

**Prevention of
Nosocomial and Zoonotic Infections
in Animal Clinics and Veterinary Institutes**

Guidelines

Edition 2021.01

Issued:
Prof. Dr. R. Bauerfeind,
17.03.2021

Approved:
Prof. Dr. Dr. M. Kramer (Dean)
31.03.2021

Important Phone Numbers

Authority, person	Phone number
Emergency Call	112
Fire Department	112
Poison Control Center (Giftnotrufzentrale Mainz)	06131-19240
Technical Emergency Service	0641-12666
Medical Officer, JLU Giessen (Medical Airport Service, Arbeitsmedizinisches Zentrum Gießen, Stolzenmorgen 18, 35394 Gießen)	0641-5330
Deanary of Faculty 10	0641-99-38000
Safety-at-work Officer (JLU Giessen, Dezernat B 3.2)	0641-99-12666
Biosafety/Genetic Engineering Officer (JLU Giessen, Dezernat B 3.3)	0641-99-12216
Non-hazardous Waste Management (JLU Giessen, Dezernat E 3.6)	0641-99-12538 0641-99-12617
Hazardous Waste Management (JLU Giessen, Dezernat B 3)	0641-99-12214
Veterinary Authorities, Giessen (Amt für Veterinärwesen und Verbraucherschutz, Rodheimer Straße 33, 35398 Gießen)	0641-9390-6200
Public Health Authorities, Giessen (Gesundheitsamt, Landkreis Gießen, Riversplatz 1-9, 35394 Gießen)	0641-93900

Veterinary Institutes, Clinics and Central Facilities

Facility	Phone number
Institute	
Institut für Hygiene und Infektionskrankheiten der Tiere	99 38301
Institut für Pharmakologie und Toxikologie	99 38401
Institut für Parasitologie	99 38461
Institut für Tierärztliche Nahrungsmittelkunde	99 38251
Professur für Milchwissenschaften	99 38950
Institut für Veterinär-Anatomie, -Histologie und -Embryologie	99 38101
Institut für Veterinär-Pathologie	99 38200
Institut für Veterinär-Physiologie und -Biochemie	99 38151
Institut für Virologie	99 38351
Veterinärklinikum	
Klinik für Geburtshilfe, Gynäkologie und Andrologie der Groß- und Kleintiere mit Tierärztlicher Ambulanz	99 38701
Klinik für Kleintiere, Chirurgie	99 38536
Klinik für Kleintiere, Innere Medizin	99 38666
Klinik für Pferde, Chirurgie	99 38571
Klinik für Pferde, Innere Medizin	99 38607
Klinik für Schweine (Innere Medizin und Chirurgie)	99 38821
Klinik für Vögel, Reptilien, Amphibien und Fische	99 38431
Klinik für Wiederkäuer (Innere Medizin und Chirurgie)	99 38671
Professur für klinische Anatomie und experimentelle Chirurgie	99 38311
Professur für Versuchstierkunde und Tierschutz & 3R-Zentrum	99 38757
Zentrale Einrichtungen	
AG Biomathematik und Datenverarbeitung	99 38801
Arbeitskreis Wildbiologie an der Justus-Liebig-Universität Gießen e.V.	99 31431

Contents

	Page
Objectives of these guidelines	6
Preface	6
Scope of the document	6
Reference	6
1 Basic principles of infection prevention and control	7
1.1 General concepts	7
1.2 Transmission of infectious microorganisms	8
1.2.1 Sources	8
1.2.2 Susceptible hosts	8
1.2.3 Routes of transmission	9
1.3 Hierarchy of infection control measurements	10
2 The infection control programme	12
2.1 General prerequisites	12
2.2 Surveillance	13
2.3 Routine practice	14
2.3.1 Hand hygiene	14
2.3.2 Personal protective equipment	17
2.4 Cleaning and disinfection	20
2.4.1 General considerations	20
2.4.2 Recommendations for cleaning and/or disinfection of selected equipment	23
2.5 Waste management	27
2.6 Hygienic measurements in surgery	28
2.7 Patient care and handling	32
2.8 Safety of clinical personnel	37
2.9 Client education	42
2.10 Client visitation	42
2.11 Clinic pets	43
2.12 Vector control	43
3 Clinic design	45
4 Notifiable diseases	46
5 References and suggested reading	46

		Page
6	Annexe	47
Annex 1	Relative Tenacity of Pathogens to Biocides	47
Annex 2	Wirksamkeitsspektren von Desinfektionsmitteln	48
Annex 3	Recommended Disinfectants and Cleaning & Disinfection Procedures	49
Annex 4	Grundsätze der Händehygiene: Vermeidung der Keimübertragungen durch die Hände	50
Annex 5	Procedure of Hygienic Hand Disinfection	51
Annex 6	Mustervorlage Hautschutzplan der JLU Gießen	52
Annex 7	Chemothermische Wäschedesinfektion	53
Annex 8	Dampfsterilisation	54
Annex 9	Mustervorlage Hygieneplan	55

Objectives of these guidelines

Infection prevention and control strategies are designed to protect animal patients from nosocomial infections and owners, veterinary personnel, veterinary students and the community from zoonotic diseases.

Preface

These guidelines are intended to guide clinical/institutional practice and provide assistance for decision-making on infection prevention and control issues. Use of these guidelines should be flexible to accommodate specific challenges and risks in different facilities and areas of the faculty while ensuring best practice in infection prevention and control.

The measurements listed in the present guidelines are basic requirements for clinics and institutes of the Faculty of Veterinary Medicine of the Justus Liebig University (JLU) Giessen, which should be included in their individual infection control programmes, respectively.

Thus, the purpose of this document is to equip veterinary personnel with a succinct guide to principles and practices of infection control relevant to any facility at the faculty. This document provides the basic information needed to develop an infection control programme and establish basic infection control practices for such a facility, with specific emphasis on critical aspects such as hand hygiene, and cleaning and disinfection.

Every veterinary clinic or institute regardless of type or size, is thus requested to implement an own formal infection control programme, a written infection control manual that describes the programme, and denominates an infection control practitioner (ICP) to coordinate the programme.

Scope of the document

This document covers veterinary clinics and veterinary institutes and is relevant to all personnel that work in association with such facilities, including veterinarians, veterinary technicians, lay staff as well as students. For the purposes of this document, 'veterinary personnel' refers to all personnel that work in a veterinary clinic/institute. This also includes non-clinical staff, as in many situations these individuals may still have periodic direct or indirect contact with patients and/or pathogens within a clinic/institute.

Reference

The present guidelines follow the instructions given in "Infection Prevention and Control - Best Practice" which was issued from the Canadian Committee on Antibiotic Resistance in August 2008 (www.ccar-ccra.org). The original text was revised 2011 as far as it was necessary to consider specific conditions at the Faculty of Veterinary Medicine of the JLU Giessen. The current version was updated 2021.

1 Basic principles of infection prevention and control

1.1 General concepts

Every veterinary clinic including the institute of food hygiene as well as all institutes where infectious material (all kind of pathogenic or potentially pathogenic microbes including viruses or material contaminated with such agents) is handled, regardless of size and type, should have a documented infection control programme. This may range from simply a written collection of basic infection control practices, to a formal infection control manual with specific training, monitoring, surveillance and compliance programmes. Lack of a clearly defined infection control programme may lead to unnecessary patient morbidity and mortality, and exposure of veterinarians, staff, students and owners to zoonotic pathogens. Improved infection control is a necessity as veterinary medicine evolves. Advances in veterinary medicine mean that animals are living longer, and owners are often expecting a higher level of care for their pets that is more comparable to what they themselves may receive. There are also more animals at higher risk for infection in general because of more invasive and immunosuppressive therapies. In addition to the desire to achieve “best practice” standards whenever possible, the increasingly litigious nature of society may be one of the driving forces toward improved infection control in veterinary clinics. While the potential liability associated with morbidity and mortality in individual pets is limited, the potential consequences of zoonotic diseases in owners and staff are significant and warrant careful consideration. Infection prevention and control measures can be broadly divided into three main categories: those that decrease host exposure, decrease host susceptibility and increase host resistance to infectious pathogens.

1. Decreasing exposure is the most important measure of disease control in most situations. If a pathogen does not encounter an individual, then disease cannot occur. The number of the infectious organism to which a host is exposed is also an important factor in determining whether or not colonization or infection (disease) will ensue. Depending on the pathogen, decreasing or preventing exposure may be easy, difficult or impossible.
2. There are many factors that interact to determine whether or not infectious disease will develop in a particular host. In most cases, simple exposure of an animal to an infectious agent does not mean that disease will result. The susceptibility of the individual to a particular number of an infectious agent plays an important role. Although difficult to quantify, certain situations may result in increased susceptibility to infection and disease. Many factors causing increased susceptibility are not preventable, but some are, and efforts should be undertaken to address these issues. Factors to consider include judicious use of antimicrobials and other drugs, provision of proper nutrition, adequate pain control, and appropriate management of underlying disease.
3. Measures to actively increase resistance of a host are commonly used in veterinary medicine, but these should be considered only the third line of defense, after those meant to decrease exposure and susceptibility. Vaccination is currently the main technique used to increase resistance of animals or humans to infection. However, no vaccine is 100%

effective. Therefore, while vaccination is an important part of infection prevention and control, it must not be the only component of an infection control programme if the programme is to be successful. In addition, many hospital-acquired infections are caused by opportunist microorganisms for which vaccines are unavailable.

1.2 Transmission of infectious microorganisms

Transmission of infection during the provision of health care requires three elements: a source, microorganisms, a susceptible host, and a means of transmission for the microorganism.

Prevention of infection in animal health care settings should be directed primarily at interrupting the transmission of microorganisms from source to host, because agent and host factors are typically more difficult to control.

1.2.1 Sources

Sources of infectious microorganisms may be animals which are merely colonized by an infectious agent (meaning the pathogen resides in or on the body, but is not associated with any clinical disease or host response), animals in the pre-clinical (incubation) phase of the infectious disease, animals with acute disease, animals with chronic disease caused by persistent infection, and animals that are recovering from clinical disease but are still shedding the infectious agent. People can be an important source of zoonotic pathogens, and like animals they may be colonized or infected. Currently, more than 200 zoonotic diseases have been recognized. Contamination on a person's clothing or body, particularly the hands, can also be a source of infectious microorganisms. Other potential sources include food, water, and an animal's own indigenous microflora, which may be difficult to control. Inanimate objects, including medical equipment, supplies and drugs, animal bedding, environmental surfaces and waste that have been contaminated can also be important sources. Microorganisms to consider include bacteria, viruses, fungi and parasites. In some cases, vectors such as lice, mosquitoes, flies, ticks, fleas, rodents and other vermin can transmit certain pathogens.

1.2.2 Susceptible hosts

Decreasing host susceptibility: Decreasing host susceptibility to infection is difficult to achieve in a hospital setting. Regarding patients, the judicious use of antimicrobials, minimizing the use of immunosuppressive agents, avoidance of dietary changes whenever possible, ensuring adequate nutritional intake, adequate pain control, and limiting the use of invasive devices should be considered, as these can all have an impact on host immune function. For hospital personnel, it may not be possible to directly decrease their own susceptibility to infection, but it is important to be aware of those individuals who may have increased susceptibility. These include persons who are immunosuppressed due to disease or medical treatment, or who are being treated with antimicrobial drugs, have open wounds or who are pregnant. Good

communication between veterinary personnel, their physicians and clinic administration is important to lessen the risk of zoonotic infection.

Increasing host resistance

Vaccination is currently the main technique used to increase resistance of animals and humans to infection. As noted, no vaccine is 100% effective and there are many infections for which vaccines are unavailable. Factors to consider when developing vaccination recommendations or requirements include the prevalence of a particular disease in the area, risk to healthy and compromised patients, transmissibility of the disease, risk to veterinary

personnel, ability to treat the disease, efficacy of vaccination and safety of vaccination. Vaccination can only be maximally effective when it is used in conjunction with other appropriate infection control practices.

1.2.3 Routes of transmission

Microorganisms are transmitted in animal health care settings by four main routes: contact, droplet, air-borne and vector-borne transmission. The same microorganism may be transmitted by more than one route.

1. **Contact transmission** is the most important and frequent mode of transmission of health-care associated infections (HAIs). It can be divided into direct and indirect contact transmission
 - **Direct** contact transmission involves direct body surface-to-body surface contact resulting in physical transfer of microorganisms from an infected or colonized animal. For example, two dogs in a waiting room that come into direct contact when they sniff each other may transmit pathogens present in their noses or perineal areas; direct contact of a veterinarian's hands with a wound on an animal may result in transmission of opportunistic pathogens from the normal microflora of the person's hands, or infectious organisms present in the animal's wound, to the patient or the veterinarian, respectively.
 - **Indirect** contact transmission is the result of physical transfer of microorganisms from the original animal (or human) source to a new host, without direct contact between the two. This typically involves body surface contact with an inanimate object, environmental surface or the integument of another animal or person that has been transiently contaminated by the original animal (or human) source. For example, handling one animal and then petting another animal without washing one's hands constitutes indirect contact between the two animals.
2. **Droplet transmission** is theoretically a form of contact transmission. However, the mechanism of transfer of the pathogen from host to host is quite distinct from either direct or indirect contact transmission. Droplets are generated from the source animal primarily during coughing or sneezing, and during the performance of certain procedures such as suctioning. Transmission occurs when droplets containing microorganisms generated from the source animal are propelled a short distance through the air (usually less than one meter) and deposited on the new host's conjunctiva (i.e. in the eye), nasal mucosa, mouth, or an open wound. For example, a cat with an upper respiratory tract infection can transmit

viruses or bacteria to another cat in the waiting room by sneezing on it, particularly if they are face-to-face, even if the animals do not touch each other directly. Because droplets do not remain suspended in the air, special air handling and ventilation are not required to prevent droplet transmission; that is, droplet transmission must not be confused with airborne transmission. Droplets can also contaminate the surrounding environment and lead to indirect contact transmission.

3. **Airborne transmission** occurs by dissemination of either airborne droplet nuclei (5 µm or smaller, about 2-3 times the size of most bacterial pathogens) from partly-evaporated droplets containing microorganisms, or dust particles containing the infectious agent. Microorganisms carried in this manner remain suspended in the air for long periods of time and can be dispersed widely by air currents. They may be inhaled by another host within the same room, or they may reach hosts over a longer distance from the source, depending on environmental factors. Airborne transmission of pathogens in veterinary clinics is very rare.
4. **Vector-borne transmission** occurs when vectors such as mosquitoes, flies, ticks, fleas, rats, and other vermin transmit microorganisms. Some act as simple mechanical vectors, comparable to indirect contact transmission, whereas others acquire and transmit microorganisms by biting. It is important to have control measures in place to reduce or eliminate the presence of such vectors in veterinary clinics.

1.3 Hierarchy of infection control measurements

The coordinated efforts of occupational health and safety groups and building engineers have created a framework in human medicine that includes three levels of infection control: engineering controls, administrative controls and personal protective measures. These levels of control can easily be applied to veterinary practices as well.

Engineering controls are built into the design of a facility (e.g. room design, sink placement, Heating Ventilation and Air Conditioning [HVAC] systems). It is important for infection prevention and control professionals to be involved in the design and planning of new facilities. They can also help to plan and design improvements which may be incorporated into an existing facility. Engineering controls include logical design of clinics to facilitate use of routine infection control measures such as hand washing, proper cleaning, and separation of animals of different species and different infectious disease risks. All new building or renovation plans need to be evaluated from an infection control perspective.

Administrative controls include protocols for hand hygiene, immunization of animals and staff, protocols for managing animals and staff during an infectious disease outbreak, and protocols for caring for animals with zoonotic infections.

Personal protective equipment (PPE), although very important, is the least desirable way to control infectious hazards because it does not eliminate them - it merely contains the hazard. Nonetheless, the inherent risk of exposure to microbial pathogens in veterinary clinics means that proper use of PPE is a critical component of a complete infection control programme. Effective use of PPE is dependent on appropriate education and compliance of all staff.

Personal protective equipment should be considered a last line of defense for hazards that cannot be overcome with other preventative measures.

2 The infection control programme

2.1 General prerequisites

Every veterinary clinic/institute, regardless of type or size, should have a formal infection control programme that is coordinated by one specific person (Infection Control Practitioner, ICP), who should develop protocols, ensure that protocols are being followed, act as a resource for infection control questions, ensure proper training of new staff, direct and interpret surveillance and communicate with staff regarding infection control issues. This is not necessarily so cumbersome or time-consuming as many may think! The day-to-day responsibilities are typically minimal. It is also not a position that needs to be filled by an expert in infection control or someone with specific training, although that would certainly be desirable. In human hospitals, ICPs are typically nurses with specialized infection control training, who perform the day-to-day infection control duties and work under an infection control head, who is typically a physician with training in one or more of infection control, infectious diseases, microbiology and/or public health. These individuals are rarely available in veterinary medicine, but that does not mean that an effective programme cannot be established. Either veterinary technicians or veterinarians would be appropriate in veterinary clinics. Formal training would be ideal but is not readily available, and the key requirement for the position is an interest in infection control. Ideally, over time, the ICP will advance his or her skills through formal and informal continuing education. In veterinary clinics, the ICP should be the central infection control resource. Among other duties, he or she should:

- Help facilitate development of a written infection control manual (Hygieneplan)
- Direct and document training of new staff (particularly lay staff)
- Perform formal or informal quality control evaluation of infection control practice compliance (e.g. observing cleaning and disinfection practices, hand hygiene)
- Be the person designated to receive information about and record incidents of suspected hospital-associated infections.

A written infection control manual (**Hygieneplan**) is an essential component of the infection control programme. Written documentation can clearly explain infection control practices, ensure that new staff members are properly informed and raise awareness about infection control. Furthermore, written documentation may be important legally in the event of hospital-associated, or more concerning, zoonotic infections. A written manual demonstrates a level of awareness and effort towards infection control and could be a critical measure to reduce liability risks by demonstrating use of some degree of due diligence. A sample of an infection control manual (Hygieneplan) is attached to these guidelines in **Annex 9**.

Support by hospital administration is also crucial to an effective infection control programme. If practice owners and managers are unwilling to provide the ICP with adequate time, resources and support, the infection control programme will fail. Hospital administration needs to ensure that all veterinary personnel understand and accept the importance of an infection control program, and intervene when required if issues (e.g. poor compliance) arise.

