof boots and bandages, induced in theatre and recovered in isolation.

- Induction and recovery areas used by these horses are signed as contaminated and fully disinfected before the next patient.

5.17. Death of a Patient and Cadaver Management

- The groom is informed; the owner's belongings are collected and returned. Students, interns, grooms and clinicians remove, discard or disinfect everything in the stall and complete the paperwork.
- Euthanasia is performed, whenever possible, close to the cadaver area, and the surroundings are closed so that owners do not watch the removal.
- Class 1–2 cadavers are taken promptly (or the next morning, at night or weekends) to the cadaver area of the hospital, covered with plastic sheeting.
- Class 3–4 cadavers stay in the stall until collected, wrapped in a leak-proof bag (double bag for Class 4 or zoonosis), labelled with class and suspected pathogen, and handled in full PPE. When necropsy is requested, they go directly to the necropsy facility (Chapter 7).
- If a notifiable disease is suspected (e.g., unexplained abortion, sudden death with fever), the HSBC and DGAV are informed before the cadaver is moved.
- The secretariat requests collection from the animal by-product operator (ITS) within 12 hours of death; collection takes place within 48 hours. The cadaver identification form includes the risk class.
- After collection, the cadaver area is cleaned and treated with lime; the stall follows terminal disinfection (section 5.8.2).

5.18. Visitors, Clients and Children

- Visits are booked with the Clinical Director and led by trained staff, who explain zoonotic and nosocomial risks. Visitors are supervised at all times, do not touch horses, and do not enter the anaesthesia, surgery, emergency or isolation areas; scientists or veterinarians may do so only with the Director's approval.
- No eating, drinking or smoking; no other animals.
- Clients may use the waiting room, toilets and cafeteria freely and go elsewhere only with staff. They may stay with their horse in an examination room if the clinician agrees, but never alone in treatment or housing areas, and they do not touch other horses or read their records.
- Clients do not visit horses in the Infetocontagiosas Unit, except for euthanasia, with full PPE and the clinician's authorisation. Visiting hours are set by the hospital.
- Children under 18 are always supervised by an adult, touch only their own animal and may be excluded from patient areas by the clinician.

5.19. Ambulatory Clinic

The ambulatory clinic works at Hidrovet, the Guarda Nacional Republicana (GNR), Embriovet, the Escola Profissional de Desenvolvimento Rural de Abrantes and the Escola Profissional Agrícola Dom Dinis (Paiã). Most contact is with healthy animals and low-risk material (blood, faeces, urine), with no cytotoxic drugs and a low probability of contagious or zoonotic disease; activities are therefore classified as biological risk Group 1–2.

Table 5.11: Ambulatory clinic – attire and hygiene

Step	Rule
Attire	Clean coverall or blue/green scrubs; washable rubber boots (preferably steel toe-cap); gloves, disposable clothing and shoe covers available when indicated; own thermometer and stethoscope; identification badge
Dressing	On arrival, in a clean area away from animals and feed (dedicated room if available, otherwise outside the vehicle); street clothes removed or fully covered; personal items stay in the room or vehicle; hair tied, short nails, no jewellery
During the visit	Gloves to handle sick animals or contact with mucous membranes and body fluids; change dirty gloves; remove gross contamination from boots between animals; wash hands with soap after sick animals; clean and disinfect personal equipment with 70 % alcohol
Boot washing (end of class)	At the designated place, before removing other PPE: running water and Klorkleen® solution (1 tablet in 5 L) with a brush until no organic matter remains; rinse; bag and seal the boots
Undressing	In the transition zone at the exit: boots first, then hand hygiene, then remove PPE into closed bags used only for this; hand hygiene again before entering the vehicle; scrubs and coveralls stay sealed until washed at 60 °C
Materials on site	Hose, brush (replaced every 6 months or when worn) and Klorkleen® dispenser, replenished by FVM-ULusófona

5.20. Emergency Contacts

Emergency contacts are displayed at the VTH-E reception and in the Infetocontagiosas Unit, and are listed in Chapter 14 (Table 14.17).

Chapter 6: Biosecurity SOPs for Farm Animals (On-Farm Activities)

FVM-ULusófona has no resident ruminants on campus: all contact with cattle, sheep, goats, pigs and poultry takes place on partner farms, through the Farm Animal Ambulatory Service and the off-site practical classes.
On a farm, the team itself is the biosecurity barrier. Everyone must arrive carrying nothing that could introduce infection and leave carrying nothing away.

6.1. Scope

This chapter sets the biosecurity rules for the classes of the Livestock Species course units of FVM-ULusófona. It applies to every visit to commercial livestock farms, private facilities housing livestock, artificial insemination centres, educational farms and other places where these animals are kept. The rules for the Catapereiro Farm Animal Teaching Hospital (VTH-FA) are set out in Chapter 12.

According to the Directorate-General for Food and Veterinary Affairs (DGAV), livestock species are those raised for agricultural production, particularly cattle, sheep, goats, pigs, equids and poultry; in a broader sense they also include rabbits, bees, game species and aquatic animals.

6.2. External and Internal Biosecurity

Table 6.1: External and internal biosecurity

Concept	Meaning
External biosecurity	Measures that prevent pathogens from entering a farm: access control, quarantine, cleaning and disinfection of vehicles and people
Internal biosecurity	Measures that control the spread of pathogens within a farm, between and within epidemiological groups: health management (e.g., vaccination), isolation of sick animals, cleaning and disinfection of facilities
Epidemiological group	Animals of a farm that share the same health risk because they live in the same area or unit, have direct or indirect contact, or share management, feed, equipment or staff, and may therefore be affected by, or transmit, a disease in the same way

6.3. Preparing the Visit

Each student plans the visit individually, following the recommendations for before, during and after contact with animals and farm staff.

6.3.1. Before Contact with Animals

- People who have been in contact with rabbits, pigs or poultry in the previous **7 days** may **not** enter facilities housing the same species.
- Private vehicles enter only with prior authorisation, requested at least 3 working days in advance.
- Bring a box, backpack or bag and plastic bags for used PPE (coveralls, boots, hair covers); carry it in the luggage compartment of the bus or the boot of the car.
- Bring hair ties; keep fingernails short, so that biological agents are not retained under them.

6.3.2. On Arrival at the Farm

- Park in a clean area with no direct access to animals or feed.
- Remove jewellery and accessories that are hard to clean (watches, bracelets, dangling earrings, necklaces, rings) and leave them in the vehicle; tie back long hair.
- Put the phone or tablet in a disposable protective cover (Figure 6.1), or leave it in the vehicle.
- Put on clean coveralls (not used elsewhere) and disinfected rubber boots, or the PPE provided by the farm, in a changing room or a transition area between clean and dirty zones.
- Prepare and use the footbath.

Table 6.1A shows the zones of a farm visit, using the colours of Chapter 1, Table 1.13; the farm's own zoning and rules always prevail.

Table 6.1A: Zones during farm visits

Colour	Zone	What to do
Green	Clean area: vehicle and parking area, with no direct access to animals or feed	Jewellery, phone and personal items stay here; used PPE comes back only in closed bags
Yellow	Transition: changing room or transition area, hygiene barrier and footbath	Put on clean coveralls and disinfected boots; footbath and hand disinfection at entry and exit
Red	Animal areas: houses, pens and epidemiological groups	Move forward from clean to dirty sectors, never back without washing boots and changing PPE
Orange	Decontamination point at the exit	Wash and disinfect boots and equipment; remove PPE into closed bags; wash and disinfect hands (section 6.5.1)



Figure 6.1: Disposable protective covers for mobile phones

6.3.3. Why Footbaths and Boot Disinfection Matter

Figure 6.2 shows the bacterial growth obtained from boots sampled after different levels of cleaning.

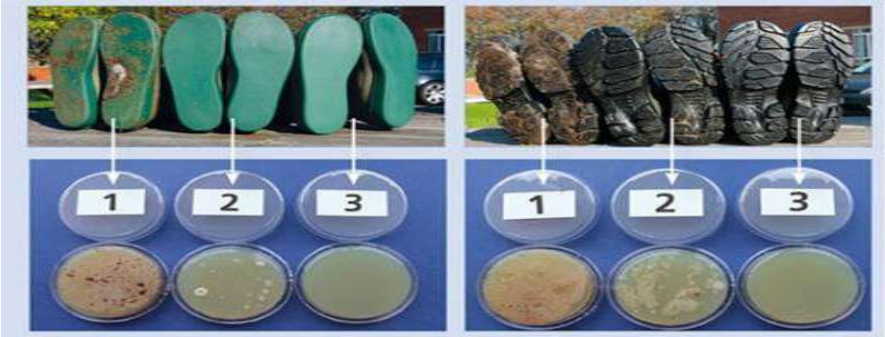


Figure 6.2: Boot cleaning and disinfection and the resulting microbial growth. Boots 1: not washed; boots 2: rinsed with water only; boots 3: properly disinfected

6.4. During Contact with Animals

- Students do **not** move around the farm without supervision.
- No photographs or videos without prior authorisation; phones only inside their protective cover.
- Whenever possible, move from lower-risk to higher-risk areas.
- Always wear disposable gloves (Figure 6.3).
- Beware of transmission through fomites: pens in the mouth, smoking with contaminated hands, touching the face or mouth.
- In high-risk situations, add masks and face shields (Table 6.2).



Figure 6.3: Hands always protected by gloves

Table 6.2: High-risk situations on farms

Situation	Agents	Extra protection
Urine aerosols	*Leptospira* spp.	Mask, eye protection, avoid splashes
Placentas, foetal membranes, vaginal discharges, abortions, newborns and periparturient dams	*Brucella* spp., *Coxiella burnetii*, *Chlamydia* spp.	Disposable coverall, gloves, FFP2 mask, face shield or goggles; pregnant students consult the lecturer beforehand (Q fever, chlamydiosis)
Calves with diarrhoea	*Cryptosporidium parvum*, *Salmonella* spp.	Gloves, coverall, strict hand hygiene; handle last

6.5. After Contact with Animals

6.5.1. Leaving the Animal Area

At the end of each visit, and between epidemiological groups on the same farm:

- Wash all equipment used (stethoscopes, thermometers, ultrasound scanners) with soap and water and disinfect it with 70 % alcohol.
- Boots are **always** washed with running water, paying attention to the sole, and only then disinfected with an iodophor, chlorhexidine, bleach or 70 % alcohol.
- Remove all PPE: personal items into a tightly closed plastic bag; farm items left for washing at 90 °C; disposables into the right waste container.
- Remove disposable gloves correctly and discard them; take the phone out of its cover and discard the cover.
- Wash hands with soap and water and disinfect them with 70 % alcohol, paying attention to the nails.

6.5.2. Back at the Vehicle

- Put the bag with PPE and rubber boots inside a tightly closed plastic bag and store it in the box, backpack or bag; if possible, disinfect the boot soles again first.
- Disinfect hands with 70 % alcohol.
- In high-risk situations, disinfect with 70 % alcohol any object exposed to contamination (phone, door handle, steering wheel, gear lever).

6.5.3. At Home

- If possible, leave footwear at the entrance and disinfect it on a tray lined with a cloth soaked in bleach (Figure 6.4).
- Take PPE out of the bag straight into the washing machine and wash at high temperature.
- Wash hands thoroughly with soap, paying attention to the nails; shower and change into clean clothes.



Figure 6.4: Footwear disinfection tray for use at home

6.6. Biological Hazards by Species

Table 6.3: Diseases of ruminants relevant to farm biosecurity

Category	Examples
Zoonotic	Leptospirosis, Q fever, cryptosporidiosis, salmonellosis, chlamydiosis, brucellosis, tuberculosis
Non-zoonotic (spread within or between farms through fomites)	Bovine viral diarrhoea (BVD), infectious bovine rhinotracheitis (IBR), bluetongue, paratuberculosis

Table 6.4: Diseases of pigs relevant to farm biosecurity

Category	Examples and routes
Zoonotic	Swine influenza, leptospirosis, campylobacteriosis, salmonellosis, hepatitis E, erysipelas, trichinellosis (undercooked contaminated meat)
Non-zoonotic (spread within or between farms)	PRRS, porcine epidemic diarrhoea and other coronaviruses, rotavirus, African swine fever (ASF), Brachyspira

- Zoonotic and non-zoonotic agents (including *Leptospira* spp, *Salmonella* spp. and *E. coli*) can be carried between farms on PPE used on other farms; influenza viruses can be carried in the visitors' respiratory tract for 3 days after exposure; ASF can also arrive in pork products brought by visitors from affected countries (Chapter 14).

Table 6.5: Diseases of poultry and rabbits relevant to farm biosecurity

Species and category	Examples
Poultry – zoonotic	Campylobacteriosis, salmonellosis, avian influenza A (Chapter 14)
Poultry – non-zoonotic (fomites, including PPE from previous visits)	Newcastle disease, Gumboro disease, mycoplasmosis, colibacillosis, coccidiosis

Rabbits – zoonotic	Dermatophytosis, mange
Rabbits – non-zoonotic (fomites, including PPE from previous visits)	Rabbit viral haemorrhagic disease, myxomatosis, colibacillosis, coccidiosis

FINAL AWARENESS MESSAGE

- Biosecurity is key to preventing and controlling animal and human disease.
- You are a guardian of animal health and a public health professional: act like one by following these rules.

Chapter 7: Biosecurity SOPs in Anatomy and Pathological Anatomy

Anatomy and Pathological Anatomy rely on cadavers and preserved specimens, which expose students and staff to animals of unknown infectious status, resistant zoonotic agents, fixatives such as formaldehyde, and sharps injuries. Chemical (formaldehyde) and physical risks in these facilities are covered in the OSH Manual (Table 4.7 and section 7.5).

Every step of the cadaver cycle is therefore controlled: origin and certification, reception, storage, dissection and necropsy, and disposal.

7.1. Scope and Objectives

This chapter applies to the Anatomy/Necropsy Room (Building M), the Osteology Laboratory (room D.0.18), the Histopathology Laboratory, the Catapereiro necropsy room and the partner necropsy rooms of Instituto Nacional de Investigação Agrária e Veterinária (INIAV) and Empresa Transformadora de Subprodutos de Origem Animal (ETSA). The Pathology and Necropsy Biosafety Manual sets out the detailed procedures for these facilities and complements this chapter. Everyone using them reads this chapter and receives an orientation on the premises and basic biosecurity training before any practical activity. The objectives are to:

- protect users from zoonotic agents and from the chemical hazards of dissection and fixation;
- accept only cadavers and specimens of known health status;
- prevent spread of agents inside the facilities and to the rest of the Faculty through zoning, controlled circulation and cleaning and disinfection;
- segregate and dispose of biological, sharps and chemical waste correctly, and ensure tetanus immunisation and correct management of injuries;
- teach infection prevention and control as part of professional training (One Health), given the role of necropsy in the surveillance of notifiable diseases.

7.2. Zoning and Circulation

Each teaching venue is divided into zones by contamination risk, with separate routes for people and cadavers. Routes must not cross clean zones unnecessarily, and circulation between risk and clean zones is kept to a minimum. Floor lines show the access allowed to users and visitors (Chapter 1). Zones follow the colours of Table 1.13: changing rooms, locker rooms and antechambers in yellow; dissection and necropsy areas, refrigerated chambers and freezers in red; washing and disinfection areas and the routes used for cadavers and waste in orange.

Table 7.1: Zoning and routes in each necropsy and dissection room

Facility	Zoning and routes
Anatomy/Necropsy Room, Building M (floor 0, doors M.0.11 and M.0.12)	The anatomy room is located on floor 0 of Building M at the FVM-ULusófona campus. Students and staff enter through door M0.12, which leads to two changing rooms. The necropsy room is divided into a semi-clean area for washing and disinfection and a contaminated area where cadavers are handled. It also includes a restroom, shower, five freezers and one refrigerator. Cadavers enter and exit through door M0.11 and the adjacent corridor.
INIAV necropsy room	Students must arrive at INIAV on time, preferably a little earlier. They enter the changing room two at a time to put on red coveralls and white rubber boots, then proceed to the autopsy room to wear the provided disposable PPE, including a face mask, latex gloves, disposable oversleeves and aprons. At the end of the class, students must remove and discard disposable PPE in the designated biobox for Type III waste, wash and disinfect their hands, clean their boots using the automatic boot washer, and return to the changing room two at a time to remove their coveralls and boots.
ETSA necropsy room (external industrial facility)	The university provides transportation to ETSA from FVM-ULusófona at a predetermined time; latecomers cannot attend the class. Students must wear red/burgundy coveralls and white rubber boots, and are advised to wear old, washable clothes. The Faculty provides disposable coveralls, sleeves, boot covers, safety goggles, latex gloves, face masks and dissection equipment, which must be used appropriately throughout the class. Students must be fully equipped before entering the necropsy room. Photography and video recording are strictly forbidden, and students must maintain a cordial and professional attitude throughout the activity.
Catapereiro necropsy room	Locker room, antechamber and necropsy room with a refrigerated chamber (hooks for large carcasses) and freezers. Students change in the locker room and enter fully equipped; on leaving they leave equipment in the washing area, wash aprons, discard disposables as Group III, disinfect hands, pass the footbath and remove boots before the locker room.
Osteology Laboratory (D.0.18)	Students only with a faculty member present; access according to the room layout and hygiene plan (section 7.7)

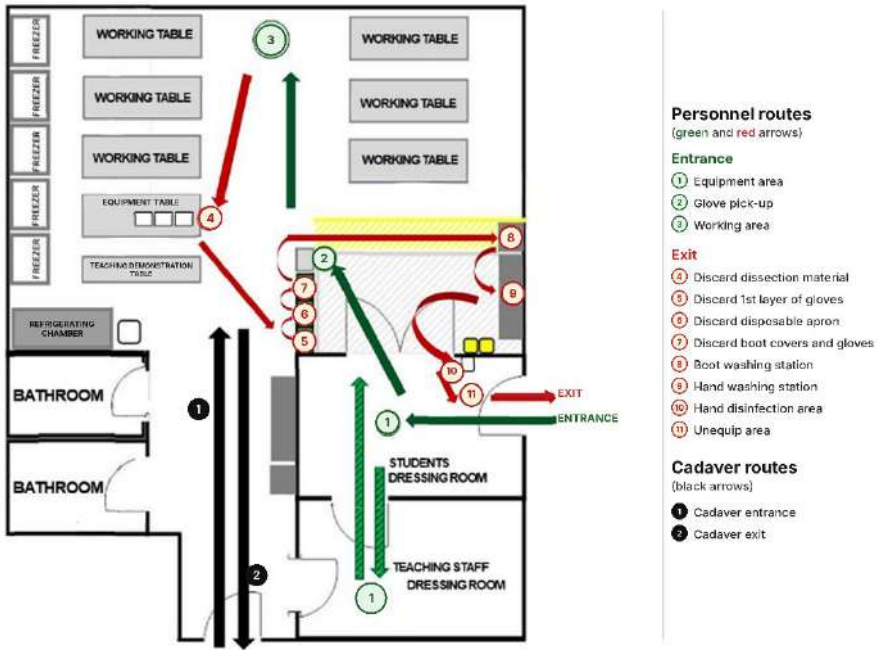


Figure 7.1: Floor plan and routes of the Anatomy/Necropsy Room (Building M)

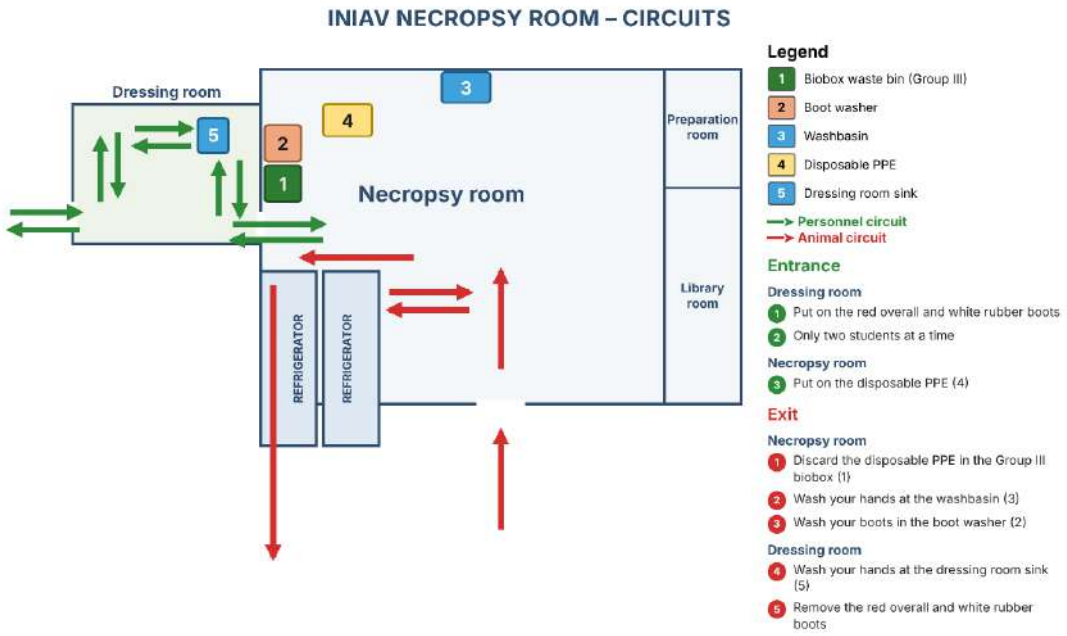


Figure 7.2: Floor plan and routes of the INIAV necropsy room

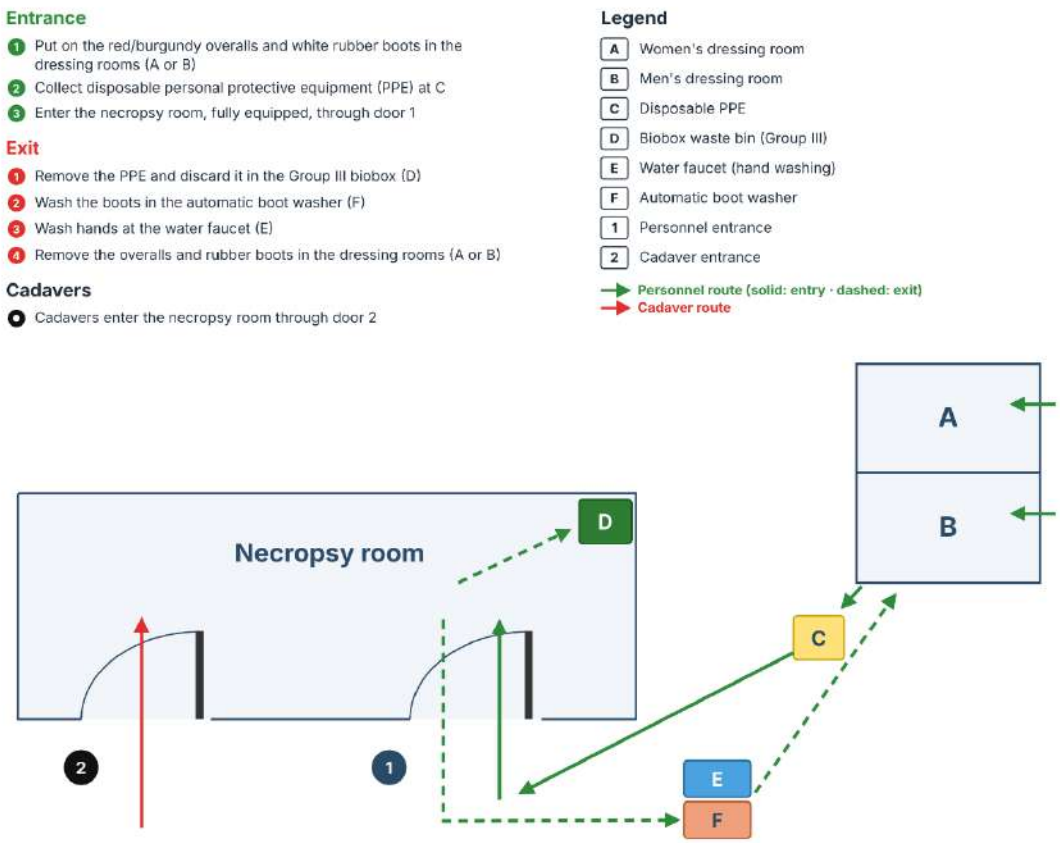


Figure 7.3: Routes in the ETSA necropsy room

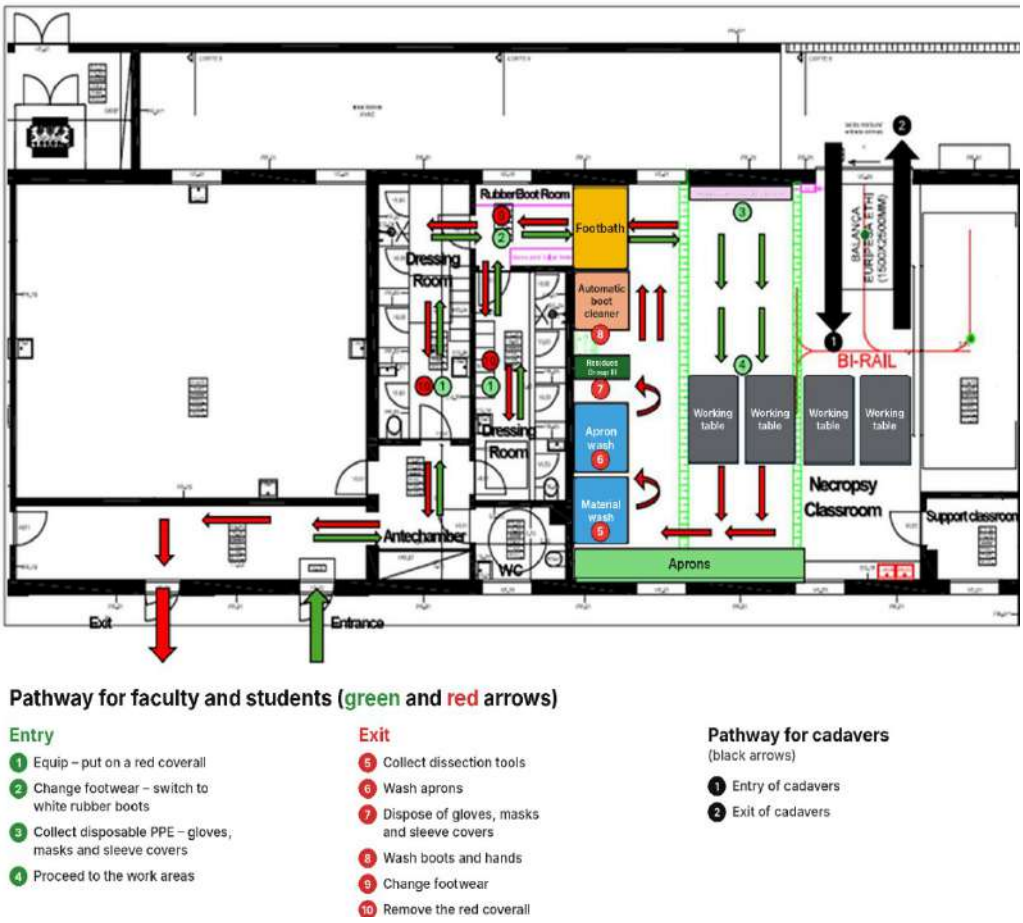


Figure 7.4: Biosecurity routes of the Catapereiro necropsy room

7.3. Origin, Reception and Storage of Cadavers

7.3.1. Origin and Certification

Only clinically healthy animals and specimens of certified health status, from sources with a protocol with FVM-ULusófona and authorised or inspected by a veterinarian at origin, are used.

Table 7.2: Sources of cadavers and specimens

Material	Source and conditions
Dogs, cats, exotic animals	Teaching Hospital, private clinics, municipal kennels and catteries with a protocol; animals from rescue centres arrive already dead
Birds, pigs, small ruminants, fish, rabbits	Slaughterhouses or farms with a protocol, after inspection by the veterinarian on site
Loose organs	Slaughterhouses with a protocol, with the on-site veterinarian's authorisation
Large ruminants and horses (Catapereiro)	Large Animal Hospital and farms with a protocol
Body parts (limbs, trunks, heads)	Necropsy Department, only if certified healthy by its Responsible Veterinarian

Osteology collection	Articulated skeletons (horse, sheep, cow, dog, cat, rabbit, pig, hen, duck), loose bones and plastinated pieces in cabinets and an adjacent room; pieces fixed in FineFix in the Anatomy room bioboxes

- Any suspicion of contagious or notifiable disease leads to rejection of the cadaver or specimen (section 7.6).
- Cadavers are requested at the start of each semester by the coordinator of each unit, with the form delivered by hand to the officer responsible for the Anatomy room. The accredited transport company delivers and collects at least once a week.
- A record is kept for each cadaver or significant specimen (species, origin, date, health certificate), and cadavers for necropsy arrive with a requisition form (species, date, origin, risk category, reason for submission).

7.3.2. Reception and Identification

- Cadavers enter and leave only through door M.0.11, bagged, in the transport company's containers. The responsible officer receives them, weighs them, checks identification against the requisition form, places them in the chamber or freezers and signs the transport form.
- Each cadaver is traceable by a registration form (species, date, origin, risk category, purpose: necropsy, anatomy or surgical pathology); the risk category is on the requisition form of cadavers for necropsy.
- Cadavers sent directly from outside (not via the Teaching Hospital) arrive in a double hermetic bag labelled with species, date, origin, risk category and reason for submission.

7.3.3. Storage

- The Anatomy room has a refrigerated chamber (used to thaw cadavers for classes, each labelled with its purpose) and five deep freezers or chests, each labelled: one for Teaching Hospital animals for necropsy; one, labelled Urbaser only for used cadavers awaiting collection; two for Anatomy classes; one for Surgical Pathology classes.
- Cadavers do not stay more than 24 h at room temperature before refrigeration (48 h if triage for a notifiable disease is pending), nor more than 7 days in the chamber before necropsy. The necropsy cold chamber is for necropsy cadavers only, with restricted access and registration forms on the door.
- No food, drinks, medicines or biological samples in chambers or freezers.

7.4. Attire and PPE

Table 7.3: Attire by room

Room	Compulsory attire	Additional rules
Dissection room (Anatomy)	Mask; double disposable gloves; disposable apron over a red/bordeaux coverall; disposable sleeves; rubber boots put on before entering and removed before leaving	Eye protection at the teacher's discretion. Change in the anteroom and enter fully equipped; disposables never leave the room. No jewellery or watches; contact lenses handled only if essential; once dissection starts, avoid touching face, hair, glasses or own clothes. Non-compliant students do not attend (absence recorded)

Necropsy rooms	As above; face protection always; double gloves in high-risk cases; rubber boots (no street, canvas or perforated shoes)	Respiratory mask with power tools producing aerosols, for wild animals and for all birds; goggles for parrots suspected of chlamydiosis and for hares; rubber apron for Group IV cases; beards covered and skin wounds protected; foxes: goggles and mask because of *Echinococcus multilocularis*
Osteology Laboratory (D.0.18)	White lab coat; closed, cleanable shoes; long hair tied	Gloves for non-plastinated or recently processed specimens; dry, preserved or plastinated material needs no further barrier

Exit sequence (dissection and necropsy rooms): remove the first pair of gloves, then apron, sleeves and second pair, into white bags in the green Group III containers with black lids → walk to the boot washer along the corridor between the yellow and grey lines and wash boots → wash and disinfect hands in the semi-clean area → in the anteroom, remove coverall and boots.

7.5. Hygiene, Cleaning and Necropsy Procedure

7.5.1. Hands and Footwear

- Hands are washed with antiseptic soap (Lifo-Scrub®) and finished with 70 % alcohol (antiseptic gel at Catapereiro): at the end of each class, after removing gloves, after contact with biological material, after the toilet, and on entering and leaving the Osteology Laboratory. (Appendix 1)
- Boots are sprayed with Ipoclor/Klorkleen and scrubbed with a hose and brush in the boot washer at the end of class (automatic boot washer and footbath at Catapereiro, INIAV and ETSA).

7.5.2. Instruments, Surfaces and Rooms

Table 7.4: Cleaning and disinfection in the Anatomy and necropsy rooms

Item	Procedure
Dissection instruments	Immerse in Helizyme® (one capful per 5 L of water) for 10 min → brush → rinse → immerse in Ipoclor/Klorkleen for 5 min → rinse; reusable necropsy instruments then go to the autoclave
Sharps	Yellow sharps containers; never loose on benches
Benches, chamber, trays, freezers	Klorkleen (1 tablet per 5 L), 5 min contact
Rooms	Remove debris with a low-pressure hose (never high pressure) → clean with the ammonia-based cleaner → rinse thoroughly → disinfect with Ipoclor (sodium hypochlorite) at the dose and time of the data sheet → air dry; ammonia-based products and hypochlorite are never mixed or used without rinsing in between; Catapereiro chamber washed after each use
High-risk cases, echinococcosis protocol	Instruments 5 min in sodium hypochlorite ≥3.75 %; table cleaned, scrubbed with detergent and rinsed, then hypochlorite ≥3.75 % for 1 h

- Safety data sheets of all reagents are kept in each room and read before preparing any solution.

Figure 7.5 summarises cleaning and disinfection in the Anatomy and necropsy rooms.