2.2 Surveillance

Surveillance is a key component of any infection control programme. Effective infection control is impossible without surveillance, and some form of surveillance should be practiced by all veterinary facilities. Many clinical aspects of surveillance are easy, inexpensive and can be readily incorporated into day-to-day veterinary practice.

Passive surveillance

In the absence of an ongoing infectious disease outbreak, passive infectious disease surveillance is likely adequate for most clinics. Passive surveillance is practical, cost-effective and can be performed in any clinic. It involves analysis of data that are already available (e.g. bacterial culture and susceptibility results, results of other kinds of infectious disease testing) to determine elements such as endemic disease rates, antimicrobial susceptibility patterns and trends, and changes in disease patterns. An example of passive surveillance would be monitoring the surgical site infection (SSI) rate following all surgical procedures and specific surgical procedures (e.g. spays, neuters). Monitoring of bacterial culture and susceptibility testing can provide information regarding possible outbreaks of hospital associated infections (HAIs), as well as information to guide empirical antimicrobial therapy. Routine recording of animals with specific syndromes such as vomiting, diarrhea, coughing or sneezing is another simple means of providing information that can help in the prevention and early detection of outbreaks, and can help to identify index cases should a hospital outbreak occur.

Post-discharge surveillance is more problematic, but is very important for conditions such as SSIs, as many such infections do not develop until after the animal is discharged from the hospital. Post-discharge surveillance can consist of direct examination of the patient during a recheck appointment, evaluation of readmission data or simple telephone or mail contact with owners. The keys to passive surveillance are to centralize the available data, and to have a designated infection control practitioner (ICP) who is responsible for compiling and evaluating these data on a regular basis. Simply collecting the data or even entering it in a spreadsheet is of no value unless someone looks at it. This is particularly important in large clinics or hospitals where multiple veterinarians may have patients with similar infections but do not communicate this to others, and therefore the start of an outbreak can be missed. If an outbreak is identified, then a plan can be formulated and implemented in order to stop the spread of disease. This plan may or may not include additional active surveillance to identify additional cases.

Active surveillance

Active surveillance involves gathering data specifically for infection control purposes. As a result, it is usually more expensive and time consuming but usually provides the highest quality data. This is rarely needed in most veterinary clinics and is typically reserved for large facilities with increased infection control threats and personnel available to direct such testing, or during a specific outbreak investigation. An example of active surveillance is collection of nasal and rectal swabs from all animals being admitted to a hospital, whether or not they have signs of infection, to screen for methicillin-resistant *Staphylococcus aureus*.

2.3 Routine practice

Routine practices include:

- Hand hygiene
- Risk reduction strategies through use of personal protective equipment (PPE), cleaning and disinfection of the environment and equipment, laundry management, waste management, safe sharps handling, patient placement, and healthy workplace practices
- Risk assessment related to animal clinical signs, including screening for syndromes that might indicate the presence of an infectious disease (e.g. fever, coughing/sneezing, diarrhea, abnormal excretions/secretions), and use of risk assessment to guide control practices
- Education and guidance of veterinary personnel and owners

2.3.1 Hand hygiene

Hand hygiene is the responsibility of all individuals involved in health care. Effective hand hygiene kills or removes microorganisms on the skin while maintaining hand health and skin integrity (i.e. prevents chapping and cracking of skin). Sterilization of the hands is not the goal of routine hand hygiene - the objective is to reduce the number of microorganisms on the hands, particularly the number of microorganisms that are part of the transient microflora of the skin, as these include the majority of opportunistic pathogens on the hands. These transient microbes may be picked up by contact with a patient, another person, contaminated equipment, or the environment. There are two methods of removing/killing microorganisms on hands: washing with soap and running water or using an alcohol-based hand sanitizer.

**Hand hygiene is the single most important way to prevent infections
in the healthcare setting.**

Alcohol-based hand sanitizers

Alcohol-based hand sanitizers/rubs are, with some exceptions, the preferred method for decontaminating hands that are not visibly soiled. They have superior ability to kill microorganisms on the skin than even hand washing with antibacterial soap, can quickly be applied, are less likely to cause skin damage, and can be made readily available at almost any point of care. Use of non-alcohol-based waterless hand sanitizers in healthcare settings is not recommended. Alcohol-based hand sanitizers should contain 70-90 % alcohol. Commercially available products mostly contain propanol. Use of products additionally containing emollients helps to reduce skin damage which can otherwise occur with frequent use of hand sanitizers. Products containing alcohol and chlorhexidine are also available. Chlorhexidine provides some residual antimicrobial action on the hands after use, but it is unclear whether or not these combinations provide any true benefit in clinical settings. They may be more useful as alternatives to traditional surgical scrubbing techniques (see Surgery section on page 40). Alcohol-based hand sanitizers are not effective against certain pathogens, including bacterial spores (e.g. clostridial spores) and *Cryptosporidium* spp. Nonetheless, alcohol-based hand sanitizers may be useful even if alcohol-resistant pathogens like *Clostridium difficile* are

present. The improved hand hygiene compliance seen with alcohol-based hand sanitizers and their efficacy against other pathogens are important aspects of infection control. Routine use of these products has not resulted in detectable increases in *C. difficile* infection rates in human hospitals. However, if hands are potentially contaminated by one of these organisms, hand washing with soap and running water should be performed if possible. Although even antimicrobial soaps are similarly ineffective against these pathogens directly, the physical process and mechanical action of hand washing can decrease the number of these organisms on the hands. Alcohol is also not as effective against non-enveloped viruses (e.g. canine parvovirus, feline panleukopenia virus) as it is against most other microbes. As for clostridial pathogens, hand washing with soap and running water is likely more effective, and should be used whenever possible when these pathogens are involved.

Hand sanitizers can be selected from the so-called VAH list (see **annex 3**). This list contains antiseptics recommended for use by the Verband für angewandte Hygiene (VAH, Germany). Only those products are listed that proved efficient during experimental examination according to VAH rules.

Technique of hygienic hand disinfection:

1. Remove all hand and arm jewelry.
2. Ensure hands are visibly clean (if soiled, follow hand washing steps).
3. Apply between 1 to 2 full pumps or a 3-5 ml of the product onto one palm.
4. Spread the product over all surfaces of hands, concentrating on finger tips, between fingers, back of the hands, and base of the thumbs. These are the most commonly missed areas.
5. Rub hands until product is dry. This will take a minimum of 30 seconds if sufficient product is used.

An illustration of this technique is given in **annex 5**.

Hands must be fully dry before touching the patient or patient's environment/equipment for the hand rub to be effective, and to eliminate the rare risk of flammability in the presence of an oxygen-enriched environment, as may occur in the presence of gas anaesthetic machines.

Hand washing

Most transient bacteria present on the hands are removed during the mechanical action of washing, rinsing and drying hands. Hand washing with soap and running water must be performed when hands are visibly soiled. If running water is not available, use moistened towelettes to remove all visible dirt and debris, followed by an alcohol-based hand rub.

Bar soaps are not acceptable in veterinary practice settings because of the potential for indirect transmission of pathogens from one person to another. Instead, liquid or foam soap should be used

- Soap should be dispensed in a disposable pump dispenser.
- Soap containers should not be refilled without being disinfected, since there is a risk of contamination.

- Antibacterial soaps should be used in critical care areas such as intensive care units (ICUs) and in areas where invasive procedures are performed.

Technique of hand washing:

1. Remove all hand and arm jewelry.
2. Wet hands with warm (not hot) water. Hot water is hard on the skin, and will lead to dryness and additional skin damage.
3. Apply liquid or foam soap.
4. Vigorously lather all surfaces of hands for a minimum of 15 seconds. This is the minimum amount of time required for mechanical removal of transient bacteria. Pay particular attention to finger tips, between fingers, backs of the hands and base of the thumbs. These are the most commonly missed areas. A simple way how many people time their hand-washing is by singing "Happy Birthday".
5. Using a rubbing motion, thoroughly rinse soap from hands under warm running water. Residual soap can lead to dryness and cracking of skin.
6. Dry hands thoroughly by blotting hands gently with a paper towel. Rubbing vigorously with paper towels can damage the skin.
7. Turn off taps with paper towel to avoid recontamination of your hands.

NOTE: If air hand dryers are used, hand-free taps are necessary, as turning taps off without using paper towel as described will result in recontamination of hands after washing.

When is hand hygiene necessary?

- Before and after contact with a patient
- Especially before performing invasive procedures
- Before and after contact with items in the patient's environment
- After any contact with or any activity involving the body fluids of a patient
- Before putting on and especially after taking off (protective) gloves
- Before eating food
- After personal body functions, such as using the toilet or blowing one's nose

Factors that influence the effectiveness of hand hygiene

- Condition of the skin: Intact skin is easier to clean than skin that is chapped, cracked, cut, abraded or otherwise inflamed. Intact skin is the first line of defense against bacteria.
- Finger nails: Natural nails more than 3-4 mm long are difficult to clean, can pierce gloves and harbour more microorganisms than short nails. Artificial nails or nail enhancements (including nail polish) should not be worn by anyone involved directly in patient care, as they have been implicated in the transfer of microorganisms in human medicine.

- **Jewelery:** Jewelery is very hard to clean, and physically protects bacteria and viruses from the antiseptic action of alcohol-based hand sanitizers and the mechanical cleaning action of soap and running water. Rings, bracelets or a wristwatch must not be worn during patient contact. Rings, in particular, increase the number of microorganisms present on hands and increase the risk of tears in gloves.

Skin care

Careful attention to skin care is an essential part of the hand hygiene programme. Products used for hygiene should be “hand-friendly” – for example, alcohol-based hand sanitizers containing emollients are available, which can help reduce the drying effect of the alcohol. If skin integrity is an issue, the individual should consult his or her physician. Skin lotions can help maintain the health and integrity of the skin, but it is important to use a skin lotion that does not interfere with glove integrity. Petroleum-based lotion formulations can weaken latex gloves and increase permeability. Lotions that contain petroleum or other oil emollients should only be used at the end of the work day. If lotions are used during the work day, select a water-based product.

2.3.2 Personal protective equipment (PPE)

General rules

Personal protective equipment (PPE) is an important routine infection control tool. PPE use is designed to reduce the risk of contamination of personal clothing, reduce exposure of skin and mucous membranes of veterinary personnel to pathogens, and reduce transmission of pathogens between patients by veterinary personnel. Some form of PPE must be worn in all clinical situations, including any contact with animals and their environment. Tables 1 and 2 summarize infectious disease control precautions by disease condition and agent, and recommended personal protective equipment for routine veterinary procedures, respectively. These recommendations must always be tempered by professional judgment, while still bearing in mind the basic principles of infectious disease control, as every situation is unique in terms of the specific clinic, animal, personnel, procedures and suspected infectious disease. Personal protective outerwear is used to protect veterinary personnel and to reduce the risk of pathogen transmission by clothing to patients, owners, veterinary personnel and the public. Protective outerwear should be worn whenever there may be contact with an animal or when working in the clinical environment (including cleaning).

Lab coats

Lab coats are meant to protect clothing from contamination, but generally they are not fluid resistant, so they should not be used in situations where splashing or soaking with potentially infectious liquids is anticipated. These garments should be changed promptly whenever they become visibly soiled or contaminated with body fluids, and at the end of each day. Lab coats worn in the clinic should not be worn outside of the work environment. Lab coats worn when handling patients with potentially infectious diseases should be laundered after each use,

because it is almost impossible to remove, store/hang and reuse a contaminated lab coat without contaminating hands, clothing or the environment.

Non-sterile gowns

Gowns provide more coverage for barrier protection than lab coats, and are typically used for handling animals with suspected or confirmed infectious diseases, that are housed in isolation. Permeable gowns can be used for general care of patients in isolation. Impermeable (i.e. waterproof) gowns should be used to provide greater protection when

splashes or large quantities of body fluids are present or anticipated. Disposable gowns should not be reused, and reusable fabric gowns should be laundered after each use, because hanging/storing and reusing contaminated gowns inevitably leads to contamination of hands, clothing or the environment. Gloves should be worn whenever gowns are worn. Gowns (and gloves) should be removed and placed in the trash or laundry bin before leaving the animal's environment, and hands should be washed immediately afterwards

Personnel should learn to remove gowns properly in such a way as to avoid contaminating themselves and the environment. The outer (contaminated) surface of a gown should only be touched with gloves.

1. After unfastening or breaking the ties, peel the gown from the shoulders and arms by pulling on the chest surface while hands are still gloved.
2. Ball up the gown for disposal while keeping the contaminated surface on the inside.
3. Remove gloves and wash hands.
4. If body fluids soaked through the gown, promptly remove the contaminated underlying clothing and wash the skin.

All gowns should be used only once, then discarded or laundered.

Protective gloves

Gloves reduce the risk of pathogen transmission by providing barrier protection. They should be worn when contact with blood, body fluids, secretions, excretions and mucous membranes is possible. Gloves should also be worn when cleaning cages and environmental surfaces, as well as when doing laundry if gross contamination of items is present.

- Gloves should be removed promptly after use, avoiding contact between skin and the outer glove surface.
- Gloved hands should not be used to touch surfaces that will be touched by people with non-gloved hands.
- Care should be taken to avoid contamination of personal item such as telephones, pens and pagers.
- Hands should be washed or an alcohol-based hand sanitizer should be used immediately after glove removal. It is a common misconception that using disposable gloves negates the need for hand hygiene. Gloves do not provide complete protection

against hand contamination, therefore hand hygiene immediately after removing gloves is essential.

- Disposable gloves must not be washed and reused.
- Change gloves and perform hand hygiene when:
 - moving from contaminated areas to clean areas on the same animal.
 - moving from dirty to clean procedures on the same animal.
 - after contact with large amounts of blood and/or body fluids.
 - between individual animals.

Gloves come in a variety of materials. The choice of glove material depends on their intended use. Latex gloves are commonly used, but if latex allergies are a concern, acceptable alternatives include nitrile or vinyl gloves. Latex gloves will decompose and lose their integrity when exposed to many chemicals. If exposure to chemicals such as disinfectants is expected (e.g. when cleaning and disinfecting cages), disposable nitrile gloves or heavier, reusable rubber gloves (e.g. common dishwashing gloves) can be used. Reusable gloves must also be disinfected at the end of each task.

Non-reusable gloves must be used only once.

Face protection

Face protection prevents exposure of the mucous membranes of the eyes, nose and mouth to infectious materials. Face protection typically includes a nose-and-mouth mask (e.g. surgical mask) and goggles, or a full face shield, which should be used whenever exposure to splashes or sprays is likely to occur, including dental procedures, nebulization, and wound lavage.

Respiratory protection

Respiratory protection is designed to protect the respiratory tract from zoonotic infectious diseases transmitted through the air. The need for this type of protection is limited in veterinary medicine because there are few relevant airborne or aerosol zoonotic pathogens in companion animals, in most regions. The N95 rated disposable particulate respirator is a mask that is inexpensive, readily available, easy to use and provides adequate respiratory protection in most situations. However, people need to be fit-tested to ensure proper placement and fitting of N95 masks. Special N95 masks are required for people with beards. Surgical masks are not a replacement for N95 masks.

Footwear

Closed toed footwear must be worn at all times to reduce the risk of injury from dropped equipment (e.g. scalpels, needles, knives, scissors), scratches from being stepped on by dogs, and to protect the feet from contact with potentially infectious substances (e.g. faeces, discharges and other body fluids). Rain boots must be worn during postmortem analysis of animals. Designated footwear or disposable shoe covers are required in areas where

infectious materials are expected to be present on the floor, in order to prevent their spread to other areas. This is particularly important in veterinary clinics because patients, and sometimes the personnel working with them, often have very close contact with the floor, unlike human hospitals. This is also important in section halls of the institute of pathology. Designated footwear or disposable shoe covers may also be required in case of patients with infectious diseases that are kept on the floor (e.g. in a large dog run) or that may contaminate the floor around their kennel (e.g. an animal with severe diarrhea). Such footwear must be removed when the person leaves the contaminated area, and should be immediately disposed off in the garbage (if disposable), or left at the entrance of the contaminated area on the “dirty” side.

2.4 Cleaning and disinfection

Cleaning and disinfection are two separate tasks. Cleaning involves the removal of visible organic matter with soap or detergent, whereas disinfection involves the application of a chemical or other procedure in order to kill the remaining microbes that cannot be adequately removed by cleaning. Cleaning is essential because the survival time of many infectious agents outside the host is prolonged by the presence of organic matter, and organic matter also decreases the effectiveness of almost all disinfectants. Depending on the level of disinfection used, disinfection kills or prevents the growth of many or most pathogens. Equipment should be cleaned and disinfected according to its intended use, the manufacturer's recommendations, and practice policy. Equipment must be cleaned before sterilization or disinfection. Surfaces where animals are housed, examined, placed for post mortem analysis or treated should be made of non-porous, sealed, easy-to-clean materials to facilitate cleaning and disinfection and minimize infection transmission. Personnel whose duties include cleaning and disinfection of equipment and different hospital or institutional areas should be trained regarding how to safely handle and use the products available in the clinic. In Germany, Material Safety Data Sheets including an instruction for safe use must be readily accessible for all the applicable chemical products.

2.4.1 General considerations

Cleaning

Cleaning entails the removal of all forms of organic matter (e.g. faeces, urine, blood, food, dirt etc.) from a surface. Veterinary clinics and those institutes where infective material is processed are requested to lay down cleaning procedures for common environmental surfaces. This can be done in connection with the required disinfection procedures.

- Ensure all areas are well ventilated during cleaning.
- After cleaning, allow all surfaces to dry completely.

Cleaning is absolutely necessary before a disinfectant is used.

Removing loose, dry debris from surfaces:

- Avoid generating airborne dust that may contain pathogens by:
 - using a vacuum cleaner equipped with a HEPA filter. The filter helps to prevent aerosolization of pathogens such as ringworm. For this reason, vacuums without HEPA filters should not be used for cleaning in patient-contact areas.
 - lightly spraying surfaces with water prior to mopping or sweeping.
 - using an electrostatic wipe (e.g. Swiffer™ cloth).
 - using a wet mop.
- Exposure to aerosols generated by brushes during cleaning can be minimized by taking certain precautions, such as wearing a face mask and containing spatter if the brush or surface is damp. A surgical nose-and-mouth mask will provide some protection against droplet spatter, but not against finer particles and dry dust that can become suspended in the air. A properly-fitted N95 face mask can provide this level of protection (see Respiratory Protection on page 23).

Removing sticky, wet or dried-on organic material from surfaces:

- This kind of debris should be removed using a detergent or soap and a brush or cloth, as necessary.
- During cleaning, it is the mechanical action and surfactant properties of the soap that are important, not necessarily its antimicrobial activity.
- Avoid the use of pressure washers, particularly those that produce more than 120 psi of pressure. This amount of pressure may cause aerosolization of pathogens, and pressure washing may even damage surfaces, thus making them harder to disinfect properly. A home garden hose sprayer usually produces less than 120 psi of pressure, and would therefore be relatively safe to use in a small animal kennel area.

Disinfection

Disinfection can only be maximally effective if it is preceded by thorough cleaning. Some pathogens (e.g. clostridial spores) are highly resistant to disinfection, therefore cleaning in these cases is particularly crucial in order to mechanically remove the organisms.

- Ensure all areas are well ventilated during disinfection
- *Gloves should be worn when handling disinfectants, but latex gloves will decompose and lose their integrity when exposed to many chemicals. For small jobs, disposable nitrile gloves should be used instead. For large jobs, heavier rubber gloves (e.g. common dishwashing gloves) can be used, but reusable gloves of this type must also be disinfected at the end of each task.
- Use of protective eye goggles is also recommended when handling disinfectants due to the splash risk.
- Always apply the selected disinfectant according to the product label, with particular attention to:
 - appropriate dilution
 - required contact time

- If patients or personnel may have direct skin contact with the surface, or if the disinfectant used may damage a particular surface, the disinfectant may need to be rinsed off with clean water after an appropriate amount of time has elapsed.
- After disinfection, allow all surfaces to dry completely.

Protective gloves must be worn during cleaning and disinfecting procedures, and hands must be washed after finishing.

Disinfectant selection

There is no standard disinfection programme that can be used in all veterinary clinics or institutes, as many factors must be considered, e.g. the clinic environment, type of surfaces, potential pathogens and their tenacity, microbial loads, general practices (see also **annex 1** and **annex 2**). Considering a disinfectant for a particular purpose should take into account the product's spectrum of activity, susceptibility to inactivation by organic matter, tenacity of potential pathogens in the environment, compatibility with soaps and detergents, toxicity for personnel and animals, contact time required, residual activity, corrosiveness, environmental effects and cost. It is recommended to choose surface disinfectants from disinfectant lists maintained by the German Veterinary Society (Deutsche Veterinärmedizinische Gesellschaft, DVG). Recommended skin disinfectants (antiseptics) are reviewed in the VAH-list as mentioned above (for references of both lists see **annex 3**). Material Safety Data Sheets as well as instruction for safe use of these products must be readily available to all personnel who work with them and around them.

Cold sterilization

“Cold sterilization” is sometimes used from clinicians to chemically sterilize items through immersion in a sterilizing solution. Because of the toxicity of some cold sterile solutions, the time required to achieve sterilization using these chemicals, and the wide availability of autoclaves for sterilization, there is only minimal indication for use of cold sterilization. It is mainly applied to items that cannot tolerate steam sterilization, such as endoscopes. Although cold sterilization can be highly valuable for sterilizing instruments, misuse can result in ineffective sterilization. Potential problems include the use of inappropriate solutions, improper preparation of solutions (i.e. inadequate concentration), inadequate contact time, inadequate replacement/refreshment of solution, or inadequate removal of organic debris from equipment prior to immersion in solution. Commonly used disinfectants such as alcohol, iodophors, phenolics and most quaternary ammonium compounds are not effective sterilants and therefore are not acceptable for use on items intended to be used in surgical or other invasive procedures. Of the chemical sterilants, only glutaraldehyde and stabilized hydrogen peroxide-based compounds are effective at sterilizing instruments, and only if the solutions are prepared and maintained properly, and allowed adequate contact time.

Prolonged contact time (e.g. 10 hours) is required for sterilization using these solutions. Therefore, cold sterilization is not a means for rapid sterilization of surgical instruments that have been inadvertently contaminated during surgery or for surgical instruments that will be used frequently on different patients throughout the day. In some veterinary clinics, disinfectant solutions of other kinds in which a set of instruments is routinely kept are frequently referred to as “cold sterile.” Such misuse of this term should be avoided, as instruments kept in

disinfectant solutions other than glutaraldehyde or high-level sterilants should not be used for surgical or other invasive procedures. Instruments must be cleaned to remove all visible organic debris (including blood) before placing them in a clean, fresh cold sterilant solution in order for the procedure to be effective. Most chemical sterilants come in solutions consisting of two parts that, when combined, form what is referred to as an "activated" solution. Refer to the product's label for the shelf life of the activated solution. Cold sterilant must be rinsed off all instruments using sterile saline or water before they are used, as some of these compounds (particularly glutaraldehyde) can be irritating to tissues. As with all other chemicals used in a veterinary clinic or institute the specific rules of the "Gefahrstoff-Verordnung" have to be respected.

2.4.2 Recommendations for cleaning and/or disinfection of selected equipment

Endoscopes

Proper cleaning and maintenance of endoscopes are important to prolonging the useful life of the instrument, but cleaning and disinfection are also important from an infectious disease control aspect. Endoscopes are semi-critical equipment, and as such require high level disinfection when used in humans. In veterinary medicine, high level disinfection is required prior to use in relatively sterile areas (e.g. urinary tract), but thorough low level disinfections is considered adequate for use in non-sterile areas (e.g. gastrointestinal tract, upper respiratory tract) if a transmissible infectious disease was not suspected in the previous patient and the subsequent patient is not significantly immunocompromised. Manufacturers typically provide detailed reprocessing (cleaning and disinfection) instructions for their instruments, which should be readily available as a reference for staff members responsible for the care of endoscopes. If the endoscope was purchased second hand and the reprocessing instructions were not provided, it is important to contact the manufacturer to obtain a copy. Some general guidelines regarding endoscope maintenance include:

- Endoscopes must be meticulously cleaned immediately after every use. Endoscopes typically have several moving or detachable parts and small channels in which moisture, debris and discharge can become trapped. Cleaning must be performed as soon as possible in order to prevent debris from drying onto surfaces, as this can make the debris considerably harder to remove. Prior cleaning is crucial to effective disinfection.
- All instrument and suction channels must be thoroughly cleaned after each use, even if the channels were not used during the procedure. Failure to clean these channels is a common error which can result in accumulation of debris, bacteria and biofilms within the instrument. Not only does this pose risk of disease transmission to subsequent patients, but it can also confound sample collection and culture.
- Rinsing and drying of the endoscope are also critical to proper maintenance. Failure to rinse off detergents or disinfectants can lead to significant irritation of the tissues of the next patient.
- Chemical sterilants (e.g. glutaraldehyde) are typically used for high-level disinfection or sterilization of endoscopes, as most cannot be steam-sterilized (autoclaved). Consult the manufacturer's instructions regarding what methods can be safely used for any

particular endoscope. If a chemical sterilant is used, a timer should be used to measure the exact contact time – too short a time may result in an inadequate microbial killing, while too long a time may result in damage to the instrument. It is recommended to use the disinfectant at elevated temperatures e. g. 60°C, if the endoscope is heat resistant at this temperature. This will increase the inactivating efficacy of the disinfectant.

Clippers

Use of good-quality clippers and maintenance of clipper blades are of great importance. Improper clipper use or maintenance can result in skin trauma, with subsequent risk for infection, or transmission of opportunistic pathogens between patients. Following routine use of clippers on areas of unbroken skin and non-infectious animals, basic cleaning with a stiff brush to remove visible dirt and hair from the blade is likely adequate. More thorough cleaning and disinfection of the blade, as described below, should be done periodically as well, depending on how often the clippers are used. Clippers should be thoroughly cleaned and disinfected after every use on an animal with a potentially transmissible infection (e.g. an animal with diarrhea), on any area where the skin or hair is significantly contaminated with faeces, urine, blood or other body fluids, and before and after use on an area where the skin is broken (especially if there is evidence of skin infection). First, a stiff brush should be used to remove visible dirt and hair from the blade, and a soapy, wet cloth used to remove any visible debris from the body of the clippers. The clipper blades can then be sterilized using a chemical sterilant (e.g. glutaraldehyde) or by autoclaving. The body of the clippers can be sterilized using hydrogen peroxide vapour or ethylene oxide (if available). Otherwise, after removing all visible debris, thorough manual wiping with a cloth wetted with a standard disinfectant solution should be performed, paying particular attention to the small crevices of the device and allowing for adequate contact time with the disinfectant. Refer to the clipper's instruction manual to determine what degree of contact with liquid the clippers can safely withstand.

Anaesthetic equipment

Endotracheal tubes: In human medicine, endotracheal (ET) tubes are typically considered single-use devices, but reuse of ET tubes has become more common with the rising costs of healthcare. These tubes can be effectively resterilized between patients using glutaraldehyde or ethylene oxide gas, although the physical integrity of the cuffs in particular can be compromised by repeated sterilization with these methods. These tubes are considered semi critical equipment, and as such should be subjected to high-level disinfection or sterilization. In veterinary medicine, it is impractical to discard ET tubes after a single use, but glutaraldehyde or ethylene oxide gas sterilization may not be readily available. Evidence-based guidelines for reuse of ET tubes in veterinary medicine are not available. Nonetheless, at an absolute minimum, ET tubes must be thoroughly cleaned (inside and outside) with hot water and detergent immediately after use to prevent any discharge or debris from drying and forming a biofilm on the device. Tubes should then be soaked in a solution of a quaternary ammonium compound (QAC), rinsed thoroughly and dried prior to being reused. It is important to test the integrity of the cuff before every use to ensure the device has not been compromised by repeated exposure to the disinfectant.

Anaesthetic gas tubing and rebreathing bags: Although the tubing connecting the anaesthetic machine to the patient's endotracheal tube should not come in direct contact with the patient, moisture and condensation often accumulate in the tubes and may contain microorganisms from the animal's airway. In human medicine, this equipment is also typically single-use. As for ET tubes, evidence-based guidelines for reuse of this equipment in veterinary medicine are not available. At a minimum, gas tubing should routinely be washed thoroughly with hot water and detergent and hung to dry at the end of the day's procedures, or more often if they are heavily used. If there is visible discharge in the tubing, or if the animal has a known or suspected respiratory tract infection, the tubing should be washed with hot water and detergent, soaked in a solution of a QAC, rinsed with water and dried prior to being reused. Rebreathing bags should be cleaned/disinfected as for the associated gas tubing, as they also come in contact with the expired air from the patient. If an animal has a known or suspected transmissible respiratory tract infection, filters are available which can be placed between the ET tube and the rest of the anaesthetic circuit in order to help protect the equipment from contamination.

Laundry

Although single-use, disposable items are ideal from an infectious disease control aspect, such items can also produce tremendous waste. Laundry is therefore a very important component of infectious disease control in the clinic setting. Although soiled linens are a potential source of microorganisms, with appropriate hygienic handling, storage and processing of clean and soiled linens, the risk of disease transmission from these items can be reduced to an almost negligible level. Linens and special clothing used in veterinary clinics (e.g. cage blankets, towels, surgical drapes, surgical gowns, scrubs, lab coats) can be an important means of transporting pathogens from one area to another within the clinic, and to areas outside the clinic. As a result, clinic clothing (e.g. scrubs, lab coats) should always be washed onsite or sent to a commercial laundry facility that is equipped to handle laundry from medical/veterinary facilities. This helps to prevent transmission of pathogens to family members, family pets and the general population. Personnel should change into clinic clothes at the beginning of their shift and back into street clothes at the end of their shift. Clinics should have appropriate laundry facilities or laundry services to accommodate the need to change clothing daily, or more frequently if required. Microbial numbers on soiled linens (e.g. towels, blankets) and clothing are significantly reduced by dilution and during the mechanical action of washing and rinsing. Linens used in veterinary clinics should be laundered together using detergent, and dried in a hot air dryer to promote killing of microorganisms. See also **Annex 7**.

Collection and handling

Except for linens potentially contaminated with infectious agents (see below), all used linens can be handled in the same way. Heavily soiled linens should be rolled or folded to contain the heaviest contamination in the centre of the bundle, without contaminating personal clothing or the environment. Large amounts of solid debris, faeces or blood clots should be removed from linen with a gloved hand and disposable tissue or paper towel, which are then immediately placed in the garbage. Excrement should not be removed by spraying with water or shaking as this may result in contamination of the surrounding area and personal clothing.

Bagging and containment

- Linens should be handled with a minimum of agitation and shaking.
- Always place soiled linens directly in a hamper or bag designated for dirty laundry.
- Never place soiled linens on the floor.
- Laundry bags should be tied securely and not over-filled.
- Carts and hampers should be cleaned after each use.
- Laundry bags should be washed after each use. They can be washed in the same cycle as the linens they contain.

Transport

Linen transported by cart must be moved in such a way that the risk of cross-contamination is minimized (e.g. avoid moving the cart from potentially contaminated areas (runs/kennel area) to cleaner areas (prep room, surgery). Clean linen must be transported and stored in a manner that prevents contamination. If laundry carts are used, separate carts must be used for clean and dirty linens

Washing and drying

- Use of normal machine washing with a commercial laundry detergent and machine drying are sufficient to greatly reduce the numbers of most significant infectious pathogens from most soiled linens.
- If laundry is washed in cold water, an appropriate cold-water detergent must be used according to label directions.
- It should not be assumed that hot water washing will disinfect or sterilize items. High temperature ($> 71.1^{\circ}\text{C}$) washing can significantly reduce bacterial numbers, but standard household washing machines do not typically reach this temperature, even if the hot water setting is used. It is strongly recommended to use washing powders with microbiocidal efficacy which are listed in the VAH list (for reference see **annex 3**). It is also recommended to use only validated washing procedures as described by the Robert Koch-Institute (RKI, 2017).
- The heat and drying effects of tumble drying are a critical step in the laundering process, and account for a large proportion of the decrease in bacterial counts achieved. Therefore, laundry should not be considered clean until it has also been dried completely, ideally using the highest heat possible.
 - Line-drying linens outdoors may have the advantage of also exposing the surface of the fabrics to ultraviolet (UV) light, if they are hung to dry in the sun. However, it would be difficult to expose all surfaces to sunlight, and thick fabrics, items made of multiple fabric layers and those containing seams may protect bacteria from UV exposure. Also, the antimicrobial action of the high heat of tumble drying is lost if linens are line-dried, therefore tumble drying is recommended, especially for any materials that may have been contaminated with a transmissible infectious pathogen.

Laundry from infectious cases

- Laundry from potentially infectious cases should be treated separately from other laundry.
- Linens should be collected in a separate linen bag and washed and dried separately.
- For linens with gross contamination of a potentially infectious nature (e.g. faeces from a diarrheic animal, discharge from an infected wound, urine from an animal with a urinary tract infection), as much organic material as possible should be removed by hand (using gloves and disposable tissue or paper towel, as described above). The items should then be pre-soaked in bleach solution (9 parts water + 1 part household bleach) for 10 - 15 minutes prior to machine washing. Alternatively, steam sterilization is recommended.

Protection of personal

Personnel need to protect themselves from potential transmission of pathogens from soiled linens by wearing appropriate personal protective equipment (e.g. gloves, gown, apron) when handling soiled linens. Personnel should wash their hands whenever gloves are changed or removed, or if they come in contact with soiled linens while not wearing gloves. Hand hygiene stations should be available in laundry area.

Commercial laundry facilities

A company which specializes handling laundry from medical/veterinary facilities should be charged if it is not possible to clean laundry properly on-site. Adequate separation of clean and dirty laundry in the transport truck is essential to ensure that there is no opportunity for mixing or cross-contamination of clean and dirty linens.

2.5 Waste management

Veterinary biomedical waste is a potential source of both zoonotic and non-zoonotic infectious pathogens. Biomedical waste typically includes sharps, tissues (anatomic waste), highly contaminated (e.g. blood-soaked) materials, and dead animals. Therefore, it is important to handle all such waste appropriately. The national guidelines for biomedical waste management have to be considered. Details are usually readily available through municipal web sites (www.laga-online.de/mitteilungen/docs/RL_Gesundheitsdienst_09_02.pdf). Specific guidelines and rules established at the Justus Liebig University Giessen must be respected as well (<https://www.uni-giessen.de/org/admin/dez/b/3/abfall>).

Although it is beyond the scope of these guidelines to describe veterinary biomedical waste management in detail, the following basic information may be helpful:

- In case of a notifiable disease the waste has to be disinfected according to directives of the veterinary authorities before removed.
- Used sharps are considered biomedical waste and should be disposed of in accordance with regulations from municipal and provincial/territorial authorities. Use approved, puncture-resistant sharps disposal containers to remove, store and dispose

used sharps such as needles, blades, razors and other items capable of causing punctures.

- Non-anatomical waste saturated or dripping with blood (e.g. blood-soaked lap sponges and gauze) are also best disposed of as biomedical waste.
- Liquid waste such as chest fluid, abdominal fluid, irrigating solutions, suctioned fluids, excretions and secretions usually may be poured carefully down a toilet or any drain connected to a sanitary sewer or septic tank. Provincial and territorial regulations may dictate the maximum volume of blood or body fluids that is permitted to be poured into the sanitary sewer. If there is likely to be splashes or sprays during this disposal process, appropriate personal protective equipment should be worn.
- All other waste, such as general office waste and non-sharp medical equipment, may be disposed of in the regular waste stream, and requires no special treatment other than containment during disposal and removal. Waste should be contained in a leak-proof container or bag that can be discarded with the waste (e.g. a plastic garbage bag). Urine and faeces are not considered biomedical waste, nor is disposable equipment that has come in contact with an infectious animal (e.g. examination gloves, gowns, bandage materials that are not saturated with blood). Nonetheless, some of these materials may pose a risk to clinic personnel, patients and waste disposal personnel in terms of their potential to transmit infectious pathogens. Therefore, additional precautions must be taken to minimize contamination of the clinic environment and the risks to people and animals from potentially infectious waste. These may include double-bagging of materials from isolation areas, and keeping waste cans covered to prevent access by curious animals and to prevent spillage if a waste can is knocked over. If contamination of the inside of a waste can occurs (e.g. due to a tear in a garbage bag), the container should be thoroughly disinfected after emptying.