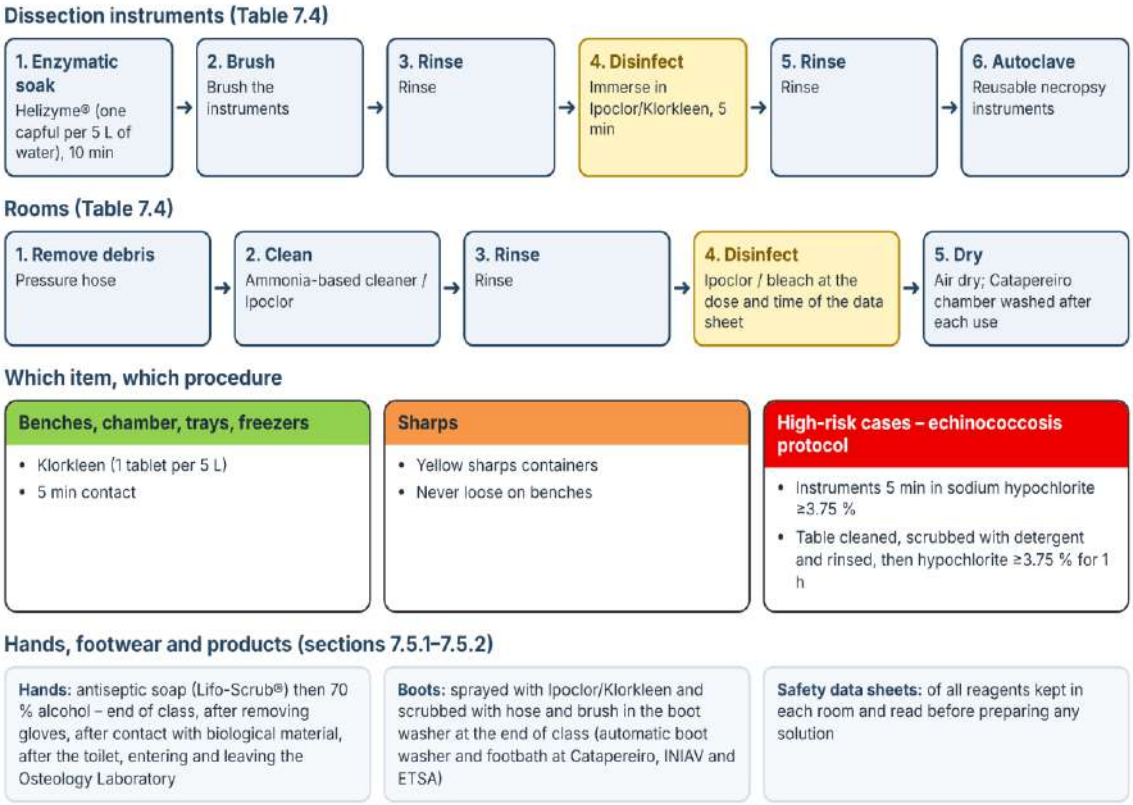


Figure 7.5: Cleaning and disinfection in the Anatomy and necropsy rooms

7.5.3. Necropsy Procedure

The procedure applies to the Anatomy room and the necropsy facilities

Before: check the requisition form (species, date, origin, risk category, reason); take the cadaver to the stainless-steel table; PPE for the risk category (section 7.4); ventilation on, drain protected with gravel, cleaning material ready.

- **During:** external inspection and notes; parasites on the cadaver treated with insecticide, bird feathers wetted with detergent/disinfectant to avoid aerosols; incisions and evisceration without contaminating surroundings; organs with suspicious lesions (especially granulomas) set aside and extra protection taken. Samples go in a jar, in a bag, in a second bag with absorbent paper; the outer bag is disinfected with 70 % alcohol before leaving. Tissues for histopathology are fixed in formalin/FineFix.
- **After:** sharps in yellow containers, other waste in Group III, cadaver remains in black bags tied with a glove; instruments and room cleaned as in Table 7.4; exit sequence of section 7.4; report filed in eDEIALab/QVET

7.6. Suspected Contagious or Notifiable Disease

The Pathological Anatomy faculty decide whether to perform a necropsy, based on the clinical history. The agents of most concern are *Mycobacterium* spp., *Salmonella* and *Clostridium*, together with those of wild and native fauna (ASF in wild boar, avian influenza, tuberculosis in wild

boar and deer, rabies, trichinellosis, toxocariasis, tularaemia in hares, *E. multilocularis* in foxes). Chapter 14 sets the crisis procedures.

Table 7.5: Decision on necropsy by situation

Situation	Decision
Epidemic context	No necropsy
Exotic disease not excluded; recently imported animals	Decided after information from the attending veterinarian; if done, staff only, outside student hours, with mask and goggles
Suspected zoonosis	Staff only, outside student hours, with goggles and mask
Rabies or tuberculosis suspected	Laboratory testing first (rabies: head to the reference laboratory); if confirmed, carcass to a reference institute and disposal by an authorised company
Risk group 3 agents	Necropsy at INIAV, outside teaching. Unexpected granulomatous lesions: mask and PPE are adequate; medical screening may be advised
Risk group 4 agents	Everyone present avoids contact with production animals and farms for one week
Notifiable disease	Avoid accepting; if unavoidable, no students, last necropsy of the day, minimum people; DGAV informed at once; Virkon™ S disinfection in a sanitary crisis; carcass and waste disposed of as DGAV instructs

7.7. Osteology Laboratory

Room D.0.18 hosts Anatomy, Clinical Anatomy and Pharmacology classes and occasional classes of other units.

- Students only with a faculty member present; no live animals, children, food, drinks, smoking or e-cigarettes; no photographs, videos or student electronic devices; no jewellery; nothing may be removed from the room.
- Users with immunosuppressive conditions tell the responsible teacher. The first-aid kit is on the material cabinet near the shower/WC; reagent data sheets are kept in the room.
- Biological material is kept in conditions that preserve it; gloves for non-plastinated or recently processed pieces.
- Cleaning follows the general sequence of Table 7.4 and the programme below; the cleaning staff record each cleaning, and records and product data sheets are kept by the faculty in the laboratory file. Pest control is done by the company contracted by the University (Chapter 10).

Table 7.6: Osteology Laboratory cleaning programme: areas, frequencies, procedures and responsibilities

Cleaning area	Frequency	Procedure	Product	Contact time	Responsible
Floors, tables and computers	On teaching days: after each period of use. On non-teaching days: daily.	Cleaning and disinfection	Ammonia-based multipurpose cleaner	5 minutes	Cleaning staff

Ceilings, walls, doors, chairs, cabinets/display cases and windows	As necessary to maintain cleanliness (indicative frequency: every six months).	Cleaning and disinfection	Ammonia-based multipurpose cleaner	5 minutes	Cleaning staff
Skeletons, bones, anatomical models and digital table	As necessary to maintain cleanliness (indicative frequency: every six months).	Dust removal	Not applicable	Not applicable	Laboratory staff

7.8. Injuries, Tetanus and General Rules

- All students are vaccinated against tetanus before practical classes (proof may be requested); after an injury in a person not fully immunised, tetanus antiserum is considered on medical advice. Vaccination of staff and students is set out in the OSH Manual (sections 7.1 and 8.3). Rabies pre-exposure vaccination is recommended for students who work with animals, and all students are covered by the school accident insurance (Chapter 1, section 1.5.1).
- Infection routes are cuts and punctures, inhalation, hand-to-mouth, skin contact and mucosal splashes. Since exposure cannot always be predicted, full precautions always apply; immunosuppression is disclosed to the teacher.
- **Cut during dissection or necropsy:** stop, call staff, wash hands, disinfect the wound with povidone-iodine and cover it; for deep wounds call 112 (INEM) and activate the school insurance; report and record (Chapter 15).
- No food, drinks or smoking in any of these rooms; bags and belongings in the lockers; no electronic devices or photographs (including of host institutions' facilities and staff); nothing removed from the rooms.
- Visitors only exceptionally, authorised by the responsible teacher and following the same rules; no children or live animals.
- At INIAV and ETSA, students follow the host's attire, circulation and hygiene rules and keep an orderly and professional attitude.

7.9. Waste

Table 7.7: Waste from anatomy, necropsy, osteology and histopathology

Waste	Disposal
Sharps (blades, needles)	Yellow sharps containers
PPE and material soiled with organic matter	White bags in green Group III containers with black lids
Cadavers and animal by-products	Black bags tied with a glove, in the Urbaser chest; collected by the transport company through door M.0.11; at Catapereiro, carcass closed and kept in the chamber until the rendering company collects it
Specimen jars (reserve material)	Red Group IV container
Chemicals and fixatives	Histopathology processor and staining reagents changed by a responsible operator, with the room empty and in the fume hood; used reagents into the jerricans of the waste company, with the LoW code

Wastewater from necropsy cleaning	Follow the established procedure for the collection and disposal of necropsy-room wastewater.
Material linked to a notifiable disease	Outside routine circuits, as instructed by DGAV, by an authorised company

Waste groups are defined in Chapter 1 (Section 1.3.8 and Table 1.7; Appendix 2). The handling, storage, transport and disposal of animal cadavers and animal by-products shall comply with Regulation (EC) No 1069/2009[5] and Commission Regulation (EU) No 142/2011[6], as amended.

7.10. Emergency Contacts

Table 7.8: Emergency contacts

Entity	Contact
Instituto Nacional de Emergência Médica (INEM)	112
Departamento de Saúde Pública	+ 351 218 425 134 / + 351 218 425 143
Centro de Informação Antivenenos (poisoning)	800 250 250
Hospital de Santa Maria, Lisboa	+ 351 217 805 000
Hospital do Barreiro	+ 351 21 214 7300
PSP, Esquadra do Campo Grande	+ 351 219 021 290
Regimento de Sapadores Bombeiros de Lisboa, Quartel de Alvalade	800 913 913

Chapter 8: Biosecurity SOPs in Veterinary Public Health and Food Technology

Teaching food safety and veterinary public health takes students to slaughterhouses, food plants, markets, inspection centres and the municipal animal shelter, and to the food laboratories and Pilot Plant on campus.

Here the aim is twofold: protect students from zoonotic and food-borne agents, and make sure that students never become a source of contamination for food or for the animals and establishments they visit.

8.1. Scope and Objectives

This chapter applies to the practical classes of Food Technology, Sanitary Inspection and Veterinary Public Health, on and off campus, and to postgraduate visits to food industries (whose programme changes each year, with specific instructions before each visit). Its objectives are to:

- protect students, staff and the personnel of visited establishments from zoonotic and food-borne agents;
- prevent academic activities from introducing hazards into the food chain, animals or production environments;
- respect the hygiene standards (BRC, IFS, ISO) and HACCP plans of the establishments visited.

Weekly visits take place during the integrated master's degree, including slaughterhouse visits where senior students follow inspection tasks on the bovine and pig lines. On campus, classes take place in the physical-chemical analysis laboratory, the food microbiology laboratory and the Pilot Plant (small-scale meat and dairy processing). The poster in the entrance of the teaching laboratories summarises the rules.

8.2. Health Declaration

- Before each visit, students fill in a health questionnaire, so that teachers (and, where required, the establishment) know of any risk; on the back they sign that they understood the hygiene rules explained by the teacher. Establishments may also ask for a visitor log.
- Students with gastrointestinal symptoms, fever, respiratory infection or open wounds in the previous days, or with a contagious disease that could harm food or animals, tell the teacher and do not enter production areas.
- Students declare whether they have been on farms, shelters or animal by-product sites in the previous 48 hours. Clothing and footwear used on farms (in Portugal or abroad) are cleaned and disinfected before entering food establishments.
- Students tell the teacher about any immunosuppressive condition.

8.3. General Hygiene Rules in Food Establishments

Table 8.1: Personal rules in food establishments and the shelter

Topic	Rule
Food, drink, smoking	No eating, drinking or chewing gum in slaughterhouses, food plants or the shelter; no smoking or e-cigarettes except in designated outdoor areas; no alcohol or drugs
Jewellery and nails	No watches, earrings, piercings, necklaces, bracelets or artificial nails/eyelashes (plain wedding band allowed; fixed piercings covered); short nails without varnish or gel
Hair	Fully covered by the cap; beards covered
Wounds	Covered with an impermeable, detectable dressing; gloves compulsory
Devices and stationery	No phones, cameras or recording devices (unauthorised use leads to absence and possible sanctions); no notebooks or pens in production areas
Behaviour	Do not touch products, equipment or surfaces unless authorised for inspection; do not cough, sneeze, talk or blow over products (use the forearm); avoid touching mouth, nose, ears, eyes and hair
Hand hygiene	Wash (or disinfect) on entering and leaving, after the toilet and when dirty, drying with paper towels; in slaughterhouses use non-manual sinks. Gloves do not replace hand washing and are compulsory with wounds and to handle viscera, carcasses and by-products

8.4. On-Campus Laboratories and Pilot Plant

8.4.1. Physical-Chemical Analysis Laboratory

- Chemistry laboratory safety rules and the teacher's instructions apply; no procedure starts without instructions, and no equipment or chemical is used without training.
- Lab coat always; gloves when the procedure requires; volatile, corrosive or hazardous chemicals in the fume hood.
- Benches kept clean and clear; equipment switched off when not in use; reagent labels read carefully and bottles kept closed; pipetting aids only (no mouth pipetting).
- Spills, accidents and exposures reported immediately; hazardous spills cleaned only by trained people. Know where the eyewash, safety shower, first-aid kit and spill kit are.
- At the end: surfaces decontaminated, material put away, waste sorted.

8.4.2. Food Microbiology Laboratory

The two aims are to protect samples from contamination and to keep microorganisms from samples and cultures inside the laboratory. Food samples may contain pathogens; under Decree-Law No 102-A/2020, the agents handled belong to risk groups 1 and 2 (Table 1.2), and the general biosafety rules of Chapter 9 apply.

- Access only for authorised people during scheduled classes. Long, clean, well-fitted cotton lab coat, closed, used only in the laboratory; no loose clothing or scarves (open flames); hair tied; no rings, bracelets or watches.

- Hands washed before and after work; gloves for risk group 1–2 organisms only if there are skin lesions. No eating, drinking, smoking, gum, make-up or contact lens handling; nothing in the mouth.
- Avoid aerosols and splashes: no mouth pipetting, filtered tips and pipetting aids, no bubbling or repeated suction; a disinfectant-soaked towel next to the operator; contaminated pipettes and tips straight into decontamination containers; disposable loops where possible; catalase test not on open slides (use a tube, closed plate or capillary).
- Aseptic technique: material prepared and labelled beforehand for traceability; work within about 15 cm of the Bunsen flame, tubes held at 45°; no sudden movements or draughts; one pipette per dilution.
- Benches decontaminated before and after work and after any incident; spills reported and disinfected with the person in charge.
- Waste sorted into Groups I–IV (Table 1.7), cultures autoclaved before disposal.

8.5. Attire for Off-Campus Activities

Students leave their belongings in the changing room lockers and travel with a backpack containing their own clean white cotton lab coat, white rubber boots, water and a light meal. Equipment used in food establishments (boots, coats, helmets) is used only there, never on farms, feed mills or by-product plants.

Table 8.2: Attire by type of establishment

Establishment	Attire
Slaughterhouses and cutting plants	Clean white lab coat or coverall, cap or hairnet, white non-slip rubber boots; on the slaughter line, also mask and gloves (disposable coverall, mob cap, sleeves and gloves for senior students doing inspection)
Food processing, catering and similar	White lab coat over a disposable apron, cap or hairnet, overshoes, mask if required
Municipal dog and cat shelter	White lab coat; cap and overshoes in surgery and treatment rooms
Technical visits to companies	Kit provided by the company (coat, cap, overshoes, mask), gloves when appropriate; comfortable waterproof shoes
Use of knives	Well-sharpened knives; steel mesh glove on the other hand

- Boots are put on in the designated room on arrival; nobody enters before being fully equipped. Disposable aprons and overshoes are discarded at the end of the visit.

8.6. Transport and Visit Flow

- Departures from the campus garage (institutional vehicle) or the faculty gate (bus); latecomers miss the class. Students using their own car tell the teachers, park in visitors' parking and enter with the group. Minimum personal items, which stay in the bus; seatbelts on; no litter.
- On arrival: put on PPE in the designated room, then wash and disinfect boots and hands at the hygiene barrier; follow footbaths, hand disinfection and other barriers of the establishment.
- Visits always go forward, from clean to dirty sectors (separated by floor lines), never back. If this is impossible, boots, aprons and hands are washed and PPE changed before re-entering a clean sector.

- At the end: in the changing room, boots off, lab coat off, both stored in a clean bag; disposables discarded; hands washed. Back at the Faculty, students help wash the wheels and chassis of the vehicle.

Table 8.3: Route of visits by establishment

Establishment	Route and specific rules
Slaughterhouses (red meat, poultry, rabbit)	Cutting room → slaughter hall → lairage and ante-mortem inspection. Students observe inspection with the teachers and hygiene practices, infrastructure and flows; they move only with a teacher or officer, respect routes and danger signs, and keep away from machines
Cutting plants	Dispatch → cutting room, walking through the hygiene barrier
Food processing, catering and other establishments	Raw material (or food) reception → … → toilets and staff areas. In meat plants: new disposable coat, boot and hand washing, new overshoes on entry, discarded on exit. Students may check prerequisite programmes and complete checklists
Fish markets, egg grading and honey extraction centres	Forward flow; PPE of the establishment; hand hygiene; touch nothing unless authorised
Municipal dog and cat shelter	Laboratory, surgery and treatment rooms → adoption areas → quarantine, infirmary and isolation (students stay outside the quarantine area). Recently admitted animals may carry infectious diseases; no eating, drinking or phones; hand hygiene on entering and leaving

8.7. Cleaning of Equipment

- Boots must be washed and disinfected at the designated boot station after use Disposable overshoes must be discarded after each use.
- Helmets, when required, must be cleaned and disinfected after use.

8.8. Injuries and Incidents

- After a cut: stop the activity, wash hands at a knee-operated sink, disinfect the wound (alcohol, chlorhexidine or povidone-iodine) and, if needed, go to the nearest hospital. Report it (Chapter 15).
- Report every spill, accident or exposure to the teacher at once; disinfect material that left its container; wash and disinfect hands.
- If an establishment identifies a zoonotic risk, it informs the Faculty so that students are not exposed.
- Breaking these rules endangers students, others and the food chain, and may be penalised in the assessment and by the Faculty.

Chapter 9: Biosecurity SOPs in Teaching, Diagnostic and Research Laboratories and in the Clinical Skills Training Centre

From didactic laboratories with fixed and stained material to BSL-2 diagnostic and research laboratories that receive clinical samples from many species, laboratories are where students and staff are closest to concentrated biological agents and hazardous chemicals.

This chapter sets out the common rules for all laboratories, the specific requirements of each type, and the procedures for cleaning, waste, accidents and training.

9.1. Scope and Objectives

This chapter applies to all teaching laboratories; the diagnostic and research laboratories located at the S.0.12 facility (Clinical Pathology, Microbiology, Molecular Biology, and Cell and Organoid Culture); the laboratories at the Catapereiro facility, once operational; other research laboratories; diagnostic imaging facilities; and the Clinical Skills Training Centre. Its purpose is to protect all users, including students, researchers, technicians, cleaning and maintenance personnel, and visitors, from biological and chemical hazards; prevent cross-contamination of samples and test results; ensure the safe handling and appropriate disposal of laboratory waste; and promote a strong culture of biosafety through appropriate training and awareness. The research laboratories at both the S.0.12 and Catapereiro facilities belong to Research in Veterinary Medicine (I-MVET) and shall operate in accordance with the I-MVET Good Laboratory Practices and Biosafety Manual. This specific manual complements the present chapter. Where requirements overlap, the more stringent requirement shall apply.

9.2. Biological Risk and Biosafety Levels

- Biological agents are classified into four risk groups (Decree-Law No 102-A/2020 Table 1.2). Groups 2–4 are pathogens. The classification concerns infection only, not allergenic, toxic or carcinogenic effects. Agents of Groups 3 and 4 are not handled in FVM-ULusófona teaching and diagnostic laboratories; if one is suspected, work stops (section 9.6.3).

Table 9.1: Biosafety levels at FVM-ULusófona

Level	Typical use	Main requirements
BSL-1	Didactic laboratories with stabilised or preserved material: parasites in 70 % ethanol, mounted slides, fixed and stained smears, fixed faecal preparations, simulated samples	Doors and hand-washing sinks; easy-to-clean benches resistant to disinfectants, solvents and moderate heat; closed windows
BSL-2	Diagnostic and research laboratories, and teaching laboratories with real samples; agents	Good microbiological technique, biohazard signs and controlled access; biological safety cabinet when aerosols or splashes are likely, and PPE;

	that can cause disease but rarely spread to the community	separated technical rooms with self-closing doors; autoclave nearby or an agreed decontamination route with the licensed waste company

Risk increases with aerosols and vapours, large volumes or concentrations, crowding, intensive use of equipment, unauthorised entry and poor workflow; activities are organised to limit these factors.

BASIC PRINCIPLE

- Every biological sample is treated as potentially infectious, whatever its origin or label, including simulated, fixed or apparently harmless material: many species and fluids are processed, pathogens are invisible, freedom from pathogens cannot be guaranteed, some agents are zoonotic and infective doses are often unknown.

9.3. Entering and Leaving the Laboratory

The rules below are summarised on the poster at each laboratory door.

Table 9.2: Entry and exit procedure for students

Entering	Leaving
Belongings in the changing-room locker or the corridor cabinet (leave it open for the next user); bring only a notebook and pen or a tablet; water bottles stay on the bench outside	Disinfect the bench with 70 % alcohol; close bottles and put material and equipment away
No shorts, and skirts only with tights; closed shoes; hair tied; no rings, bracelets, watches or dangling earrings	Discard waste in the right containers (section 9.8)
Put on a clean, personal white cotton lab coat (Microbiology: coat provided by the Faculty; Parasitology and Infectious Diseases with biological risk: disposable gown provided)	Remove gloves correctly and discard them; wash hands with soap and water, then disinfect with 70 % alcohol
Read the class protocol; disinfect hands with 70 % alcohol and enter by the indicated door	Leave by the exit door; remove the lab coat (back to its cabinet, or to the collection container if soiled)
Wait for instructions on gloves, masks or goggles; disinfect the bench with 70 % alcohol; gloves compulsory if you have cuts on your hands (at the Bunsen burner, cover them with a waterproof dressing instead)	Collect water bottle and belongings. Lab coats, gloves and other PPE are never worn outside the laboratory

9.4. Attire and PPE

Table 9.3: PPE in the laboratories

Item	When
White cotton lab coat, long sleeves, closed	Always; changed when stained or splashed and at least weekly.

Closed, impermeable footwear	Always (no sandals)
Disposable gloves	Any handling of biological material, blood, body fluids or potentially infectious material; nitrile for corrosive or toxic chemicals; changed when contaminated or damaged. Exception: work at an open flame (Bunsen burner) in Microbiology and Food Science, where gloves are not worn because of the fire risk; cuts or wounds on the hands are covered with a waterproof dressing, and hands are washed and disinfected after the session
Mask or respirator	Risk of aerosols; compulsory with liquid nitrogen and splash-prone materials
Goggles or face shield	Splashes, flying objects, UV radiation, highly toxic substances
Impermeable apron	High likelihood of splashes or aerosols of biological or chemical material

- PPE is never worn in corridors, offices or outdoors, and is stored apart from personal clothing.
- Gloved hands do not touch phones, face, hair, door handles, notebooks, computers or switches; gloves are removed aseptically, discarded and followed by hand washing.
- Visitors and maintenance staff enter only when authorised and informed of the risks, accompanied when needed and with suitable PPE.

9.5. Work Practices

9.5.1. General Conduct

- No food, drink, smoking, make-up, contact lens handling, creams or perfume; no mobile phones.
- No running or distracting others; do not touch face, hair or glasses or chew pens; never smell or taste liquids or chemicals.
- Doors closed during work and locked when unattended; no children, unauthorised people or animals.
- Plan the work, organise material in advance, work calmly; keep benches clear; label everything on benches, refrigerators and freezers.
- Move samples as little as possible, in racks or secondary containers; report any spill, incident, exposure or anomaly at once, even if minor.

9.5.2. Samples

- **Reception:** in the designated area, by trained staff, who check container integrity and identification (species, clinical suspicion), keep request forms apart from samples, decontaminate soiled containers and discard contaminated packaging as biological waste. Samples from other institutions arrive in rigid, leak-proof boxes with transport conditions indicated. Damaged or leaking containers are opened only in the biological safety cabinet, with PPE, after informing the person responsible; unsuitable samples are rejected.

- **Handling:** samples are supervised by teaching or technical staff, labelled, and kept only in sample refrigerators (never with food or reagents only). Open containers gently; never put used instruments back into the original container; new tip for each sample. Inside the laboratory, samples move forward in closed secondary containers; students never take material out.
- **Shipping:** triple packaging (individual primary container, leak-proof secondary packaging with absorbent material, rigid outer box), request forms kept separate, outer packaging clean, intact, labelled, and disinfected with 70 % alcohol before leaving.

9.5.3. Biological Safety Cabinets

- Used for infectious material of significant risk, procedures with aerosol or splash risk, and whenever the risk assessment requires; if cabinets are scarce, serum separation and handling of secretions and fluids have priority.
- Switch on at least 5 min before and leave on 5 min after work; disinfect the interior before and after use and after spills; wait 1 min after putting arms in; work in the centre or back, never blocking the grilles; keep few items inside; the pipette discard container stays inside; do not open the sash during use; UV light does not replace chemical disinfection.
- Cabinets are installed away from doors, windows and traffic, and certified at least yearly (including HEPA filters); UV lamp hours are recorded (lifetime about 7,500 h). Cabinets are disinfected before any maintenance.

9.5.4. Centrifuges

- Closed, intact, preferably screw-capped tubes, at least 2 cm below the rim; balanced loads (never balanced with saline or bleach); angle rotors only in ultracentrifuges.
- Never open before the rotor stops; in refrigerated centrifuges wait a few minutes before opening; stay nearby during the first minutes; inspect the interior at each use and decontaminate regularly and before any repair.
- **Broken tube:** keep the lid closed at least 30 min; then, with a mask, isolate the area, remove the buckets and decontaminate with a validated disinfectant; report the incident.

9.5.5. Pipetting and Sharps

- No mouth pipetting; pipetting aids and filtered tips; do not blow into liquids or mix by repeated suction; dispense gently; never pipette with a needle and syringe.
- Cover the work area with absorbent paper (discarded as infectious waste); contaminated pipettes and tips go straight into disinfectant in an unbreakable container (inside the cabinet when used there).
- Limit sharps: plastic Pasteur pipettes instead of glass; syringes and needles only when essential; never recap, bend, break or remove needles; discard the whole assembly in a rigid sharps container not filled above the line.

9.5.6. Other Equipment

- **Smears:** fixation and staining may not kill all organisms; handle with forceps, store correctly and disinfect before disposal.

- **Refrigerators and freezers:** contents labelled and inventoried; unidentified or old material decontaminated and discarded; no flammables except in explosion-proof units; defrost before ice exceeds 1 cm (empty, wash, disinfect with 70 % alcohol for 2 min); gloves and coat for cleaning; disinfect before maintenance.
- **Shakers and vortexes:** check speed and volume, secure tubes, let rest before opening, use the cabinet when needed.
- **Microscopes and balances:** keep clean and dust-free; switch off after use; clean and disinfect with gloves.
- **Electrical and electrophoresis equipment:** do not use with damaged cables or near water; disconnect before opening a tank.
- Manuals are kept next to each instrument (preferably in Portuguese) and users are trained before using new equipment.

9.6. Laboratory Profiles

9.6.1. Didactic BSL-1 Laboratories (Parasitology, Immunology, Clinical Diagnosis and Research in Veterinary Parasitology)

Students observe stabilised material (section 9.2). There are no viable agents of significant risk, but all material is still handled as potentially infectious. Specific rules: read the protocol and clear doubts first; label all preparations; keep the bench clean and dry; open containers gently, avoiding splashes of ethanol, stains or preservatives; do not put instruments back without the teacher's indication; handle slides and coverslips with care and carry boxes with both hands; do not bring the face close to samples; stop and ask the teacher in case of doubt; use equipment only with authorisation; do not sit on benches or put bags on them. In case of spill of preservative or sample, keep calm, move other material away, tell the teacher and follow section 9.7.2.

9.6.2. BSL-1/2 Diagnostic Teaching Laboratories (Pathology and Clinical Presentation of Parasitic Diseases I and II)

Students practise diagnostic techniques of a parasitology laboratory with agents of risk groups 1–2, often replaced by non-pathogenic strains; risk group 3 agents are not handled. BSL-2 work uses the cabinet and PPE as primary barriers and the laboratory design as secondary barrier. Samples are kept in the dedicated refrigerator, labelled with species and clinical suspicion. Sections 9.3 to 9.9 apply.

9.6.3. I-MVET Diagnostic and Research Laboratories (S.0.12)

Four laboratories – Clinical Pathology, Microbiology, Molecular Biology, and Cell and Organoid Culture – occupy separate rooms of the S.0.12 facility (Campo Grande, Building S, floor 0) and share the following rules:

- Access only for authorised people; doors closed during work and locked at the end; biohazard signs at the entrances; no children, unauthorised people or animals; hand hygiene at entry and exit; technical areas only for technical work (meetings and study elsewhere).

- Layout and workflow separate clean material, incoming samples, material in process, finished analyses and waste, without crossings. Samples move between rooms closed and labelled; equipment and consumables are not moved between laboratories without authorisation and decontamination; shared equipment follows procedures that prevent cross-contamination.
- Cultures and infectious material are never left unattended or accessible; work only starts when containment equipment, PPE, waste containers and procedures are in place.

Table 9.4: Responsibilities in the I-MVET S.0.12 laboratories

Person responsible for each laboratory	Implement and review procedures; designate a biosafety focal point; train staff; make SOPs, manuals and SDS available; supply PPE; maintain and certify cabinets and critical equipment; ensure health surveillance; record and analyse accidents, incidents and near misses; stop activities whose risks are not controlled; make sure internal transport and autoclaving routes are known
All users	Follow this manual and the SOPs; use PPE; report hazards and incidents; keep workstations clean; use only equipment and procedures they are trained and authorised for; keep materials, cultures and waste labelled and contained; clean and disinfect after work
Teachers and technicians supervising students	Inform the responsible person of planned activities and materials; train students before practical work; supervise until competence is shown; ensure SOPs are read and areas left clean; report accidents
Visitors, maintenance and cleaning staff	Enter only when authorised and informed of risks; accompanied when needed; suitable PPE

Table 9.5: Specific requirements of each I-MVET S.0.12 laboratory

Laboratory	Specific requirements
Clinical Pathology (BSL-2)	Samples from companion animals, wildlife, horses and farm animals. Reception area: check integrity and identification against documents, keep forms separate, decontaminate soiled containers; damaged or leaking containers never opened on an open bench; unsuitable samples rejected. Closed containers and defined workflow inside; only the quantity needed at the bench. Centrifugation and pipetting as in sections 9.5.4–9.5.5; sealed buckets opened in containment when aerosols are possible; never mix disinfectants with samples. Triple packaging for samples leaving the laboratory
Microbiology (BSL-2 practices)	Cultures concentrate viable agents: plates and tubes kept closed and opened only as long as needed; procedures that may create aerosols (transfer, mixing, vortexing, centrifugation) assessed and done in the cabinet when indicated. Reference strains, controls and isolates clearly labelled, stored apart from routine samples with restricted access and traceability records; unwanted or unidentified material discarded. Material for autoclaving collected in closed, labelled containers and taken to the DLCTT laboratories (E.1.7 or E.0.7, according to the day). If a high-risk agent is suspected, routine work stops until risk assessment and referral are decided with the person responsible
Molecular Biology	Pre- and post-amplification activities separated physically or by workflow, with dedicated equipment; movement between them follows anti-contamination rules. Extraction or amplification does not make the original sample non-infectious; samples that may contain viable agents keep their biological risk handling. Surfaces cleaned with procedures that remove nucleic acids and amplicons
Cell and Organoid Culture	Primary cells, tissues, blood and clinical material handled in a class II cabinet according to the risk assessment; cell lines and organoids are not assumed hazard-free. Cabinet disinfected before and after use (UV is not a substitute). Liquid nitrogen only by trained staff with face shield and cryogenic gloves, without obstructing vents. CO2 incubators cleaned according to procedure; contamination (bacteria, fungi,

	mycoplasma, cross-contamination) investigated, not hidden with antibiotics. Maintenance, culture identity and contamination events recorded

Table 9.5A shows the zones of the S.0.12 laboratories and the circuits of people, samples and waste (colours as in Chapter 1, Table 1.13). People enter through the changing rooms and reach the other laboratories only through the Clinical Pathology laboratory, and leave by the same route, removing PPE and washing their hands. Samples arrive closed, in a secondary container. Waste leaves each laboratory in closed, labelled containers for autoclaving in the DLCTT laboratories (E.1.7 or E.0.7).