2.6 Hygienic measurements in surgery

All surgical procedures cause breaks in the physiological defensive barriers of the skin or mucous membranes. These breaks are therefore accompanied by an inherent risk of surgical site infection (SSI). Surgical site infections can occur sporadically or as part of an outbreak, and can have devastating outcomes in some situations. Good general infection control practices (e.g. hand hygiene, cleaning and disinfection) are important for prevention of SSIs. Specific measures pertaining to surgery include maintenance of the surgical environment, use of appropriate personal protective equipment and hand hygiene, disinfection and sterilization of anaesthetic equipment and surgical instruments, appropriate use of peri-operative antimicrobials, and surgical site care before, during and after the procedure. Many of the recommendations below have to be considered as minimum practice standards.

Surgical environment

Having a well designed and maintained surgical area or suite is very important. In order to keep the surgical environment as clean as possible, this area should be separated from

personnel and animal traffic, and be easy to thoroughly clean and disinfect. A surgical area should only be used for surgical procedures, and should not be used for non-surgical procedures between surgeries. Entrance to the area should be restricted at all times to minimize traffic in the room. The number of people in the surgical area has been identified as a risk factor for SSI in small animals, so only essential personnel should be allowed in the area during any surgical procedure. All personnel participating in the procedure, including those performing surgical nursing duties, must be trained in operating room procedures.

Personnel considerations

Personal protective equipment

All personnel in the surgical area should wear designated surgical scrubs, a surgery cap or hair bonnet, and a nose and-mouth mask when surgery is underway, regardless of whether or not they are directly involved in the procedure itself. Hygienic clothing worn in surgery (scrubs) should not be worn when handling or treating other patients, and at a minimum should be covered with a lab coat when outside the surgery area (see Personal Protective Equipment under Routine Procedures). Personnel directly involved in the procedure should also wear a sterile gown and sterile gloves.

Hand hygiene

A surgical hand scrub should be performed before putting on a sterile gown and sterile gloves. Various surgical scrub techniques have been described. Most commonly, a structured five-minute surgical scrub with antibacterial soap is used:

- Remove all hand and arm jewelry
- A pick or file should be used to clean all dirt out from underneath the fingernails.
- If hands or arms are visibly dirty, they should initially be washed with soap and water as per standard hand hygiene protocols.
- Hands and forearms are then lathered with antibacterial soap. Scrubbing with a bristled sponge proceeds proximally from the fingertips to the forearms, just below the elbow. Additional details can be found in a surgical reference book.
- A sterile towel must be used to dry the hands before donning a gown and gloves.

Application of commercial alcohol-chlorhexidine combinations can be used as a replacement for traditional surgical scrubbing. This approach has been shown to be equally effective at removing bacteria, and is less time consuming and irritating to the skin, particularly if a surgical hand scrub is required multiple times in a day. If such a commercial combination is used, hands must be thoroughly washed and fingernails carefully cleaned initially. It is also critical to follow the label directions regarding the amount of product to use and how to apply it.

Equipment considerations

Sterilization of instruments

Complete sterilization of surgical instruments and any items that might come in contact with the surgical field is a crucial procedure. Poor sterilization or inappropriate handling of instruments after sterilization can result in contamination of sterile tissues during surgery. Steam sterilization (i.e. autoclaving) is most commonly used in veterinary clinics. Quality control testing of autoclaves should be performed regularly and documented:

- Sterility indicator strips should be placed in every surgical pack. External autoclave indicator tape is not a reliable indicator of the sterility of a pack's internal contents.
- Biological sterility indicators should be used periodically. These indicators contain bacterial spores, which are the most resistant form of bacteria. After being autoclaved, the indicator is submitted for testing to ensure that all of the spores have been killed by the sterilization process. In human healthcare facilities it is recommended that these indicators are used daily, or at least weekly. Weekly or biweekly use is likely adequate in most veterinary clinics, depending on how heavily the autoclave is used. A biological sterility indicator should also be used in the next cycle anytime the autoclave has been moved, repaired, or if there has been any other indication of sterilization failure.

Flash sterilization should not be used unless absolutely necessary for emergencies only. Flash sterilization should never be used for surgical implants. Countertop "cold sterile" disinfectant solutions should not be used for any surgical instruments or implants, as these solutions typically do not achieve true sterilization of the instruments they contain.

Quality control testing of autoclaves should be performed regularly.

Peri-operative application of antimicrobials

Administration of peri-operative (i.e. before, during and after surgery) antimicrobials is an important and complex issue. The goal of peri-operative antimicrobial therapy is to reduce the risk of post-operative infection, while minimizing the negative impact on the patient's natural microflora and the risk of antimicrobial-associated complications such as diarrhea. There is currently very little objective information about the need for antimicrobials for specific veterinary procedures, as well as the optimal choice of drug(s), timing and dosages. Antimicrobials are indicated in clean-contaminated, contaminated and dirty procedures. The need for antimicrobial prophylaxis in clean procedures is unclear. In human medicine, antimicrobials are not typically recommended for clean procedures such as arthroscopy, however there are conflicting opinions. Regardless, it is unclear whether recommendations from human medicine should be directly extrapolated to veterinary procedures, because there are obvious differences in post-operative incision care and patient environment for animals, which may increase the risk of infection. The need for peri-operative antimicrobial therapy for different procedures, particularly clean procedures, requires further research. Concerns with this practice that currently exist include inappropriate timing of administration (i.e. too far in advance of surgery or starting after surgery), excessive duration of therapy, inadequate dosing and inappropriate drug choice. If peri-operative antimicrobials are used, they should be administered so that therapeutic levels are present at the surgical site at the time of first incision.

This typically requires parenteral (i.e. not oral) administration of an antimicrobial approximately one hour before surgery. If the surgical time is longer than two half-lives of the drug(s), then an additional dose should be given during the surgery. In human medicine, it has been shown that starting antimicrobial therapy after surgery is no more effective than not using antimicrobials at all. Typically, antimicrobials are not needed after surgery since the highest-risk time for contamination of the surgical site (i.e. during the surgery itself) is already passed.

Surgical site management

Pre operative care

Pre-operative management of the surgical site may be very important, but there has been very little research in this area in veterinary medicine. The goal of pre-operative surgical site management is to eliminate potential pathogens without creating a physical environment that may increase bacterial colonization or infection post-operatively. If the patient's hair coat is visibly dirty, bathing the animal before surgery is reasonable if there is adequate time for the hair coat to dry before the procedure. In humans, it has been suggested that any method of hair removal can be associated with higher SSI rates, but obviously this cannot be avoided for the vast majority of procedures in veterinary medicine. Shaving the surgical site the night before has been associated with higher SSI rates in humans, therefore clipping (not shaving) of the surgical site should only be performed right before surgery. Care must be taken to avoid damaging the skin during this procedure, as abrasions provide sites for invasion and proliferation of opportunistic bacteria. Use of good quality, well-maintained clippers and blades helps to reduce the risk of skin abrasions. If skin lesions around the surgical site are noted before or after surgery, the finding should be recorded and investigated, to determine whether equipment maintenance and/or personnel training need to be improved. Animals should not be clipped in the surgery area/suite itself. A "prep" area outside of surgery area should ideally be used for this and any other pre-operative procedures.

Skin preparation after clipping is also important. Typical practices include thoroughly cleaning and scrubbing the site with antibacterial soap, followed by application of alcohol, and finally application of a chlorhexidine or iodine solution. Potential problems that need to be avoided include:

- Failure to prepare a large enough area of skin
- Inadequate initial cleaning with soap and water
- Contamination of preparation solutions
- Inadequate contact time with the antiseptic
- Contamination of the area during or after preparation due to improper technique

If skin preparation solutions (e.g. antibacterial soap and water, alcohol, chlorhexidine, iodine) are kept in refillable containers, these containers must be disinfected when empty before being refilled. Contamination of these solutions with bacteria that are resistant to their respective antimicrobial actions can occur. Refilling the containers without disinfecting them can allow these resistant contaminants to accumulate. An outbreak of catheter site infections was reported in a small animal clinic that was associated with contaminated skin preparation solutions.

Post-operative care

Post-operatively, a surgical incision site is highly susceptible to opportunistic infection from the bacteria of the patient's own microflora, from the environment or from hospital personnel. Contact with the surgical incision, particularly with bare hands, should be avoided. Covering or bandaging incisions for a minimum of 24 to 48 hours after surgery has been recommended in humans; this is also a reasonable recommendation in small animals in most situations. Bandage changes should be performed using aseptic technique. Pet owners and handlers should be instructed on how to manage an animal with an incision, and the signs for which to look that may indicate the development of a SSI. There is no objective information about the need to cover surgical incisions for more than 48 hours in veterinary or human medicine, but arguments can be made for both sides. Preventing the animal from licking, scratching or otherwise traumatizing the surgical site is critical. Damaging to the healing incision or the skin around it can result in the deposition of opportunistic pathogens, and make it easier for bacteria to grow in the area.

2.7 Patient care and handling

Isolation facilities

Every veterinary clinic should have a dedicated isolation area for caring for and housing animals with potentially contagious infectious diseases. The size and structure of the isolation facility varies with aspects such as clinic size, types of animal species treated and diseases that are endemic to the area. A proper isolation area should allow for complete physical separation of potentially infectious cases, and have areas for performing routine procedures such as bandage changes, thereby reducing the risk of direct or indirect infection of other hospitalized animals or clinic personnel. Ideally, isolation facilities should be in a low traffic location within the clinic.

If an isolation area was not included in the original physical design of the clinic, a potential alternative in some cases may be to convert an examination room into a dedicated isolation room. The room selected should be in the area of the lowest human and animal traffic possible. The room should be easy to clean and disinfect and emptied of all non-essential equipment. This type of room conversion can be difficult to do effectively depending on the design and layout of the clinic and the room itself. The feasibility of using such a room for isolation of infectious animals must be assessed on a facility-by-facility basis.

Ventilation should be designed such that movement of air from the isolation room to other areas of the clinic is prevented (i.e. the room should be vented to the outdoors). If this is not readily possible, a HEPA air filtration system should be used for the air leaving the isolation room. Only the equipment and materials needed for the care and treatment of the individual animal should be kept in the isolation room. This may include items such as a designated stethoscope, thermometer, grooming supplies, leash, and muzzle. Supplies of items that will be used on subsequent isolation patients (e.g. packages of bandage material, boxes of

needles and syringes) should not be kept in the isolation area. All items entering an occupied isolation area should be considered infectious and disposed of or disinfected after discharge of the patient. Items should not be removed from the room except for disposal. Use of disposable articles can minimize the need to take soiled items out of the isolation room.

When the isolation room is in use by an animal with a potentially contagious infectious disease:

- Prominent signage should indicate that the animal may be infectious and should outline any additional precautions that need to be taken in addition to routine isolation protocols.
- Access to the isolation room should be limited to the minimum number of essential personnel necessary to provide appropriate patient care.

Personal protective equipment and waste in the isolation area

All personnel entering an isolation area housing a potentially infectious animal, regardless of whether they plan on having direct contact with the animal, must wear appropriate personal protective clothing. At a minimum, this consists of a clean lab coat or similar item of outerwear that is only worn in the isolation area and disposable examination gloves. Depending on the diagnosis and the mode of transmission of the disease, shoe covers, masks and eye protection may be required when handling an animal in isolation.

- Gloves should be discarded after a single use. Hands must be washed immediately after gloves are removed.
- Similarly, gowns should be discarded (if disposable) after a single use. Reusable gowns and lab coats used in isolation should be laundered after a single use. Storing/hanging and reusing a contaminated gown or lab coat inevitably leads to contamination of hands, clothing and the environment. Therefore, when removed, these items should immediately be placed in the isolation room garbage or laundry bag.
- Eye/nose/mouth protection may be re-used with the same animal if they are not visibly soiled and can be consistently removed without contamination of the inside of the eye wear/mask or the immediate environment. Nose and mouth masks should only be reused by the same person. If the eyewear or mask becomes contaminated with body fluids such as urine or faeces, it should be replaced with a clean article.

Designated personal protective equipment must remain in the isolation room. Contaminated items and waste alike should be bagged prior to being removed from the isolation area. Articles should then immediately be either discarded or taken to the appropriate area for additional cleaning and disinfection. Waste from an isolation room should be treated as potentially infectious.

Patients in isolation

Dogs that are housed in isolation should not be walked nor allowed to urinate or defecate in public areas or areas used by other animals. If a dedicated area for walking is not available and the dog needs to be taken out of the primary isolation area to urinate and defecate, a separate run should be designated for each dog in isolation (i.e. if there is more than one animal in isolation, they cannot all use the same run). The run selected should be as far as

possible from runs being used by other animals. The dog should be moved directly to the run by personnel wearing appropriate personal protective clothing. Moving the animal through other areas of the clinic should be avoided as much as possible. Carrying the dog or transporting it on a gurney is ideal in order to minimize the risk of contamination of the floor and clinic environment. The designated run should be prominently labeled and disinfected daily. If a patient being housed in isolation absolutely must be taken elsewhere in the clinic for essential procedures such as radiographs or surgery, if at all possible this should be done the end of the day, or during a time where there is the least animal and personnel movement in the clinic.

- Appropriate personal protective equipment should be worn by all personnel involved with the procedure.
- Other animals should be kept out of the procedure area.
- The procedure area should be thoroughly cleaned and disinfected as soon as the procedure is completed.

Footbaths and footmats

Footbaths or footmats are used to decrease (but do not eliminate) microbiological contamination of footwear. Footbaths are shallow containers containing a disinfectant solution. Footmats are spongy commercial mats covered with a durable, easy-to-clean material that can be saturated with disinfectant. Footmats can increase compliance because they are easier to use, but they are more expensive and more difficult to maintain than footbaths. Data regarding the need for and efficacy of footbaths and footmats are very limited, and there is essentially no information relating to small animal clinics specifically. It has been shown that footbaths can reduce bacterial contamination of footwear in large animal clinic settings. Although other sources of contamination have been shown to be more significant in infection transmission, footwear and floor surfaces cannot be overlooked in an infection control programme in a small animal clinic, because patients so often have extensive direct contact with the floor. Possible problems with footbath or footmat use must also be considered. Footbath or footmat use is almost invariably accompanied by spillage of disinfectant solution; this can create a slipping hazard on smooth floor surfaces, which are typically present in small animal clinics. Certain disinfectants can also damage floor surfaces with prolonged contact. Footbaths or footmats should be considered when personnel will be walking on a surface that could potentially be more contaminated than the general floor environment, and where spread of this contamination might pose a risk to patients or personnel. The most likely area where footbaths or footmats could be useful would be at the exit of an animal housing area (e.g. dog run) that contains a potentially infectious case, and where clinic personnel will be walking in and out of the potentially contaminated area. The need for routine use of footbaths or footmats in isolation areas where animals are confined in cages is questionable. If footbaths or footmats are used, selection of an appropriate disinfectant is important. The disinfectant should be effective against the specific pathogen(s) of concern, stable in solution, and effective with a relatively short contact time (see Tables 5 and 6). Oxidizing agents such as accelerated/stabilized hydrogen peroxide and peroxygen disinfectants are ideal. The solution should be **changed daily, or better sooner** if gross contamination of the bath/mat occurs.

**Maintaining proper concentrations of active disinfectants
in footbaths and footmats is essential for proper performance.**

Wounds and Bandages

Wound infections can be caused by many bacterial pathogens, some of which can be transmitted between animals or between animals and people. One example is methicillin-resistant *Staphylococcus aureus* (MRSA), which can infect both man and animals, but there is a variety of other pathogens that are of concern. This includes both multidrug resistant (e.g. *S. aureus*, *S. pseudintermedius*, enterococci) and susceptible bacteria. Wounds provide a prime site for invasion of opportunistic bacteria such as these. Even wounds that are not known to be infected should be protected from contamination by veterinary personnel and from the environment to reduce the risk of secondary infection.

- Sterile gloves should be worn for debridement, treatment and bandaging of deep wounds and those involving vital structures. Clean, non-sterile examination gloves are adequate for these procedures if the wound is more superficial.

- Bandages must be kept dry to prevent bacterial strike-through. This means keeping the outside of the bandage as dry as possible, and also including sufficient absorbent material in the bandage itself to prevent discharge from the wound from soaking through the bandage. If the outside of a bandage appears wet, it should be changed.
- Used bandage materials should be considered infectious. Such materials should be placed directly in the garbage and not on the floor, examination table or any other surface. The risk of contamination and spread of any pathogen is likely higher for wounds with a large amount of discharge.
- Wound treatments and bandage changes should be performed in an area that is easily disinfected (e.g. on an examination table). Wound irrigation and lavage should be performed in such a way that the fluid used is contained (e.g. in a sink or tub, or with disposable absorbent material). Bandages should NOT be changed in the kennel/ward area where there is a higher risk of cross-contamination of other patients.
- Hands should be washed thoroughly after changing a bandage. Equipment used for bandage changes (e.g. bandage scissors) should be disinfected between uses.

Animals with known MRSA or multi-resistant bacterial wound infections are likely to be colonized with these pathogens at other body sites as well (e.g. nose, rectum, intestinal tract), and should therefore be handled with contact precautions and housed in isolation.

Feeding of raw meat

Raw meat-based diets for cats and dogs often contain a variety of enteropathogens, including *Salmonella* spp., *Campylobacter* spp., *Clostridium difficile*, *Clostridium perfringens*, extended spectrum beta-lactamase (ESBL) Enterobacteriaceae, and enterohemorrhagic strains of *Escherichia coli* such as EHEC O157:H7. It has also been shown that animals fed with raw meat diets may shed higher levels of *Salmonella* and ESBL Enterobacteriaceae in their faeces. Raw meat diets and faeces from animals fed these diets thus may pose a risk to hospitalized

animals and clinic personnel, and may contaminate the hospital environment. Therefore, a policy against the feeding of raw meat to hospitalized animals should be in place.

Admission of animals from shelters

Humane societies, animal shelters and similar facilities typically contain transient, stressed populations of animals, large numbers of young animals, sick animals and animals with unknown health and vaccination status. As such, they should be considered high risk from an infectious disease standpoint. Animals admitted from these facilities should be subjected to a high degree of scrutiny. Recommended practices include:

- All animals from such facilities should be examined immediately upon arrival. They should not be allowed to come in contact with other animals in the waiting/reception area.
- If there is an ongoing outbreak of an infectious disease at an animal shelter, admission of animals from the facility for elective procedures should be restricted (i.e. admission for emergencies only). Otherwise, all animals from the facility should be admitted directly to isolation.
- Animals from these facilities should be housed separately from other patients, if possible. Use of a separate ward, separate area of a ward or leaving empty cages between those animals and other patients can be used, depending on the degree of separation required for the diseases of primary concern.

For elective procedures (e.g. spay, neuter):

- All dogs, cats and ferrets must have been vaccinated against rabies at least 2 weeks prior to presentation if they are more than 14 weeks old.
- All dogs and cats must have received other routine vaccinations (as needed according to geographic region) at least twice if they are more than 14 weeks old, with the most recent vaccine administered at least 2 weeks prior to presentation.
- All animals must have been dewormed with a broad spectrum anthelmintic at least 7-10 days prior to admission.
- Animals with abnormalities including, but not limited to, fever, oculo-nasal discharge, coughing/sneezing, diarrhea and potentially infectious skin conditions should not be admitted for elective procedures.
- Depending on the geographic region and time of year, flea treatment prior to admission may also be required.

2.8 Safety of clinical personnel

Bites and scratches

Bites and scratches are an inherent risk in veterinary medicine and a common cause of occupational injury and illness. In a survey of veterinarians from the USA, approximately two-thirds had sustained a major animal-related injury at one time. Bites and scratches accounted for just over one-third of these injuries. Up to 60% of dog bites and 80% of cat bites require medical attention. Approximately 3% to 18% of dog bites and 20% to 50% of cat bites become infected. Most dog and cat bite wound infections are caused by a mixture of aerobic and anaerobic bacteria. In general, veterinary personnel should be able to recognize behaviour in animals and situations that are associated with an increased tendency for an animal to bite. Professional judgment must be exercised to guide bite prevention practices. Personnel should take all necessary precautions to prevent animal-related injuries in the clinic. These may include physical restraint or chemical restraint (sedation or anaesthesia) of an animal. Appropriate equipment (e.g. different sizes of muzzles, bite-resistant gloves, catch pole, cat bags) should be readily available. Such equipment should also be as easy to clean as possible. Experienced veterinary personnel rather than owners should restrain animals for procedures whenever possible. Personnel must always be aware of changes in their patients' behavior which may precede attempts to bite. Veterinary personnel should not let client perceptions or attitudes prevent them from using appropriate bite-prevention measures (e.g. muzzling).

If anyone is bitten or scratched by an animal:

- Immediately wash the wound thoroughly with plenty of soap and water.
- Report the incident to the local public health unit.
- If a bite occurred, the rabies vaccination status of the animal must be noted
- Seek medical attention as soon as possible for any bite that:
 - is on a hand or is over a joint
 - is over a prosthetic device or an implant
 - is in the genital area
 - is over a tendon sheath, such as bite on the wrist or the ankle
 - causes a large amount of tissue damage (e.g. a deep tear or tissue “flap”)

Medical attention should also be sought for any bite (particularly from a cat) sustained by a person with any of the following conditions:

- Compromised immune system (e.g. HIV/AIDS, transplant or chemotherapy patients)
- Chronic swelling (edema) in the area that was bitten
- If the person has had his or her spleen removed
- Liver disease, diabetes, lupus or other chronic systemic disease

If the bitten area becomes increasingly painful or swollen, if the wound develops a discharge, or if the person develops a fever or swollen lymph nodes, consult a physician as soon as

possible. A physician will decide (in some cases in consultation with public health personnel) if antimicrobial therapy, tetanus vaccination, rabies vaccination, or any additional treatment (e.g. lavage, debridement, sutures) are necessary. Most bite wounds are not sutured in order to promote drainage and reduce the risk of infection. Emergency contact information (i.e. physician, public health department) should be clearly posted in the clinic. All bites or scratches should be reported to the clinic infection control practitioner (ICP) and the injury documented. Bites and scratches should not be considered “part of the job” and summarily dismissed. Even seemingly small, innocuous injuries can develop severe complications. Regular review of injuries is useful to identify trends in behaviour that may be associated with injuries and to develop protocols to reduce the risk of injuries. Documentation is also important for employees in the event that serious health problems subsequently develop.

Sharps

Injuries from needles and other sharp implements are common in veterinary medicine but are largely preventable. Although there is not the level of risk of bloodborne pathogen exposure in veterinary practice as there is in human medicine, serious outcomes can result following needlestick or other sharps injuries, including significant trauma, secondary infection and drug reaction (i.e. toxic, allergic, idiosyncratic). Proper sharps handling practices are a practical yet effective way of reducing workplace injuries in veterinary clinics. Use appropriate barriers (e.g. closed toed shoes) and safe work practices when using sharp instruments and devices (e.g. needles, scalpels, etc.), after procedures and when cleaning used instruments.

- Never remove needle caps by mouth.
- Do not bend or manipulate needles in any way.
- Do not pass uncapped needles to another person.
- Ensure proper animal restraint to reduce inadvertent needle-stick injuries from animal movement.
- Do not recap needles by hand. If recapping is required, use the “one-handed scoop” technique (see below), forceps or a needle cap holder.
- Ensure that approved point-of-use sharps disposal containers are located everywhere needles are handled. These containers are puncture-resistant, leakproof, and prevent removal (both accidental and intentional) of discarded sharps.
- Always dispose sharps immediately in an approved sharps disposal container.
- Never dispose needles or other sharps into anything other than an approved sharps container, even if they are capped or otherwise contained. This reduces the risk of accidental injury to veterinary personnel, patients, clients and non-veterinary personnel (e.g. waste disposal personnel). The most important precaution for preventing needle-stick injuries is to avoid recapping needles. Recapping needles causes more injuries than it prevents. When it is absolutely necessary to recap needles as part of a medical procedure or protocol:
 - Use a mechanical device such as forceps or hemostats to replace the cap on the needle.
 - Alternatively, the needle can be recapped using the “one-handed scoop” technique:
 - Place the cap on a flat horizontal surface.

- Holding the syringe with the attached needle, or the needle hub alone (when unattached), scoop up the cap with the needle by sliding the needle tip inside, without touching the cap with one's other hand.
- Once the point of the needle is covered, tighten the cap by pushing it against an object, or by pulling the base of the needle cap onto the hub of the needle with the same hand holding the syringe.

Recapping needles causes more injuries than it prevents.

After injecting live vaccines or aspirating body fluids or tissue, the used syringe should be placed in a sharps container with the needle attached. Following most other veterinary procedures, the needle and syringe may be separated for disposal of the needle in the sharps container. This is most safely accomplished by using the needle removal device on an approved sharps container, which allows the needle to drop directly into the container without being handled or touched.

Sharps safety for clients

Periodically, owners may be required to treat their animals at home with injectable medications (i.e. insulin, subcutaneous fluids). In these situations, it is the responsibility of the attending veterinarian to:

- Provide (and document) training on how to handle sharps, including injection and disposal practices.
- Provide an approved sharps container or give clients clear instructions regarding how to obtain one.
- Ensure that the client is able to safely handle and dispose of sharps.
- Advise clients that the sharps container should be returned to the clinic for disposal when 3/4 full, and exchanged for a new container (if necessary).

Used sharps are considered biomedical waste in veterinary practices. Dispose of used sharps containers in accordance with regulations from municipal and/or provincial/territorial authorities.

Diagnostic specimen handling

Urine from animals with suspected urinary tract disease, faeces, aspirates, and swabs should be treated as potentially infectious material. Protective outerwear (e.g. lab coat) and disposable gloves should be worn when handling these specimens. Gloves should be discarded and hands washed immediately after handling these items. Care should be taken to avoiding touching clean items (e.g., microscopes, telephones, food) while handling specimens or before glove removal. A separate refrigerator should be used for diagnostic specimens, which should be cleaned on a regular basis.

A designated area of the clinic should be used for specimen processing. This should be separate from treatment and surgery areas so as to decrease the risk of contamination of these areas. After processing a specimen, materials should be disposed of or stored properly and promptly.

- Specimen processing areas should be cleaned and disinfected immediately after use.
- Samples from animals with suspected or known infectious diseases should be disposed of as infectious waste.
- Leak-proof plastic containers should be used for specimen storage in a designated refrigerator which does not contain food, vaccines or medications of any kind.
- Contamination of the outside of sample containers should be avoided. If the outside of a container becomes contaminated, it should be cleaned and disinfected prior to storage.
 - Sharps such as microscope slides and glass pipettes should be disposed of in approved sharps containers

Dental procedures

Dental procedures often entail a significant risk of splash exposure involving saliva, blood, and bacteria-laden debris. Procedures such as ultrasonic scaling can result in aerosolization of large numbers of bacteria. There is also potential for personnel to sustain cuts and abrasions from dental equipment or teeth during dental procedures. To reduce the risk of transmission of harmful bacteria from the animal's mouth to veterinary personnel, the person performing the procedure and anyone in the immediate vicinity should wear:

- Protective outerwear (e.g. designated lab coat, designated scrubs)
- Disposable gloves
- Surgical (i.e. nose and mouth) mask
- Protective eye glasses/goggles, or a full face shield

Dental procedures should be performed in a contained area away from other patients, personnel and high traffic areas. Procedure such as bandage changes, wound care or placement of invasive devices (e.g. intravenous catheters, urinary catheters) should never be performed in close proximity to a dental procedure due to the risk of contamination by aerosolized bacteria.

Necropsies

Necropsies are high risk procedures because of potential contact with infectious body fluids, aerosols, and contaminated sharps. Non-essential persons should not be present during necropsy procedures in order to minimize exposure of personnel to these hazards. Personnel involved in or present at necropsies should wear:

- Protective outerwear (e.g. designated lab coat, designated scrubs)
- Disposable gloves
- Protective eye glasses/goggles, or a full face shield

- Rain boots

In addition, when opening the body cavities of larger animals or for any other heavy cutting, cut-proof gloves which can be washed in the laundry should be used to prevent accidental injury from necropsy blades. Additional precautions for respiratory protection (including environmental controls and face masks) should be employed if power equipment is used, since these instruments increase the amount of potentially infected material that becomes aerosolized. **In-clinic necropsies are strictly prohibited.** Instead the entire body has to be submitted to the Institute of Veterinary Pathology of the JLU Giessen or, in case of small non-mammalian animals, to the Clinic for Birds, Reptiles, Amphibians and Fish. If another diagnostic laboratory is desired, ensure that all legal requirements for shipment of biological samples are met.

Vaccination of personnel

Vaccination should be considered a final line of protection but is important for certain diseases. Decisions regarding vaccination policies should consider the risk of exposure, the severity of disease, whether the disease is treatable, the transmissibility of disease, as well as the quality and safety of the vaccine.

Rabies: Rabies vaccination is indicated for anyone who has a greater than average risk of exposure to the virus. All veterinary personnel that might have contact with animals should therefore be vaccinated against rabies except in areas that have been formally declared rabies-free (e.g. Hawaii). This includes lay staff that might have periodic animal contact, such as front office staff. Even animals that are kept indoors can be exposed to rabies by bats, and the disease may not be suspected on initial admission. Rabies vaccines for humans are generally considered safe and highly effective. In areas where rabies is endemic, rabies titres should be checked every 1-2 years to ensure that protective immunity is maintained, with re-vaccination provided as required. For additional information on rabies vaccination in people, you are pleased to contact the medical airport service (see important phone numbers, page 2).

Tetanus: Although bites and scratches are very low risk for tetanus infection, cuts and scratches from other objects or soil contamination of puncture wounds are still a risk. Therefore, tetanus vaccination is indicated in veterinary personnel. Boosters are generally administered every 10 years.

Influenza: Human influenza is a common and highly transmissible disease, even though it is not transmissible to companion animals. Infected veterinary personnel can rapidly infect their colleagues and veterinary clinics could act as sources of community infection if infected employees are present. It is reasonable for veterinary clinics to recommend annual influenza vaccination of all personnel. Employees should also be encouraged to stay home if they are ill.

**All veterinary personnel including students that might have contact with animals
should be vaccinated against rabies**

Training and education of personnel

Personnel training and education are essential components of an effective infection control programme. All personnel, including temporary lay personnel, kennel staff, students and volunteers, should receive education and training about injury prevention and infection control during their initial orientation and periodically thereafter. Additional training should be provided as recommendations change or if problems with infection control practices are identified. Training should emphasize awareness of the hazards associated with individual work duties, and prevention of zoonotic disease exposure. Staff participation in training should be documented by the infection control practitioner (ICP).

2.9 Client education

Client education is the responsibility of the entire practice team. By helping clients understand infectious and zoonotic disease risks and the basic steps they can take to protect themselves and their animals, they can live happier and healthier lives with their pets. Discussion of zoonotic disease risks should be a routine part of new pet examinations and new client visits. Client education must also occur when the veterinarian has a reasonable suspicion of a potentially infectious disease, and particularly if the disease is zoonotic. Notification of the owner to this effect must be documented in the patient's medical record. This documentation may also be very important legally, should an animal's infection result in human illness.

Items to discuss, information to provide to the client in print form, and/or information to document in the medical record may include:

- What disease is suspected or has been diagnosed
- How the disease is confirmed, if necessary
- How the disease is transmitted
- Risks to members of the household
- Risks to other in-contact individuals (e.g. elderly grandparents who live elsewhere)
- Risks to in-contact pets
- Symptoms in humans
- Clinical signs in animals
- How to prevent disease transmission from the pet to people and to other pets
- How the disease is treated in animals
- Public health enforcement issues such as quarantine, submission of tissues to labs, etc.
- Circumstances under which the client should seek medical attention, if applicable

2.10 Client visitation

Given the strong bond between owners and their pets, it is understandable when clients wish to visit their hospitalized pets. However, animals carrying transmissible infectious pathogens

pose a potential risk to other animals at the clinic and at the owner's home, as well as to the clinic employees, the owner and other household members. As a policy, clients should not be allowed to visit animals that are considered potentially infectious. Under extenuating circumstances, such as an animal whose condition is imminently life-threatening, owners may be allowed to visit their animal, but the use of proper personal protective equipment should be demonstrated to the clients and all infection control procedures should be followed, as for clinic personnel involved in the animal's care.

2.11 Clinic pets

It is common for many veterinary clinics to have resident pet animals ("clinic pets")¹. From an infection control perspective, these animals pose a potential risk for disease transmission, and from the health perspective of the clinic pet itself. Clinic animals that have free access within the clinic could be sources of pathogen transmission. Uncontrolled access to waiting room areas could result in a large number of contacts, with the corresponding potential for pathogen transmission. Although there are no objective data quantifying the risks to patients, people or clinic animals themselves, the theoretical risks and lack of a real need for clinic pets indicates a need for consideration of the cost-benefit of keeping clinic pets. Based on the potential risks, it is recommended that veterinary clinics do not keep such animals, and every attempt should be made to adopt out any existing pets.

While suboptimal from an infection control standpoint, if a clinic has a clinic pet, the following recommendations should be considered. The clinic pet should not have access to any patient treatment areas, patient housing areas, examination rooms, isolation, surgery or the patient waiting area. It should not be allowed to wander freely through the kennel/ward areas where it could cross-contaminate kennels. The animal should have a dedicated food and water bowl, litter box, toys, etc. The pet must also receive regular health checks and have an appropriate vaccination, deworming and external parasite control programme. Clinic pets, particularly cats, should not be allowed to have unsupervised outdoor access because of the higher risk of exposure to (and subsequent shedding of) pathogens such as *Salmonella* and *Toxoplasma* from hunting birds and rodents.

**From an infection control standpoint,
veterinary clinics should never have a resident "clinic pet."**

2.12 Vector control

Some important pathogens can be transmitted by wild rodents (e.g. mice, rats) or insect vectors (e.g. fleas, ticks, mosquitoes, houseflies). A few of these pests can be true carriers of certain diseases, meaning they can be infected by or incubate particular pathogens, but many of them can also be non-specific mechanical vectors that simply move microbes from one area

¹ This section does not refer to experimental animals that are indispensable for teaching, research or treatment, e.g. as blood donors

or surface to another. Pest management is an important aspect of effective prevention and control of infectious disease transmission.

Pest management practices include:

- Examination of animals upon arrival for ectoparasites such as fleas, and treatment with an adulticidal antiparasitic medication prior to admission if ectoparasites are detected.
- Storing food and garbage in metal or thick plastic containers with tight-fitting lids.
- Prompt disposal of food waste and other material (e.g. faeces) that may attract rodents or insects.
- Sealing potential pest points-of-entry into buildings. Common methods include the use of caulk, steel wool or mesh wire under doors and around pipes.
- Installation and maintenance of window screens to prevent entry of insects into buildings.
- Elimination of potential rodent nesting sites (e.g. clutter).
- Removal of standing water (e.g. empty cans, clogged gutters) outside buildings that can otherwise serve as breeding grounds for mosquitoes.

Additional measures may be warranted for the control of specific pests. Consultation with a pest control expert is recommended if a particular infestation is present, or for additional guidance and information. Further information can be provided by staff of department Dez E of the Justus Liebig University Giessen (<https://www.uni-giessen.de/org/admin/dez/e/zust/e3>).

3 Clinic design

Clinic design is critical to effectively implementing infection control measures. Unfortunately, infection control has not always been considered when designing clinics.

Commonly encountered problems include:

- High animal and personnel movement in areas where procedures are performed
- Use of flooring and kennel surfaces that are difficult or impossible to disinfect
- Inadequate (or absent) isolation facilities
- Lack of a separate area to examine or treat animals with potentially infectious diseases
- Lack of sinks in all examination rooms and treatment areas
- Lack of a separate area for diagnostic specimen processing
- Lack of a separate area for staff to store personal items and eat

In established clinics, correcting these deficiencies can be difficult or impossible, and often expensive. However, practical and cost-effective measures can often be established to improve infection control within an existing facility, e.g.:

- Place alcohol-based hand sanitizers in patient contact areas wherever sink access is inadequate.
- Provide separate refrigerators for diagnostic specimens, vaccines and medications, and food for human consumption.
- Alter personnel and animal movement patterns to reduce direct and indirect contact of relatively healthy patients with sick patients.