Table 9.5A: Zones and circuits in the I-MVET S.0.12 laboratories

Colour	Zone and rooms	Rules
Yellow	Transition – intermediate risk: changing rooms with lockers	Belongings in the lockers; lab coat put on at entry and removed at exit; hand hygiene
Yellow	Work area – intermediate risk (BSL-2): **Clinical Pathology laboratory**	Authorised people only; PPE as in Table 9.3; the other laboratories are reached only through this room
Red	Restricted area – high risk (BSL-2): **Microbiology**	Named staff and a small number of supervised students; door closed; cultures and infectious material handled in the biological safety cabinet
Red	Restricted area – high risk: **Molecular Biology**	Named staff and a small number of supervised students, to protect people and to prevent contamination of samples and reactions; door closed
Yellow	Transition – intermediate risk: antechamber of the Cell and Organoid Culture room	Gown and gloves put on before entering and removed on leaving
Red	Restricted area – high risk: **Cell and Organoid Culture room**	Named staff only; work in the class II cabinet, disinfected before and after use
Orange	Decontamination – outside S.0.12: DLCTT laboratories (E.1.7 or E.0.7)	Material for autoclaving from all S.0.12 laboratories taken in closed, labelled containers (section 9.8)

9.6.4. Laboratory-Specific Requirements by Discipline

Table 9.6: Laboratory-specific requirements by discipline

Food Science laboratories	Cotton lab coats; gloves not advised with Bunsen burners; procedures follow the food microbiology rules of Chapter 8
Parasitology / Mycology	Cotton lab coats; gloves mandatory when handling biological material; additionally, disinfection with Aniospray-type product
Virology	Single-use disposable lab coats; gloves mandatory when handling biological material; disinfection with specific products and 70° ethanol
Immunology	Cotton lab coats; disposable gloves always in contact with samples; disposable gowns when biological risk exists; samples simulated or controlled
Infectious Diseases	Cotton lab coats, Disposable gowns whenever biological risk exists; respiratory protection when appropriate

Microbiology	Cotton lab coats; wearing gloves is not advised when working with Bunsen burners; respiratory masks available if necessary; calculators provided, so mobile phones are not allowed; the platinum loop must be disinfected between uses; gas supply valve must be closed in case of fire outbreaks; benches disinfected with 70% alcohol before and after class; cuts or wounds on the hands covered with a waterproof dressing

9.6.5. Zoonotic Agents of Concern

Table 9.7 lists examples of zoonotic agents that may be present in laboratory samples; it supports, but does not replace, the risk assessment of each activity (species, sample type, suspected agent, procedure). Preventive measures: treat samples as infectious; PPE suited to the material; avoid aerosols and splashes; use containment; do not work with uncovered wounds; disinfect surfaces and equipment; discard waste correctly; wash hands; report any exposure. If a high-risk agent is suspected, routine handling stops.

Table 9.7: Examples of zoonotic agents relevant to FVM-ULusófona laboratories, sources of exposure and main routes of transmission

Group	Examples	Possible sources of exposure	Main transmission routes
Bacteria	*Salmonella* spp.	Faeces, contaminated food, carrier animals	Ingestion, contact with contaminated surfaces
Bacteria	*Campylobacter* spp.	Faeces, birds, companion animals	Ingestion, direct or indirect contact
Bacteria	*Leptospira interrogans*	Rodent urine, dogs, production animals, contaminated environments	Contact with damaged skin or mucous membranes
Bacteria	*Brucella* spp.	Blood, tissues, reproductive secretions, placenta, aborted foetuses	Aerosols, contact with mucous membranes or damaged skin, inoculation
Bacteria	Mycobacterium bovis	Respiratory samples, tissues, infected animals	Inhalation of aerosols, contact with contaminated material
Bacteria	*Coxiella burnetii*	Placenta, secretions, milk, contaminated dust	Inhalation of contaminated aerosols or dust
Bacteria	*Listeria monocytogenes*	Food samples, environment, animals or contaminated tissues	Ingestion, direct or indirect contact
Bacteria	*Chlamydia psittaci*	Birds, respiratory secretions, dried faeces, dust	Inhalation of contaminated aerosols or dust
Viruses	*Rabies virus*	Saliva of infected animals	Bite, scratch, contact with mucous membranes or damaged skin
Viruses	Zoonotic influenza viruses	Birds, pigs, respiratory secretions	Inhalation, contact with secretions
Viruses	Hantavirus	Rodent urine, faeces and saliva	Inhalation of contaminated aerosols
Viruses	West Nile virus	Birds, mosquitoes, biological samples	Vector-borne transmission; laboratory contact with contaminated samples
Parasites	*Toxoplasma gondii*	Cat faeces, tissues, soil or contaminated material	Ingestion, contact with contaminated material
Parasites	*Echinococcus* spp.	Faeces of dogs or other canids, contaminated organs	Accidental ingestion of eggs, indirect contact
Parasites	*Giardia duodenalis*	Faeces, contaminated water	Ingestion, faecal–oral contact
Parasites	*Cryptosporidium* spp.	Faeces, contaminated water	Ingestion, faecal–oral contact
Fungi	*Microsporum* spp.	Skin, fur, scales, contaminated surfaces	Direct or indirect contact
Fungi	*Trichophyton* spp.	Skin, fur, contaminated surfaces	Direct or indirect contact

9.6.6. Other Research Laboratories

Other laboratories including histology and pathological anatomy, biochemistry, pharmacology and toxicology must have documented biosafety procedures identifying their location, activities, users, biological and chemical hazards, samples handled, required equipment and available safety measures. Access rules, user responsibilities, equipment training requirements and the person responsible for biosafety must also be defined, under the coordination of the HSBC. In histology and immunohistochemistry laboratories, formaldehyde and staining reagents must be handled using appropriate ventilation, such as fume hoods, and suitable equipment.

9.7. Cleaning, Disinfection, Spills and Chemicals

9.7.1. Surfaces and Equipment

- Work surfaces are disinfected before and after work, between procedures when there is risk of cross-contamination, after any spill and at the end of the day, by trained people with PPE, using products compatible with the surfaces and respecting concentration and contact time.

Table 9.8: Disinfectants in the S.0.12 laboratories

Product	Use
Virkon™ S 1 % (1:100)	Work surfaces and equipment
CaviWipes™	Surfaces and equipment, according to the manufacturer
Klorkleen® (NaDCC), 1 tablet per litre (about 1,000 ppm available chlorine)	Floors
Mikrozid® AF Liquid	Rapid disinfection of small equipment and alcohol-compatible surfaces, according to the manufacturer
70 % alcohol	Benches (teaching laboratories), hands, outer packaging

- Equipment is decontaminated regularly, when contamination is suspected and before maintenance or transfer; if full decontamination is impossible, the technician is told of the residual risk. Cleaning is recorded when required, and cleaning materials from contaminated areas are kept from spreading contamination.

9.7.2. Biological Spills

Table 9.9: Response to biological spills

Small spill (manageable by trained staff)	Large spill, high-risk agent or aerosols
Warn the person responsible and keep others away → gloves and coat (more PPE if needed) → spill kit → cover with absorbent material without splashing → apply disinfectant for the contact time → remove absorbent material as biological waste → clean and disinfect again → remove PPE, hand hygiene → record the incident	Stop work and close off the area → inform the person responsible immediately → no routine cleaning until risks are assessed → the person responsible decides containment, decontamination and PPE → re-entry only when declared safe → record and assess impact on other rooms of S.0.12

9.7.3. Chemicals

- Chemicals are stored in labelled, restricted areas according to hazard and compatibility; containers kept closed and labelled; flammables in suitable storage away from ignition sources. Chemical risk assessment, exposure monitoring and health surveillance follow the OSH Manual (section 7.5 and Chapter 6).
- Disinfectants are never mixed with other products unless compatibility is confirmed (Table 9.10).

Table 9.10: Hazardous chemical combinations

Chemical combination	Potential hazard
Sodium hypochlorite or NaDCC with acids	Release of chlorine gas
Sodium hypochlorite or NaDCC with ammonia or ammonia-containing products	Formation of hazardous chloramines
Sodium hypochlorite or NaDCC with alcohols or organic solvents	Potential hazardous reactions and formation of harmful by-products
Flammable alcohols or organic solvents with oxidising agents, heat or ignition sources	Fire or explosion
Strong acids with strong bases	Exothermic reaction, with risk of heat generation and splashing

- The SDS is consulted before use; corrosive, volatile, toxic or flammable chemicals are handled with PPE and in the fume hood; acids and bases are diluted carefully; chemical spills follow the SDS (not the biological spill procedure); chemicals never go down the sink or in general waste unless allowed.
- An up-to-date inventory with storage locations is kept; expired or unwanted chemicals are disposed of properly; staff are trained on chemical hazards, spills and SDS access.

9.8. Laboratory Waste

Healthcare waste shall be managed in accordance with the institutional Waste Management Plan, the general waste management regime established by Decree-Law No 102-D/2020[3], as amended, and the specific classification and management requirements set out in Dispatch No 242/96[10]. Waste codes shall be assigned in accordance with the European List of Waste, established by Commission Decision 2000/532/EC, as amended[11]. Animal by-products shall be managed separately from healthcare waste, in accordance with Regulation (EC) No 1069/2009[5] and Commission Regulation (EU) No 142/2011[6], as amended. All waste streams shall be segregated at the point of generation, in accordance with the procedures described in Chapter 1.

[10] Portuguese Ministry of Health. Dispatch No 242/96 of 13 August 1996, on the classification and management of healthcare waste. Diário da República, 2nd Series, No 187.
[11] European Commission. Commission Decision 2000/532/EC of 3 May 2000 establishing the European List of Waste, as amended. Official Journal of the European Communities, L 226, 6 September 2000.

Table 9.11: Classification, packaging and treatment of laboratory waste (Appendix 2)

Group	Waste	Packaging	Final treatment
Group I Urban and equivalent waste	Common refuse and recyclables	Designated containers; black bags (common refuse)	Recovery; landfill
Group II Non-hazardous, uncontaminated	Uncontaminated PPE (gloves, masks, pipette tips, aprons); serum bottles, pads and non-contaminated nappies	Black bags (same circuit and destination as urban waste)	Landfill
Group III Biological origin waste	Collection and storage material for blood, urine and organic fluids; reagents and consumables of blood, urine and fluid analyses; microbiology, mycology and genetic analysis material; PPE in contact with biological products; non-identifiable anatomical pieces	White bags; green containers with black lid (60 L or 30 L)	Pre-treatment (autoclave) by the licensed operator, then landfill; or incineration
Group IV Specific hospital waste	Sharps (needles, scalpels, blades, catheters, invasive material); rejected chemicals and drugs; cytostatics and manipulation material	Red bags; red containers with black lid; imperforable containers (yellow with red lid) for sharps	Incineration
M1 Category 1 animal by-products	Identifiable anatomical pieces; animal carcasses	Black bags; black containers with red lid; refrigeration	Incineration

Table 9.12: Liquid waste, LoW codes and precautions

Waste	LoW code	Specific precautions
Non-halogenated solvents (alcohols, ketones, hydrocarbons, formaldehyde, phenol, methanol)	07 01 04	Own hermetically closed, solvent-resistant container, away from ignition sources; 5/10 or 25 L
Methanol-based dyes	07 03 04	As above
Halogenated solvents (chloroform, dichloromethane, carbon tetrachloride)	07 03 03	Avoid direct contact; labelled, sealed containers
Gram stain dyes (safranin, crystal violet, methylene blue, fuchsine, malachite green)	07 06 04	Waste designation placed before container starts being used
Acid solutions	06 01 06	Protective gloves and clothing, ocular and facial protection
Bleach and hydroxide solutions	06 02 05	Resistant container; avoid contact with acids
Liquids from biological analyses (blood, plasma, urine, microorganism cultures)	18 01 03	Identified, puncture-resistant containers

Unidentified reagents	16 05 06	Protective gloves and clothing, ocular and facial protection

- Liquids go into jerricans labelled (on the side opposite the opening) with the waste name and LoW code, never filled to the top; decanting is done in the fume hood; in case of doubt, ask the licensed waste company.
- Solid waste circuits: Group I/II and recycling containers collected by cleaning staff; stains in labelled jerricans; microbiology and mycology material in closed white bags inside green containers with black lid; biological fluids from analysers in a labelled jerrican; sharps in yellow containers with red lid. Group III bags are closed at two-thirds full and placed in lined green containers. Everything is taken to the signposted Waste Room next to building T (restricted access, separate from clinical material, medicines and clothing), collected twice a week; Group III/IV are handled with plastic apron and two pairs of gloves.
- Discard waste immediately; do not overfill (bags 2/3, containers and sharps boxes 3/4); never press waste down or take it back out; infectious material is autoclaved in impermeable containers or autoclave bags before disposal, without pre-washing; close containers before transport and report damaged containers or mistakes.

9.9. Accidents and Emergencies

If in doubt about severity or symptoms worsen, call INEM (112); for poisoning, call the Poison Information Centre (CIAV, 800 250 250). For further emergency contact details, see Chapter 7.10: Emergency Contacts (Table 7.8).

Table 9.13: First response to exposure

Exposure	Immediate action
Intact skin	Wash with soap and water, dry, report and record when relevant
Damaged skin, cut or puncture	Do not squeeze; wash with soap and water; rinse; disinfect 5 min (chlorhexidine or validated product); cover with a dressing; see a doctor; inform the person responsible; record and complete the work accident form. Broken glass is never picked up by hand
Eyes or mucous membranes	Eyewash for at least 15 min, holding eyelids open; see a doctor; report
Large splash on the body	Emergency shower, removing contaminated clothing; see a doctor; report
Aerosols outside the cabinet	Stop; evacuate and close the room; inform the person responsible; send exposed people for medical evaluation; no entry for the time set by the responsible person; decontamination only by protected, authorised staff; record
Irritant or toxic gases	Move the person to fresh air; call INEM or CIAV (symptoms may appear later)
Burns	Cool under running water at about 20 °C, 20 cm from the tap, for 10 min

- **Fire:** keep calm; switch off power and gas; small fires: smother containers (cover the opening), use CO2 or powder extinguishers; never water in laboratories; sodium, potassium or lithium: powder (or sodium carbonate/salt), never CO2 or water; burning clothing: shower, or roll the person on the floor or wrap in a fire blanket. Large fires: alarm, evacuate, cut power, call 112 indicating the location and that it is a laboratory. The University emergency organisation is described in the OSH Manual (section 9.2).

- **Accident register:** person, laboratory, date, time and place; type of exposure; description; material and agent; immediate measures; medical referral; signatures of the worker, the person responsible and the safety technician. A daily good-practice checklist is kept in the laboratory. Incidents feed the CAPA system (Chapter 15).

9.10. Health Surveillance and Training

- Laboratory workers have a health check before starting and periodic occupational health surveillance; records identify more susceptible people. Health surveillance follows the OSH Manual (Chapter 6).
- Pregnant and immunocompromised people, or those with conditions increasing susceptibility, are assessed by occupational health and tasks are adapted; women of childbearing age are informed of agents harmful to the foetus. Students disclose such conditions to the teacher (Chapter 1, section 1.5.5).
- Annual training for laboratory and support staff, and whenever procedures or equipment change; basic training for students, trainees and temporary staff before work, including eyewash, first-aid kit, extinguishers and spill kits. Training is recorded and every user signs the acknowledgement of this manual.

9.11. Diagnostic Imaging

- Hands are washed between all cases. Patients with suspected infectious disease are imaged only when needed, at the end of the day (or before lunch); otherwise, the room and equipment are disinfected before the next patient.
- The primary clinician informs the imaging staff of the precautions, organises transport (cage, trolley or stretcher) and indicates barrier clothing (at least gown and gloves; masks and goggles for certain zoonoses); as few people as possible take part.
- X-ray: detector in a plastic bag when in contact with the patient; lead aprons and dosimeters compulsory, with disposable outerwear on top when needed. Ultrasound: pillow in a plastic bag under a disposable pad; probe in a disposable cover for MDR patients; probe and cable disinfected.
- Afterwards: the room is closed, cleaned and disinfected; floors mopped with disinfectant; lead aprons and gloves sprayed; lead ropes disinfected weekly; waste and excreta in a sealed container; everyone in contact washes hands and changes outerwear. See also Chapters 2 and 5.

9.12. Clinical Skills Training Centre

- Training on models and simulators (knots, sutures, bandaging, catheterisation, clinical examination) before contact with patients. General laboratory rules apply (attire, hair, jewellery, no food, hand hygiene at entry and exit).
- A footbath at the entrance and exit of the training area, renewed on schedule.
- Gloves, and the protection of the corresponding chapter, for activities with biological material (simulated body fluids, cadaver parts from the anatomy circuit).
- Simulators and equipment are cleaned and disinfected after each session according to the manufacturer and the Centre's hygiene plan, and are not taken to clinical areas. Waste follows section 9.8. A teacher or supervisor is always present.

Chapter 10: Biosecurity SOPs for Pest Control

Arthropods, rodents and wild birds can carry infectious agents, contaminate feed, equipment and surfaces, and break the hygiene and containment barriers of hospitals, isolation units, anatomy rooms, laboratories and food areas.

FVM-ULusófona controls them through one Integrated Vector Management Programme (IVMP): prevention, monitoring, timely intervention and written records.

10.1. Objectives and Responsibilities

Portugal's climate supports mosquitoes (dirofilariosis, West Nile fever), *Culicoides* midges (bluetongue, Schmallenberg), sand flies (*Leishmania infantum*) and ticks (borreliosis, babesiosis, ehrlichiosis), while rodents and birds spread agents such as *Salmonella* and *E. coli* and damage buildings. The IVMP combines physical, chemical and environmental measures and complies with the legislation on biocides and protected wildlife. This chapter:

- identifies the pests relevant to FVM-ULusófona and the agents they carry (Tables 10.1, 10.2 and 10.6);
- defines how pest activity is monitored (section 10.3) and how it is prevented and controlled in each type of facility (sections 10.4–10.7);
- sets the coordination with the contracted pest control company and the records needed to review the programme (section 10.8).

Everyone shares responsibility: staff keep their areas clean and tidy, keep doors and openings closed and report any sign of pests at once; students follow staff instructions and respect any area closed during a pest control intervention.

Figure 10.1 shows the four steps of the IVMP and the sections where each is described.

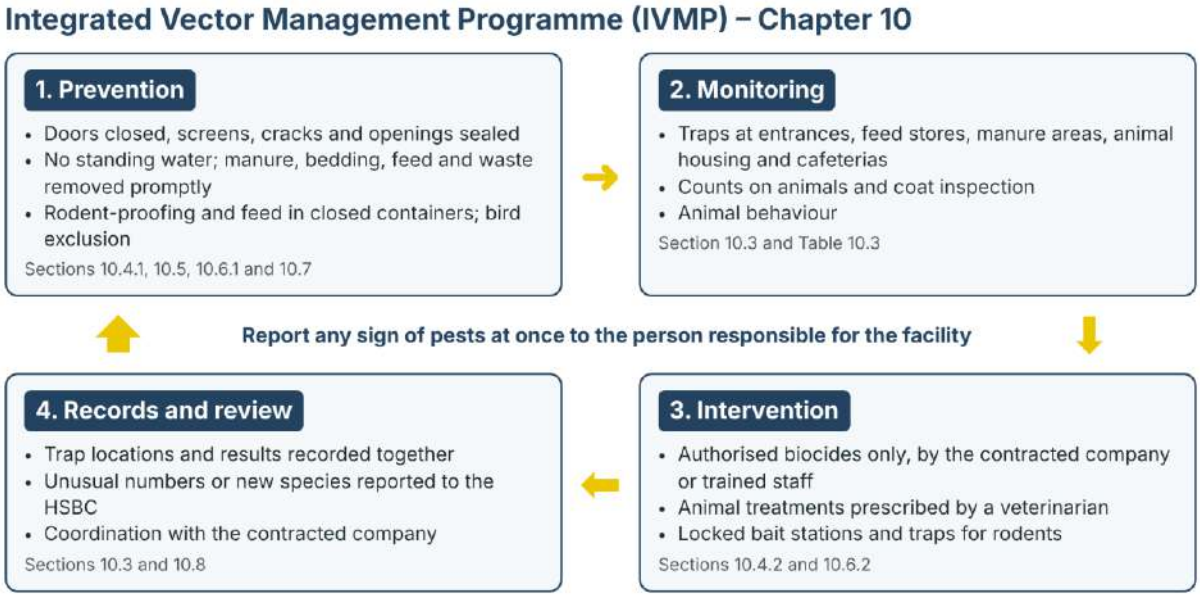


Figure 10.1: Integrated Vector Management Programme (IVMP)

10.2. Arthropods of Interest

Arthropods transmit agents biologically (the agent develops or multiplies in the vector) or mechanically (it is simply carried). The presence of a vector does not prove that a pathogen is circulating at the Faculty, but several vector species are established in Portugal.

Table 10.1: Flying arthropods of veterinary and biosecurity concern

Group	Main species	Relevance
Mosquitoes	*Culex*, *Aedes*, *Anopheles*	*Culex pipiens*: West Nile virus; *Dirofilaria*. *Aedes albopictus* is under surveillance in Portugal (dengue, chikungunya; no local transmission implied)
Biting midges	*Culicoides* spp.	Bluetongue and Schmallenberg viruses; larvae in moist soil and organic matter
Sand flies	*Phlebotomus perniciosus*, *P. ariasi*	*Leishmania infantum* (canine leishmaniosis); risk varies by area
House and face flies	*Musca domestica*, *M. autumnalis*	Mechanical carriage from faeces and waste to feed, equipment and surfaces
Stable and horn flies	*Stomoxys calcitrans*, *Haematobia irritans*	Painful bites, stress, lower welfare; some mechanical transmission
Tabanids and black flies	Horse flies, *Simulium* spp.	Painful bites; mechanical carriage; *Onchocerca* (black flies)

Table 10.2: Ticks and other ectoparasites

Parasite	Main agents or effects
Ixodes ricinus	*Borrelia burgdorferi* s.l. (Lyme borreliosis), *Anaplasma*
Dermacentor reticulatus	*Babesia canis*
Rhipicephalus sanguineus	*Ehrlichia canis*, *Babesia*, *Rickettsia* (Mediterranean spotted fever)
Fleas	Dermatitis; *Bartonella henselae*, *Dipylidium caninum*

Lice	Irritation, anaemia in young or weak animals, secondary skin infection
Mites (*Sarcoptes*, *Psoroptes*, *Chorioptes*, *Demodex*)	Mange, pruritus, otitis; some *S. scabiei* variants are zoonotic

- Ectoparasites arrive on animals, people and shared equipment (grooming tools, blankets, carriers). Anyone finding ticks or other ectoparasites tells the person responsible for the facility; a veterinarian identifies the parasite and decides on treatment of the animal and the environment.

10.3. Monitoring

Monitoring shows where pests are active, finds breeding sites and checks whether control works. It uses three complementary sources, recorded together (section 10.8): traps, direct counts on animals and animal behaviour.

Table 10.3: Monitoring methods

Method	Target and use
CO_2-baited light traps	Mosquitoes
OVI light traps	*Culicoides* (reference method in surveillance)
UV traps, electric fly killers, sticky traps, bait traps	Flies and other insects indoors (hospitals, cafeterias)
Spot cards	White cards at fly resting places; fly specks counted over time
H-traps	Tabanids
Counts on animals	Flies counted weekly on at least 15 animals chosen at random (stable flies on the legs; economic threshold in cattle about 5 per leg)
Coat inspection	Every hospitalised patient on admission; ticks checked and removed daily in hospitalised companion animals and horses
Behaviour	Tail flicking, bunching, stamping, rubbing; working threshold about 10 tail flicks per animal in 2 minutes

- Traps are placed at entrances, feed stores, manure areas, animal housing and cafeterias; their location is recorded. In companion animal and equine facilities, traps and electric fly killers are always out of patients' reach, and in food areas they must not endanger food or people.
- Unusual numbers or a species not seen before are reported to the HSBC; specimens may be sent for identification.

10.4. Control of Arthropods

Eliminating insects completely is not possible; the aim is to keep them out of animal buildings, above all isolation units, and to limit their contact with animals and people. Several methods are always combined.

10.4.1. Physical and Environmental Measures

- Doors of animal buildings stay closed; plastic strip curtains where a door must stay open.
- Window and ventilation screens: mesh of about 1.5 mm for mosquitoes and flies, under 1 mm where sand flies or *Culicoides* are a concern; inspected regularly for tears and cleaned when clogged.

- Cracks in walls, ceilings and floors are sealed (resting places for adult insects).
- No standing water: gutters and drains kept clear, containers, tyres and bowls emptied or removed. Water must stand for about 4 days for mosquitoes to complete development, and most fly up to 1.5–2 km, so areas around the facilities are also considered.
- Manure, bedding, food and organic waste are removed promptly; waste containers are covered and cleaned weekly; vegetation and leaves are cut back and cleared; outdoor floors kept clean or paved.

Table 10.4: Breeding sites to eliminate

Insect	Breeding sites
***Culex* / *Anopheles* mosquitoes**	Standing water / water with vegetation
***Aedes* mosquitoes**	Small containers: buckets, tyres, plant pots, gutters, cans, bottles, pet bowls
Culicoides	Wet organic matter, leaf litter, manure
House and stable flies	Wet or fermenting organic matter, faeces, waste
Sand flies	Flower beds, garden soil, animal burrows, green waste

10.4.2. Chemical Measures

- Insecticides and acaricides complement, never replace, physical and environmental measures. Only authorised biocides are used, according to the label, by the contracted company or trained staff.
- Larvicides (preferably biological, *Bacillus thuringiensis israelensis*) where breeding water cannot be removed. Adulticides (residual sprays on resting surfaces, area sprays at 18–32 °C, baits) only when numbers are harmful, alternating chemical classes to limit resistance and protecting non-target insects.
- Treatment of animals (impregnated collars, spot-ons, sprays, pour-ons) is prescribed by a veterinarian. Repellents gave limited protection in European bluetongue epidemics; during vector-borne outbreaks, animals are kept indoors at dusk and dawn.

10.5. Measures by Facility

Table 10.5: Arthropod control by facility

Facility	Specific measures
VTH-CA, VTC-CA and exotic service	Doors closed; screens; fly killers and sticky traps out of reach; daily mechanical cleaning of cages and bedding; droppings removed daily and cat litter changed at least weekly; carcasses into the designated refrigerated containers; patients checked daily for ticks. Leishmaniosis season: dogs indoors at dawn and dusk, walks away from lawn edges and brush
UICB (Class 3–4 small animals)	Windows and doors closed at all times; screens where windows open; no flowers or standing water nearby; equipment not shared
VTH-E and Infetocontagiosas Unit	Doors closed, window screens and sticky traps placed out of horses' reach. Daily manure removal, inspection of incoming horses for ectoparasites and no sharing of grooming tools or rugs.
Paddocks and outdoor areas (VTH-E, Catapereiro)	Water troughs cleaned regularly and standing water avoided. Puddles are prevented through appropriate drainage or paving. Vegetation management may help reduce tick exposure.

Incoming animals (all services)	Inspected on arrival and treated against ectoparasites before contact with other animals; infested animals kept apart
Food areas and cafeterias	Window screens and appropriate insect traps used without compromising food safety. Waste removed daily.

10.6. Rodents

The house mouse (*Mus musculus*), black rat (*Rattus rattus*, a good climber) and brown rat (*R. norvegicus*, nests below ground) are the species of concern; voles and wood mice are rare in the Faculty buildings. Rodents need water every day, are attracted by feed, bedding and waste, and rats avoid new objects. They are associated with about 35 pathogens, contaminate feed, damage wiring, insulation and plumbing, and stress housed animals.

Table 10.6: Rodent-associated agents and signs of infestation

Agents	Signs of infestation
Leptospira*, *Salmonella*, *Campylobacter*, *Yersinia*, *Listeria*, *E. coli*, *Pasteurella*, *Rickettsia*, *Brucella*, *Mycobacterium*; hantaviruses, hepatitis E virus, rabies virus; *Toxoplasma*, *Trichinella*, *Cryptosporidium	Droppings along walls and near feed (rat about 10–12 mm, mouse about 4 mm); gnaw marks and torn sacks; grease marks along runs; burrows; noises; strong odour; animals seen in daylight (heavy infestation)

10.6.1. Prevention

- Surroundings clean and free of clutter, weeds and waste; a gravel strip about 1 m wide around buildings where possible.
- Doors close within 0.6 cm of the floor; gaps over 0.6 cm (pipes, cables) sealed with rodent-proof material (metal, not wood, rubber or plastic); vulnerable edges protected with sheet metal or fine wire mesh. Buildings inspected yearly.
- Feed in closed metal or rodent-proof containers, only the quantity needed; hay, straw and bags on pallets off the floor; spilled feed removed at once and storage areas cleaned weekly; no water left within rodents' reach.
- Appliances (refrigerators, washing machines) can be moved for cleaning behind and beneath them.

10.6.2. Control

Table 10.7: Rodent control

Measure	Rules
Traps	Plastic traps, in pairs along runs and walls, away from feed; not in theatres or wards; no snap traps or cage traps; ultrasonic devices not allowed in animal facilities
Rodenticides	Authorised anticoagulants (blocks, paste, gel) only, applied by the contracted company; first-generation products need repeated feeding, second-generation act after a single feed
Bait stations	Locked, fixed, tamper-proof, out of reach of patients, people and non-target animals; 1–2 m apart for mice and 7–10 m for rats along runs; placed 5–7 days before baiting for rats; signed
Inspection	Regular checks of bait consumption, uneaten bait collected with gloves, carcasses collected with gloves and disposed of as animal by-products
Hygiene	Bait is never the only measure: removing food and shelter gives lasting control

10.7. Birds

Pigeons (*Columba livia*, *C. palumbus*), crows and occasionally blackbirds may enter animal buildings, eat and contaminate feed and water, spread agents (*Salmonella*, *Campylobacter*, *E. coli*, *Listeria*, West Nile virus, intestinal parasites) and damage buildings with droppings and nests.

- Doors and windows closed or netted; broken windows repaired; openings over 1.3 cm closed with metal mesh; strip curtains where doors stay open.
- Feed in closed metal containers in closed rooms; spills cleaned at once and feeding areas cleaned daily; unnecessary water removed.
- Anti-perching devices and nets that do not injure birds, fitted before nesting; scaring devices moved or changed regularly.
- **Legal status:** pigeons are game species, so their control follows hunting legislation. Swallows (*Hirundo rustica*, *Delichon urbicum*) are protected: birds, nests and eggs (even empty nests) are not removed or damaged without legal authorisation. Any nest is reported to the person responsible for the facility before maintenance or cleaning, and any action is agreed with the competent authority (ICNF).

10.8. Contracted Service, Coordination and Records

Pest control is contracted by the University to a specialised external company, covering insect treatments, rodent bait stations and, where needed, bird exclusion.

All users keep doors closed, manage waste and feed, remove breeding sites and report signs of pests to the person responsible for their facility, who arranges for the contracted company to be called when needed.

Chapter 11: Biosecurity SOPs for Laundry

The hospital laundry, located outside the hospital building near the T classrooms on campus, processes textiles generated by the Companion Animal Teaching Hospital (VTH-CA). Other Faculty services use outsourced laundry services and are therefore not covered by the procedures described in this chapter

11.1. Principles

- All used hospital textiles are treated as contaminated, whatever their origin, and handled with standard precautions. Bacteria (e.g., MRSA, *Pseudomonas*, *Bacillus cereus*) can survive for weeks to months on cotton and polyester; transmission of scabies, dermatophytosis, salmonellosis and hepatitis A through textiles has been described.
- Everyone who collects, transports, sorts or washes laundry is trained, and the laundry procedures are written and kept in the laundry room.

11.2. Separation of Dirty and Clean Circuits

- Clean laundry must be handled before dirty laundry. soiled laundry is taken promptly to the laundry in closed, labelled containers; laundry staff wear cap, mask, apron and gloves, discarded afterwards, and wash, disinfect and dry their hands, again before handling clean laundry; doors and windows closed during processing;
- bags are emptied onto the sorting bench without shaking and without putting hands inside them (OSH Manual, Table 4.9); items are separated by presence of organic material and checked for foreign objects, sharps being removed with forceps, with organic matter removed before washing; machines are not overloaded;

- Figure 11.1 summarises the laundry circuit, from collection on the dirty side to storage on the clean side.

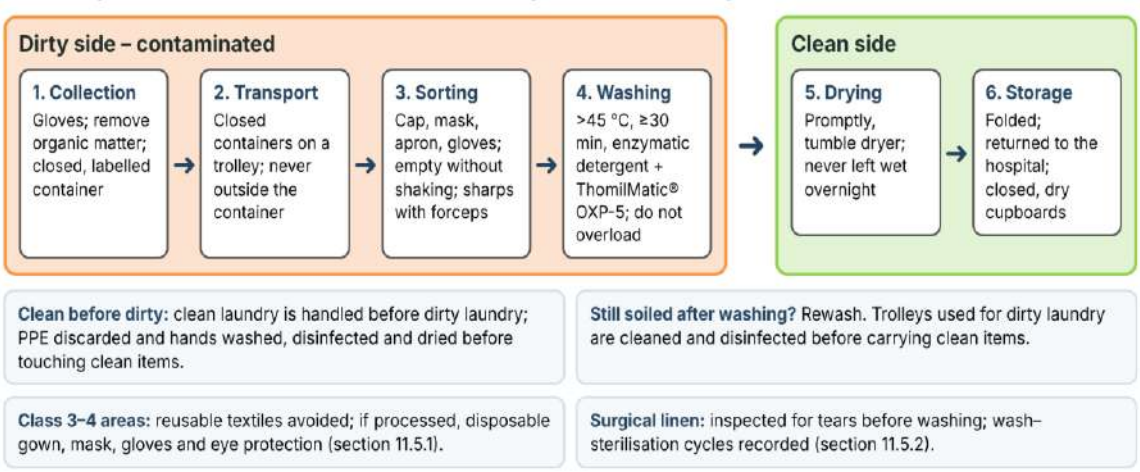


Figure 11.1: Laundry circuit of the VTH-CA, from dirty to clean

11.3. Collection and Transport

11.3.1. Collection

- Gloves on; cover any skin wound; personal clothing does not touch dirty laundry.
- Remove as much organic matter as possible (e.g., hospital blankets).
- Remove gloves and wash and disinfect hands.

11.3.2. Transport

- Closed, labelled containers on trolleys that are easy to clean and are cleaned and disinfected regularly; a trolley used for dirty laundry is cleaned and disinfected before carrying clean items.
- Transport is quick and, as far as possible, avoids wind and rain. Laundry is not sorted in patient areas and never carried outside its container.

11.4. Processing

11.4.1. Reception and Sorting

At the dirty entrance, bags are emptied onto the bench without shaking and without putting hands inside them; items are checked for objects (sharps removed with forceps), separated into those with and without organic matter, and cleaned of organic matter as much as possible, with disposable gloves. Categories: normal; infectious (risk to people, animals and environment); delicate (e.g., hospital blankets). Class 3–4 items follow section 11.5.1.

11.4.2. Washing

- Washing at temperatures above 45 °C for at least 30 minutes, using a neutral, unscented enzymatic detergent. Textiles are chemically disinfected during the wash cycle using ThomilMatic® OXP-5, a hydrogen peroxide- and peracetic acid-based product, dosed in accordance with the supplier's instructions.

- tumble-drying with a suitable programme; clean items folded, returned and stored in clean, dry, closed cupboards; laundry staff maintain equipment, monitor detergent and disinfectant stocks and report faults.
- Do not overload machines. After loading, discard gloves and wash hands.

11.4.3. Drying and Storage

- Laundry must be dried promptly after washing, preferably using a tumble dryer at an appropriate temperature.
- Wet laundry must not be left in the washing machine overnight.
- Clean items are tumble-dried and folded, then returned to the hospital and stored in the designated laundry cupboards.
- Textiles that remain visibly soiled after washing must be rewashed.

11.5. Specific Situations

11.5.1. Class 3 and Class 4 Areas

- Reusable textiles are avoided in these areas. When they must be processed (e.g., UICB scrubs), staff wear disposable gown, mask, gloves and eye protection, and for Class 4 the same PPE as for patient care.

11.5.2. Surgical Linen

- Each item is inspected for tears or holes before washing (holes of 1 µm already let bacteria through); the number of wash-to-sterilisation cycles is recorded to decide replacement. The laundry is one step of the chain; drapes and gowns end in sterilisation.

11.5.3. Blankets and Towels in the VTH-CA

- One blanket per animal, used for only one or two patients without wounds. Class 3–4 patients and patients with any wound have disposable pads.

11.6. Laundry Staff and Records

- Preferably the same person runs the laundry, for consistency. Operators maintain equipment and product stocks, and keep the written procedures and stock records
- PPE: cap, mask, apron and gloves for dirty laundry, then discard PPE and wash, disinfect and dry hands; hand hygiene before handling clean laundry; skin wounds covered.

Chapter 12: Biosecurity SOPs in the Catapereiro Farm Animal Teaching Hospital (VTH-FA): Ruminants, Pigs and Equids

The Farm Animal Teaching Hospital (VTH-FA), at Catapereiro, will receive ruminants, pigs and referred equids, many from farms of unknown health status and some with agents that are zoonotic or notifiable.
This chapter adds to the general rules of Chapter 1 only what is specific to the VTH-FA: which animals are admitted and how, where they are housed, its isolation unit (UICB-FA), cleaning, waste and emergencies. Crisis situations follow Chapter 14.

Note: this chapter comes into force when the VTH-FA opens. Until then, all contact with farm animals follows Chapter 6.

12.1. Scope and Organisation

This chapter applies to everyone who works at the VTH-FA: clinicians, interns, veterinary nurses, assistants, teachers, students, cleaning staff and contractors. Reading it is compulsory before the first activity at the hospital.

Other facilities on the Catapereiro campus are covered elsewhere: the necropsy room in Chapter 7, the laboratories in Chapter 9 and pest control of paddocks and outdoor areas in Chapter 10 (Table 10.5).

12.2. Species Admitted and Risk Classes

Each patient receives a risk class at admission (Chapter 1, section 1.2.2), shown on the pen card and reviewed whenever the clinical picture or laboratory results change.

Table 12.1: Risk classes at the VTH-FA

Class	Ruminant and pig examples	Housing
1 – green	Routine consultations; reproduction (pregnancy diagnosis, artificial insemination, andrology); elective surgery; stable animals without fever, diarrhoea or contagious lesions	General hospitalisation
2 – green	Fever of unknown origin; non-haemorrhagic diarrhoea without suspicion of a high-risk agent; non-exudative skin lesions; animals from farms with health problems that are not notifiable	General hospitalisation
3 – orange	Haemorrhagic diarrhoea; suspected *Salmonella*; calves with diarrhoea; suspected contagious respiratory agents; abortion; neonates without passive immunity; immunosuppressed animals; MDR bacteria (Chapter 1, section 1.7.3)	Separate pen, preferably in the UICB-FA
4 – red	Suspected notifiable disease (e.g., tuberculosis, brucellosis, anthrax, vesicular diseases); serious zoonoses	UICB-FA (see section 12.3.2)

The species admitted are subject to different rules:

- **Ruminants** (cattle, sheep, goats): Classes 1 to 4.
- **Pigs:** Class 1 only.
- **Equids:** Classes 3 and 4 only, on referral from the VTH-E (Chapter 5), and always in the UICB-FA.

12.3. Admission

12.3.1. Prior Telephone Contact

- No animal is sent to the VTH-FA without prior telephone contact, even in emergencies.
- Before arrival, the attending veterinarian or the owner reports the clinical signs, epidemiological history, origin of the animal and any suspected infectious or notifiable disease.
- Animals are transported with the health documents required by DGAV and under biosecurity conditions.

12.3.2. Suspected Notifiable Disease

As an exception to Chapter 1, section 1.6.4, an animal suspected of a notifiable disease during telephone triage is **not transported** to the VTH-FA. If it is already on its way, it returns to the farm of origin without being unloaded. The Clinical Director notifies DGAV (Chapter 1, section 1.7.4).

12.3.3. On Arrival

- The owner waits with the animal in the vehicle until a clinician has assessed it and assigned a risk class (Table 12.1).
- Pigs with fever, diarrhoea, cough, skin lesions or any suspicion of infectious disease are not unloaded and return to the farm of origin.
- According to its class, the animal is unloaded and taken to general hospitalisation or straight to the UICB-FA by the shortest route, without contact with other animals.
- An animal that develops signs of a higher class after admission is reclassified at once; Class 3–4 animals move to the UICB-FA.

12.4. Housing and Circulation

12.4.1. General Hospitalisation (Class 1–2)

- Pens 1 and 2 for cattle; Pens 3 and 4 for small ruminants or calves; a separate pen for pigs.
- Daily cleaning; cleaning and disinfection between animals (section 12.6).
- Equipment may be shared, with disinfection between animals.

12.4.2. Isolation Unit (UICB-FA)

The UICB-FA, in Building 2, houses Class 3–4 ruminants, pigs reclassified after admission and all equids. Access is restricted to authorised staff, and the unit is marked with a red floor line (Chapter 1, Table 1.13).

- Each animal has its own equipment (feeders, drinkers, thermometer, stethoscope, cleaning material), colour-marked and never used outside the unit.
- Medicines and fluids taken into the UICB-FA never return to the pharmacy.
- Animals leave the UICB-FA only when essential, by predefined routes, scheduled at the end of the day.
- Pregnant people do not enter the UICB-FA, except in exceptional, authorised situations (Chapter 1, section 1.5.5).
- The VTH-FA crisis kit is kept sealed in the UICB-FA changing area (Chapter 14, section 14.1.5).

12.4.3. Circulation

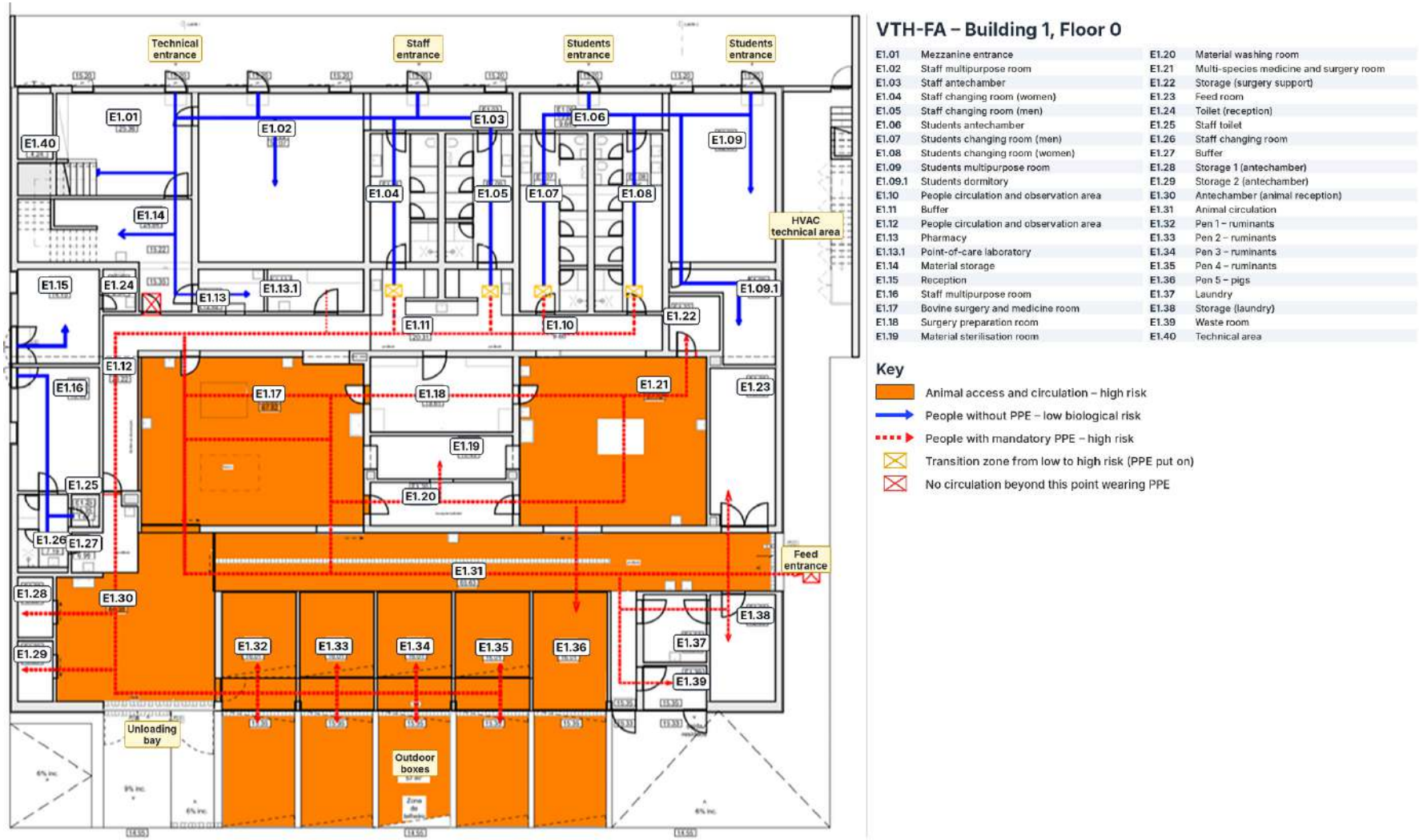
- Work from lower- to higher-risk animals; the UICB-FA is always visited last (Chapter 1, section 1.3.4).
- Feed is kept in labelled individual bags or closed containers; the animal's own medication is labelled and kept next to its pen.

12.4.4. Zones and Circuits

Figures 12.1 and 12.2 show the zones and the circuits of people and animals in the two VTH-FA buildings. Table 12.1A explains the codes used in the plans and the colours used on site.

Table 12.1A: Zones of the VTH-FA buildings (colours as in Chapter 1, Table 1.13)

Colour	Zone and biosecurity level	Rooms (Figures 12.1 and 12.2)
Green	Clean area – low risk; no PPE (blue arrows on the plans: circulation of people without PPE)	Entrances, offices and classrooms of Buildings 1 and 2
Yellow	Transition – intermediate risk (yellow crosses on the plans: where PPE is put on)	Changing rooms E1.04–E1.08 and E1.26; UICB-FA antechamber, changing rooms and buffer E2.11–E2.14
Yellow	Hospital animal area – Class 1–2 (orange area on the plans: animal access and circulation)	Animal reception antechamber E1.30, animal corridor E1.31, Pens 1–4 (E1.32–E1.35) and Pen 5 (E1.36)
Red	Restricted area – high risk; full PPE (red dashed arrows on the plans: people with mandatory PPE; red crossed square: no circulation beyond this point while wearing PPE)	UICB-FA: animal reception antechamber E2.20, ruminant pen E2.21 and multi-species pen E2.22; necropsy room and cold room E2.10 (Chapter 7)
Orange	Decontamination area – contaminated	Decontamination room E2.28; temporary waste storage (Table 12.4)



VTH-FA – Building 1, Floor 0

E1.01	Mezzanine entrance	E1.20	Material washing room
E1.02	Staff multipurpose room	E1.21	Multi-species medicine and surgery room
E1.03	Staff antechamber	E1.22	Storage (surgery support)
E1.04	Staff changing room (women)	E1.23	Feed room
E1.05	Staff changing room (men)	E1.24	Toilet (reception)
E1.06	Students antechamber	E1.25	Staff toilet
E1.07	Students changing room (men)	E1.26	Staff changing room
E1.08	Students changing room (women)	E1.27	Buffer
E1.09	Students multipurpose room	E1.28	Storage 1 (antechamber)
E1.09.1	Students dormitory	E1.29	Storage 2 (antechamber)
E1.10	People circulation and observation area	E1.30	Antechamber (animal reception)
E1.11	Buffer	E1.31	Animal circulation
E1.12	People circulation and observation area	E1.32	Pen 1 – ruminants
E1.13	Pharmacy	E1.33	Pen 2 – ruminants
E1.13.1	Point-of-care laboratory	E1.34	Pen 3 – ruminants
E1.14	Material storage	E1.35	Pen 4 – ruminants
E1.15	Reception	E1.36	Pen 5 – pigs
E1.16	Staff multipurpose room	E1.37	Laundry
E1.17	Bovine surgery and medicine room	E1.38	Storage (laundry)
E1.18	Surgery preparation room	E1.39	Waste room
E1.19	Material sterilisation room	E1.40	Technical area

Key

- Animal access and circulation – high risk
- People without PPE – low biological risk
- People with mandatory PPE – high risk
- Transition zone from low to high risk (PPE put on)
- No circulation beyond this point wearing PPE

Figure 12.1: Floor plan of Building 1, ground floor (VTH-FA), with circuits of people and animal areas

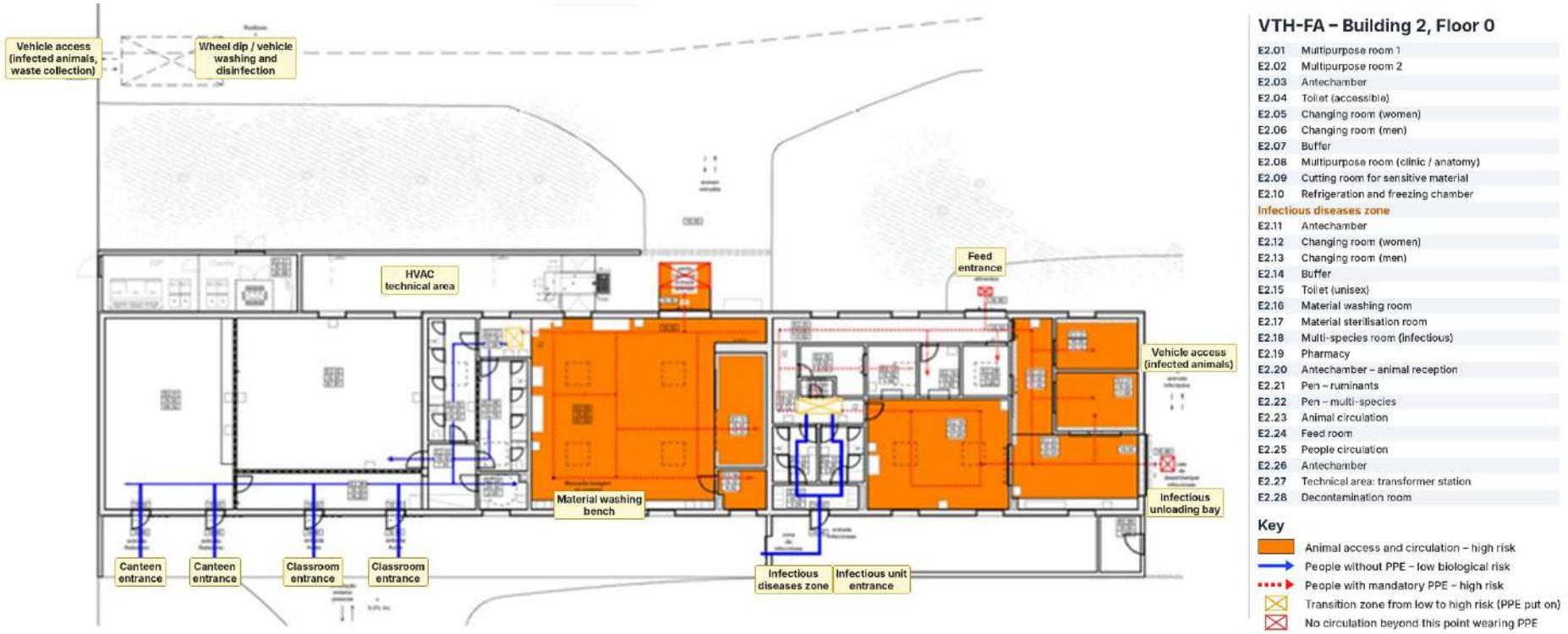


Figure 12.2: Floor plan of Building 2 (UICB-FA, necropsy room and classrooms), with circuits of people and animal areas

- **Building 1 (hospital):** people enter through the changing rooms (E1.04–E1.08; staff E1.26) and reach the clinical area only through the transition zones. Animals are unloaded at the animal reception antechamber (E1.30) and move along the animal corridor (E1.31) to Pens 1–4 for ruminants (E1.32–E1.35) or Pen 5 for pigs (E1.36).
- **Building 2:** the UICB-FA (rooms E2.11–E2.28) has its own antechamber, changing rooms and buffer (E2.11–E2.14) for people, and a separate animal reception antechamber (E2.20) leading to the ruminant pen (E2.21) and the multi-species pen (E2.22); the decontamination room (E2.28) is used to decontaminate equipment and material leaving the unit. The necropsy room and the cold room (E2.10) follow Chapter 7.

Figure 12.3 summarises the daily work order and circulation described in sections 12.4.1–12.4.3.

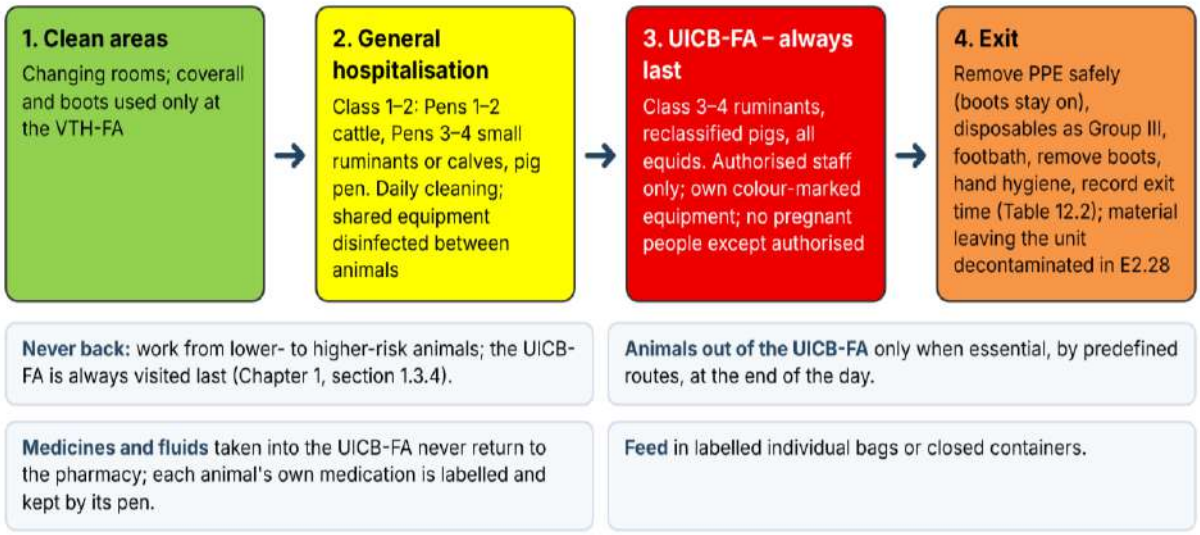


Figure 12.3: Daily work order and circulation at the VTH-FA

12.5. Attire, PPE and Entry to the UICB-FA

- Attire: coverall and rubber boots used only at the VTH-FA (Chapter 1, Table 1.6).
- Minimum PPE by situation follows Chapter 1, Table 1.5. Placentas, foetal membranes, abortions and periparturient dams require at least a disposable coverall, gloves, FFP2 mask and face shield or goggles.
- In the UICB-FA: disposable coverall, double gloves, mask (FFP2 or FFP3 according to the agent, Chapter 14), face shield or goggles, cap and unit boots.

Table 12.2: Entry to and exit from the UICB-FA

Entering	Leaving
1. Record name and time on the entry sheet	1. Remove PPE safely, avoiding self-contamination (unit boots stay on)
2. Put on full PPE in the changing area (Section 12.5)	2. Discard disposables as Group III ☣
3. Footbath	3. Footbath
	4. Remove the unit boots
	5. Hand hygiene (Table 1.4)
	6. Record the time of exit

12.6. Cleaning and Disinfection

Cleaning and disinfection follow the standard sequence of Chapter 1 (Table 1.8) and the footbath rules of section 1.4.3. The products used at the VTH-FA are listed in Chapter 1, Table 1.10; their dilutions and contact times are in Table 12.3.

- **Pens after discharge:** remove all bedding and organic matter, wash with detergent, disinfect all surfaces in contact with animals, and dry before housing a new animal.
- **Class 3–4 pens and the UICB-FA:** the pen is signed 'DO NOT USE – DISINFECTION REQUIRED' until terminal disinfection is complete, using a disinfectant suited to the suspected or identified agent; dedicated equipment is disinfected at the same time.
- **Pens after MDR bacteria or *Salmonella*:** the pen follows the decontamination and environmental sampling protocol of Chapter 13 (sections 13.4.4 and 13.4.6) and is released only when cultures are negative; the HSBC is informed when it is vacated (Chapter 1, section 1.7.2)
- **Equipment:** stethoscopes, thermometers, tubes and specula are disinfected between animals; equipment with wheels is cleaned if soiled with faeces or fluids.
- **Cleaning tools:** buckets, shovels, brushes and hoses are cleaned and disinfected after use; UICB-FA tools are colour-marked and stay in the unit.
- **Ambulatory vehicles:** cleaned and disinfected after each trip, and thoroughly after visits to high-risk farms (e.g., farms under movement restrictions).

Table 12.3: Disinfectants used at the VTH-FA: dilutions and contact times

Product	Use at the VTH-FA	Dilution	Contact time
Virkon™ S	All footbaths; UICB-FA surfaces and equipment; fogging	1 % (10 g per litre of water)	At least 15 min
Sodium hypochlorite (bleach)	Clean surfaces; terminal disinfection of pens and the UICB-FA	1:64 (about 16 mL per litre) for most uses; 1:32 (about 31 mL per litre) to widen the spectrum; 1:10 (about 100 mL per litre) only for limited high-risk use	At least 10 min
Chlorhexidine	Hand washing; soaking of items in contact with skin or mucosa (muzzles, endotracheal and stomach tubes, specula)	0.05 % for soaking (25 mL of 2 % solution per litre)	At least 15 min
Povidone-iodine	Skin and wound antisepsis; surgical preparation	As on the label	As on the label
Alcohol-based hand rub / 70 % alcohol	Hands, stethoscopes, thermometers and small equipment	Ready to use	Until dry

Dilutions of sodium hypochlorite assume a commercial bleach of about 5 % available chlorine; always check the label of the product in use (Chapter 1, sections 1.4.1–1.4.2).

Figure 12.4 summarises the cleaning and disinfection sequence and the release of pens at the VTH-FA.

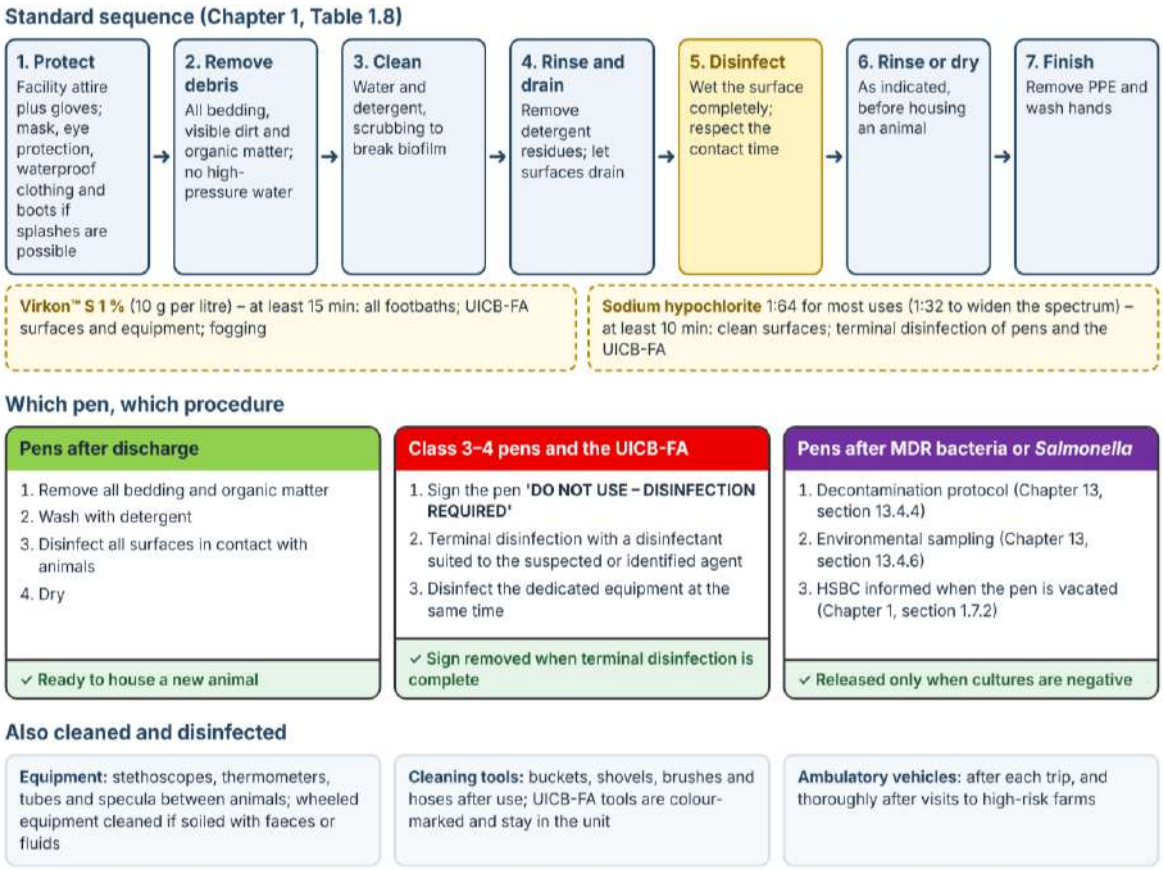


Figure 12.4: Cleaning and disinfection at the VTH-FA

12.7. Waste, Bedding and Carcasses

Waste is sorted at the point of production into Groups I–IV (Chapter 1, Table 1.7). In addition:

- Bedding and manure from Class 1–2 animals go to the manure heap; bedding from Class 3–4 animals and all UICB-FA waste are Group III.
- Group III waste from the UICB-FA is kept in closed containers inside the unit and taken to the waste room E1.39 along the waste route at the end of each day.
- Sharps go into puncture-proof containers in every room where medicines are prepared or given (Chapter 1, section 1.3.8).
- Carcasses and identifiable anatomical parts are Category 1 animal by-products: kept in the cold room until collected by the licensed operator. When necropsy is requested, they follow Chapter 7.

Table 12.4: Temporary waste storage at the VTH-FA

Waste	Storage area
Group I	Outside wall next to E.1.16; collected daily
Group III	E.1.39 (Building 1): closed, signed, restricted access
Chemicals	Ventilated cabinets E.1.29 (Building 1) and E.2.19 (Building 2)
Carcasses and anatomical parts	Dedicated cold room E.2.10

Waste is moved by authorised staff in gloves, boots and gown, in closed carts, along the waste routes and away from clean areas.

12.8. Staff Safety

- **Zoonoses:** ruminants, pigs and equids may carry *Salmonella*, *Leptospira*, *Campylobacter*, *Listeria monocytogenes*, *Brucella*, *Coxiella burnetii*, *Mycobacterium bovis*, *Cryptosporidium* and dermatophytes (Chapter 6, Tables 6.3–6.4; Chapter 9, Table 9.7).
- **Physical risks:** kicks, crushing and falls are the main risks with large animals. Animals are restrained in crushes or stocks, and restraint is led by a clinician or nurse.
- **People at increased risk:** pregnant and immunocompromised people inform their supervisor confidentially (Chapter 1, section 1.5.5); their activities may be adapted, including no entry to the UICB-FA. See also the OSH Manual, section 8.1.
- **Exposures:** bites, kicks, needle-stick injuries and contact with body fluids follow the first response of Chapter 9, Table 9.13, and are reported to the OSH officer and recorded (Chapter 15). If the animal is suspected of a notifiable disease, the Clinical Director is informed at once. Work accidents follow the OSH Manual (section 9.3).
- **Imaging:** radiation protection as in the OSH Manual (Chapter 5); hygiene of the imaging room as in Chapter 9, section 9.11.

12.9. Visitors, Owners and Children

The rules of Chapter 1, Table 1.11 apply. In addition:

- Owners wait with their animal in the vehicle until it has been triaged.
- Visitors and owners never enter the UICB-FA. Owners of Class 4 animals may enter only for euthanasia, with the clinician's authorisation and the same PPE as staff.
- No other animals are brought onto the premises.

12.10. Emergencies

- **Fire:** raise the alarm, call the fire brigade (stating that large animals are present) and evacuate people first, then animals, to the outdoor paddocks. Animals from the UICB-FA are kept apart from other animals. Re-entry only with the authorities' permission. The University emergency organisation is described in the OSH Manual (section 9.2).
- **Biological or chemical spills:** as in Chapter 9, section 9.7.
- **Power failure:** activate the contingency plan; stabilise animals undergoing procedures and move them to their pens.
- **Ventilation or water failure:** stop movement in the affected area and report it at once; use alternative cleaning methods until water is restored.
- **Structural problems:** evacuate the affected area and request a technical assessment.

Table 12.5: Local emergency contacts for the VTH-FA

Entity	Contact
INEM – medical emergency	112
Samora Correia Fire Brigade	+ 351 263 651 122 / + 351 263 651 115 / + 351932 698 030

GNR – Samora Correia Station	+ 351 263 650 020
Poison Information Centre (CIAV)	800 250 250
Clinical Director, VTH-FA	Available through internal communication channels

These contacts are displayed at reception and in the UICB-FA. Crisis contacts (DGAV, INIAV, municipal veterinarian of Benavente, Public Health Unit) are in Chapter 14, Table 14.17.

Chapter 13: Biosecurity SOPs for Antimicrobial Resistance

Antimicrobial resistance (AMR) is one of most serious threats to both veterinary medicine and public health. It is a One Health challenge in which animal, human and environmental health are interconnected. Multidrug-resistant bacteria can spread across different settings and facilities.

This chapter establishes the Antimicrobial Resistance SOPs of FVM-ULusófona, including the regulatory framework governing the use of veterinary antibiotics in Portugal and the EU, the principles of responsible prescribing and use in the Teaching Hospitals, surveillance programmes that detect resistant bacteria in hospital environment and in clinical cases, and the education of students, staff, clients and producers.

13.1. Introduction and Objectives

Antimicrobial resistance (AMR) is increasing in companion animals, horses and farm animals, in Portugal and worldwide. The most effective way to use fewer antimicrobials is to need fewer of them: every infection prevented by biosecurity and good clinical practice is a treatment avoided, and every containment measure reduces the selection pressure that favours resistant bacteria. Biosecurity is therefore the first tool of antimicrobial stewardship.

Students learn about AMR and about the clinical, ethical and public health responsibility of prescribing antimicrobials throughout the curriculum, notably in Microbiology, Pharmacology, Pharmacy and Pharmacotherapy, Epidemiology, Infectious Diseases and Preventive Medicine, Medicine, Exotic Species, Conservation and Laboratory Animal Medicine, Veterinary Public Health, Livestock Clinical Practice and Population Medicine, Equine Clinical Practice and Companion Animal Clinical Practice, always under the principles of prudent use and One Health.

The objectives of this chapter are therefore to:

- Establish the regulatory framework governing antimicrobial use in the Faculty's Teaching Hospitals;
- Define the principles of responsible prescription and use, from clinical diagnosis to the last-resort use of critical antimicrobials;
- Implement the surveillance of multidrug-resistant bacteria in the hospital facilities and in clinical cases;
- Promote education and awareness among students, staff, clients and producers;
- Review and update the protocols regularly.