Infection control issues should be considered when designing new clinics or when undertaking renovation or expansion of existing clinics. An architect with experience designing veterinary clinics should be used, and infection control considerations should be emphasized. Consultation or review of preliminary plans by a veterinary infection control expert is also useful. However, critical assessment of plans with an infection control mindset can readily be performed by any veterinarian.

Special emphasis should be given to issues such as:

- Number and placement of sinks – a sink should be present in every examination and procedure room.
- Overall clinic flow from “clean to dirty”, with isolation areas well removed from other animal housing or procedure areas.
- Use of sealed flooring materials that are amenable to frequent cleaning and disinfection.
- Separation of animal procedure areas from areas where specimens (i.e. stool) are processed.
- Provision of a dedicated “personnel-only” space for breaks, food storage and consumption, and storage of personal items.

4 Notifiable diseases

Certain infectious diseases must be reported immediately to the local veterinary officer even at the time the disease is suspected but still not diagnosed. These diseases are listed in the “Verordnung über anzeigepflichtige Tierseuchen”. For further information please visit the website of the Federal Ministry of Food and Agriculture (Bundesministerium für Ernährung und Landwirtschaft, BMEL) (www.bmel.de). Every veterinary clinic should have a list of notifiable and reportable diseases prominently displayed in an area easily accessible to clinic personnel. The clinic’s Infection Control Manual should clearly state the required reporting procedures, including contact numbers for the appropriate veterinary and/or public health authorities.

5 References and suggested reading

- Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (2012). Technische Regeln für Biologische Arbeitsstoffe: Grundlegende Maßnahmen bei Tätigkeiten mit biologischen Arbeitsstoffen (TRBA 500).
- Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (2018). Technische Regeln für Biologische Arbeitsstoffe: Schutzmaßnahmen für gezielte und nicht gezielte Tätigkeiten mit biologischen Arbeitsstoffen in Laboratorien (TRBA 100).
- Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (2018). Technische Regeln für Biologische Arbeitsstoffe: Biologische Arbeitsstoffe im Gesundheitswesen und in der Wohlfahrtspflege (TRBA 250).
- Canadian Committee on Antibiotic Resistance (2008). Infection Prevention and Control - Best Practice www.ccar-ccra.org (zuletzt besucht am 04.03.2021)
- Deutsche Gesetzliche Unfallversicherung (2006). Desinfektionsarbeiten im Gesundheitsdienst (DGUV Regel 107-002; vormals BGR 206)
- Deutsche Gesetzliche Unfallversicherung (2006). Reinigungsarbeiten mit Infektionsgefahr in medizinischen Bereichen (DGUV Regel 101-017; vormals BGR 208)
- Kassenärztliche Vereinigung Saarland (2021). Muster-Hygieneplan. <https://www.kvsaarland.de/documents/10184/480547/Muster-Hygieneplan/459235ef-9a9e-4c82-8d0b-4731131bbc45?version=1.1&targetExtension=pdf> (zuletzt besucht am 04.03.2021)
- RKI (2016). Händehygiene in Einrichtungen des Gesundheitswesens. Empfehlung der Kommission für Krankenhaushygiene und Infektionsprävention (KRINKO) beim Robert Koch-Institut (RKI). Bundesgesundheitsblatt 59:1189–1220.
- RKI (2017). Liste der vom Robert Koch-Institut geprüften und anerkannten Desinfektionsmittel und –verfahren; Stand 31. Oktober 2017 (17. Ausgabe). Bundesgesundheitsblatt 60: 1274 – 1297. (<https://doi.org/10.1007/s00103-017-2634-6>).

6 Annexe

Annex 1 Relative Tenacity of Pathogens to Biocides

Relative tenacity	Type of infectious agent
Very susceptible	Enveloped viruses Some protozoa Some Gram-positive bacteria (e.g. <i>Streptococcus</i> spp.)
Susceptible	Some Gram-positive bacteria (e.g. <i>Staphylococcus</i> spp.) Gram-negative bacteria (e.g. <i>Salmonella</i> spp.) Yeasts (e.g. <i>Candida</i> spp.) Moulds (e.g. <i>Trichophyton</i> spp.)
Resistant	Non-enveloped viruses (e.g. Parvoviruses) Protozoal cysts (e.g. <i>Giardia</i> spp.) Acid-fast bacteria (e.g. <i>Mycobacterium</i> spp.)
Very resistant	Coccidia (e.g. <i>Cryptosporidium</i> spp.) Bacterial spores (e.g. spores of <i>Clostridium</i> spp.)
Extremely resistant	Prions

Annex 2 Wirksamkeitsspektren von Desinfektionsmitteln

Tabelle 1: Wirksamkeitsspektrum, pH-Abhängigkeit und Milieueinfluss der wichtigsten Desinfektionswirkstoffe (nach Wallhäußer, K.H., Praxis der Sterilisation-Desinfektion-Konservierung, Georg Thieme-Verlag, 1996; modifiziert und ergänzt)

Desinfektionsmittel	Reaktionsgeschwindigkeit	optimaler pH-Bereich									Wirkungsspektrum						Beeinflussung durch das Milieu	
											Bakteriengram-positive		Pilze					
		2	3	4	5	6	7	8	9	10	Sporen	vegetative Formen	Mykobakterien	gramneg. Bakterien	Hefen	Schimmelpilze	Viren	
Peressigsäure	S																	stark
Chlor (Na-Hypochlorit)	S																	stark
Chlorabspalter	S																	stark
Jod	S																	stark
Formaldehyd	L																	stark
Formaldehydabspalter	LL																	stark
Glutaraldehyd	S																	stark
Phenol und Derivate	S										—							gering
Alkohole*	S										—							gering
quartäre Verbindungen	L										—		—					stark
Guanidine	S										—		—					stark
amphotere Verbindungen	L										—							mäßig
Organische Säuren	S										—		—					stark

 gute Wirksamkeit, abnehmend
 nur noch schwache Wirkung
 gute Wirksamkeit
 mäßig wirksam
 unwirksam
 selektiv wirksam
 S = schnell wirksam, L = langsam wirksam, LL = sehr langsam wirksam

Quelle: Empfehlungen des Friedrich-Loeffler-Instituts über Mittel und Verfahren für die Durchführung einer tierseuchenrechtlich vorgeschriebenen Desinfektion“, Stand: 29.07.2020, <https://desinfektions-rl.fli.de/de/home>

Annex 3 Recommended Disinfectants and Cleaning & Disinfection Procedures

Approved and listed disinfectants are recommended only.

Field of application	Recommended disinfectants
Surface disinfection Veterinary Institutes	Approved disinfectants according to the guidelines – of the DVG, Part “Veterinary Practice and Animal Shelter” (http://www.dvg.net/index.php?id=169) – of the RKI (https://doi.org/10.1007/s00103-017-2634-6)
Surface disinfection Small Animal Clinics	Approved disinfectants according to the guideline of the DVD, Part “Veterinary Practice and Animal Shelter” (https://www.desinfektion-dvg.de/index.php?id=2151)
Surface disinfection Large Animal Clinics	Approved disinfectants according to the guidelines of the DVD, Part “Animal Holding” (https://www.desinfektion-dvg.de/index.php?id=2150)
Hand sanitizers	Approved disinfectants according to the guidelines – of the VAH, Part “Disinfection of Hands” (https://vah-liste.mhp-verlag.de/) – of the RKI (https://doi.org/10.1007/s00103-017-2634-6)
Laundry	Approved disinfectants according to the guidelines – of the VAH, Part “Disinfection of Laundry” (http://www.vah-online.de) – of the RKI (https://doi.org/10.1007/s00103-017-2634-6)

Abkürzungen:

DVG: Deutsche Veterinärmedizinische Gesellschaft e.V.
RKI: Robert Koch-Institute, Berlin
VAH: Verbund für angewandte Hygiene e.V.

For cleaning and disinfection procedures in veterinary fields of application, particularly in case of an outbreak of a notifiable disease, see also

“Empfehlungen des Friedrich-Loeffler-Instituts über Mittel und Verfahren für die Durchführung einer tierseuchenrechtlich vorgeschriebenen Desinfektion”

<https://desinfektions-rl.fli.de/de/home>

Annex 4 Grundsätze der Händehygiene: Vermeidung der Keimübertragungen durch die Hände

Ausgangssituation	Empfohlene Maßnahme
Reduktion der Abgabe von transienten Mikroorganismen	
Hände sind noch sauber	Hände sauber halten Arbeiten mit <i>non touch</i> -Technik
Hände sind normal kontaminiert	Hände waschen
Hände sind (wahrscheinlich) mit Pathogenen kontaminiert	Hygienische Händedesinfektion
Berührung von Risikomaterial	Hygienische Händedesinfektion
Reduktion der Abgabe von transienten und residenten Mikroorganismen	
Operateur/Assistent vor einem chirurgischen Eingriff	chirurgische Händedesinfektion und sterile Einmalhandschuhe
Pflegender vor der Patientenpflege	hygienische Händedesinfektion und sterile Einmalhandschuhe
Besiedlung der Hände mit Pathogenen	Therapie und desinfizierende Händewaschung und sterile Einmalhandschuhe
Verhütung der Infektionsübertragung aus infizierten Handläsionen	
Infizierte Läsion an den Händen	– Verbot von chirurgischen Aktivitäten – Verbot von Tätigkeiten mit Risiko der Keimübertragung auf Tiere oder andere Personen

(Quelle: W. Herbst, 2011, modifiziert)

Annex 5 Procedure of Hygienic Hand Disinfection

HOW TO CARRY OUT A CORRECT AND THOROUGH HAND WASH AND DISINFECTION

Wash the hands for at least 15 seconds. Disinfect the hands for at least 30 seconds.



1:
Damp hands and wrists
with water and soap or with
2 ml hand disinfection.



2:
Palm against palm.



3:
Right palm above the left back
of the hand and left palm above
the right back of the hand.



4:
Palm against palm with
interlaced fingers.



5:
The back of the fingers against
the opposite palm with the fingers
gripping each other.



6:
Rotating wash of the right
thumb with left palm
and opposite.



7:
Rotating wash of right palm
with left hand fingers closed
and opposite.



8:
Rotating wash of both
wrists.

Source: https://plum.eu/images/Viden_Om/UK/CorrecthandwashUK.pdf, March 10, 2021

Annex 6 Mustervorlage Hautschutzplan der JLU Gießen

Hautschutz- und Händehygieneplan

Für daspersonal der Justus-Liebig-Universität Gießen

Was Maßnahme	Wann Indikation	Wie Durchführung	Womit Produkt
Hautschutz 	- vor Arbeitsbeginn - nach Pausen - vor Feuchtarbeiten	- Schmuck an Händen und Unterarmen ablegen - Hautschutzcreme gründlich in die Hände einmassieren	Hautschutzcreme: bei wasserlöslichen Stoffen: bei wasserunlöslichen Stoffen:
Handschuhe 	Siehe Betriebsanweisung, Hygieneplan Arbeits-, Verfahrensanweisungen „Händehygiene“, etc.	Siehe Betriebsanweisung, Hygieneplan Arbeits-, Verfahrensanweisungen „Händehygiene“, etc.	Siehe Betriebsanweisung, Hygieneplan Arbeits-, Verfahrensanweisungen „Händehygiene“, etc. unter Handschuhen:
Händedesinfektion 	Siehe Betriebsanweisung, Hygieneplan Arbeits-, Verfahrensanweisungen „Händehygiene“, etc.	Siehe Betriebsanweisung, Hygieneplan Arbeits-, Verfahrensanweisungen „Händehygiene“, etc.	Händedesinfektionsmittel: Entsprechend Hygieneplan
Händereinigung 	- vor Arbeitsbeginn - bei sichtbarer Verschmutzung entsprechend Hygieneplan	- Händewaschen auf ein Minimum beschränken - Waschlotion aus dem Spender auf den feuchten Händen aufschäumen - gut mit Wasser abspülen - Hände gründlich abtrocknen	Normale Waschlotion bei mittlerer Verschmutzung: bei starker Verschmutzung:
Händepflege 	- nach jedem Händewaschen - zwischendurch bei Bedarf - am Arbeitsende	- Pflegeprodukt gründlich in beide Hände einmassieren	Pflegelotion oder Pflegecreme z.B.

AG – Hautschutz, B 3.2/ B 3.1 Stand April 2009

Quelle: https://www.uni-giessen.de/org/admin/dez/b/sonst_jlu_intern/hautschutzplan-muster100318.doc/view, March 10, 2021

Annex 7 Chemothermische Wäschedesinfektion

Wenn Infektionskrankheiten vorliegen, können die Erreger von den Patienten auch auf die Berufskleidung übertragen werden. Gebrauchte Berufskleidung und Schutzkleidung aus den Tierkliniken ² ist daher grundsätzlich als kontaminiert einzustufen und einem chemothermischen Waschverfahren zu unterziehen.

Problematisch ist im Allgemeinen das Einsammeln und Transportieren der gebrauchten Wäsche. Gebrauchte Wäsche muss deshalb unmittelbar und ohne Zwischenlagerung in dazu aufgestellte Wäschesammler entsorgt werden. Wäschesammler sind Stoffwickelsäcke, die in fahrbare Gestelle eingehängt sind. Die Wäschesammler sind nach dem Befüllen ausschließlich mit den Verschlüssen, die von der Wäscherei vorgegeben sind, dicht zu verschließen.

Gebrauchte Wäsche muss mindestens einmal täglich vom Stations- bzw. Funktionsbereich durch den hausinternen Hol- und Bringedienst oder andere beauftragte Personen abgeholt und zum Wäschesammelpunkt transportiert werden. Die Wäschesammler sind dabei stets in geschlossenen Behältern zu transportieren.

Weiterhin ist zu beachten:

1. Mitarbeiter*innen und Patientenbesitzer dürfen keine persönliche Wäsche in die zentrale Wäscherei geben.
2. Bevor die Mitarbeiter*innen die Wäsche in den Wäschesammler geben, müssen sie gewissenhaft alle Fremdkörper entfernen, wie Papiertaschentücher, Kugelschreiber, Schlüssel, medizinische Schutzmasken und Ähnliches.
3. Nach dem Einsammeln darf die gebrauchte Wäsche nicht mehr sortiert werden, da die damit verbundene Infektions- und Verletzungsgefahr zu hoch ist.
4. Auch Säcke, die nicht ganz voll sind, müssen bei Betriebsende in geschlossene Behälter gegeben werden.
5. Frischwäsche ist nach der Anlieferung sofort aus dem geschlossenen Behälter zu entnehmen.
6. Die Behälter dürfen nicht als Zwischenlager verwendet werden.

Bei der Waschung der Kleidung sind Waschmittel zu verwenden, die nach den Richtlinien des VAH geprüft und für wirksam befunden wurden (siehe **Annex 2**). Waschtemperatur, Waschmittelkonzentration, Waschkdauer und Flottenverhältnis sind den Gebrauchshinweisen der VAH-gelisteten Waschmittel oder der VAH-Liste oder der RKI-Liste ³ zu entnehmen.

In besonderen Fällen, ist es sinnvoll, die Wäsche bereits vor Ort chemothermisch zu desinfizieren oder einem anderen Dekontaminationsverfahren zu unterziehen, bevor sie zum Wäschesammelpunkt des Fachbereichs gegeben wird, z.B. bei Schutzkleidung aus gentechnischen Labors der Sicherheitsstufe 2 oder höher oder bei konkretem Verdacht der Wäsche-kontamination mit dem Erreger einer anzeigepflichtigen Tierseuche oder mit einem human-pathogenen Erreger.

² Wäsche aus Instituten, in denen klinische Proben oder pathogene Mikroorganismen bearbeitet werden, ist Klinikwäsche gleichzusetzen.

³ RKI (2017). Liste der vom Robert Koch-Institut geprüften und anerkannten Desinfektionsmittel und -verfahren; Stand 31. Oktober 2017 (17. Ausgabe). Bundesgesundheitsblatt 60: 1274 – 1297 (<https://doi.org/10.1007/s00103-017-2634-6>)

Annex 8 Dampfsterilisation

Definition:

Unter der Dampfsterilisation versteht man das Sterilisieren von Materialien mit reinem, gesättigtem Wasserdampf. Dieser Dampf muss für die Einwirkung auf den Oberflächen des Sterilisiergutes mindestens eine Temperatur von 121 °C erreicht haben. Die Dampfsterilisation ist in den Bereichen der Medizin, Veterinärmedizin und Mikrobiologie (inkl. Virologie und Parasitologie) das sicherste Verfahren. Daher sollte sie gegenüber allen anderen Sterilisationsverfahren bevorzugt werden.

Wenn das Sterilisationsgut porös ist (z. B. Textilien), muss es vollständig entlüftet werden, damit es der Dampf vollständig durchdringen kann.

Einwirkzeit:

- Bei einer Temperatur von 121 °C beträgt die Einwirkzeit mindestens 15 Minuten.
- Bei einer Temperatur von 134 °C beträgt die Einwirkzeit mindestens 3 Minuten.

Von dieser Vorgabe nach DIN EN 285 und DIN 58951 kann nur abgewichen werden, wenn vorher eine Validierung stattgefunden hat.

Fehlerquellen:

Damit die Luft aus Kammer und Sterilisationsgut vollständig entfernt wird und eine gleichmäßige Dampfdurchdringung stattfinden kann, setzt man heute fraktionierte Vakuumverfahren ein. Die Wirksamkeit der Dampfsterilisation kann durch mangelhafte Dampfqualität (nicht kondensierbare Gase, überhitzter Dampf, Nassdampf) sowie mangelhafte Entlüftung, Leckagen und Luftinseln beeinträchtigt werden.