13.2. Regulatory Framework

13.2.1. European Union Regulation (EU) 2019/6

- The use of veterinary medicinal products, antimicrobials included, is governed by Regulation (EU) 2019/6 and by national law (Decree-Law No 148/2008, as amended[12]);
- Regulation (EU) 2019/6[13] sets the rules for authorisation, prescription, distribution, use and pharmacovigilance of veterinary medicines;
- Under the EU framework, the use of certain antimicrobials considered of critical importance is subject to reinforced controls, including the requirement of antimicrobial susceptibility testing prior to their use in food-producing animals.

13.2.2. National Legislation (Decree-Law 148/2008, DGAV, PNCUM)

- The implementation of the European regulation at the national level is ensured by the **Direção-Geral de Alimentação e Veterinária (DGAV)**, the competent authority for veterinary medicinal products in Portugal;
- The national plan for the control of the use of medicines and veterinary medicines (PNCUM)[14] gives guidance on prescribing, recording and prudent use of antibiotics;
- Clinicians of the Teaching Hospitals prescribe through the electronic veterinary prescription system (PEMV) whenever possible and keep complete records of all antibiotics used[15];
- The choice of antibiotic respects the categories of the European Medicines Agency (EMA)[16] (section 13.2.3);
- Treatment guidelines of recognised professional and scientific societies may be followed where they apply.

13.2.3. EMA/AMEG Categorization of Antibiotics

The European Medicines Agency (EMA), through its Antimicrobial Advice Ad Hoc Expert Group (AMEG), categorises antibiotics into four groups according to the risk their use in animals poses to public health, taking into account their importance in human medicine[16]: **Category A ("Avoid")** — Antibiotics in this category are not authorised for use in veterinary medicine in the European Union. They must not be used in food-producing animals but may be used in companion animals under

[12] Decree-Law No. 148/2008 of 29 July (Decreto-Lei n.º 148/2008, de 29 de julho). Legal regime of veterinary medicinal products. Diário da República, Series I, No. 145, 29 July 2008, as amended and republished by Decree-Law No. 314/2009 of 28 October.

[13] Regulation (EU) 2019/6 of the European Parliament and of the Council of 11 December 2018 on veterinary medicinal products and repealing Directive 2001/82/EC. Official Journal of the European Union, L 4, 7 January 2019, pp. 43–167.

[14] Direção-Geral de Alimentação e Veterinária (DGAV). Plano Nacional de Controlo da Utilização de Medicamentos Veterinários (PNCUM). Lisboa: DGAV. Available at: https://www.dgav.pt/medicamentos/conteudo/medicamentos-veterinarios/planos-de-controlo-oficial-e-relatorios/pncum/

[15] Direção-Geral de Alimentação e Veterinária (DGAV). PEMV – Electronic Veterinary Prescription System Available at: https://pemv.dgav.pt/

[16] European Medicines Agency (EMA), Committee for Medicinal Products for Veterinary Use (CVMP) and Committee for Medicinal Products for Human Use (CHMP). Categorisation of antibiotics in the European Union (AMEG categorisation). EMA/CVMP/CHMP/682198/2017. Amsterdam: EMA, 2019.

exceptional circumstances, where permitted by applicable legislation. **Category B ("Restrict")** — Antibiotics in this category are critically important in human medicine, and their use in animals should be restricted to reduce risks to public health. They should only be considered when no antibiotic in Category C or D is clinically effective. Their use should be based on antimicrobial susceptibility testing whenever possible. **Category C ("Caution")** — Antibiotics in this category have alternatives available in human medicine. However, for some veterinary indications, suitable alternatives in Category D may not be available. Category C antibiotics should therefore only be considered when no Category D antibiotic is clinically effective. **Category D ("Prudence")** — Antibiotics in this category should be used prudently and, whenever appropriate, as first-line treatment. As with all antibiotics, their use should be limited to situations in which antimicrobial treatment is clinically justified

Table 13.1 summarises the four categories, with examples of the antimicrobial classes in each, as published by EMA/AMEG (EMA/CVMP/CHMP/682198/2017).

Table 13.1: EMA/AMEG categories of antibiotics for use in animals

Category	Meaning and use	Examples of antimicrobial classes
A – Avoid	Not authorised in veterinary medicine in the EU; never in food-producing animals; companion animals only in exceptional circumstances, where legislation permits	Carbapenems, glycopeptides, oxazolidinones, lipopeptides, monobactams, glycylcyclines, fosfomycin, drugs used solely to treat tuberculosis
B – Restrict	Critically important in human medicine; only when no Category C or D antibiotic is clinically effective, based on susceptibility testing whenever possible; justified and recorded (section 13.3.3)	Third- and fourth-generation cephalosporins, polymyxins (colistin), quinolones (including fluoroquinolones)
C – Caution	Only when no Category D antibiotic is clinically effective	Aminoglycosides, aminopenicillins with β-lactamase inhibitors (amoxicillin–clavulanic acid), amphenicols (florfenicol), first- and second-generation cephalosporins, macrolides, lincosamides, pleuromutilins
D – Prudence	First-line treatment whenever appropriate; used prudently and only when antimicrobial treatment is clinically justified	Aminopenicillins without β-lactamase inhibitors, natural and anti-staphylococcal penicillins, tetracyclines, sulfonamides and trimethoprim, nitroimidazoles and fusidic acid (companion animals only)

Antimicrobial use should follow the principles of responsible prescribing and applicable legislation:

- Broad-spectrum antibiotics should be used prudently, favouring narrow-spectrum alternatives whenever clinically appropriate.
- Category B antibiotics ("Restrict") should only be used when no antibiotic in Category C or D is clinically effective. Antimicrobial susceptibility testing should be performed whenever possible to guide treatment selection

The use of Category B antibiotics in food-producing animals must comply with the applicable legal requirements and restrictions. Antimicrobial susceptibility testing should be performed whenever possible to guide treatment selection. Prophylactic use of antimicrobial medicinal products is permitted only under the exceptional circumstances and conditions set out in Regulation (EU) 2019/6. Whenever possible, an antimicrobial susceptibility testing should be performed to help guide treatment selection and assess whether the prescribed antimicrobial is active against the suspected or identified pathogen.

13.3. Responsible Use of Antibiotics in Teaching Hospitals

The Teaching Hospitals must keep MDR bacteria out, limit their spread inside and avoid releasing them into the environment. Prudent antimicrobial use applies to all clinicians, all services and all species.

13.3.1. Clinical Diagnosis and Complementary Testing

Antimicrobial therapy should be based on a clinical assessment and diagnosis, supported by appropriate diagnostic tests (cytology bacteriology and antimicrobial susceptibility testing) or whenever indicated and feasible.

Samples for microbiological testing should, whenever possible, be collected before antimicrobial treatment is initiated, provided that doing so does not compromise the patient's welfare or delay urgently needed treatment.

Bacterial culture and antimicrobial susceptibility testing should be performed when clinically indicated and feasible, particularly in cases involving suspected antimicrobial resistance, treatment failure or recurrent infection.

The identification of the causative pathogen and its antimicrobial susceptibility profile should guide the selection of the antimicrobial agent, dosage and duration of treatment, in accordance with the relevant clinical guidelines and the characteristics of the patient.

Empirical treatment may be necessary in certain clinical situations. Where empirical broad-spectrum treatment is initiated, the need for continued treatment should be reassessed when diagnostic results become available, and therapy should be adjusted where appropriate.

13.3.2. Prescription and Recording (PEMV system)

- Clinicians working in the Teaching Hospitals must issue **veterinary medical prescriptions in** accordance with applicable legislation, preferably through the **PEMV**;
- Comprehensive records of antimicrobials used must be maintained for each clinical case, including the antimicrobial agent, dosage, treatment duration, clinical outcome and antimicrobial susceptibility testing results, where available (see also Section 13.4.2).
- Antimicrobial use in the Teaching Hospitals must comply with the national and European regulatory requirements described in Section 13.2.
- Animal owners and livestock producers must be informed about responsible antimicrobial use, the importance of appropriate diagnostic testing where indicated, and the risks associated with self-medication and inappropriate antimicrobial use (section 13.5.2).

13.3.3. Use of Category B ("Restrict") Antibiotics According to the EMA/AMEG Categorisation

Antibiotics classified in Category B ("Restrict") by the European Medicines Agency (EMA) and its Antimicrobial Advice Ad Hoc Expert Group (AMEG), including third- and fourth-generation cephalosporins, fluoroquinolones and polymyxins, should be used restrictively to minimise the risk to public health[16],

- Section 13.4Selection of treatment: Category B antibiotics should only be considered when no antibiotic in Category C or D is clinically effective. Antimicrobial susceptibility testing should be performed whenever possible to guide treatment selection.
- Clinical justification and record-keeping: The use of a Category B antibiotic must be clinically justified and documented in the patient's clinical record, including the reason for selecting that antibiotic and the relevant susceptibility testing results, where available.
- Use in food-producing animals: The use of Category B antibiotics must comply with the specific legal requirements applicable to food-producing animals, including any applicable antimicrobial susceptibility testing requirements.
- Prophylactic use: antimicrobial medicinal products are not used routinely, and prophylactic use is limited to the exceptional circumstances and conditions set out in Article 107 of Regulation (EU) 2019/6.[13]
- Empirical treatment and biosecurity: Category B antibiotics should not be used routinely as first-line empirical treatment when suitable alternatives are available. Their use must not replace appropriate biosecurity, infection prevention or hygiene measures.
- Monitoring: The use of Category B antibiotics and overall antimicrobial consumption patterns should be reviewed periodically as part of the antimicrobial stewardship and surveillance programme (Section 13.4).

Figure 13.1 summarises the prescribing steps of sections 13.3.1 to 13.3.3.

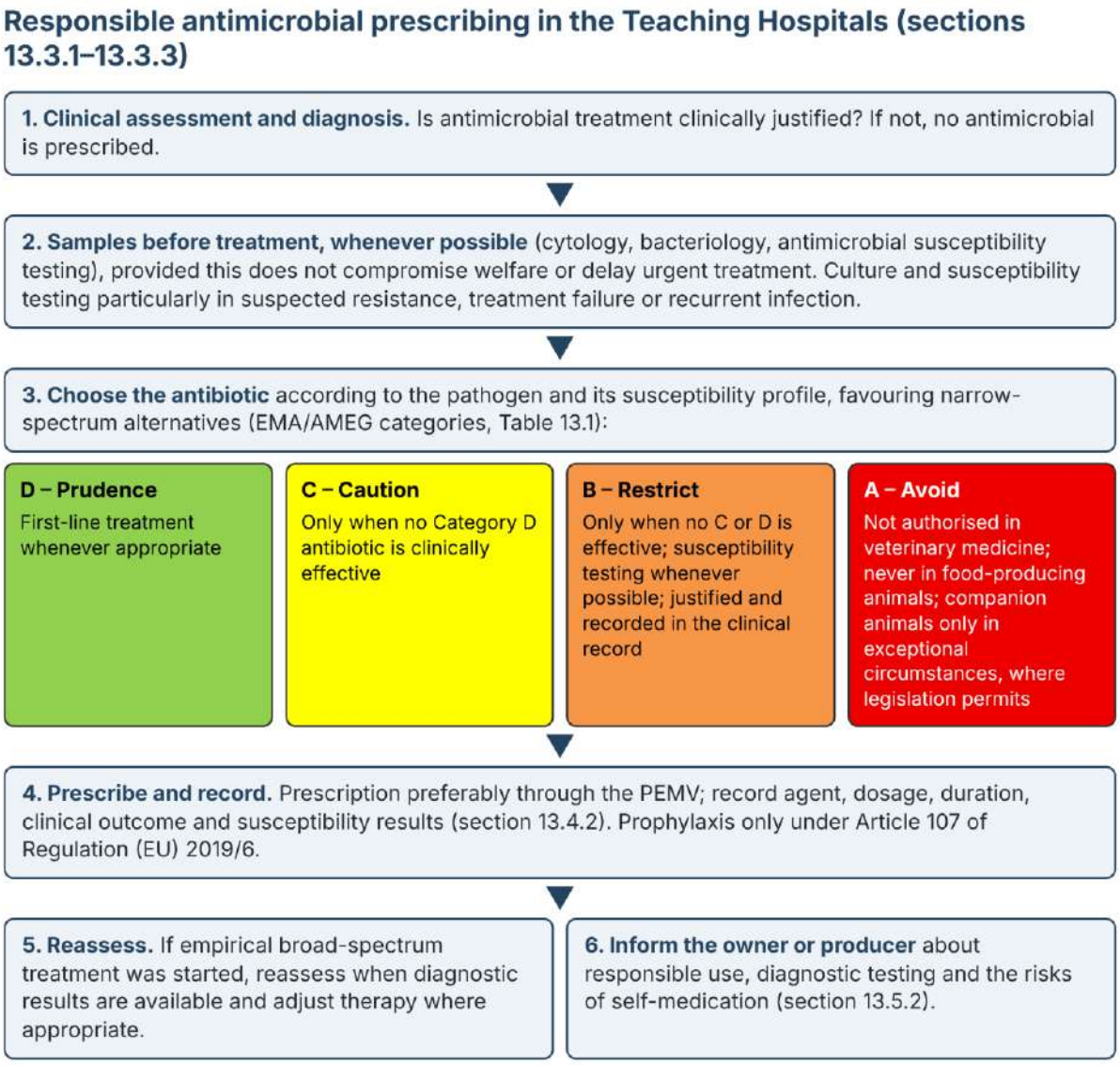


Figure 13.1: Responsible antimicrobial prescribing in the Teaching Hospitals

13.4. Surveillance of Multidrug-Resistant Bacteria

The Teaching Hospitals run a regular surveillance programme for MDR bacteria in the environment and in clinical cases.

13.4.1. Environmental Surveillance Program

- **Regular environmental monitoring** of MDR bacteria should be performed monthly in the hospital facilities. Sampling should include surfaces, consultation and hospitalization areas, surgical and animal housing areas;

- Targeted environmental sampling protocols follow **the patient's journey** through the hospital, from arrival in the consultation room, through the surgical and hospitalization areas, and should target areas where environmental contamination or pathogen transmission may occur.
- Environmental surveillance pays particular attention to **hand-contact points** (door handles, computer mice, keyboards, telephones), which act as reservoirs of nosocomial pathogens and contribute to their transmission.
- Sampling protocols may include paired environmental samples (before and after cleaning and disinfection) to evaluate the effectiveness of disinfection procedures in reducing surface contamination with resistant bacteria

13.4.2. Clinical Case Registry

- The surveillance programme includes the **recording of clinical cases where antimicrobials were used**, indicating the antimicrobial agent, dosage duration, clinical outcome and antimicrobial susceptibility testing results;
- The registry allows the monitoring of antimicrobial consumption by clinical service and animal species, the identification of clusters of resistant infections that may indicate nosocomial transmission resistant infections, of compliance with the principles of responsible antimicrobial use (section 13.3);
- Confirmed cases of MDR infection trigger the patient management and biosecurity protocols of the respective hospitals, which may include Class 3 risk classification, implementation of a hygiene lock, use of dedicated equipment and enhanced cleaning and disinfection procedures (Chapters 2, 5 and 12).

13.4.3. Priority Microorganisms in Hospital Surveillance

The hospital surveillance programme focuses on microorganisms of particular concern because of their antimicrobial resistance, potential for nosocomial transmission, zoonotic relevance or environmental persistence. Surveillance activities are adapted to the clinical setting, identified risks and available microbiological data[17,18,19,20].

The programme gives particular attention to the following microorganisms:

[17] World Health Organization. WHO Bacterial Priority Pathogens List, 2024: Bacterial pathogens of public health importance to guide research, development and strategies to prevent and control antimicrobial resistance. Geneva: WHO; 2024.
[18] Stull JW, Weese JS. Hospital-associated infections in small animal practice. Veterinary Clinics of North America: Small Animal Practice. 2015;45(2):217–233.
[19] Weese JS, van Duijkeren E. Methicillin-resistant *Staphylococcus aureus* and Staphylococcus *pseudintermedius* in veterinary medicine. Veterinary Microbiology. 2010;140(3–4):418–429.
[20] Ward MP, Brady TH, Couëtil LL, Liljebjelke K, Maurer JJ, Wu CC. Investigation and control of an outbreak of salmonellosis caused by multidrug-resistant Salmonella typhimurium in a population of hospitalized horses. Veterinary Microbiology. 2005;107(3–4):233–240.

- Multidrug-resistant Enterobacterales: Including extended-spectrum beta-lactamase (ESBL)-producing and carbapenemase-producing bacteria. These organisms are important targets for environmental and clinical surveillance. Culture and, where appropriate, further characterisation of isolates may help investigate suspected nosocomial transmission and identify potential sources of environmental contamination
- Carbapenem-resistant bacteria outside the order Enterobacterales: Particular attention should be given to carbapenem-resistant *Pseudomonas aeruginosa* and *Acinetobacter* spp., given their potential to cause difficult-to-treat infections and their relevance to hospital environmental surveillance[17].
- Methicillin-resistant staphylococci: Methicillin-resistant *Staphylococcus aureus* (MRSA) is of particular concern in equine and small animal hospitals because of its zoonotic potential and documented capacity for nosocomial transmission. Methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) is also relevant, particularly in small animal hospitals. Surveillance should be guided by the clinical and epidemiological risks identified in each hospital.
- ESKAPE pathogens: The term ESKAPE refers to six groups of bacterial pathogens associated with healthcare-associated infections and antimicrobial resistance: *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter* spp. This framework may help identify clinically relevant resistant bacteria for surveillance in veterinary healthcare settings. The significance of each organism should be assessed according to the animal species, clinical setting, antimicrobial susceptibility profile and risk of nosocomial transmission.
- *Salmonella* spp.: Specific surveillance measures are implemented in the large animal hospitals.
- Environmental surveillance of stalls: Following the housing of an animal, environmental sampling and culture are performed after routine cleaning and disinfection, before the stall is released for use by another patient. If cultures remain positive, cleaning and disinfection must be repeated, and the stall must remain out of use until negative culture results are obtained, in accordance with the protocols described in Chapters 5 and 12.

Table 13.2 summarises the priority microorganisms and the response when they are detected.

Table 13.2: Priority microorganisms in hospital surveillance

Microorganisms	Why they are a priority	Surveillance and response
MDR Enterobacterales (ESBL- and carbapenemase-producing)	Important targets for environmental and clinical surveillance	Culture and, where appropriate, characterisation of isolates to investigate suspected nosocomial transmission and environmental sources; WGS case by case (section 13.4.5)
Carbapenem-resistant *Pseudomonas aeruginosa* and *Acinetobacter* spp.	Difficult-to-treat infections; relevant to hospital environmental surveillance	Environmental and clinical surveillance
MRSA	Zoonotic potential and documented nosocomial transmission in equine and small animal hospitals	Surveillance guided by the clinical and epidemiological risks of each hospital
MRSP	Relevant particularly in small animal hospitals	Surveillance guided by the clinical and epidemiological risks of each hospital

ESKAPE pathogens (*E. faecium, S. aureus, K. pneumoniae, A. baumannii, P. aeruginosa, Enterobacter* spp.)	Associated with healthcare-associated infections and antimicrobial resistance	Significance assessed by animal species, clinical setting, susceptibility profile and risk of nosocomial transmission
***Salmonella* spp.**	Relevant to the large animal hospitals	Specific surveillance measures in the large animal hospitals
Any confirmed MDR infection	Triggers the patient management and biosecurity protocols (section 13.4.2)	Class 3, hygiene lock, dedicated equipment and enhanced cleaning and disinfection (Chapters 2, 5 and 12); after discharge, daily cleaning and disinfection of the stall for four days and environmental sampling, repeated until no growth (section 13.4.6)

13.4.4. Environmental Surveillance and Infection Prevention Measures

Environmental surveillance is an integral part of infection prevention and control in the veterinary teaching hospitals. Environmental sampling should be performed monthly in designated areas, focusing on high-touch surfaces such as door handles, computer mice, keyboards and telephones, which may act as reservoirs of nosocomial pathogens and contribute to their transmission. This sampling complements the routine monthly monitoring of critical surfaces[18,21].

Pathogens can persist on environmental surfaces and equipment for periods ranging from days to months or longer, depending on the microorganism and environmental conditions. Certain bacteria can remain in the environment for prolonged periods, potentially contributing to the transmission of infection[21]. This highlights the importance of appropriate cleaning and disinfection procedures, particularly in high-risk areas and locations used by animals infected or colonised with pathogens of concern.

The surveillance programme complements the infection prevention and control measures implemented in the hospitals, including routine cleaning and disinfection of environmental surfaces and equipment, hand hygiene, staff training, and compliance with the relevant hygiene and biosecurity protocols[22,23].

Over the past two years, efforts to strengthen infection prevention and control have included enhanced cleaning and disinfection practices and staff training on hygiene and biosecurity procedures.

Findings from environmental surveillance are used to identify areas requiring further attention and, where appropriate, to inform decisions on additional sampling, targeted investigations or preventive measures. Together with clinical and microbiological surveillance data, these findings contribute to the ongoing assessment of the hospital environment and support the continuous review and improvement of infection prevention and control practices.

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[21] Stull JW, Bjorvik E, Bub J, Dvorak G, Petersen C, Troyer HL. 2018 AAHA Infection Control, Prevention, and Biosecurity Guidelines. Journal of the American Animal Hospital Association. 2018;54(6):297–326. https://doi.org/10.5326/JAAHA-MS-6903

[22] King, C., Diaz-Campos, D., Mollenkopf, D., Van Balen, J. C., Mathys, D., Zuckerman, K., Fingland, R., Stepp, L., Johnstone, C., Norris, K., Marolf, A., Cooper, E., & Wittum, T. E. (2026). Management of carbapenem-resistant Enterobacterales in a veterinary hospital environment utilizing surveillance with infection control and prevention measures. Journal of veterinary internal medicine, 40(1), aalaf023. https://doi.org/10.1093/jvimsj/aalaf02

[23] World Health Organization. Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: WHO; 2016

13.4.5. Molecular Epidemiology and Whole-Genome Sequencing

Where necessary, whole-genome sequencing (WGS) is used to support the characterisation of bacterial isolates and investigate potential epidemiological links between isolates, including suspected nosocomial transmission. The decision to perform WGS is made on a case-by-case basis by the responsible microbiology and/or infection prevention and control teams, as appropriate; it is not routinely performed for all isolates. WGS results must be interpreted in conjunction with clinical, microbiological and epidemiological data, since genetic similarity alone does not establish direct transmission or determine its direction.

13.4.6. Environmental Decontamination of Stalls Following MDR Cases

Following the discharge of an animal infected with multidrug-resistant (MDR) bacteria, the stall undergoes daily cleaning and disinfection for four days, in accordance with the relevant hospital procedures. Environmental sampling is performed at the end of this period to assess the effectiveness of decontamination. If bacterial growth is detected, cleaning and disinfection are repeated, followed by further environmental sampling after an additional period. This process continues until no bacterial growth is detected in the samples analysed.

13.5. Education, Training and Awareness

13.5.1. Students and Staff

- **Continuous training:** students, clinicians, nurses, assistants and interns receive regular training on AMR, prudent antimicrobial use, biosecurity, hygiene, disinfection, sterilisation and isolation;
- **Curriculum:** AMR and the responsibilities of antimicrobial prescribing are taught across the curricular units listed in section 13.1, guided by prudent use and One Health;
- **Hand hygiene:** awareness campaigns on hand hygiene, the key measure against transmission of MDR bacteria, are repeated regularly for staff and students (Chapter 1, section 1.3.1).

13.5.2. Clients and Producers

- Responsible antimicrobial use: Animal owners and livestock producers should be informed about the importance of responsible antimicrobial prescribing and use, the role of diagnostic testing in guiding treatment decisions, and the risks associated with self-medication and indiscriminate antimicrobial use.
- Communication tailored to the context: In livestock production, education should emphasise how herd-level biosecurity can help reduce the need for antimicrobial treatment (Chapter 6). Companion animal owners benefit from understanding why an antimicrobial susceptibility testing may precede the prescription;

- One Health responsibility: Client education is part of the One Health responsibility of the veterinary profession: every prescription is an intervention at the human-animal-environment interface.

Figure 13.2 summarises the education, training and awareness actions of this section.

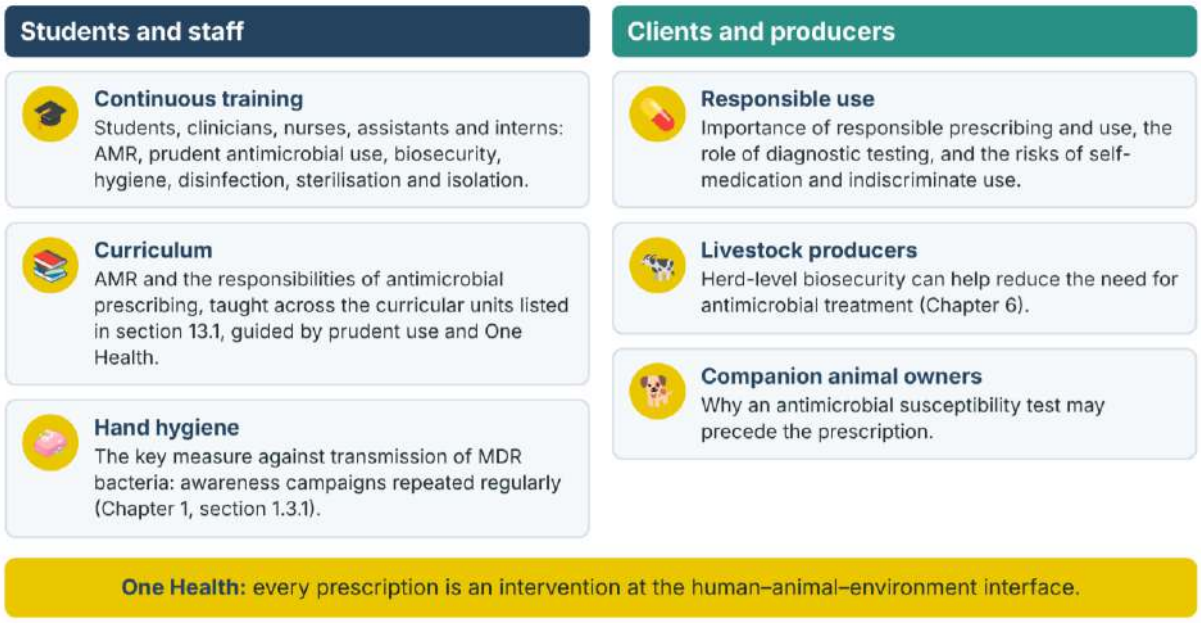


Figure 13.2: Education, training and awareness on antimicrobial resistance

13.6. Review and Updating of Protocols

The AMR standards of the Teaching Hospitals should be reviewed periodically and whenever significant changes occur that may affect antimicrobial stewardship practices, including:

- **Changes in national or European legislation:** New or amended regulations affecting the authorisation, prescription or use of veterinary antimicrobials.[24,13]
- **Detection of failures, outbreaks or increases in antimicrobial resistance:** Hospital-acquired infection episodes, environmental cultures positive for multidrug-resistant (MDR) bacteria, or deterioration in surveillance indicators[21] (Section 13.4).
- **Changes in clinical, hospitalisation or biosecurity practices:** Restructuring of facilities, introduction of new clinical services or revisions to biosecurity protocols that may affect antimicrobial stewardship[25].

[24] European Commission. Commission Notice 2015/C 299/04: Guidelines for the prudent use of antimicrobials in veterinary medicine. Official Journal of the European Union, C 299, 11 September 2015, pp. 7–26.
[25] World Organisation for Animal Health (WOAH). Terrestrial Animal Health Code. 2016 edition, Chapter 6.9: Responsible and prudent use of antimicrobial agents in veterinary medicine. Paris: OIE; 2016. Available at: https://www.woah.org/fileadmin/Home/eng/Health_standards/tahc/2016/en_chapitre_antibio_use.htm.

Chapter 14: Biosecurity SOPs for Crisis Scenarios

A crisis is any event in which a highly contagious, zoonotic or notifiable agent is suspected or confirmed in an FVM-ULusófona facility. The first hours decide whether it stays a single case or becomes an outbreak.

This chapter sets a common framework (alert levels, Crisis Cell, first-hour actions, notification, records) and eleven disease scenarios chosen for their zoonotic, nosocomial or legal impact.

14.1. Common Framework

These procedures apply from the moment a suspicion is raised until the official authorities take over: DGAV for animal health, DGS and the local Public Health Unit for human health. From then on their instructions prevail. The chapter covers the VTH-CA (including the UICB), the VTC-CA (no isolation; suspect cases referred to the UICB), the VTH-E (including the Infetocontagiosas Unit, UICB-EQ), the VTH-FA at Catapereiro once operational (Chapter 12), the anatomy and necropsy facilities (Building M, and INIAV and ETSA, where host procedures also apply), the laboratories and the Clinical Skills Training Centre, and extramural activities.

A disease has its own scenario when it carries a severe zoonotic risk, a legal or economic impact (notifiable, possible official restrictions), a high nosocomial risk, or when handling the patient, carcass or samples may spread it. The list (Table 14.1) is reviewed yearly by the HSBC; the scenarios for foot-and-mouth disease, bovine tuberculosis, Q fever and equine influenza (sections 14.9–14.12) apply when the VTH-FA opens or the situation justifies it.

Table 14.1: Crisis scenarios of FVM-ULusófona

Scenario	Main concern	Facilities most at risk	Notification
African swine fever (14.2)	Legal/economic	VTH-CA (pet pigs), necropsy, pig farm visits, VTH-FA (pigs)	DGAV, immediate
VS-FCV (14.3)	Nosocomial	VTH-CA, VTC-CA, UICB	Internal (HSBC)
Rabies (14.4)	Zoonotic, fatal	VTH-CA, VTC-CA, necropsy, shelters	DGAV + municipal veterinarian; Public Health Unit if human exposure
HPAI (14.5)	Zoonotic, legal	VTH-CA (birds, cats), necropsy, poultry visits	DGAV; DGS if human exposure
Leptospirosis (14.6)	Zoonotic	Necropsy, VTH-CA, VTH-E, field, VTH-FA	DGAV; DGS when confirmed in humans
EHV-1 (14.7)	Nosocomial, legal	VTH-E (and referred equids at the VTH-FA)	DGAV
Salmonellosis (14.8)	Nosocomial, zoonotic	VTH-E (and VTH-CA, VTH-FA)	DGAV list; DGS if human cases
Foot-and-mouth disease (14.9)	Legal/economic	VTH-FA, necropsy, farm visits	DGAV, immediate
Bovine tuberculosis (14.10)	Zoonotic, legal	VTH-FA, necropsy, slaughterhouse visits	DGAV; DGS if human cases
Q fever (14.11)	Zoonotic	VTH-FA, necropsy, farm visits	DGAV; DGS if human cases

Equine influenza (14.12)	Nosocomial, legal	VTH-E, VTH-FA (referred equids)	DGAV

- Animal diseases are notified to DGAV on suspicion (Chapter 1, section 1.7.4); human cases are notified to DGS by the physician.

14.1.1. Alert Levels



Figure 14.1: FVM-ULusófona crisis alert levels

Table 14.2: Alert levels

Level	Trigger	Declared by	Typical measures
0 – Surveillance	Routine; known risk context (e.g., outbreaks in Spain)	HSBC	Triage questions at admission; awareness; kits checked
1 – Pre-alert	Patient, carcass or sample compatible with a crisis disease	Clinician / pathologist in charge	Isolate, stop movements, PPE, internal notification, records
2 – Alert	Laboratory confirmation or official suspicion by DGAV	Clinical Director + HSBC Coordinator	Crisis Cell; contact tracing; official notification; partial suspension if needed
3 – Crisis	Secondary cases or official restrictions	Dean, on proposal of the Crisis Cell	Closure or lockdown; suspension of admissions and teaching in the area; institutional communication
Stand-down	End-of-crisis criteria met	Crisis Cell	Terminal disinfection verified; measures lifted; after-action review

14.1.2. Crisis Cell

From Level 2, the Clinical Director and the Coordinator of the HSBC convene the Crisis Cell within 2 hours to support the management of the situation. It includes the Coordinator of the HSBC, representatives of the HSBC and the Dean. Decisions and measures affecting teaching activities are communicated to the relevant parties.

14.1.3. First-Hour Actions

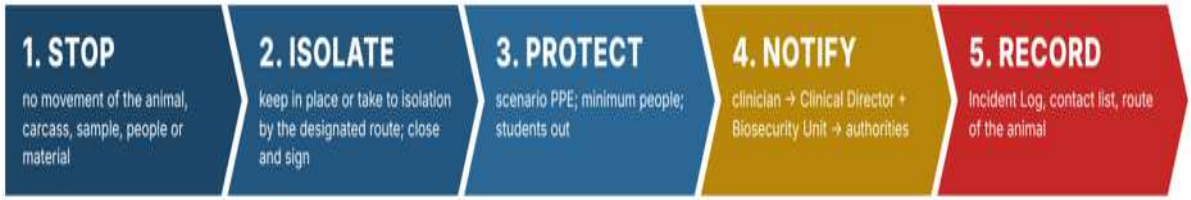


Figure 14.2: The five first-hour actions: Stop, Isolate, Protect, Notify, Record

Table 14.3: The five first-hour actions

Action	What to do
STOP	Stop all movements of the suspect animal, carcass or sample and of people and materials in contact with it
ISOLATE	Keep the animal where it is (vehicle, room, cage, stall) or take it to isolation by the designated external route; close the door and sign it (section 14.13.3)
PROTECT	PPE required by the scenario; minimum number of people; students out unless needed and protected
NOTIFY	Clinician or facility responsible at once, who informs the Clinical Director and the HSBC; official notification as in Table 14.4
RECORD	Open the Incident Log; list people and animals in contact; note the route the animal took

GOLDEN RULES

- Never euthanise a rabies suspect without DGAV authorisation, and never open a carcass suspected of ASF, HPAI or rabies in FVM facilities.
- Nothing leaves an area under suspicion (animals, carcasses, waste, equipment, samples, or people without changing) until the Incident Lead authorises it.
- Students never work alone with a suspect case: they inform, they do not decide.