Folgendes ist zu beachten:

- Mängel, die nur hin und wieder auftreten, werden zuverlässiger durch chargenbezogene als durch periodische Kontrollen entdeckt.
- Es ist durch Kondensierung des Sterilisiergutes im Sterilisator sicherzustellen, dass die Sterilisation durch Kondensatbildung nicht beeinträchtigt wird. Wenn das Sterilisiergut richtig verpackt ist und die Sterilisierkammer sachgerecht behandelt wurde, darf das Sterilgut bei der Entnahme aus dem Gerät auf keinen Fall feucht oder nass sein. Ansonsten kann es nicht mehr verwendet werden.
- Bei Krankenhäusern werden Mischprogramme empfohlen, die sowohl auf Instrumente als auch auf Textilien angewendet werden. Die Vorgaben der DIN EN 554 sind dabei zu beachten.
- Einzelne Instrumente, die während des Eingriffes unsteril geworden sind, aber sofort wieder benötigt werden, können dezentral bei einer Temperatur von 134 °C in der Verpackung sterilisiert werden. Es besteht jedoch die folgende Ausnahme: Wenn bei Patienten der Verdacht besteht, dass sie an einer Form der Spongiformen Enzephalopathie (Mensch: Creutzfeld-Jakob-Krankheit) leiden, können die Instrumente auf keinen Fall mehr wiederverwendet werden – es sei denn, sie werden einem speziellen Verfahren unterzogen: Dampfsterilisation bei 134 °C über mind. 60 Minuten. Wenn dieser Vorgang nicht möglich ist, kann man sie zunächst mit 1 molarer Natronlauge oder 2,5 bis 5 %iger Natriumhypochloridlösung über 24 Stunden chemisch desinfizieren. Anschließend muss dann eine Dampfsterilisation bei einer Temperatur von 134 °C mit üblicher Einwirkungszeit durchgeführt werden.

Annex 9 Mustervorlage Hygieneplan

JUSTUS-LIEBIG- UNIVERSITÄT GIESSEN	Fachbereich 10 – Veterinärmedizin	Hygieneplan
Institut/Klinik/Professur für Frankfurter Straße, 35392 Gießen (Name und Anschrift der Einrichtung) Erstellt am: ... Bearbeitet von: ... Letzte Änderung am: ... Verantwortlicher: ...		

INHALTSVERZEICHNIS

1. Personalhygiene nn
2. Flächenreinigung und –desinfektion nn
3. Instrumentenaufbereitung nn
4. Wäscheaufbereitung nn
5. Hygienemaßnahmen bei der Diagnostik, Pflege und Therapie nn
6. Hygienemaßnahmen bei der Abfallentsorgung nn

1. Personalhygiene

HÄNDEHYGIENE

WAS?	WANN?	WIE?	WOMIT?	WER?
Händewaschung	– vor Arbeitsbeginn / nach Arbeitsende – nach Verschmutzung	Hände nass machen und Waschlotion aus dem Wandspender entnehmen. Waschlotion auf den gesamten Handflächen gründlich einreiben, unter fließendem Wasser gründlich abspülen. Hände mit Einmalhandtuch abtrocknen.	Waschlotion, siehe auch Annex 4 .	Alle Personen
Hygienische Händedesinfektion	– vor Arbeitsbeginn / nach Arbeitsende – vor / nach jedem Patientenkontakt – vor Anlegen einer Infusion – vor Injektionen – nach Berühren von (mutmaßlich) kontaminiertem Material – nach Toilettenbenutzung	3 – 5 ml Händedesinfektionsmittel in die hohle Hand geben (i.d.R. 2 Hübe aus dem Wandspender) und für mindestens 30 Sek. in die trockenen Hände einreiben. Besondere Beachtung ist den Fingerzwischenräumen und den Fingerkuppen zu schenken. Die Hände sind währenddessen feucht zu halten.	Alkoholische Händedesinfektionsmittel gemäß VAH-Liste. Siehe auch Annexe 3, 4 und 5 .	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal
Hygienische Händedesinfektion	– bei sichtbarer Kontamination	Wurden die Hände sichtbar oder merklich mit keimhaltigem Material (Eiter, Sputum, Stuhl, Exudat u. ä.) kontaminiert, so sind die beschmutzten Stellen mit einem mit Desinfektionsmittel getränkten Einmaltuch zu reinigen. Anschließend erfolgt eine hygienische Händedesinfektion (siehe oben). Hiernach können die Hände gewaschen werden. Es schließt sich eine weitere hygienische Händedesinfektion an.	Alkoholische Händedesinfektionsmittel gemäß VAH-Liste. Siehe auch Annexe 3, 4 und 5 .	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal

Hygieneplan	Institut/Klinik/Professur für	Stand 04.03.2021	Seite 57 von 72 Seiten
--------------------	-------------------------------------	------------------	------------------------

WAS?	WANN?	WIE?	WOMIT?	WER?
Chirurgische Händedesinfektion	– vor chirurgischen Eingriffen – vor Punktionen in Organe und Körperhöhlen	Hände und Unterarme mind. 10 min vor der Desinfektion waschen (siehe auch Abschnitt 1). Dazu Hände und Unterarme bis zu den Ellenbogen mit nach oben gerichteten Fingerspitzen und tief liegenden Ellenbogen über etwa 30–60 s mit einem Handwaschpräparat bearbeiten. Danach die Haut sorgfältig abtrocknen. 3 – 5 ml Händedesinfektionsmittel (HDM) in die hohle Hand geben (i.d.R. 2 Hübe aus dem Wandspender) und zunächst auf den Händen (10 sec), dann auf den Unterarmen (10 sec) lückenlos verteilen. Dann die Hände mittels Einreibetechnik desinfizieren (70 sec). Hauptaugenmerk: Fingerkuppen, Nagelfalze, Fingerzwischenräume. Alle Hautareale müssen mit dem HDM für die Dauer der deklarierten Einwirkungszeit (mind. 1,5 min) benetzt bleiben. Falls erforderlich, muss man dem Spender weiteres HDM entnehmen Danach Hände lufttrocken lassen (1 min).	Alkoholische Händedesinfektionsmittel gemäß VAH-Liste. Siehe auch Annex 3 und 4.	Wiss. Personal, med.-technisches Personal, Studierende
Haut- und Handpflege	– mehrmals täglich – nach Arbeitsende	Hautpflegemittel aus dem Spender entnehmen und in die Haut gleichmäßig einmassieren. Hautpflegemittel aus einem, von allen Beschäftigten gemeinsam benutzten Behälter ohne Dosiereinrichtung sind ungeeignet. Geeignet sind z. B. Tuben oder Direktspender.	Handcreme, Pflegeemulsion. Siehe auch Hautschutzplan. Siehe auch Annex 6.	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal
Haare, Fingernägel	– täglich – bei Bedarf	Lange Haare sind zusammenzubinden und evtl. hochzustecken. Die Länge der Fingernägel darf die Fingerkuppen nicht überragen. Nagellack ist nicht zulässig.		Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal

PERSONALSCHUTZ

WAS?	WANN?	WIE?	WOMIT?	WER?
Berufskleidung	Während des Dienstes ist Berufskleidung zu tragen.	Die Einrichtung wird ausschließlich in privater Kleidung betreten und verlassen. Die Berufskleidung muss geschlossen getragen werden und die Privatkleidung vollständig bedecken. Die Privatkleidung ist getrennt von der Berufskleidung aufzubewahren. Die Berufskleidung ist wöchentlich sowie bei Kontamination / Verschmutzung zu wechseln. Über der Berufskleidung kann eine Schutzkleidung getragen werden. Unmittelbar nach dem Ablegen von Berufskleidung, z.B. nach Dienstende, sind die Hände hygienisch zu desinfizieren.	Hemden, Shirts, Kasacks, Hosen. Chemothermische Wäschedesinfektion. Siehe auch Annex 7 .	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal
Schutzkleidung	Schutzkleidung ist zu tragen, – bei allen Arbeiten, bei denen mit einer mikrobiellen Kontamination oder Keimverschleppung zu rechnen ist. – bei Kontakt zu Patienten. – bei Schmutzarbeiten – bei Bedarf	Die Schutzkleidung, z.B. in Form eine Schutzkittels, ist über der Berufskleidung oder über der Privatkleidung zu tragen. Die Schutzkleidung muss geschlossen getragen werden, die Kleidung darunter muss bis unterhalb der Knie vollständig bedeckt sein. Die Schutzkleidung ist täglich sowie bei Kontamination / Verschmutzung zu wechseln. Die Schutzkleidung ist abzulegen – vor dem Betreten der Aufenthaltsräume bzw. vor dem Essen und Trinken, – vor dem Verlassen der Einrichtung.	Schutzkittel Chemothermische Wäschedesinfektion, ggf. vorherige Dampfsterilisation. Siehe Annexe 7 und 8 .	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal
Einmalschürzen	– bei Arbeiten mit besonderem Risiko der Verschmutzung oder Kontamination – bei Schmutzarbeiten	Bei bestimmten Arbeiten ist über der Berufskleidung und/oder über der Schutzkleidung eine Einmalschürze zu tragen, z. B. wenn mit dem Verspritzen von Blut, Körperflüssigkeiten, Ausscheidungen oder kontaminiertem Material zu rechnen ist. Einmalschürzen sind abzulegen – vor dem Betreten der Aufenthaltsräume bzw. vor dem Essen und Trinken, – vor dem Verlassen der Einrichtung.	Einmalschürzen. Unschädliche Entsorgung mit dem infektiösen Abfall.	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal

Hygieneplan	Institut/Klinik/Professur für	Stand 04.03.2021	Seite 59 von 72 Seiten
--------------------	-------------------------------------	------------------	------------------------

WAS?	WANN?	WIE?	WOMIT?	WER?
Röntgenschürzen	– nach jedem Patientenkontakt	Wischdesinfektion: mit einem mit Desinfektionsmittel getränkten Einmaltuch abwischen.	Flächendesinfektionsmittel gemäß VAH-Liste (siehe Annex 3).	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen
Einmalhandschuhe	– bei Infektionsgefahr – bei Schmutzarbeiten	Einmalhandschuhe sind zu tragen: – bei allen Arbeiten, bei denen eine Berührung mit Blut, Blutbestandteilen, Körperflüssigkeiten oder Ausscheidungen möglich ist, – bei invasiven Maßnahmen zur Diagnostik oder Therapie (z.B. Katheterisierung, Drainagen), – bei der Berührung der Schleimhaut, von nässenden oder blutenden Hautveränderungen, von Wunden. – Bei Kontakt mit Patienten, von denen Infektionen ausgehen können. Die Einmalhandschuhe sind nach Gebrauch bzw. nach dem Kontakt zu einem Patienten sofort wegzuwerfen. Das Tragen von Einmalhandschuhen entbindet nicht von der Pflicht einer hygienischen Händedesinfektion. Einmalhandschuhe dürfen nicht wiederverwendet werden.	Nicht-gepuderte Einmalhandschuhe Unschädlich entsorgen mit dem infektiösen Abfall.	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal
Schutzhandschuhe	– bei Reinigungs- bzw. Schmutzarbeiten	Beim Umgang mit Reinigungs- und Desinfektionsmitteln, v.a. mit den Stammlösungen, sind geeignete Schutzhandschuhe zu tragen. Die Schutzhandschuhe sind nach Gebrauch sofort zu reinigen und zu trocknen. Schutzhandschuhe sind alle 8 Wochen bzw. bei Beschädigung sofort gegen neue Handschuhe auszutauschen.	Flüssigkeitsdichte Gummi- oder Kunststoffhandschuhe Desinfektionsmittel gemäß VAH-Liste, (siehe Annex 3)	Wiss. Personal, med.-technisches Personal, Tierpfleger*innen, Reinigungspersonal

Hygieneplan	Institut/Klinik/Professur für	Stand 04.03.2021	Seite 60 von 72 Seiten
--------------------	-------------------------------------	------------------	------------------------

WAS?	WANN?	WIE?	WOMIT?	WER?
Mund-/Nasenschutz, Schutzbrille	– bei Kontakt zu bestimmten Patienten – bei invasiven Eingriffen	Ein Mund-/Nasenschutz sowie ggf. eine Schutzbrille sind korrekt zu tragen, – wenn mit Aerosolbildung oder Verspritzen von Blut, Körperflüssigkeiten, Ausscheidungen oder kontaminiertem Material zu rechnen ist, – bei Patienten, von denen Infektionen ausgehen können, – bei Patienten, die vor Infektionen besonders geschützt werden müssen. Die Maske muss Mund und Nase stets vollständig bedecken. Sie muss bei länger dauernden Eingriffen sowie bei Durchfeuchtung oder Verschmutzung gewechselt und sofort entsorgt werden. Anschließend sind die Hände zu desinfizieren.	Medizinische Maske (OP-Maske oder FFP2-Maske ohne Ventil)	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal, Besucher*innen
Schuhe	– täglich – nach Verschmutzung	Während der Tätigkeiten in der Klinik, in Ställen oder im Labor sind geeignete Berufs- oder Arbeitsschuhe mit folgenden Eigenschaften zu tragen: – vorderer Bereich geschlossen, – Fersenhalt rutschhemmend, – desinfizierbar. Wischdesinfektion: mit einem mit Desinfektionsmittel getränkten Einmaltuch abwischen.	Flächendesinfektionsmittel gemäß DVG-Liste, (siehe Annex 3)	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal
Schmuck und Uhren	– während jeglicher Tätigkeiten in der Klinik, in den Ställen oder im Labor	Während der Tätigkeiten in der Klinik, in den Ställen oder im Labor dürfen an den Händen und Unterarmen keine Schmuckstücke (inkl. Eheringe, Freundschaftsbändchen) und Uhren getragen werden. Die Gegenstände sind vorher abzulegen und diebstahlsicher aufzubewahren.		Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen, Reinigungspersonal
Essen, trinken, rauchen, schminken, u.ä.	– grundsätzlich	Essen, trinken, schminken, hantieren mit Kontaktlinsen und dergl. ist nur in den Aufenthaltsräumen und Büros ohne Publikumsverkehr gestattet. Lebensmittel und Getränke dürfen nur dort aufbewahrt werden. Rauchen ist nur an den dazu ausgewiesenen Raucherplätzen gestattet.		Alle Personen

2. Flächenreinigung und -desinfektion

WAS?	WANN?	WIE?	WOMIT?	WER?
Tischoberflächen, Untersuchungs- und Behandlungstische	– nach jedem Patienten – bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort	Scheuer-Wisch-Reinigung und -Desinfektion	Flächendesinfektionsmittel gemäß DVG-Listen oder VAH-Liste, (siehe Annex 3)	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen
Tischoberflächen, Arbeitstische	– mindestens arbeitstäglich (nach Arbeitsende) – bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort	Scheuer-Wisch-Reinigung und -Desinfektion		
OP-Tisch, OP-Einrichtung	– nach jeder OP – mindestens arbeitstäglich (nach Arbeitsende)	Scheuer-Wisch-Reinigung und -Desinfektion		
Möbeloberflächen	– 1 x/Monat – bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort	Feucht abwischen; ggf. Scheuer-Wisch-Desinfektion	Haushaltsreiniger, ggf. Flächendesinfektionsmittel gemäß DVG-Listen oder VAH-Liste, (siehe Annex 3)	Reinigungspersonal
Medizinische Geräte und Monitore	– sofort nach Gebrauch – bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort – mindestens 1 x/Woche	Vorsicht bei stromführenden Teilen! Zuerst Netzstecker ziehen! Feuchte Wisch-Desinfektion. Dabei darf keine Flüssigkeit in das Geräteinnere eindringen.	(Alkoholische) Flächendesinfektionsmittel gemäß VAH-Liste, (siehe Annex 3)	Med.-technisches Personal, Reinigungspersonal
Fußböden, glatt	– Reinigung arbeitstäglich – Reinigung und Desinfektion jeden dritten Arbeitstag – bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort	Scheuer-Wisch-Reinigung und -Desinfektion	Haushaltsreiniger bzw. Flächendesinfektionsmittel gemäß DVG-Listen oder VAH-Liste, (siehe Annex 3)	Reinigungspersonal

Hygieneplan	Institut/Klinik/Professur für	Stand 04.03.2021	Seite 62 von 72 Seiten
--------------------	-------------------------------------	------------------	------------------------

WAS?	WANN?	WIE?	WOMIT?	WER?
Fußböden, textil	– Reinigung arbeitstäglich – bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort	Saugen; ggf. Scheuer-Wisch-Desinfektion	Staubsauger, ggf. Flächen-desinfektionsmittel gemäß DVG-Listen oder VAH-Liste, (siehe Annex 3)	Reinigungspersonal
Lichtleisten, Versorgungsräume	– Reinigung 1x / Monat – bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort	Scheuer-Wisch-Reinigung; ggf. Scheuer-Wisch-Desinfektion	Haushaltsreiniger, ggf. Flächen-desinfektionsmittel gemäß DVG-Listen oder VAH-Liste, (siehe Annex 3)	Reinigungspersonal bzw. Vet.med. Personal
Wände, Decke	– bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort	Scheuer-Wisch-Reinigung; ggf. Scheuer-Wisch-Desinfektion	Haushaltsreiniger, ggf. Flächen-desinfektionsmittel gemäß DVG-Listen oder VAH-Liste, (siehe Annex 3)	Vet.med. Personal, Reinigungspersonal
Personal- und Besuchertoiletten	– Reinigung arbeitstäglich – Reinigung und Desinfektion jeden dritten Arbeitstag – bei sichtbarer Verschmutzung sofort	Scheuer-Wisch-Reinigung und -Desinfektion	Haushaltsreiniger bzw. Flächen-desinfektionsmittel gemäß DVG-Listen oder VAH-Liste, (siehe Annex 3)	Reinigungspersonal
Hundebox und dergl.	– Reinigung arbeitstäglich – Reinigung und Desinfektion nach jedem Patienten – bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort	Scheuer-Wisch-Reinigung; ggf. Scheuerwisch-Desinfektion	Haushaltsreiniger, ggf. Flächen-desinfektionsmittel gemäß DVG-Listen oder VAH-Liste, (siehe Annex 3)	Tierpfleger*innen
Sonstige Flächen	– bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort	Scheuer-Wisch-Reinigung; ggf. Scheuerwisch-Desinfektion	Haushaltsreiniger, ggf. Flächen-desinfektionsmittel gemäß DVG-Listen oder VAH-Liste, (siehe Annex 3)	Wiss. Personal, med.-technisches Personal, Studierende, Tierpfleger*innen