14.1.4. Notification and Communication

Table 14.4: Who notifies whom, when and how

When	Who	To whom	How
Suspicion	Anyone (clinician, nurse, pathologist, student)	Clinician in charge / facility responsible	In person or phone, immediately
Suspicion	Clinician in charge	Clinical Director, Coordinator of the HSBC and Dean	Phone or e-mail
Notifiable disease suspected	Clinical Director	DGAV – DSAVR LVT	spc.dgav.pt, phone, secretariado.lvt@dgav.pt

Human exposure	Clinical Director / OSH officer	Public Health Unit; exposed person to SNS 24 or emergency department	Phone; written exposure record
Staff or student exposure	Incident Lead	OSH officer	E-mail and accident/incident form
Confirmation	Crisis Cell	Affected staff and students; owners of exposed animals; referring veterinarians	Mailing lists, Moodle, letters/e-mails
Media or public	Communication office only	Media, public	Statement approved by the Dean
End of crisis	Crisis Cell	Everyone informed	Same channels as the alert

No information on cases, owners or patients is shared on social media or with third parties. Contacts are in Table 14.17, displayed at each hospital reception and isolation unit.

14.1.5. Records, Crisis Kits and Training

- **Records** (from Level 1, by the Incident Lead; templates on Moodle and in the kits; kept 5 years): Incident Log (events, decisions, who and when); contact list of exposed persons (role, type and date of contact, PPE, contacts); animal movement register (animals sharing rooms, equipment or staff with the index case); disinfection log (area, product, concentration, contact time, operator; terminal disinfection signed); sample register.
- **Crisis kits** are kept sealed at the VTH-CA (UICB anteroom), the VTC-CA (clinical store), the VTH-E (Infetocontagiosas Unit changing room) and the necropsy room of Building M, and at the VTH-FA (UICB-FA changing area) when operational; checked every three months and after each use (Chapter 15).

Table 14.5: Minimum content of a crisis kit

Item	Quantity
Hooded disposable coveralls (category III, type 5/6)	6
FFP2 and FFP3 respirators	10 + 10
Face shields and/or sealed goggles	4
Nitrile gloves (S, M, L) and cut-resistant gloves	2 boxes per size + 2 pairs
Waterproof boot covers or dedicated rubber boots	6 pairs
Virkon™ S (1 % = 10 g/L) and sodium hypochlorite	2 kg + 5 L
Portable footbath tray and hand sprayer	1 + 1
Group III and IV containers, biohazard bags and ties	4 + 10
Barrier tape and printed signs (section 14.13.3)	1 roll + 1 set
UN3373 sample transport kit, EDTA and serum tubes, swabs	1
Copy of this chapter, Incident Log and contact list forms	1 set

- **Training:** Clinical, necropsy and laboratory staff should receive appropriate biosecurity and emergency response training. Students should receive training during the Biosafety Day and before each clinical rotation. Additional training should be provided whenever necessary.

14.2. African Swine Fever (ASF)

Table 14.6: ASF – key facts

Topic	Summary
Agent and hosts	ASF virus (*Asfarviridae*), enveloped DNA virus; domestic, pet and miniature pigs and wild boar. Not zoonotic; no vaccine or treatment in the EU
Transmission	Blood (very high load), tissues, carcasses, excreta; contaminated pork products (infectious for months); fomites (boots, clothes, vehicles); *Ornithodoros* soft ticks
Clinical picture	Fever 40–42 °C, anorexia, skin erythema or cyanosis, haemorrhages, abortion, sudden death (mortality close to 100 %); haemorrhagic lymph nodes, splenomegaly, renal petechiae
Inactivation	Virkon™ S 1 %, sodium hypochlorite, other virucides approved for ASF
Context	Portugal is free; ASF confirmed in wild boar in Catalonia (Spain) since November 2025. Check the DGAV ASF page before any activity with pigs[26]
Routes into FVM	People who hunt, visit pig farms or have been in areas affected by swine diseases must not have contact with pigs for 7 days before entering pig areas. Change of clothes and footwear is required, as described in Chapter 6. Pig farm visits (one farm per day); pig carcasses at necropsy; pork products in animal areas

- **Suspect case:** pig with high fever and skin haemorrhages or cyanosis, sudden deaths in the holding, abortion or bloody diarrhoea, or any sick pig linked to an affected area or wild boar; or a carcass with compatible lesions. **Confirmed:** positive at INIAV (National Reference Laboratory) only.

14.2.1. Immediate Action

- **At triage (animal in the vehicle):** the animal and owner stay in the vehicle, parked away from the entrance; the clinician examines it outside in coverall, double gloves and boot covers; the Clinical Director notifies DGAV and the HSBC; owner and vehicle wait for DGAV instructions.
- **Already inside:** the animal stays in the room where it is (not moved to the UICB); room closed and signed, footbath with Virkon™ S 1 % at the door, one clinician and one nurse in full PPE. Corridors used are cordoned off and not cleaned until DGAV instructions. Everyone present is registered and leaves only after PPE removal, hand washing and footwear disinfection. No other animals of the same owner are admitted.
- **Official sampling:** Official samples are collected or sampling is supervised by DGAV and sent directly to INIAV. These samples are not received or processed by the Diagnostic and Research Laboratories.

14.2.2. Carcasses and Necropsy

- Wild boar carcasses are never accepted at FVM facilities; the transporter is referred to DGAV/INIAV.

[26] African Swine Fever Contingency Plan. DGAV. Available at: https://www.dgav.pt/animais/conteudo/animais-de-producao/suinos/saude-animal/doencas-dos-suinos/peste-suina-africana/plano-de-contingencia/

- Domestic pigs are necropsied only without ante-mortem suspicion. If suspicious lesions appear: stop, close the room, remove nothing, keep the carcass sealed and refrigerated, notify DGAV. By-product collection from the facility is suspended until DGAV authorises it. At INIAV and ETSA, the host's procedures apply and the teacher informs the HSBC the same day.

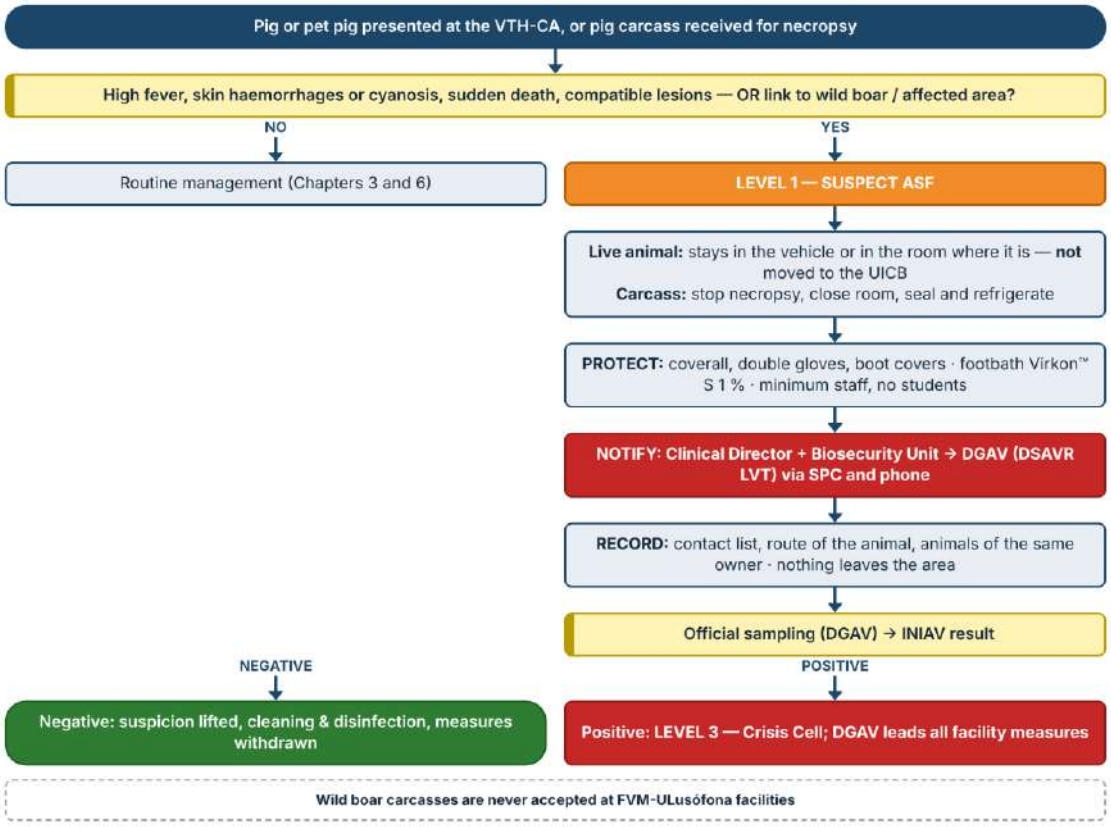


Figure 14.3: African swine fever: decision-support flowchart

End of the event: the suspicion is lifted by DGAV (negative official result). If confirmed, DGAV decides on cleaning, disinfection and reopening; the Crisis Cell implements them, followed by the after-action review.

14.3. Virulent Systemic Feline Calicivirus (VS-FCV)

Table 14.7: VS-FCV – key facts

Topic	Summary
Agent and hosts	Hypervirulent feline calicivirus strains (non-enveloped RNA virus); cats and other felids; not zoonotic; vaccinated adults also affected
Transmission	Direct contact and, above all, fomites (hands, clothes, stethoscopes, thermometers, carriers, cages); outbreaks start in hospitals, shelters and catteries
Incubation and signs	1–5 days (up to 12). Fever, oedema of face and limbs, ulcers on nose, lips, pinnae, pads and mouth, jaundice, dyspnoea, haemorrhage; fatality 50–70 %
Inactivation	Survives a month on dry surfaces; resistant to quaternary ammonium, chlorhexidine and alcohol. Use sodium hypochlorite (5 % bleach 1:32, about 1 500 ppm, 10 min), accelerated hydrogen peroxide or Virkon™ S 1 %; textiles at ≥60 °C
Routes into FVM	Sick or incubating cats (VTH-CA emergency service, VTC-CA), especially from shelters, colonies or other clinics; staff or students volunteering at shelters; necropsy of an infected cat followed by contact with inpatients

14.3.1. Three-Phase Management

- **Surveillance (Level 0):** reception asks about origin (shelter, colony, other clinic), fever, facial or limb swelling and skin ulcers. Such cats are flagged in QVET and go to the UICB by the external route, never to the feline waiting area. Two or more cats with fever and oedema or ulcers within 15 days are reported to the HSBC.
- **Pre-alert (Level 1):** the cat goes in a closed carrier straight to the UICB feline room (from the VTC-CA, it waits in a closed consultation room and is transferred by the owner's car, with no stop at the VTH-CA reception). PPE stays in the UICB. Samples: EDTA blood, oropharyngeal and conjunctival swabs and skin lesions for FCV RT-PCR, with capsid sequencing if positive. All areas used are disinfected at once and recorded; fabric carriers discarded as Group III; clothes of contacts changed and washed at ≥60 °C. Reception lists all cats present since the cat's arrival. If PCR is negative and the suspicion is lifted, Class 3/4 management continues as usual.
- **Alert (Level 2–3):** confirmed case = compatible signs and positive RT-PCR; outbreak = two or more cases with the same strain and at least one hospital link. Crisis Cell led by the VTH-CA Clinical Director. Exposed inpatients are discharged when possible, otherwise housed separately and checked twice daily for 12 days; students do not work in the UICB and other feline areas on the same day. With secondary cases, the Dean may suspend non-urgent feline consultations at the VTH-CA and VTC-CA for at least 12 days after the last case. Terminal disinfection of rooms, followed by airborne hydrogen peroxide where available.
- **Contact tracing:** reception lists all cats in the hospital from the index case's arrival to disinfection. Owners receive a standard letter (Moodle template): signs to watch for 12 days, keep the cat indoors and away from other cats, dedicated contact. Exposed cats with signs are seen at the end of the day or in the UICB. The Clinical Director informs referring veterinarians and shelters; no personal data are disclosed.
- **End of crisis:** no infected cat in the hospital, terminal disinfection recorded, and 12 days since the last exposure without new cases.

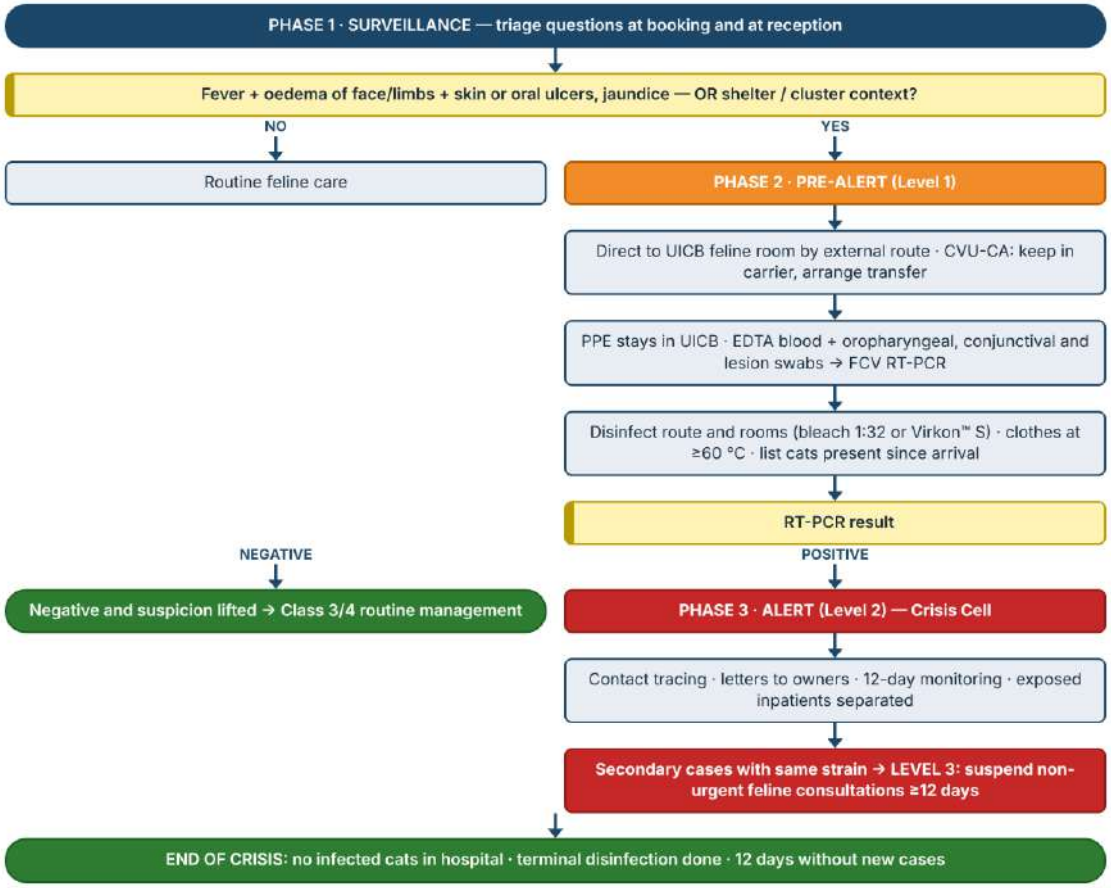


Figure 14.4: VS-FCV: three-phase management flowchart

14.4. Rabies

Table 14.8: Rabies – key facts

Topic	Summary
Agent and hosts	Rabies virus and other lyssaviruses; all mammals (dogs, cats, ferrets; bats as reservoirs of other lyssaviruses)
Transmission	Saliva through bites, scratches or licks on broken skin or mucosa; shedding may start days before signs
Signs	Behaviour change, hypersalivation, dysphagia, change of voice, paresis (mandible or hind limbs), seizures, death; almost always fatal once signs appear
Context	Portugal free in terrestrial animals (last imported case 1984); risk from imported or travelling animals and bats. Notifiable; national rabies programme (DGAV)[27] and DGS Norm 01/2025 on prophylaxis[28]
Inactivation	Most disinfectants (hypochlorite, 70 % ethanol, Virkon™ S, quaternary ammonium) and drying

[27] Rabies ~~Contigency~~Contingency Plan. DGAV. Available at: https://www.dgav.pt/wp-content/uploads/2024/08/Plano-de-contingencia-Raiva_2024.pdf

[28] DGS Norm ~~001/202~~ 001/2025. Pre- and Post-Exposure Prophylaxis for the Rabies Virus: Procedures for access to the National Strategic Reserve of Rabies Immunoglobulin (HRIG). Available at: www.dgs.pt

- **Suspect case:** mammal with compatible neurological or behavioural signs, especially if unvaccinated, imported or travelled in the last six months from an endemic country, with bat contact, or biting without cause. Any dog, cat or ferret that bit a person enters the official observation period set by DGAV. **Confirmed:** positive at INIAV.

14.4.1. Immediate Management

- **Bitten, scratched or licked person:** wash the wound with soap and water for **15 minutes**, then apply povidone-iodine or 70 % alcohol (mucosae: rinse 15 min); do not suture; go to an emergency department **the same day** (or SNS 24, 808 24 24 24) saying the animal is a rabies suspect. Post-exposure prophylaxis is decided by the doctor and the Public Health Unit. The Clinical Director informs the Public Health Unit and the OSH officer.
- **Live animal:** confined at once in a closed room or secure cage and never leaves the hospital. At the VTH-CA, moved to the UICB in a closed rigid carrier by staff in full PPE, cage labelled **'BIOLOGICAL RISK – SUSPECTED RABIES – DO NOT HANDLE'**; at the VTC-CA it stays in a closed room. Only the clinician and one nurse; no students. **No euthanasia** without DGAV authorisation. The Clinical Director notifies DGAV and the municipal veterinarian the same day.
- **Carcass:** whole carcass (head for large animals) double-bagged, labelled and refrigerated at 2–8 °C (frozen only if DGAV agrees). No full necropsy at FVM; brain sampling, if requested by DGAV, by an experienced (preferably vaccinated) pathologist with FFP3, face shield and cut-resistant gloves, manual instruments only. Sent to INIAV as UN3373 after a phone call.
- **PPE and disinfection:** waterproof gown, double nitrile gloves with bite-resistant gloves for restraint, FFP2 (FFP3 for brain sampling), face shield or goggles; chemical restraint preferred, with catch poles, squeeze cages and towels; surfaces disinfected with hypochlorite or Virkon™ S; disposables as Group III.
- **Pre-exposure vaccination** (DGS Norm 01/2025) is recommended for pathologists, exotic and wildlife clinicians and staff handling imported animals; eligible staff are identified yearly (Chapter 15). Vaccination is decided by the occupational physician (OSH Manual, sections 6.3 and 7.1).
- **Tracing:** the Incident Lead lists everyone in contact with saliva (type and date) for the Public Health Unit, and the exposed animals for DGAV; the OSH officer contacts each person individually.

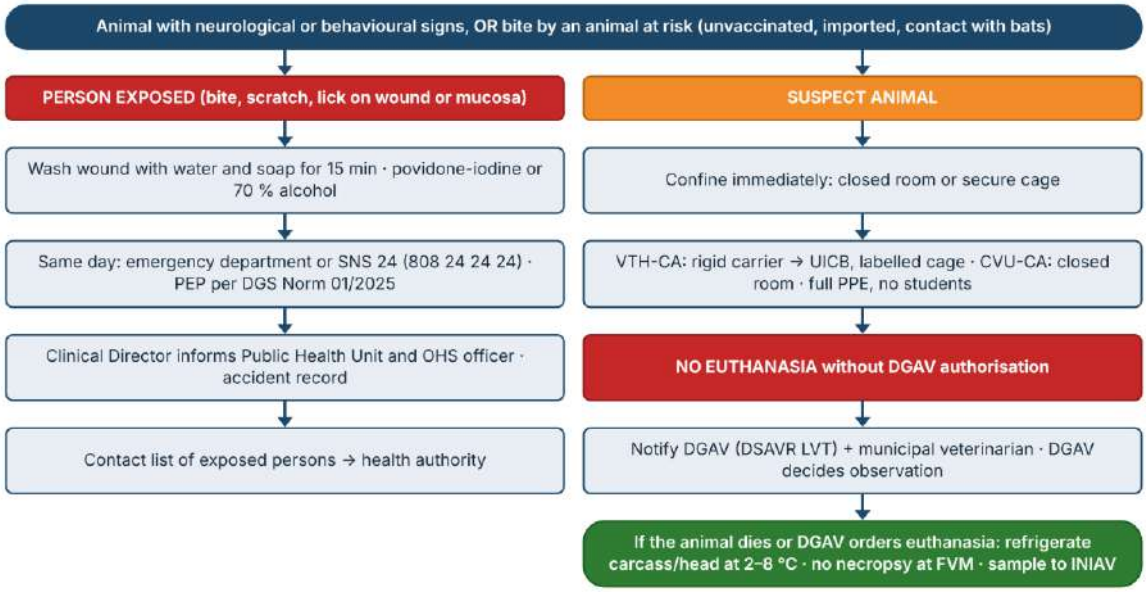


Figure 14.5: Rabies: rapid action flowchart for people and animals

14.5. Highly Pathogenic Avian Influenza (HPAI)

Table 14.9: HPAI – key facts

Topic	Summary
Agent and hosts	Influenza A H5 and H7 of high pathogenicity, especially H5N1 clade 2.3.4.4b: wild birds, poultry and mammals (cats, foxes, marine mammals, dairy cattle in the Americas)
Transmission	Secretions, faeces, feathers and carcasses; contaminated water, feed, clothes, footwear and vehicles. Cats are infected mainly by eating infected birds or raw poultry
Zoonotic risk	Rare but severe human cases; unprotected contact with sick or dead birds and necropsy aerosols. Notifiable to DGAV[29]; human exposure managed with DGS
Context	Repeated outbreaks in Portugal with official restriction zones; check the DGAV avian influenza page before any activity with birds
Inactivation	Hypochlorite, Virkon™ S 1 %, 70 % alcohol, heat ≥60 °C
Routes into FVM	Pet, backyard and wild birds and outdoor or raw-fed cats (VTH-CA, VTC-CA); bird and cat carcasses at necropsy; poultry farm, slaughterhouse and egg centre visits; VTH-FA (Catapereiro), near waterfowl wetlands

- **Suspect bird:** sudden death, depression, respiratory signs, swollen or cyanotic head, comb or wattles, neurological signs or drop in laying, especially from a restriction zone or after wild bird contact; any dead wild waterfowl, gull or raptor. **Suspect cat:** acute neurological and/or severe respiratory signs with fever and outdoor access, contact with birds, raw poultry diet or origin in an outbreak area. **Confirmed:** positive at INIAV.

[29] Highly Pathogenic Avian Influenza Contingency Plan. DGAV. Available at: https://www.dgav.pt/wp-content/uploads/2025/10/Plano-Contingencia-GAAP-2025.pdf

14.5.1. Immediate Management

- **Hospitals:** never in the waiting room. Birds should be kept in their carriers and separated from other animals while awaiting examination, cats to the UICB feline room; at the VTC-CA, the animal waits in its carrier in a closed room. FFP2 (FFP3 for aerosol-generating procedures), goggles or face shield, nitrile gloves, waterproof gown; clinician and one nurse, no students. The Clinical Director notifies DGAV (birds, and cats with a clear epidemiological link) and follows its instructions on sampling and destination; the animal does not leave FVM without DGAV authorisation.
- **Necropsy:** wild waterfowl, gulls, raptors, birds from flocks with sudden mortality and suspect cats are **not opened** at FVM: double-bagged, sealed, refrigerated and referred to INIAV via DGAV. Unexpected compatible lesions: stop, close the room, leave after PPE removal and hand and footwear disinfection, notify DGAV; disinfect reception and vehicle.
- **Field visits**: The teacher must check DGAV notices on the day before the visit. Visits to establishments located within protection or surveillance zones must be cancelled. Establishment-provided or disposable PPE must be used, and personal belongings must remain on the bus. Following a visit to a poultry farm, staff and students must avoid contact with birds (including birds presented to the Exotic Animal Service, birds undergoing necropsy and their own birds) for at least 7 days, as specified in Chapter 6.
- **Human health:** after unprotected contact, contact SNS 24 or the Public Health Unit and inform the OSH officer; watch for fever, cough, conjunctivitis or flu-like symptoms for 10 days. Pathologists and exotic or wildlife clinicians may be eligible for zoonotic influenza vaccination (DGS Norm 004/2025[30]); seasonal influenza vaccination is recommended for everyone working with animals.
- **Communication:** contact point is the VTH-CA Clinical Director (clinical cases) or the necropsy responsible (carcasses). Areas used by a positive animal are closed and disinfected with an approved virucide before reopening.

[30] DGS Norm 004/2025. Vaccination Against Zoonotic Influenza Available at: https://www.dgs.pt/normas-orientacoes-e-informacoes/orientacoes-e-circulares-informativas/orientacao-n-0042025-de-09092025-vacinacao-sazonal-contra-a-gripe-e-a-covid-19-procedimentos-especificos-pdf.aspx

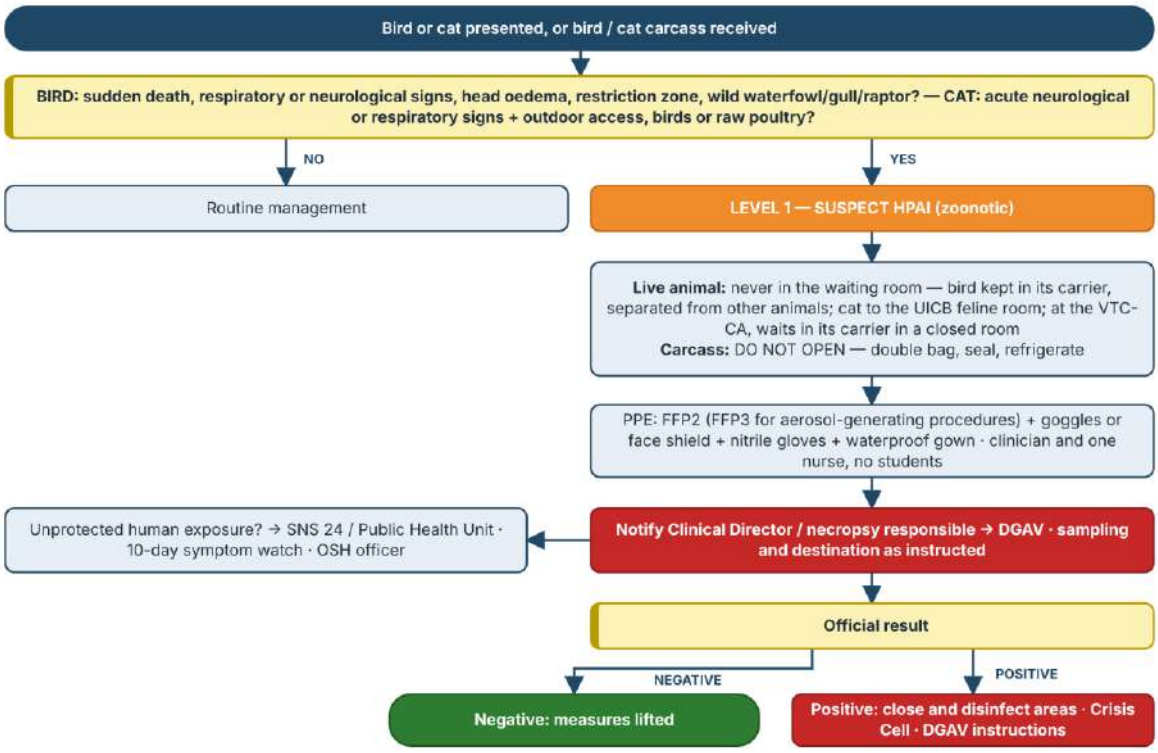


Figure 14.6: HPAI: action flowchart for birds and cats

14.6. Leptospirosis

Pathogenic *Leptospira* spp. infect most mammals; rodents are the main reservoir, and dogs, cattle, pigs and horses may shed leptospires in urine for weeks to months. Infection occurs through damaged skin or mucosae in contact with urine, blood, tissues or placental fluids, contaminated water, soil or bedding, or urine aerosols from pressure washing. In people it ranges from a flu-like illness to Weil's disease and is notifiable to DGS[31]. Leptospires survive in warm, humid places and stagnant water but are sensitive to drying and most disinfectants.

Table 14.10: Leptospirosis – measures by setting

Setting	Measures
Field necropsy	No necropsy with students on the farm if suspected ante mortem (jaundice, haemoglobinuria, abortions): refer the carcass. If lesions appear, stop, students at least 2 m away, teacher takes essential samples only. Double gloves, goggles or face shield, waterproof apron and boots; disposable PPE left on the farm; boots and equipment disinfected before entering the vehicle
Necropsy room	Sign 'BIOLOGICAL RISK – SUSPECTED LEPTOSPIROSIS' on door and table; FFP2/FFP3, face shield, cut-resistant over nitrile gloves, waterproof apron, boots; no electric saws and **no high-pressure washing**; minimum number of students; no pregnant or immunocompromised people
VTH-CA	Dog with acute kidney or liver injury, fever and incomplete vaccination or exposure to water, rodents or rural areas: Class 4 in the UICB, cage with absorbent lining labelled **'CAUTION – INFECTIOUS URINE'**. Closed urine collection when indicated; spills should be covered with absorbent paper and disinfected before removal. High-pressure hoses should not be used during cleaning, and staff should wear gloves, gowns and eye protection.

[31] Ministry of Health. DGS. (2021). Despacho n.º 1150/2021: Updates the list of mandatory notifiable communicable diseases. Diário da República: 2.ª série, (19), 35-37.

VTH-E	Horse in the Infetocontagiosas Unit (independent sewage); footbaths at unit and stall; coverall, boots, gloves and eye protection; wet bedding bagged as Group III, never on the common manure heap; signs on door and stall
VTH-FA	Ruminant or pig with abortion, haemoglobinuria or jaundice: Class 4 in the UICB-FA; footbaths at the unit and pen; coverall, boots, gloves and eye protection; no high-pressure hoses; wet bedding bagged as Group III, never on the manure heap; signs on door and pen

- **Disinfection:** organic matter removed without water pressure → detergent → hypochlorite (bleach 1:10), Virkon™ S 1 %, iodine or quaternary ammonium, at least 10 min → rinse → dry. Rodent control reinforced around the area (Chapter 10).
- **Exposed people:** the clinician lists everyone who handled the animal, urine, cage or stall or took part in the necropsy; they receive the information sheet (Moodle), watch for fever, myalgia and headache for 30 days and tell their doctor about the exposure. The list goes to the OSH officer.
- **Diagnosis:** EDTA blood and urine for PCR early in disease; paired sera (MAT) 2–3 weeks apart; kidney and liver at necropsy. Samples labelled 'SUSPECTED LEPTOSPIROSIS', opened in a Class II cabinet; positives reported to the clinician the same day.

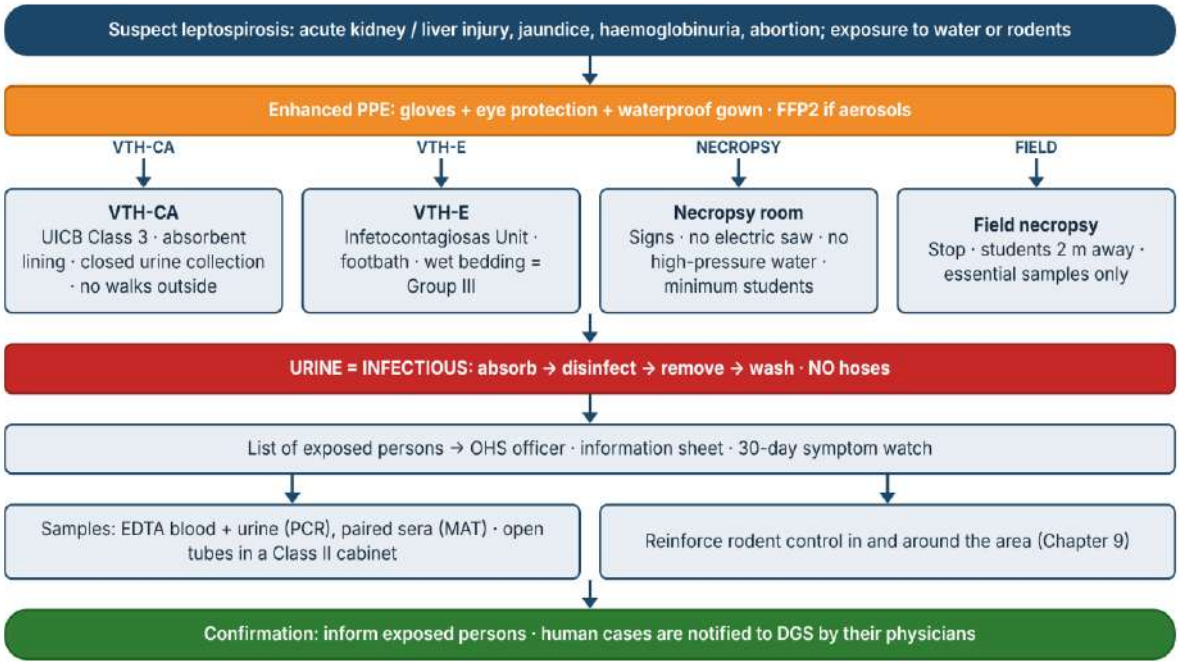


Figure 14.7: Leptospirosis: action summary

14.7. Equine Rhinopneumonitis (EHV)

Equid alphaherpesvirus 1 (EHV-1) causes respiratory disease, abortion, neonatal death and myeloencephalopathy (EHM: fever, then ataxia, hind-limb paresis, urinary incontinence, reduced tail tone, recumbency); EHV-4 is mainly respiratory. Spread is by aerosols, nasal secretions, aborted foetuses and fomites; the virus survives days to weeks. Most adult horses are latent

carriers and stress (transport, surgery, hospitalisation) causes reactivation, which explains hospital cases. Not zoonotic, but notifiable in Portugal[32].

- **Suspect case:** fever (>38.5 °C) with acute respiratory or neurological signs, late abortion, or a febrile contact of a confirmed case (Level 1). **Confirmed:** EHV qPCR on nasal swab and/or buffy coat, or isolation (Level 2); EHM or a secondary hospital case = Level 3.

14.7.1. Immediate Management

- **Admission of a suspect:** asked at booking (fever, neurological signs, abortions, outbreaks at the yard). The horse is examined in the trailer or the external unloading area and, if admitted, goes straight to the Infetocontagiosas Unit, never through the hospital corridor. The trailer is disinfected before leaving or leaves with instructions.
- **Internal case ('Code Red'):** declared by the clinician on duty, who informs the Clinical Director. Horse movements in and out of the barn stop; no discharges until risk assessment. The horse moves to the Infetocontagiosas Unit by the shortest route (or a barrier is set at the stall if it cannot move); the stall is signed **'DO NOT USE – DISINFECTION REQUIRED'**. All horses in the barn are contacts: temperature twice daily.
- **Infetocontagiosas Unit:** with a changing room, preparation room, atrium and a box, independent sewage and no communication with other stalls. PPE only in the changing room/atrium (footbath with Virkon™ S 1 % renewed daily, PPE stock, Group III container): hooded coverall, dedicated boots, double gloves; FFP2 and cap for aerosol-generating procedures. Doors closed; air must not flow towards the main barn (checked at activation). Dedicated equipment stays in the unit. Staff working there see no other horses afterwards in the shift, or visit the unit last.

14.7.2. VTH-E Lockdown

With confirmed EHM or a secondary case, the VTH-E Clinical Director, after consulting the Crisis Cell, declares a lockdown: elective admissions and discharges suspended, emergencies referred elsewhere, owners informed. The hospital is divided into three zones, and people move only from green to yellow to red within a day:

  - **Red** (Infetocontagiosas Unit, stalls with confirmed cases): designated clinician and one nurse; no students.
  - **Yellow** (exposed horses): gown and gloves changed between stalls, footbaths, temperature twice daily; students only under direct supervision.
  - **Green** (offices, classrooms, areas without horses): normal activity.
- Students do not visit other equine premises during the lockdown and for 7 days after. The lockdown ends when there have been no new febrile cases for at least 21 days in the contacts (or less, if agreed with DGAV and supported by negative PCR) and terminal disinfection is complete.

[32] Equine Rhinopneumonitis. DGAV. Available at: https://www.dgav.pt/animais/conteudo/animais-de-producao/equideos/saude-animal/doencas-dos-equideos/rinopneumonia-equina/



Figure 14.8: VTH-E lockdown zoning (red / yellow / green) and one-way movement of people

- **Sampling:** at onset of fever, before treatment if possible: deep nasopharyngeal swab in transport medium and EDTA blood for qPCR, labelled 'SUSPECTED EHV – HIGH CONTAGION RISK', to the laboratory designated by the Clinical Director (INIAV for official confirmation); febrile contacts sampled likewise.
- **Disinfection:** organic matter removed first; Virkon™ S 1 %, hypochlorite (1:10) or quaternary ammonium. Terminal: bedding bagged as Group III, wash with detergent, disinfect walls, doors, feeders, drinkers and floor, box empty and dry for at least 48 h.
- **Communication:** VTH-E staff and students briefed the same day; DGAV notified of confirmed cases; owners of contacts informed of monitoring and delayed discharge; referring veterinarians receive a note; public communication only through the communication office.

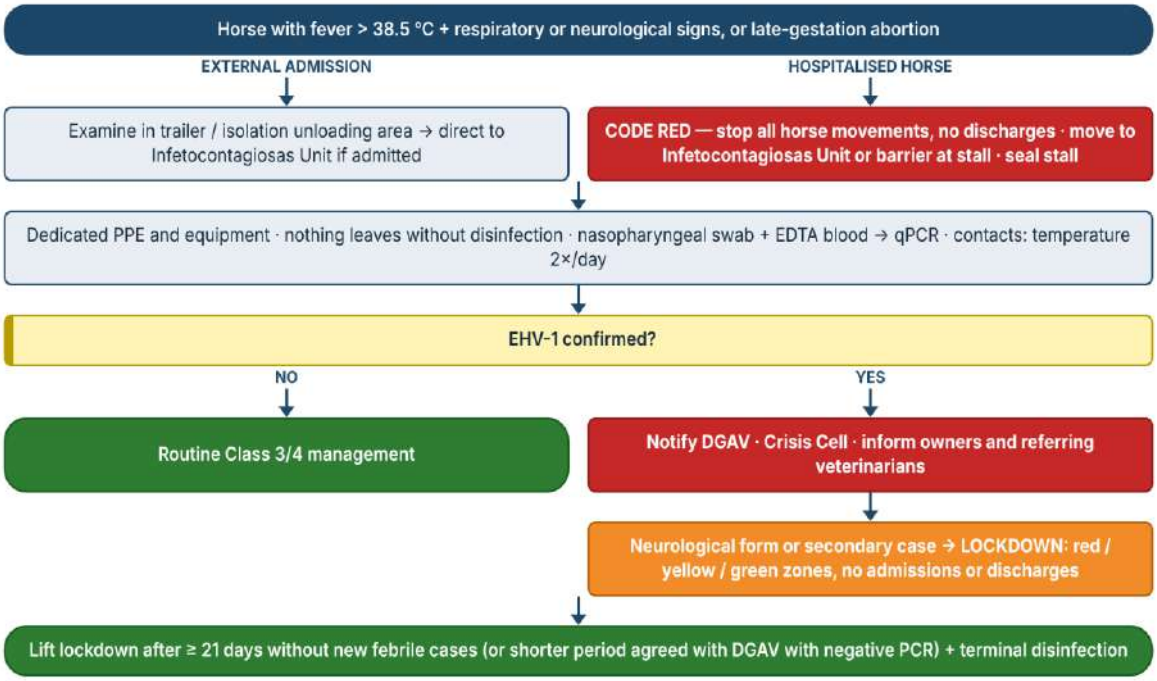


Figure 14.9: Equine herpesvirus: action summary

14.8. Equine Salmonellosis

Salmonella enterica (e.g., Typhimurium, Newport, Anatum), often multidrug-resistant in hospital outbreaks, spreads faecal–orally and through fomites (boots, buckets, thermometers, nasogastric tubes, hands, floors, drains) and persists for months in biofilms. Colic and colic surgery, antimicrobials, transport, fasting and long hospitalisation increase risk; healthy horses may shed under stress. Signs: fever, depression, leukopenia, acute diarrhoea, colitis, endotoxaemia; septicaemia in foals. It is zoonotic and a leading cause of outbreaks and closure of equine hospitals.

Table 14.11: Triage for salmonellosis at the VTH-E (repeated if fever or diarrhoea appears)

Risk	Criteria	Placement
High (Class 4, red)	Acute diarrhoea with fever (>38.5 °C) and/or leukopenia (<4 000/µL); diarrhoea after transport or antimicrobials; foal with diarrhoea or sepsis	Infetocontagiosas Unit immediately
Moderate (Class 3, orange)	Fever of unknown origin without diarrhoea; soft faeces without fever; from premises with recent salmonellosis	Restricted stall with barrier precautions; faecal sampling
Low (Class 1–2, green)	No gastrointestinal or systemic signs	General hospitalisation

14.8.1. Immediate Management

- **Admission:** a horse with liquid diarrhoea is assessed in the trailer and, if admitted, unloaded on the isolation side and taken straight to the unit; faeces dropped on the way are removed, the spot disinfected and cordoned.

- **Internal case ('Code Brown'):** declared by the clinician on duty. Gown, gloves and boot covers to enter; footbath and tape at the stall; horse moved to the unit by the shortest route, which is then disinfected. The stall stays closed until terminal disinfection and negative environmental cultures; neighbours and horses sharing staff or equipment are monitored (temperature twice daily, faeces).
- **In the unit:** waterproof gown or coverall, gloves changed between clean and dirty tasks, dedicated boots, mask and goggles when handling diarrhoea; dedicated equipment (nasogastric tubes exclusive or sterilised); footbath renewed every 24 h or when soiled; no pregnant or immunocompromised people.
- **Diagnosis:** shedding is intermittent. At least 10 g of faeces (not a swab) five times at 12–24 h intervals for enrichment culture, or one PCR followed by culture of positives (serotyping and susceptibility testing, Chapter 13). Request labelled **'SUSPECTED SALMONELLA'**.
- **Cleaning:** Frequent faeces removal using disinfectable plastic tools; **no high-pressure hoses**. Terminal cleaning includes disposal of bedding as Group III waste, scrubbing with an enzymatic or degreasing detergent to remove biofilm, rinsing and drying, followed by disinfection with Virkon™ S 1% or hypochlorite for 10–30 minutes. Rinse and dry again and clean the drains.
- **People:** contacts are listed and informed, watch for diarrhoea, fever and cramps for 7 days and tell their doctor; hand washing then alcohol rub on leaving the unit; no food, drink or phones in clinical areas.
- **Discharge:** clinical resolution and 3–5 consecutive negative cultures at 24 h intervals, or a negative PCR after resolution. A horse going home still positive leaves with a signed acknowledgement and the owner leaflet (Table 14.12). The decision is taken by the clinician in charge and recorded in the clinical file.

Table 14.12: Owner leaflet – home care after salmonellosis (template)

Topic	Instructions for 30 days after discharge
Why	Your horse may still shed *Salmonella* in its faeces, which can infect other horses and people
Housing	Separate stall or paddock, no nose contact or shared water with other horses
People	Dedicated boots and gloves; wash hands after every contact; children, elderly, pregnant and immunocompromised people do not handle the horse
Manure	Not spread on pastures; composted separately, away from watercourses
Equipment	Dedicated buckets, feeders and tools, disinfected at the end
When to call	If the horse has fever or diarrhoea again, or anyone in contact has diarrhoea

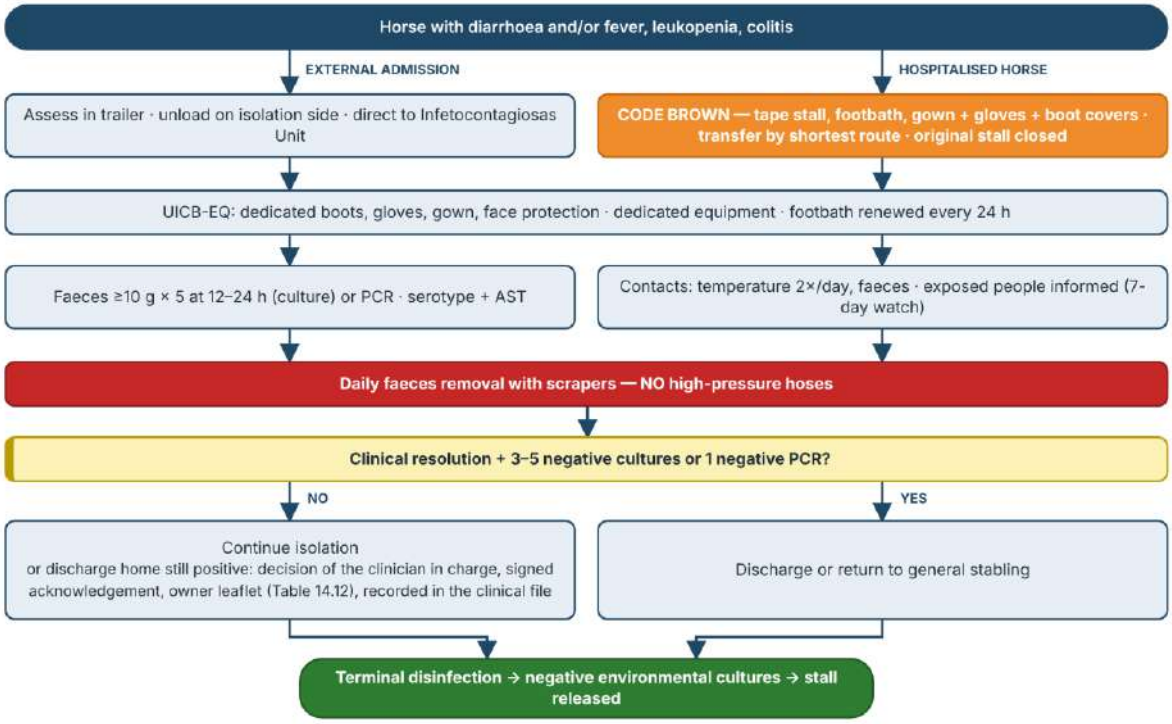


Figure 14.10: Equine salmonellosis: action summary

14.9. Foot-and-Mouth Disease (FMD)

Table 14.13: FMD – key facts

Topic	Summary
Agent and hosts	FMD virus (*Aphthovirus*, Picornaviridae), non-enveloped RNA virus, seven serotypes; cattle, pigs, sheep, goats and wild cloven-hoofed animals. Not considered zoonotic
Transmission	Direct contact; secretions, milk and semen; aerosols (pigs shed very large amounts); fomites (boots, clothes, vehicles, equipment); animal products. People can carry the virus on clothes and in the respiratory tract
Clinical picture	Fever, vesicles and erosions on mouth, tongue, feet and teats; salivation, lameness, drop in milk yield; sudden death in young animals (myocarditis). Sheep and goats often show mild signs
Inactivation	Survives for weeks in the environment; resistant to alcohols, chlorhexidine and quaternary ammonium compounds. Use Virkon™ S 1 %, sodium hypochlorite, 4 % sodium carbonate or 0.2 % citric acid
Context	Category A disease (Regulation (EU) 2016/429): immediate notification to DGAV. Portugal is free, but outbreaks occurred in the EU in 2025 (Germany, Hungary, Slovakia). Check DGAV notices before activities with susceptible species
Routes into FVM	Ruminants or pigs referred to the VTH-FA; farm visits (Chapter 6); carcasses of cloven-hoofed animals at necropsy; contaminated vehicles

- **Suspect case:** cloven-hoofed animal with fever and vesicles or erosions in the mouth, feet or teats, salivation or sudden lameness of several animals; any such signs in an animal from an affected area. **Confirmed:** positive at INIAV (National Reference Laboratory) only.

14.9.1. Immediate Management

- **At telephone triage:** the animal is not transported to the VTH-FA (Chapter 12, section 12.3.2); the Clinical Director notifies DGAV.
- **At arrival or inside the VTH-FA:** the animal is not unloaded, or stays where it is; standstill of all animals, people, vehicles and materials in the VTH-FA (Level 2); no animal leaves until DGAV decides. One clinician and one nurse in full PPE; students out.
- **Sampling:** only by or under the supervision of DGAV (vesicular epithelium and fluid), sent directly to INIAV. No necropsy at FVM facilities.
- **People:** everyone in contact is registered, changes clothes and footwear on site and has no contact with cloven-hoofed animals for at least 72 hours; vehicles are cleaned and disinfected before leaving.
- **Disinfection:** footbaths and surfaces with Virkon™ S 1 % or an approved virucide; terminal disinfection as instructed by DGAV.
- **Farm visits:** cancelled in restriction zones and during a national alert.
- **End of the event:** suspicion lifted by DGAV (negative official result). If confirmed, DGAV decides on culling, cleaning, disinfection and reopening.

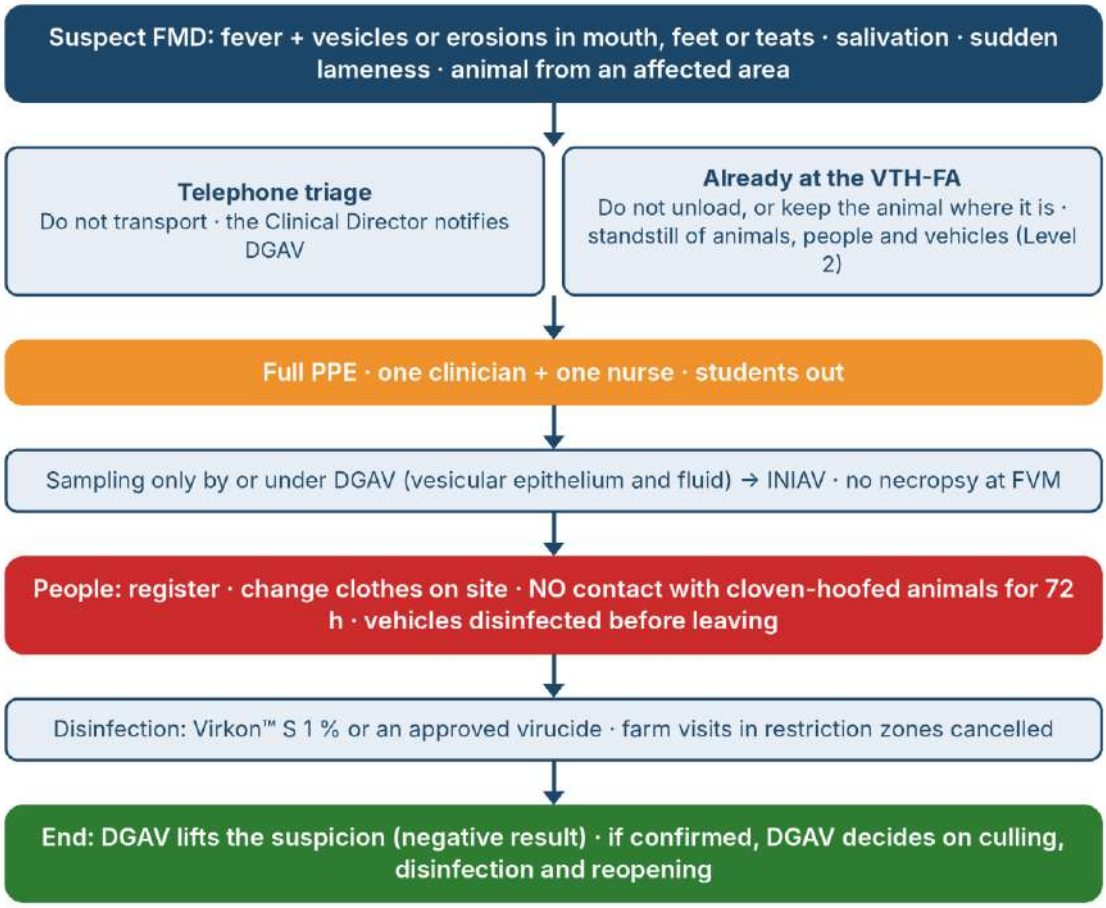


Figure 14.11: Foot-and-mouth disease: action summary

14.10. Bovine Tuberculosis

Table 14.14: Bovine tuberculosis – key facts

Topic	Summary
Agent and hosts	*Mycobacterium bovis* and other members of the *M. tuberculosis* complex (risk group 3); cattle, goats, pigs, deer and wild boar
Transmission	Aerosols from infected animals and tissues; raw milk; contact with lesions; aerosols during necropsy, surgery or high-pressure cleaning
Clinical picture	Often subclinical; chronic weight loss, cough, enlarged lymph nodes, mastitis; caseous or calcified granulomas in lymph nodes and lungs
Zoonotic risk	Tuberculosis in people, mainly by inhalation or raw milk. Notifiable to DGAV (animals) and to DGS (people)
Inactivation	Mycobacteria resist chlorhexidine and quaternary ammonium compounds. Use sodium hypochlorite (1:10), 70 % alcohol (equipment) or a tuberculocidal product, after removal of organic matter
Routes into FVM	Cattle and goats from herds under restriction or with reactor animals; unexpected granulomas at surgery, necropsy or slaughterhouse visits (Chapter 7, Table 7.5; Chapter 8)

- **Suspect case:** animal from a herd under official restriction or reacting to the tuberculin test, or unexpected granulomatous lesions. **Confirmed:** culture or PCR at INIAV.

14.10.1. Immediate Management

- **Admission:** animals from restricted herds or reactors are not admitted (Chapter 12, section 12.3.2).
- **Suspicion after admission:** Class 4; the animal moves to the UICB-FA; FFP3 respirator for procedures with aerosols; no high-pressure cleaning; the Clinical Director notifies DGAV.
- **Granulomas at surgery or necropsy:** stop the procedure, keep the room ventilated, set suspicious tissues aside in sealed containers for INIAV, and follow Chapter 7, Table 7.5.
- **People:** the clinician lists everyone exposed (type and date of contact, PPE used) for the OSH officer; occupational health decides on screening (tuberculin skin test or IGRA). Health surveillance follows the OSH Manual (Chapter 6).
- **Milk and carcasses:** no raw milk leaves the VTH-FA; carcasses are disposed of as DGAV instructs.

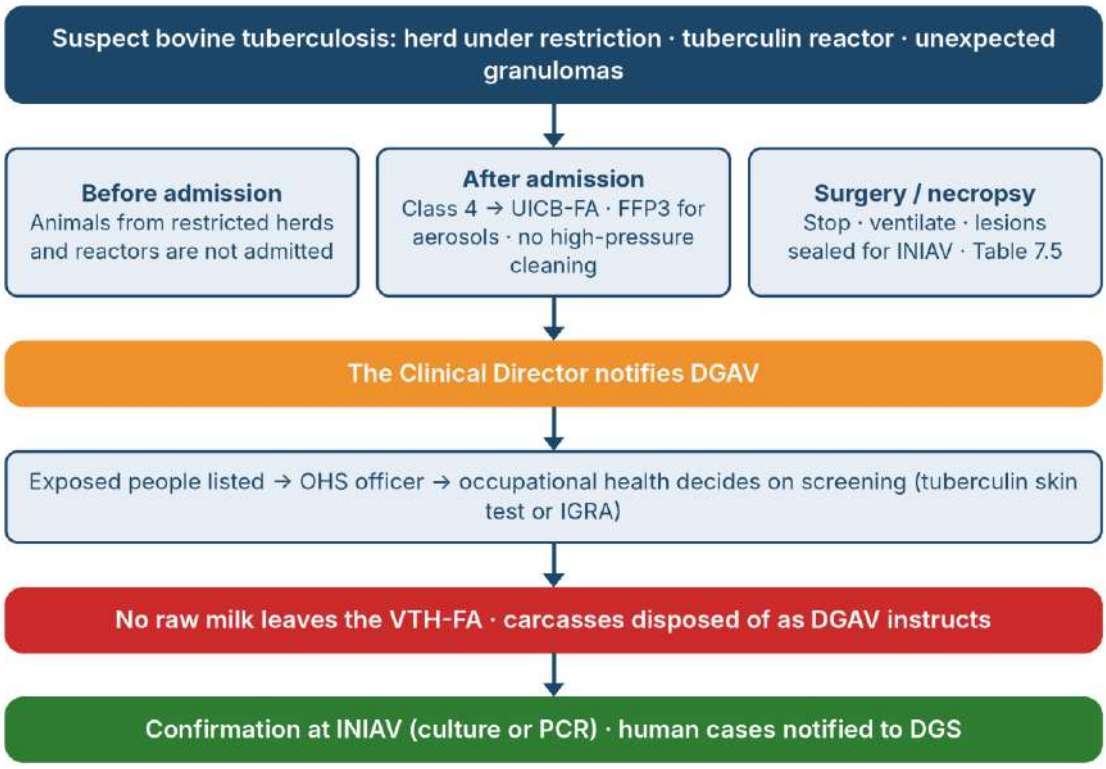


Figure 14.12: Bovine tuberculosis: action summary

14.11. Q Fever

Table 14.15: Q fever – key facts

Topic	Summary
Agent and hosts	*Coxiella burnetii* (risk group 3); goats, sheep and cattle are the main sources; also other mammals, birds and ticks
Transmission	Inhalation of contaminated dust and aerosols from placentas, birth fluids, aborted foetuses, manure and bedding; very low infective dose; can spread several kilometres with the wind; raw milk
Clinical picture	In ruminants, mostly subclinical; late abortion, stillbirth and weak newborns, especially in goats and sheep
Zoonotic risk	Flu-like illness, pneumonia or hepatitis; chronic endocarditis in people with valve disease; abortion and premature birth in pregnant women. Notifiable to DGS
Inactivation	Very resistant in the environment. Remove organic matter, then sodium hypochlorite (1:10) or a product validated against *Coxiella*; manure composted or covered, never spread fresh
Routes into FVM	Abortions and periparturient ruminants at the VTH-FA; farm visits during lambing and kidding (Chapter 6, Table 6.2); necropsy of foetuses and placentas

- **Suspect case:** abortion, stillbirth or weak newborns in goats, sheep or cattle, especially several in the same herd. **Confirmed:** PCR on placenta, vaginal swab or foetus, or serology, at a laboratory designated by the Clinical Director.

14.11.1. Immediate Management

- **Housing:** aborting or periparturient ruminants from suspect herds are Class 3–4 and housed in the UICB-FA.
- **PPE:** disposable coverall, gloves, FFP2 respirator (FFP3 for procedures with aerosols) and eye protection for any contact with birth products.
- **Birth products:** placentas, foetuses and soiled bedding are collected at once, double-bagged and sent to the laboratory or disposed of as Category 1 animal by-products; no high-pressure water or dry sweeping.
- **People:** pregnant and immunocompromised people and people with heart valve disease do not take part (Chapter 1, section 1.5.5). Everyone exposed watches for fever, headache or cough for 3 weeks and tells their doctor about the exposure; the list goes to the OSH officer. See also the OSH Manual, section 8.1.
- **Notification:** human cases are notified to DGS; animal cases are reported to DGAV as part of the investigation of abortions.

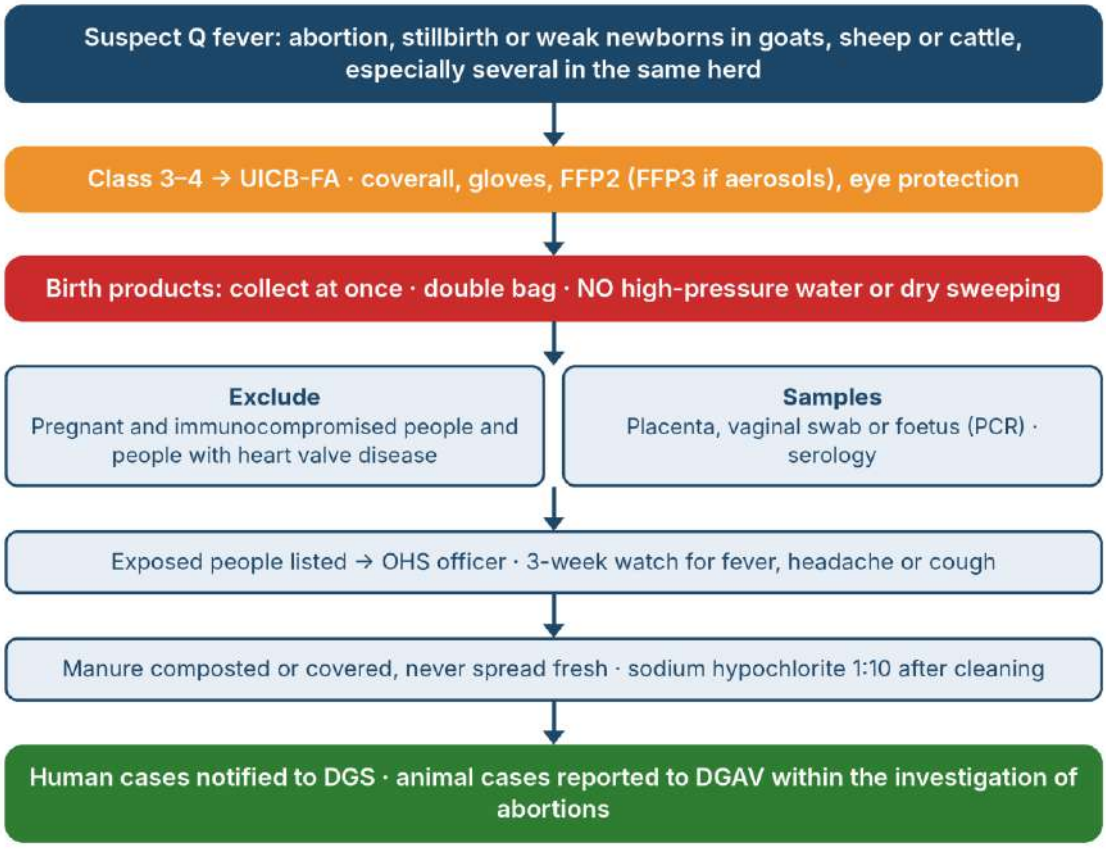


Figure 14.13: Q fever: action summary

14.12. Equine Influenza

Table 14.16: Equine influenza – key facts

Topic	Summary
Agent and hosts	Equine influenza virus (influenza A, mainly H3N8), enveloped RNA virus; horses, donkeys and mules

Transmission	Highly contagious: aerosols from coughing horses, nasal secretions, and fomites (hands, clothes, tack, buckets, vehicles); incubation 1–3 days
Clinical picture	Sudden high fever, dry harsh cough, serous then mucopurulent nasal discharge, depression, loss of appetite; outbreaks spread fast in unvaccinated groups
Inactivation	Inactivated by most disinfectants (Virkon™ S 1 %, sodium hypochlorite, 70 % alcohol) and by drying
Context	Notifiable in Portugal (Chapter 1, Table 1.15); vaccination is compulsory for competition horses
Routes into FVM	Febrile equids with respiratory signs at the VTH-E and equids referred to the VTH-FA (Chapter 12); horses returning from events

- **Suspect case:** equid with sudden fever (>38.5 °C) and cough or nasal discharge, especially if unvaccinated or recently at an event, or a febrile contact of a confirmed case. **Confirmed:** qPCR on nasopharyngeal swab.

14.12.1. Immediate Management

- **Housing:** at the VTH-E, the horse goes straight to the Infetocontagiosas Unit; when referred to the VTH-FA, only to the UICB-FA, never with other equids.
- **Contacts:** all equids that shared air space, staff or equipment with the case have their temperature taken twice daily for 14 days; elective admissions and discharges of equids may be suspended (Chapter 5).
- **People:** dedicated PPE and equipment; staff caring for the case see other horses before, never after, in the same shift.
- **Notification:** the Clinical Director notifies DGAV of confirmed cases and informs referring veterinarians.
- **End of the event:** no new febrile case in the contacts for 14 days after the last case, and terminal disinfection complete.

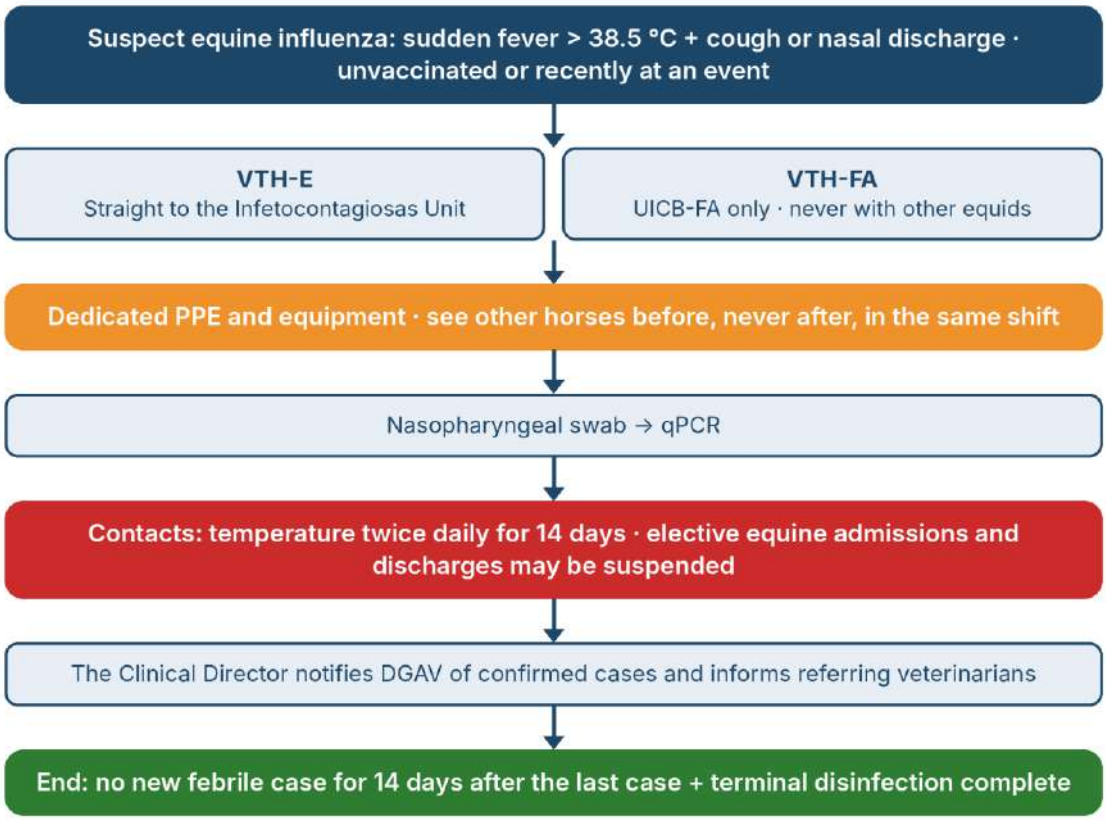


Figure 14.14: Equine influenza: action summary

14.13. Final Provisions

14.13.1. Availability and Review

- Communication in a crisis is centralised in the Incident Lead and the Coordinator of the HSBC. This chapter is on Moodle and printed and laminated at each hospital reception, isolation unit, necropsy and anatomy room and crisis kit; students are told of any restriction before entering affected areas.
- Each scenario is reviewed at least yearly and after each activation (Chapter 15). At stand-down, the Crisis Cell informs everyone through the same channels, removes the signs and closes the Incident Log; the after-action review follows within 30 days.