3. Instrumentenaufbereitung

MANUELL

WAS?	WANN?	WIE?	WOMIT?	WER?
Stethoskop, EKG-Elektroden, Thermometer	– mindestens arbeitstäglich (nach Arbeitsende) – bei Kontaminationsverdacht oder sichtbarer Verschmutzung sofort – nach Kontakt zu infektiösen Patienten sofort	Scheuer-Wisch-Reinigung und –Desinfektion oder Einlegen in Desinfektionsmittel	Desinfektionsmittel gemäß VAH-Liste, Rubrik Instrumentendesinfektion, (siehe Annex 3)	Wiss. Personal, med.-technisches Personal, Studierende
Gummi- und Kunststoffteile (Mehrweg-)	– nach Gebrauch	Gebrauchte Teile nur mit Handschuhen anfassen und in Desinfektionsmittelwanne mit Siebeinsatz und Deckel einlegen. Mindesteinwirkzeit beachten.	Desinfektionsmittel gemäß VAH-Liste, Rubrik Instrumentendesinfektion, (siehe Annex 3)	med.-technisches Personal, Studierende
Sonstige Instrumente desinfizieren	– nach Gebrauch	Gebrauchte Instrumente nur mit Handschuhen anfassen und in Desinfektionsmittelwanne mit Siebeinsatz und Deckel einlegen. Mindesteinwirkzeit beachten.	Desinfektionsmittel gemäß VAH-Liste, Rubrik Instrumentendesinfektion, (siehe Annex 3)	
Sonstige Instrumente manuell reinigen	– nach Ende der chemischen Desinfektion (s.o.)	Bürsten und spülen.	Kunststoffbürste oder –schwamm (keine Metallbürsten), Reinigungspistole	
Sonstige Instrumente reinigen mit Ultraschall	– nach Ende der chemischen Desinfektion (s.o.) – oder direkt nach Gebrauch, wenn das Ultraschallbad mit Desinfektionsmittel gefüllt ist	In Ultraschallbad mit Reinigungslösung oder (kombinierter) Desinfektionsmittellösung beschallen.	Ultraschallbecken, Reinigungsmittel oder Desinfektionsmittel gemäß VAH-Liste, Rubrik Instrumentendesinfektion, (siehe Annex 3)	
Sonstige Instrumente spülen	– nach der manuellen Reinigung – nach dem Ultraschallbad	Gründlich abspülen.	Demineralisiertes Wasser	

Hygieneplan	Institut/Klinik/Professur für	Stand 04.03.2021	Seite 64 von 72 Seiten
--------------------	-------------------------------------	------------------	------------------------

WAS?	WANN?	WIE?	WOMIT?	WER?
Sonstige Instrumente trocknen	– nach dem Spülen	Von außen mit Druckluft anblasen oder mit keimarmen, sauberen Tüchern abreiben. Hohlinstrumente mit Druckluft durchblasen.	Druckluftpistole, keimarme Einmaltücher	
Sonstige Instrumente aufbewahren und sterilisieren	– nach vollständiger Trocknung	Hände hygienische desinfizieren und Instrumente in kontaminationsgeschützte Behälter legen. Ggf. der Sterilisation zuführen.	Kontaminationsgeschützte Behälter	med.-technisches Personal, Studierende
Gummi- und Kunststoffteile (Mehrweg-)	– nach Gebrauch	Gebrauchte Teile nur mit Handschuhen anfassen und in Desinfektionsmittelwanne mit Siebeinsatz und Deckel einlegen. Mindesteinwirkzeit beachten. Weitere Aufbereitung wie „Sonstige Instrumente“	Desinfektionsmittel gemäß VAH-Liste, Rubrik Instrumentendesinfektion, (siehe Annex 3)	med.-technisches Personal, Studierende

MASCHINELL

WAS?	WANN?	WIE?	WOMIT?	WER?
Instrumente, thermostabile	– Nach Gebrauch trocken abgelegt	Evtl. zuerst in Einzelteile zerlegen. Siebeinlage in den Reinigungsautomaten einlegen und thermisches Programm starten.	Reinigungsautomat	Wiss. Personal, med.-technisches Personal
Instrumente, chemothermisch stabile	– Nach Gebrauch trocken abgelegt	Evtl. zuerst in Einzelteile zerlegen. Siebeinlage in den Reinigungsautomaten einlegen und chemothermisches Programm starten.		

4. Wäscheaufbereitung

WAS?	WANN?	WIE?	WOMIT?	WER?
Medizinische Schutzkleidung, normal verschmutzt	– arbeitstäglich (nach Arbeitsende)	Taschen entleeren. Kleidung in den dazu ausgewiesenen Sammel-Containern (inkl. Wäschesäcke) ablegen. Dort abgelegte Kleidung nicht noch einmal herausnehmen. Säcke nicht überfüllen Container gut verschließen über die FB10-Wäschesammelstelle der Zentralwäscherei zu führen.	Chemothermische Wäsche-desinfektion (siehe Annex 7)	Reinigungspersonal
Berufskleidung, normal verschmutzt	– arbeitswöchentlich (nach Arbeitsende)			
Medizinische Schutzkleidung und Berufskleidung, mikrobiell kontaminiert	– bei Kontamination oder Kontaminationsverdacht sofort – nach Kontakt zu infektiösen Patienten	Taschen entleeren. Kleidung in den dazu ausgewiesenen Autoklavier-Eimer ablegen, Eimer verschließen und der Sterilisation zuführen. Sterilisierte Kleidung danach wie normal verschmutzte Wäsche behandeln.	Dampfsterilisation (siehe Annex 8), danach chemothermische Wäschesdesinfektion (siehe Annex 7)	Vet.med. Personal, Studierende, Tierpfleger*innen, Reinigungspersonal
Sonstige Textilien	– nach jedem Patienten – arbeitstäglich	Nicht auf den Boden werfen! Textilien wie normal verschmutzte Kleidung weiterbehandeln (siehe oben).	Chemothermische Wäsche-desinfektion (siehe Annex 7)	Reinigungspersonal
	– nach Kontakt mit infektionsverdächtigen Patienten – mit Blut oder Kot verschmutzt	Nicht auf den Boden werfen! Textilien wie mikrobiell kontaminierte Kleidung weiterbehandeln (siehe oben).	Dampfsterilisation (siehe Annex 8), danach chemothermische Wäsche-desinfektion (siehe Annex 7)	Vet.med. Personal, Studierende, Tierpfleger*innen, Reinigungspersonal

5. Hygienemaßnahmen bei der Diagnostik, Pflege und Therapie

HYGIENE BEI EINFACHEN INJEKTIONEN UND PUNKTIONEN

WAS?	WANN?	WIE?	WOMIT?	WER?
Hygienische Händedesinfektion	– vor dem Aufziehen der Spritze – vor der Injektion oder Punktion	Siehe Kapitel 1 „Personalhygiene“	Alkoholische Händedesinfektionsmittel gemäß VAH-Liste. Siehe auch Annexe 3, 4 und 5.	Tierärzt*innen, assistierende Personen
Hautdesinfektion	– unmittelbar vor der Injektion oder Punktion	An der vorgesehenen Injektions- bzw. Punktionsstelle satt aufsprühen und mit Tupfer auf der Haut verteilen. Mindesteinwirkzeit beachten.		
Vorbereitung	– vor der Entnahme der Lösung aus der Injektionsflasche	Einstichstelle desinfizieren, Mindesteinwirkzeit beachten, Desinfektionsmittel trocknen lassen Mehrdosierbehältnisse (z. B. Aqua, NaCl etc.) sind max. ein Arbeitstag haltbar.		
Gebrauchte Kanülen	– nach der Injektion oder Punktion	Gebrauchte Kanülen dürfen nie in die Schutzhüllen zurückgesteckt werden. Die Entsorgung erfolgt ohne jede Zwischenlagerung in das dafür vorgesehene Sammelgefäß	festes, durchstichsicheres, bruchfestes Behältnis (keine Glasflaschen).	

HYGIENE BEI PUNKTIONEN VON ORGANEN UND KÖRPERHÖHLEN

WAS?	WANN?	WIE?	WOMIT?	WER?
Sterile Schutzkleidung	– bei erhöhter Gefährdung der Patienten	Vor der Händedesinfektion anlegen.		Tierärzt*innen, assistierende Personen
Chirurgische Händedesinfektion	– unmittelbar vor der Punktion	Siehe Abschnitt 1 „Personalhygiene“	Alkoholische Händedesinfektionsmittel gemäß VAH-Liste. Siehe auch Siehe auch Annexe 3, 4 und 5.	
Hautdesinfektion	– unmittelbar vor der Punktion	An der vorgesehenen Punktionsstelle satt aufsprühen und mit Tupfer auf der Haut verteilen. Mindesteinwirkzeit beachten (mind. 2 x 2,5 min).		
Vorbereitung	– vor der Entnahme der Lösung aus der Injektionsflasche	Einstichstelle desinfizieren, Mindesteinwirkzeit beachten, Desinfektionsmittel trocknen lassen Mehrdosierbehältnisse (z. B. Aqua, NaCl etc.) sind max. ein Arbeitstag haltbar.		
Gebrauchte Kanülen	– nach der Injektion oder Punktion	Gebrauchte Kanülen dürfen nie in die Schutzhüllen zurückgesteckt werden. Die Entsorgung erfolgt ohne jede Zwischenlagerung in das dafür vorgesehene Sammelgefäß	festes, durchstichsicheres, bruchfestes Behältnis (keine Glasflaschen).	

HYGIENE BEI DER INFUSIONSTHERAPIE

WAS?	WANN?	WIE?	WOMIT?	WER?
Hygienische Händedesinfektion	– vor der Vorbereitung – vor dem Anlegen – vor dem Wechsel – vor dem Entfernen	Siehe Kapitel 1 „Personalhygiene“	Alkoholische Händedesinfektionsmittel gemäß VAH-Liste. Siehe auch Siehe auch Annexe 3, 4 und 5.	Tierärzt*innen, assistierende Personen
Vorbereitung	– kurz vor der Verabreichung	Sichtkontrolle des Infusionsbehälters auf Beschädigungen oder Veränderungen der Lösung. Verfallsdatum beachten. Medikamente erst kurz vor Gebrauch zumischen. Dabei Gummistopfen vor dem Zuspitzen mit Hautdesinfektionsmittel desinfizieren.	Infusionslösung, ggf. zusätzliche Medikamente	
Hautdesinfektion	– vor der Injektion oder Punktion	An der vorgesehenen Injektions- bzw. Punktionsstelle satt aufsprühen und mit Tupfer auf der Haut verteilen. Mindesteinwirkzeit beachten.	Alkoholische Händedesinfektionsmittel gemäß VAH-Liste. Siehe auch Siehe auch Annexe 3, 4 und 5.	
Verabreichen der Infusion	–	Einmalhandschuhe tragen. Verweilkanüle sorgfältig fixieren. Bei Kurzinfusion Metallkanüle verwenden. Bei Kunststoffkanüle Liegedauer von 72 h nicht überschreiten. Dokumentation: Name des Patienten, Beginn und Dauer der Infusion, ggf. zugemischte Medikamente.	Infusionslösung, ggf. zusätzliche Medikamente	Tierärzt*innen

HYGIENE BEI DER WUNDVERSORGUNG

WAS?	WANN?	WIE?	WOMIT?	WER?
Hautdesinfektion	– vor der Wundversorgung – vor jedem Verbandwechsel	Desinfektionsmittel an der vorgesehenen Injektions- bzw. Punktionsstelle satt aufsprühen und mit Tupfer auf der Haut verteilen. Mindesteinwirkzeit beachten.	Alkoholische Händedesinfektionsmittel gemäß VAH-Liste. Siehe auch Annexe 3, 4 und 5.	Tierärzt*innen, assistierende Personen, Tierpfleger*innen, Tierarzthelfer*innen, Studierende
Versorgung der Wunde	– bei Indikation	Sterile Einmal-Handschuhe anziehen. Wunde niemals mit Hand berühren (non touch-Technik), sterile Instrumente verwenden. Benutzte Instrumente sofort aufbereiten. Gebrauchtes Verbandsmaterial sofort entsorgen. Nach der Versorgung sind die Hände eine hygienische Händedesinfektion durchgeführt werden.	Sterile Einmal-Handschuhe, Verbandsmaterial, sterile Instrumente, alkoholische Händedesinfektionsmittel gemäß VAH-Liste. Siehe auch Annexe 3, 4 und 5.	
Verbandwechsel	– bei Indikation	Der Verbandwechsel sollte von zwei Personen durchgeführt werden. Sterile Einmal-Handschuhe anziehen. Verband unter Zuhilfenahme von sterilen Instrumenten wechseln. Wunde niemals mit Hand berühren (non touch-Technik). Verbandwagen und Arbeitsfläche vor und nach dem Verbandwechsel desinfizieren. Benutzte Instrumente sofort aufbereiten. Gebrauchtes Verbandsmaterial sofort entsorgen. Nach dem Verbandwechsel Hände hygienisch desinfizieren.	Sterile Einmal-Handschuhe, Verbandsmaterial, sterile Instrumente, alkoholische Händedesinfektionsmittel gemäß VAH-Liste. Siehe auch Annexe 3, 4 und 5.	

6. Hygienemaßnahmen bei der Abfallentsorgung

ALLGEMEINES

Die Abfallströme und die ordnungsgemäße Entsorgung von Abfällen sind an der JLU Gießen zentral geregelt. Eine Übersicht finden Sie auf der Website „Wohin mit dem "Müll" - kleines Abfall ABC“ (<https://www.uni-giessen.de/org/admin/dez/e/3/Abfallwirtschaft/Abfalltrennung>).

Zuständigkeiten:

Siedlungsabfall („normaler“ Abfall, nicht gefährlicher Abfall)

Zu diesem Abfall zählen z.B. Restmüll, Biomüll, Papier und Pappe, Wertstoffe des Dualen Systems Deutschland (DSD) etc. Für das Abfallmanagement an der JLU Gießen ist die Liegenschaftsabteilung (Dezernat E 3) der JLU Gießen zuständig, genauer das Sachgebiet E 3.6 „Logistik und Außenanlagen“. Der zuständige Sachbearbeiter ist unter der Rufnummer 0641-99-12538 oder -12617 erreichbar.

Gefährlicher Abfall (chemischer Sonderabfall)

Das chemische Zwischenlager des Dezernats B 3 entsorgt und koordiniert die Entsorgung gefährlicher Abfälle aus Einrichtungen der Universität einschließlich der Versuchsgüter und Kliniken sowie des Universitätsklinikums Gießen und Marburg (Standort Gießen), mit Ausnahme der radioaktiven Abfälle. Zuständiger Ansprechpartner ist Herr Ellinghaus (Dezernat B) unter der Rufnummer 0641/99-12214.

EINRICHTUNGSSPEZIFISCHE MASSNAHMEN

WAS?	WANN?	WIE?	WOMIT?	WER?
Mikrobiell kontaminierter Abfall, autoklavierbar	– arbeitstäglich – nach Bedarf	Mülltrennung beachten. Abfall in jeweils eigenen mit Autoklavenbeuteln bestückten Autoklaviereimern sammeln. Befüllte Autoklavenbeutel und -eimer der zentralen Vernichtungssterilisation durch Dampfsterilisation zuführen. Autoklaven dürfen nur durch qualifiziertes u. eingewiesenes Personal bedient werden; spezifische Betriebsanweisung beachten. Abfall abkühlen lassen und Eimer danach in die Restmüll-Tonnen entleeren.	Autoklavenbeutel, Autoklaviereimer aus Edelstahl mit gelochtem Falz; Stand- oder Tischaufklaven (z.B. mind. 121 °C, ca. 2 bar; mind. 15 min)	Alle Mitarbeiter*innen; Autoklavenbedienung: nur durch qualifiziertes u. eingewiesenes Personal
Mikrobiell kontaminierter Abfall, <u>nicht</u> autoklavierbar ⁴	– arbeitstäglich – nach Bedarf	In Wanne mit Desinfektionsmittel legen. Mindesteinwirkzeit beachten. Danach in die Restmüll-Tonnen entleeren.	Flächendesinfektionsmittel gemäß DVG-Listen oder VAH-Liste, (siehe Annex 3)	Alle Mitarbeiter*innen
Papiermüll	– 2 – 3 x/Woche – nach Bedarf	Mülltrennung beachten. Papiermüll-Eimer in den Papiermüll-Tonne entleeren und reinigen.	Papiermüll-Eimer und –tonne, Haushaltsreiniger	Reinigungspersonal (bei Bedarf: sonstige Mitarbeiter*innen)
Restmüll/Hausmüll	– 2 – 3 x/Woche – nach Bedarf	Mülltrennung beachten. Papiermüll-Eimer in den Restmüll-Tonne entleeren, reinigen und mit neuer Abfalltüte bestücken.	Restmüll-Eimer und –tonne, Haushaltsreiniger, Abfalltüten	
Altglas, normal	– nach Bedarf	Mülltrennung beachten. Glasmüll nach Farbe sortieren und in die Glasmüll-Tonnen entsorgen: weiß, grün und braun. Rotes, blaues und gelbes Glas in den Grünglas-Container.	Glasmüll-Tonnen: weiß, grün und braun.	Alle Mitarbeiter*innen

⁴ z.B. Nitrocellulose (entzündlich, explosionsgefährdet)

Hygieneplan	Institut/Klinik/Professur für	Stand 04.03.2021	Seite 72 von 72 Seiten
--------------------	-------------------------------------	------------------	------------------------

WAS?	WANN?	WIE?	WOMIT?	WER?
Labor-Altglas hitzebeständiges Glas, Borosilikatglas	– nach Bedarf	Z.B. Glas der Firmen Schott®, Duran®. Mikrobiell kontaminiertes Glas und Glasbruch dekontaminieren (siehe oben). Glas in den gekennzeichneten Sammelbehältern im Zentrallager Chemie (Flügel C und D) entsorgen. Hitzebeständiges Glas darf <u>NIE</u> in die Glasmüll-Tonnen für normales Altglas entsorgt werden.		Alle Mitarbeiter*innen
Organproben, Tierkadaver	– nach Bedarf	In dem gekennzeichneten Kadaver-Container deponieren. Container-Inhalt bis zur Abholung gegen unbefugten Zugriff, Witterungseinflüsse und Tiere geschützt aufbewahren. Container nach jeder Abholung reinigen und desinfizieren (siehe Flächendesinfektion, sonstige Flächen).	Kadaver-Container. Flächendesinfektionsmittel gemäß DVG-Listen (siehe Annex 3)	Tierpfleger*innen
Sonstiger Abfall	– nach Bedarf	In Absprache mit dem zuständigen Sachbearbeiter im Dezernat E, Sachgebiet 3.6), 0641-99-12538 oder -12617.		Alle Mitarbeiter*innen
Sondermüll	– nach Bedarf	In Absprache mit dem zuständigen Ansprechpartner Herr Ellinghaus (Dezernat B), Rufnummer 0641/99-12214		Alle Mitarbeiter*innen