14.13.2. Emergency Contacts

Table 14.17: Emergency contacts for crisis scenarios

Entity	Contact
Clinical Director, VTH-CA	Available through internal communication channels
Clinical Director, VTC-CA	Available through internal communication channels
Clinical Director, VTH-E	Available through internal communication channels
Clinical Director, VTH-FA	Available through internal communication channels
Coordinator of the HSBC	Available through internal communication channels

Person responsible for the necropsy facilities	Available through internal communication channels
OSH officer (University)	Available through internal communication channels
DGAV – DSAVR Lisboa e Vale do Tejo	secretariado.lvt@dgav.pt; spc.dgav.pt
INIAV – National Reference Laboratory (Oeiras)	+351 214 403 500 · geral@iniav.pt/infocliente@iniav.pt
Municipal veterinarian – Lisbon (Casa dos Animais de Lisboa)	+351 218 172 300 · casa.dos.animais@cm-lisboa.pt
Municipal veterinarian – Benavente (VTH-E, VTH-FA)	+ 351 968 648 767
Public Health Unit (area of the facility)	Available through internal communication channels
SNS 24	808 24 24 24
INEM – medical emergency	112
Poison Information Centre (CIAV)	800 250 250
Animal by-product collection operator	+351 261 320 300 · info.portugal.si@urbaser.com

14.13.3. Crisis Signage

A4 laminated signs in the colours of the alert levels, with a blank field for disease and date, are kept in every crisis kit; editable versions are available from the HSBC.



Figure 14.15: Door sign for an isolation room or area under suspicion

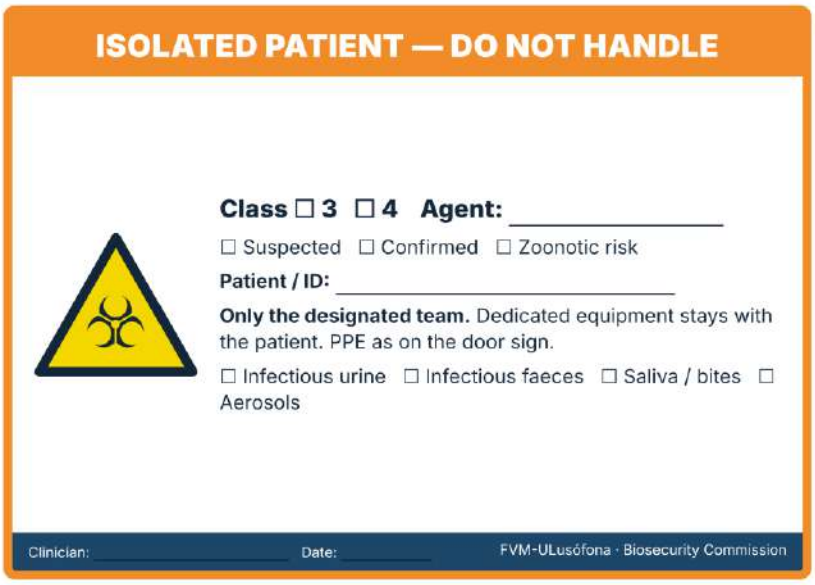


Figure 14.16: Cage or stall card for a suspect or confirmed patient

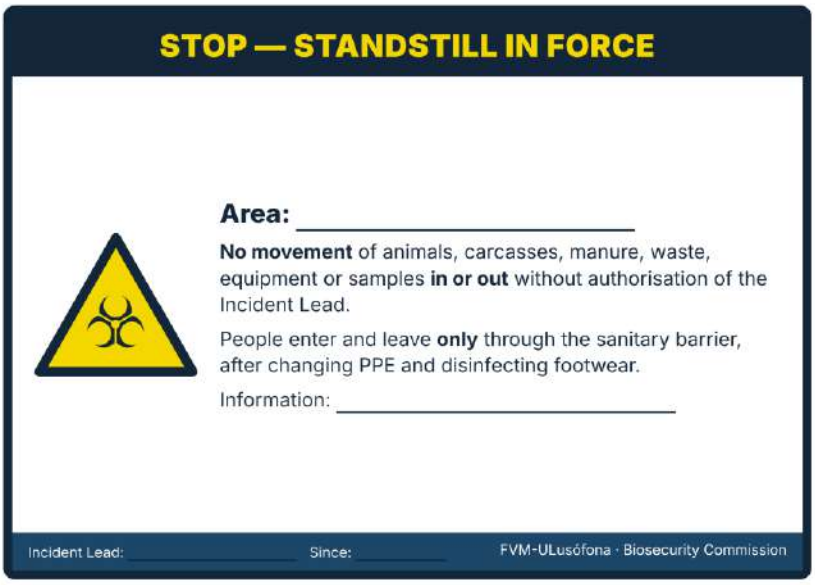


Figure 14.17: Lockdown / standstill sign for a hospital, barn or necropsy room



Figure 14.18: 'Do not use – disinfection required' sign

Chapter 15: Biosecurity SOPs for Quality Assurance

Writing biosecurity procedures is only the first step; their value depends on whether they are known, applied, verified and improved. Quality assurance (QA) closes this loop.

This chapter describes how FVM-ULusófona plans, monitors, assesses and improves biosecurity in its clinical, laboratory, necropsy and farm activities, in line with ESEVT Standard 4.9 and with the University's Internal Quality Assurance System (SIGQ): who is responsible, which tools and indicators are used, how non-conformities are corrected and how students, staff and clients contribute to continuous improvement.

15.1. Introduction and Scope

At Universidade Lusófona, quality assurance is organised by the **Internal Quality Assurance System (SIGQ)**, accredited by the Agency for Assessment and Accreditation of Higher Education (A3ES), with the Quality Management Service supporting the organic units. Biosecurity QA at FVM-ULusófona is integrated into the SIGQ: it uses the same planning and reporting instruments (strategic plan, annual activities plan, curricular unit reports and organic unit reports) and adds tools that are specific to biological risk.

This chapter applies to all FVM-ULusófona facilities and activities described in Chapters 2 to 12: VTH-CA, VTC-CA, VTH-E, VTH-FA (Catapereiro), anatomy and necropsy facilities (including activities at INIAV and ETSA), Diagnostic and research laboratories and teaching laboratories, the Clinical Skills Training Centre, and extramural activities.

The objectives of biosecurity QA are to:

- ensure that every person who enters an FVM-ULusófona facility knows and applies the procedures relevant to his or her activity;
- verify, with objective evidence, that procedures are applied and are effective (audits, environmental monitoring, indicators);
- detect and correct deviations, incidents and near misses before they cause harm;
- collect and use the feedback of students, staff, clients and external partners;
- keep this manual up to date with legislation, scientific knowledge and changes in facilities and activities;
- report the results to the Faculty governing bodies and make the improvement cycle visible to the whole community.

15.1.1. Alignment with the ESEVT SOP 2023

Biosecurity is addressed in several ESEVT Standards and Day One Competences, not only in Standard 4.9. Table 15.1 shows where each requirement is covered in this manual, so that the evidence requested in the Self-Evaluation Report (Area 4, section 4.9) can be traced to written procedures.

Table 15.1: ESEVT SOP 2023 requirements related to biosecurity and where they are addressed

ESEVT requirement	What is required	Where addressed
Standard 1.6	Monitoring and periodic review of activities; closed PDCA loops; actions communicated to all concerned	15.4, 15.6, 15.9
Standard 4.1	Facilities comply with relevant legislation, including health, safety and biosecurity	Chapters 1–12; 15.5.1, 15.5.7
Standard 4.3	Livestock facilities, animal housing and clinical facilities ensure relevant biosecurity	Chapters 2–6 and 12; 15.5.1, 15.5.2
Standard 4.6	Isolation facilities properly constructed, ventilated, maintained and operated; procedures to use them in an emergency	Chapters 2–5 and 12; Chapter 14; 15.5.7
Standard 4.8	Transport of students, animals, cadavers and materials prevents the spread of infectious agents	Chapters 6–8; 15.5.7 (vehicles)
Standard 4.9	Procedures taught and posted (in the languages of the curriculum); biosecurity manual available; committee structure; QA of clinical, laboratory and farm services; feedback from students, staff and clients	Whole manual; 15.2, 15.3, 15.5, 15.7, 15.8
Standard 7 (admission)	Number of admitted students adapted to biosecurity and welfare requirements	15.8.1 (group sizes in high-risk areas); Chapters 2–7 and 12
Standard 9.1	Quality-assured teacher training programme including biosecurity and QA procedures, mandatory for newly appointed teaching staff	15.8.1
Day One Competence 1.29	Recommend and evaluate protocols for biosecurity, and apply these principles correctly	15.8.1 (student competence assessment)

15.2. Governance and Responsibilities

Biosecurity QA follows the structure described in Chapter 1 (section 1.1.2). The table below summarises who does what; 'R' indicates the person or body that carries out the task, 'A' who approves or is accountable, 'C' who is consulted and 'I' who is informed.

Table 15.2: Biosecurity QA responsibilities (R = responsible, A = accountable, C = consulted, I = informed)

Task	Dean	HSBC	Clinical Directors / Facility responsibles	OSH officer	Students / staff reps
Approval and revision of the manual	A	R	C	C	C
Annual audit programme	I	A/R	C	C	I
Environmental microbiological monitoring	I	A	R/C	I	I
Incident and accident reporting	I	C	R	A	I
Corrective and preventive actions (CAPA)	I	A	R	C	I
Biosecurity training and records	I	A	R	C	C
Feedback surveys (biosecurity items)	A	R	C	I	C
Annual Biosecurity Report and management review	A	R	C	C	I

15.2.1. The HSBC in the QA System

The HSBC is responsible for supporting and promoting biosecurity within FVM-ULusófona, contributing to compliance with ESEVT Standard 4.9. It works in collaboration with the Dean.

Its main responsibilities include:

- **Biosecurity planning:** Supporting the development and implementation of biosecurity policies, procedures, training and monitoring activities.
- **Monitoring and evaluation:** Reviewing audit findings, environmental monitoring results, incident reports and relevant feedback, and identifying areas for improvement.
- **Documentation:** Supporting the maintenance and updating of the Biosecurity Manual and related records.
- **Reporting:** Contributing to the preparation of reports on biosecurity activities and communicating relevant findings to the appropriate institutional bodies.
- **Advisory role:** Providing guidance on biosecurity matters raised by clinical services, laboratories and other university departments.

15.2.2. Facility Responsibles

Each facility should have a designated person responsible for implementing this Manual and liaising with the HSBC. This responsibility lies with the management of the VTH-CA, VTC-CA, VTH-E and VTH-FA, the person responsible for the necropsy facilities, the researchers responsible for the diagnostic and research laboratories, and the teachers responsible for teaching laboratories, the Clinical Skills Training Centre and extramural activities.

15.3. Document Control of the Biosecurity Manual

The manual is a controlled document. Every version is identified, approved, dated and distributed in a way that ensures that only the current version is in use.

Table 15.3: Document control of the Biosecurity Manual

Element	Rule
Identification	Code FVM-BIO-MAN, version number and date of approval on the cover and in the footer; each chapter states its own revision date.
Approval	Drafted by the HSBC with the facility responsibles; approved by the Dean after consulting the Scientific and Pedagogical Councils.
Ordinary review	At least once a year, before the start of the academic year.
Extraordinary review	Within 30 days of: new legislation or official guidance (DGAV, DGS, EU); new or modified facility (e.g., new UICB, VTH-FA); a crisis activation or after-action review; a major audit finding; a new scientific recommendation relevant to FVM activities.
Change log	Each version lists the sections changed, the reason and the date; changes are highlighted for users.
Languages	Portuguese and English versions, with identical content and version number.

Distribution	Moodle (general resources and each curricular unit with practical activities); website summary; printed controlled copies at hospital receptions, isolation units, necropsy and anatomy rooms, laboratories and crisis kits.
Obsolete versions	Removed from Moodle and from controlled locations on the day the new version is published; one archived copy is kept by the HSBC.
Acknowledgement	Staff and students sign (on paper or Moodle) that they have read the chapters relevant to their activity, before their first practical activity and after each major revision.

15.4. The Biosecurity Improvement Cycle

Biosecurity QA follows the Plan–Do–Check–Act cycle of the SIGQ. Each element of this chapter fits into one stage of the cycle, so that every finding ends in a documented action and every action is verified.



Figure 15.1: The biosecurity Plan–Do–Check–Act cycle at FVM-ULusófona

- **Plan:** annual QA programme; risk assessment of new activities and facilities; manual revision; training plan.
- **Do:** application of the SOPs; training and information; signage; supplies of PPE, disinfectants and waste containers.
- **Check:** audits and inspections; environmental monitoring; incident reports; indicators; feedback from students, staff and clients; drills.

- **Act:** corrective and preventive actions; revision of procedures; investment proposals; communication of results to the community.

15.5. Monitoring and Verification Tools

15.5.1. Internal Biosecurity Audits

Every sector with biological risk is audited at least **once per academic year**, according to an annual programme approved by the HSBC. High-risk sectors (UICB, Infetocontagiosas Unit, UICB-FA, necropsy, microbiology) are audited twice per year.

- Audits use a standard checklist derived from the relevant chapter of this manual (attire and PPE, hand hygiene, footbaths, cleaning and disinfection records, waste segregation, signage, isolation procedures, storage of food, training records). Each item is scored as compliant, partially compliant or non-compliant, with evidence noted.
- Auditors are trained members of the HSBC or of other departments and never audit their own sector. The Diagnostic and Research Laboratories should continue to be audited against the I-MVET Good Laboratory Practices and Biosafety Manual.
- Each audit ends with a short meeting with the facility responsible and a written report within 15 days, including a compliance score per area and the non-conformities raised.

15.5.2. Environmental Microbiological Monitoring

Environmental monitoring verifies the effectiveness of cleaning and disinfection. It is carried out monthly in clinical areas and on equipment, by surface swabbing and contact plates (Chapter 1, section 1.7.2).

- Sampling methods, culture media and interpretation criteria are described in the Microbiology Laboratory SOPs. Action levels are defined for each type of surface; a result above the action level, or the isolation of a target pathogen, triggers re-cleaning and repeat sampling within 7 days.
- Results are sent to the Operational Management of the facility and to the HSBC within 10 working days and are presented as trends (per area and per month) in the Annual Biosecurity Report.
- Two consecutive non-conforming results in the same area are treated as a non-conformity (section 15.6).

15.5.3. Hand Hygiene and PPE Compliance

Hand hygiene and the correct use of personal protective equipment (PPE) are essential components of hospital infection prevention and control. Compliance with hand hygiene practices and PPE requirements should be monitored as part of routine biosecurity practices.

15.5.4. Surveillance of Healthcare-Associated Infections and Antimicrobial Resistance

- Clinicians record suspected healthcare-associated infections (surgical site infections, catheter-related infections, nosocomial diarrhoea, respiratory infections acquired in hospital) in the clinical record (Q-Vet).
- The Microbiology Laboratory reports monthly to the HSBC the isolates of multidrug-resistant bacteria from patients and the environment.
- The surveillance of antimicrobial use and resistance follows Chapter 13; clusters of the same agent (two or more cases in 15 days in the same unit) are investigated by the HSBC.

15.5.5. Incident, Accident and Near-Miss Reporting

Any person (staff, student, contractor) can and should report an incident, accident or near miss related to biological risk: bites, scratches, needlestick injuries, splashes, spills, PPE failures, breaches of isolation, wrong waste disposal, animals escaping, etc.

- Reports are made on the incident form, within 24 hours, without fear of blame: the aim is to learn, not to punish.
- Work accidents are also reported through the University occupational health and safety procedure. See the OSH Manual, section 9.3.
- The facility responsible analyses each report with the person involved, records the immediate measures and, when needed, opens a corrective action.

15.5.6. Laboratory Quality Assurance

The Pathology Analysis Laboratory manages its workflow with dedicated laboratory software (eDeiLab), with barcode-based sample registration and tracking and result validation. Internal quality control is defined in the SOPs of each laboratory: quality-control materials in clinical biochemistry and haematology, second-person review in cytology when necessary, reference strains and culture-media sterility checks in microbiology, and positive, negative and no-template controls in PCR assays. External verification is requested whenever results raise doubts.

15.5.7. Equipment, Infrastructure and Supplies

Table 15.4: Verification of equipment and infrastructure critical for biosecurity

Equipment / item	Verification	Frequency	Responsible
Autoclaves	Physical parameters each cycle; chemical indicators each load; biological indicators	Each cycle / weekly (biological)	DLCTT technical staff; hospital sterilisation
Class II biological safety cabinets	Certification (airflow, HEPA integrity)	Annually and after relocation or repair	External accredited company
UICB ventilation (negative pressure, HEPA)	Pressure differential reading; filter maintenance	Daily reading when occupied; maintenance per manufacturer	VTH-CA Operational Management; technical services
Infetocontagiosas Unit (VTH-E)	Integrity of surfaces, drains and separate sewage; footbath and PPE stock	Monthly and before each admission	VTH-E Operational Management

UICB-FA (VTH-FA)	Integrity of surfaces, drains and footbath; PPE and crisis kit stock	Monthly and before each admission	VTH-FA Operational Management
Footbaths and foot mats	Concentration (test strips), visible soiling, renewal date	Daily in use; recorded	Nurses / grooms of each area
Disinfectants and PPE stocks	Minimum stock levels, expiry dates	Monthly	Stores / facility responsible
Crisis kits (Chapter 14)	Content checklist and seal	Quarterly and after use	Facility responsible
Cold rooms for cadavers	Temperature log	Daily	Necropsy / anatomy technicians
Ambulatory vehicles	Boot wash tray, disinfectant, gloves, sharps container, waste bags	Before each departure (checklist)	Teacher responsible for the visit

15.6. Non-Conformities and Corrective and Preventive Actions

A non-conformity is any failure to comply with this manual or with legal requirements, detected by audit, inspection, monitoring, incident report, complaint or feedback. Each non-conformity is registered in the **CAPA register** kept by the HSBC and handled according to its severity.

Table 15.5: Classification of non-conformities and response times

Severity	Definition	Example	Immediate action
Critical	Immediate risk to human or animal health, or legal breach	Class 4 patient outside isolation; rabies suspect handled without PPE; sharps container overfilled in a public area	Same day, by the facility responsible
Major	Systematic failure of a procedure, without immediate risk	Footbaths not renewed for several days; no training records for a rotation	Within 7 days
Minor	Isolated deviation or documentation gap	Missing sign; disinfection log incomplete for one day	At the next routine check
Improvement opportunity	Suggestion that would improve performance	New poster, better location for hand-rub dispenser	—

For each critical or major non-conformity, the facility responsible identifies the root cause (e.g., using the '5 whys'), defines the action, the person responsible and the deadline, and the HSBC verifies its effectiveness (for example by a repeat audit or monitoring). The record is closed only after verification.

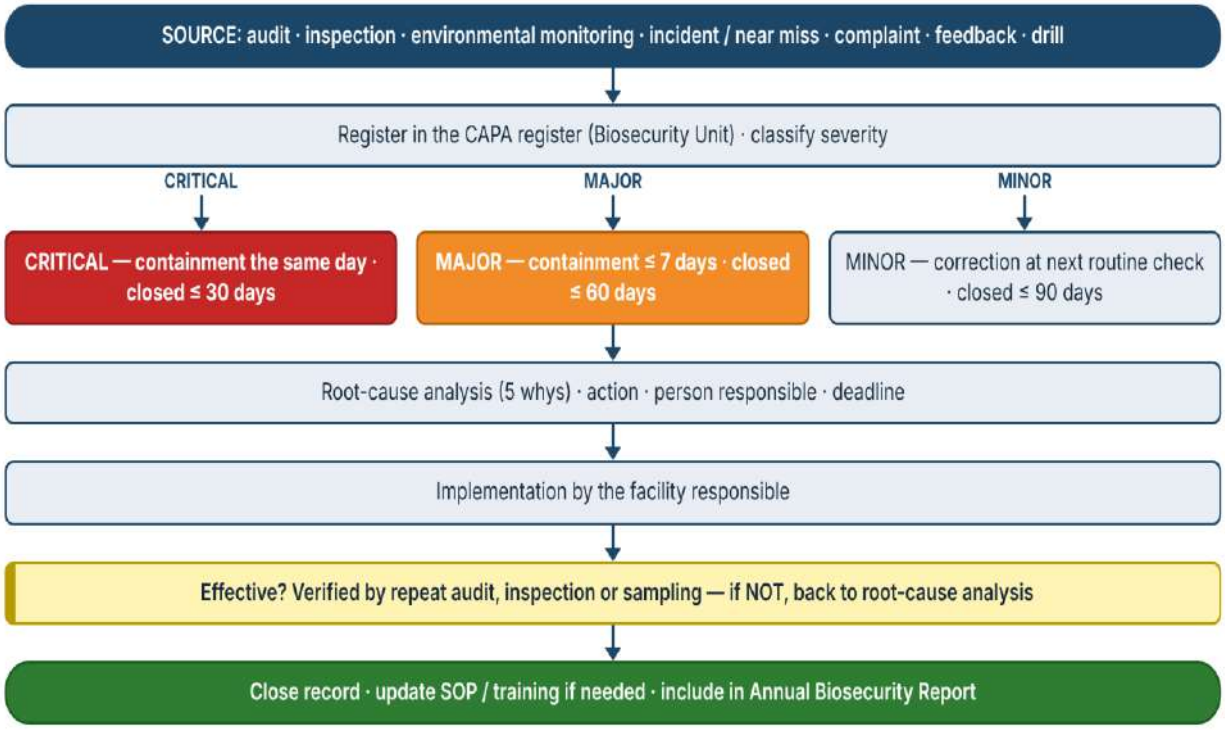


Figure 15.2: Workflow for non-conformities and corrective actions

15.7. Feedback from Students, Staff, Clients and Stakeholders

Feedback is collected through the channels already in place in the SIGQ, complemented by items specific to biosecurity:

- **Students:** pedagogical surveys at the end of each semester for every curricular unit, with two to three standard biosecurity items for units with practical activities (e.g., 'Biosecurity rules were explained before the practical activity', 'The PPE and materials needed were available', 'I know what to do in case of an accident or exposure'); feedback in the Biosafety Day; student representatives in the Pedagogical Council and in meetings with the Dean.
- **Teaching and support staff:** pedagogical surveys (teacher version) on the adequacy of laboratories, equipment and resources; the Teaching Staff Satisfaction Survey (working conditions, health and well-being); division meetings; direct requests to the HSBC.
- **Clients:** satisfaction surveys of the Teaching Hospitals, complaints records and online reviews, with an item on cleanliness and hygiene of the facilities. Complaints related to hygiene, infection or zoonotic risk are forwarded to the HSBC.
- **External partners and stakeholders:** feedback from INIAV, ETSA, associated farms, slaughterhouses and other host establishments on students' compliance with their biosecurity rules, collected by the teachers responsible and discussed in the stakeholders' commission.

The HSBC analyses the biosecurity-related feedback once a year, includes it in the Annual Biosecurity Report, and informs students and staff of the actions taken in response ('you said, we did'), through Moodle and the Biosafety Day.

15.8. Training, Competence and Communication

15.8.1. Training Programme

Table 15.6: Biosecurity training programme

Audience	Content	When	Record
1st-year students	General biosecurity and health and safety rules; hand hygiene; PPE; laboratory safety	Before the first laboratory class	Attendance + signed acknowledgement
3rd–5th-year students	Biosafety Day: hospital biosecurity, risk classes, isolation, zoonoses, crisis scenarios	Once a year	Attendance + short assessment
Students before rotations and necropsy	Site-specific briefing (attire, routes, isolation, waste, emergencies)	First day of each rotation or block	Signed briefing sheet
Clinical, laboratory and support staff	Manual update; PPE donning and doffing; spill management; crisis scenarios of their unit	At induction and annually	Training register
Newly appointed teaching staff (including practitioners)	Mandatory module on biosecurity and QA procedures within the teacher training programme (ESEVT Standard 9.1): manual, risk classes, isolation, incidents, CAPA, crisis scenarios	As part of the induction programme	Training register
Cleaning, maintenance and contractors	Areas, routes, PPE, products and contact times, waste	At start of contract and annually	Training register (contractor)
Visitors and owners	Rules of access and hygiene, visiting hours, restrictions	On arrival (reception, posters)	—

- Training materials and short self-assessment quizzes for each chapter are available on Moodle; completion of the quiz is a mandatory prerequisite for the first clinical rotation. Occupational safety and health training is set out in the OSH Manual (section 9.1).
- Competence in key procedures (hand hygiene, donning and doffing PPE for Class 4 patients, footbath preparation) is checked by direct observation during clinical rotations and recorded in the logbook.
- Day One Competence 1.29 ('recommend and evaluate protocols for biosecurity and apply these principles correctly') is assessed in the clinical rotations and in the farm-animal and population medicine units, e.g. through a supervised biosecurity assessment of a farm or a hospital area followed by a short-written report.
- Student group sizes in high-risk areas (isolation units, necropsy, infectious cases) are limited to those that allow effective supervision and correct use of PPE, as defined in the facility chapters.

15.8.2. Posting and Signage

- Biosecurity signage is standardised across all FVM-ULusófona sites (colours of risk classes, pictograms of mandatory PPE, access restrictions) and is the responsibility of the facility responsible, under the supervision of the HSBC. Safety signage (emergency exits, extinguishers, eyewash stations) follows the legislation in force and is the responsibility of the University technical and OSH services.
- A one-page **'Top 10 biosecurity rules'** poster, specific to each facility, is displayed at the entrance of every clinical area, laboratory and necropsy room, in Portuguese and English.
- Signage is checked during audits and inspections; missing or outdated signs are minor non-conformities.

15.8.3. Communication of Changes

When procedures change, the HSBC informs staff and students through Moodle and the institutional e-mail, and the facility responsibles brief their teams. Major changes are presented in the Biosafety Day and in staff meetings, and the corresponding chapter is re-signed.

15.9. Management Review and Annual Biosecurity Report

Once a year, at the end of the academic year, the HSBC prepares the **Annual Biosecurity Report**, which is the main QA output on biosecurity and an input to the organic unit report of the SIGQ and to the Faculty's strategic and activity plans. It contains:

- summary of activities of the HSBC (meetings, requests received and answered);
- results of audits, inspections and environmental monitoring, with trends;
- review of overall biosecurity performance based on available records and evidence;
- Information on incidents, accidents, near misses and crisis activations, including lessons learned, where applicable;
- status of corrective and preventive actions;
- analysis of feedback from students, staff, clients and stakeholders;
- training delivered and coverage;
- changes to the manual and to facilities;
- priorities and proposed investments for the following year (infrastructure, equipment, PPE budget, staff).

The report is discussed in a management review meeting chaired by the Dean, with the HSBC and the facility responsibles. Decisions are recorded and integrated into the Annual Activities Plan. A summary of the main results and of the actions decided is published on Moodle for students and staff, closing the PDCA loop.

15.10. Records and Retention

Relevant biosecurity records should be maintained and made available for review, as appropriate. These may include:

- Current version of the Biosecurity Manual and records of revisions.
- Biosecurity audit and inspection findings, where applicable.
- Records of biosecurity incidents and accidents.
- Training records.

- Cleaning, disinfection and equipment maintenance records, where applicable.

Records containing personal or health-related data must be handled confidentially, in accordance with the General Data Protection Regulation (GDPR), with access restricted to authorised persons.

Appendix 1: Poster to affix – Hand hygiene techniques

UNIVERSIDADE LUSÓFONA fmv FACULDADE DE MEDICINA VETERINÁRIA

medidas simples salvam vidas

Fricção antisséptica das mãos

Solução antisséptica de base alcoólica (SABA) — **20-30** segundos

1 APLIQUE A SABA

Acione o doseador com o cotovelo

Pressione a alavanca com o cotovelo. Recolha a solução na palma da outra mão, em concha.



Friccione todas as superfícies

Use solução suficiente para cobrir as mãos e os punhos.

2 Palmas
Esfregue uma palma contra a outra.

3 Dorso das mãos
Palma sobre o dorso oposto, com os dedos entrelaçados.

4 Entre os dedos
Esfregue palma com palma, com os dedos entrelaçados.

5 Dorso dos dedos
Encaixe os dedos e friccione o dorso na palma oposta.

6 Polegares
Rode cada polegar dentro da palma da outra mão.

7 Pontas dos dedos
Rode as pontas dos dedos na palma da outra mão.

8 Continue até as mãos secarem
Deixe a solução evaporar por completo.

Se as mãos estiverem visivelmente sujas, lave-as com água e sabão.

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medidas simples salvam vidas

Lavagem das mãos

Com água e sabão — **40-60** segundos

1



Molhe as mãos

Use água corrente.

2



Aplique sabão

Use sabão suficiente para cobrir as mãos e os punhos.

Friccione todas as superfícies

Esfregue ambas as mãos, incluindo os punhos.

3 Palmas
Esfregue uma palma contra a outra.

4 Dorso das mãos
Palma sobre o dorso oposto, com os dedos entrelaçados.

5 Entre os dedos
Esfregue palma com palma, com os dedos entrelaçados.

6 Dorso dos dedos
Encaixe os dedos e friccione o dorso na palma oposta.

7 Polegares
Rode cada polegar dentro da palma da outra mão.

8 Pontas dos dedos
Rode as pontas dos dedos na palma da outra mão.

9 Enxague
Retire o sabão com água corrente.

10 Seque bem
Use um toalhete descartável.

Appendix 2: Poster to affix – Healthcare waste reference chart



Appendix 3: Poster to affix – Surgical hand preparation

PROTOCOLO DA DESINFECÇÃO DAS MÃOS NA PREPARAÇÃO DO CIRURGIÃO

1. **Deve ser colocada touca e máscara antes do início do procedimento de lavagem de mãos.**
2. **Realizar uma primeira lavagem das mãos e antebraços com sabão normal neutro. NOTA: As mãos têm que ficar bem higienizadas!**
3. **Passar por água e secar bem as mãos.**
4. **Iniciar o processo de antissépsia das mãos com solução hidro-alcoólica.**

O Procedimento de desinfecção das mãos deve ser seguido à risca completanto todos as etapas que são apresentadas nas imagens:



Colocar cerca de **5 ml** de solução de base alcoólica na palma da mão esquerda, usando o cotovelo direito.



Mergulhar a ponta dos dedos da mão direita na solução alcoólica para descontaminar a zona entre as unhas. (**5 segundos**)



Imagens 3-7: Espalhar a solução de lavagem na zona do antebraço até ao cotovelo.. (**10-15 segundos**).





Garantir que toda a região do antebraço é limpa, usando movimentos circulares, até à solução evaporar (**10-15 segundos**).





Ver imagem 3-5.



Realizar o mesmo procedimento da imagem 1 para a mão contrária.(**5 ml** de solução alcoólica/mão direita).



Realizar o mesmo procedimento da imagem 2 para a mão contrária. (**5 segundos** para a mão esquerda).



Espalhar a solução de lavagem na zona do antebraço até ao cotovelo, garantir que toda a região do antebraço é limpa, usando movimentos circulares, até a solução evaporar (**10-15 segundos**).



Colocar cerca de 5 ml de solução alcoólica na palma da mão esquerda, utilizando o cotovelo direito. Esfregar ambas as mãos ao mesmo tempo até aos pulsos e realizar as etapas de 12-17 (**20-30 segundos**).



Cobrir toda a superfície das mãos até ao pulso e esfregar as palmas das mãos.



Esfregar as costas da mão esquerda, com a palma da mão direita e vice-versa.



Esfregar as palmas das mãos para a frente e para trás com os dedos entrelaçados.



Esfregar as costas dos dedos segurando com a palma da mão e movimentando os dedos. Repetir ambas as mãos.



Esfregar o dedo polegar da mão esquerda rodando e envolvendo com a palma da mão oposta e vice-versa.



Quando as mãos estiverem secas, pode dar início à restante paramentação (Luvas, bata).

Realizar todas as etapas apresentadas na sequência acima (cerca de **60 segundos** de duração média de cada etapa). Repetir o número de vezes necessário até completar o tempo total recomendado pelo fabricante da solução de lavagem.

1. Manter as unhas curtas
2. Não utilizar unhas artificiais ou verniz
3. Remover toda a joalharia (anéis, relógio, pulseiras)
4. Lavar as mãos com um sabão normal antes de entrar na área do bloco cirúrgico.
5. Antes de iniciar o procedimento de lavagem das mãos, iniciar o relógio.

Tempo total de antissépsia com solução alcoólica 1.5-3 minutos!!

6. Realizar todos os procedimentos de lavagem (imagem 1-17).

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