COVID-19 & COMPANION ANIMAL SETTINGS:

Practical measures for protecting your team and your clients in returning back to business

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EVP & Lead Science Advisor

OUTLINE

- COVID-19 - select etiological, epidemiological and transmission aspects
- Background knowledge to mitigate COVID-19: A general framework for Infection Control in Companion settings
- Key considerations in the context of COVID-19:
  - Risk assessment of facility & operations
  - Protocols & SOPs
  - Training
  - Surveillance
  - Quality assurance
- Specific issues related to cleaning & disinfection:
  - The Ideal Disinfectant
    - Aspects related to biocidal efficacy
    - Criteria related to Safety
    - The importance of cleaning & detergency
    - Practical issues related to use
- Mistakes and oversights to avoid in Cleaning & Disinfection

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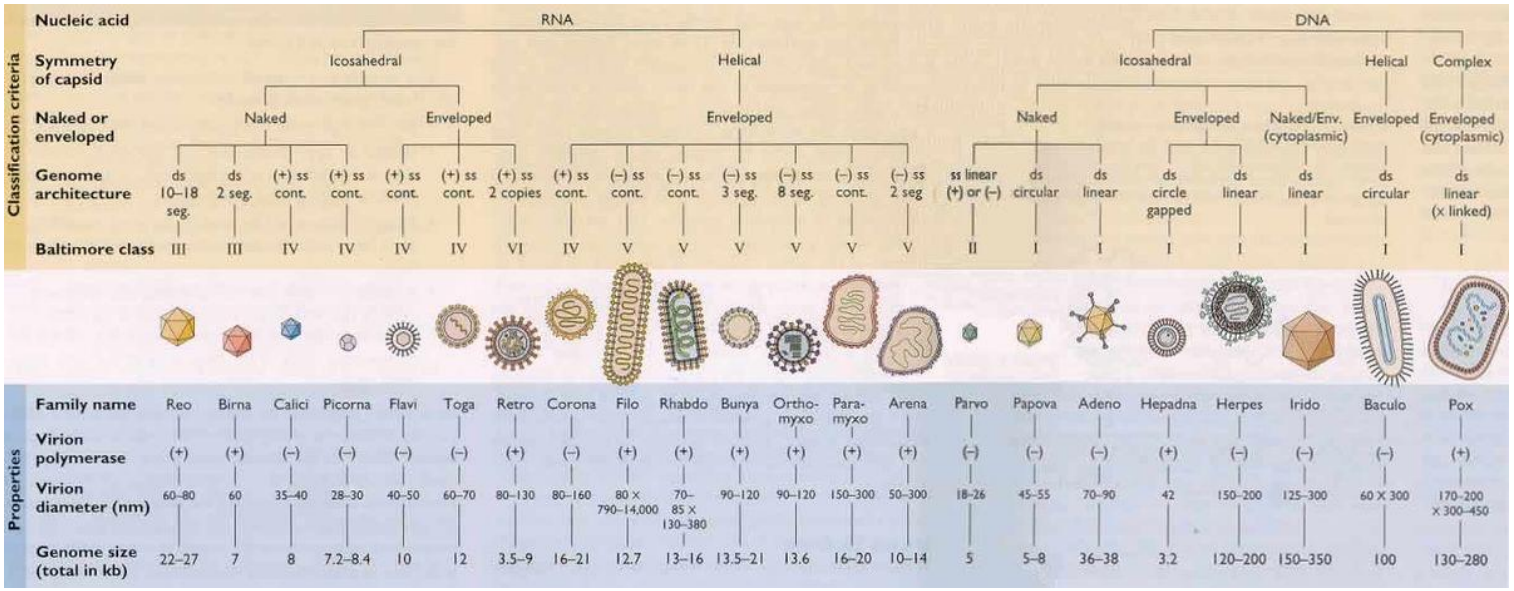
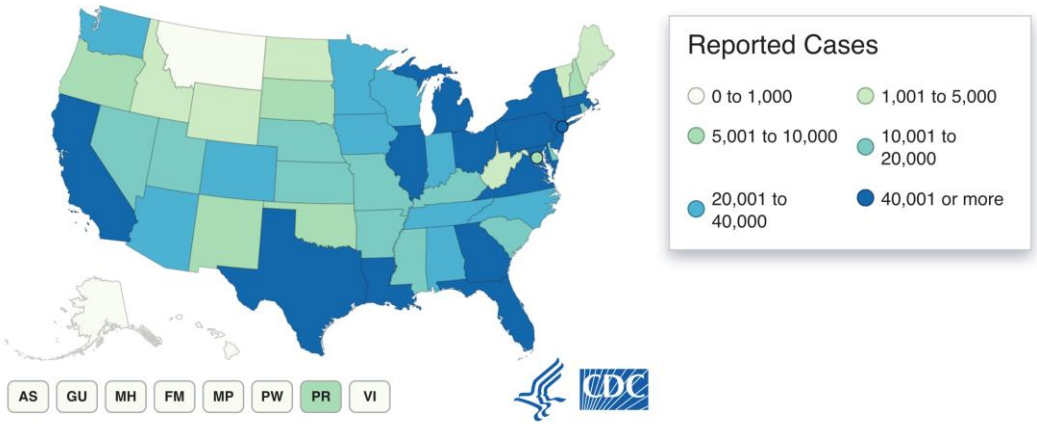
COVID-19 - SELECT ETIOLOGICAL, EPIDEMIOLOGICAL AND TRANSMISSION ASPECTS

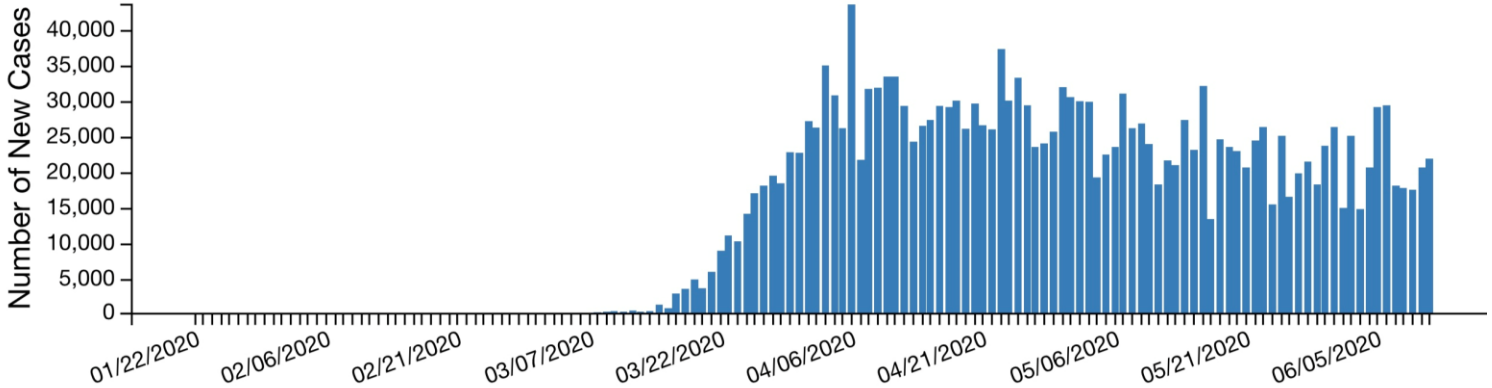
- Etiology & Virology - COVID-19 caused by enveloped RNA virus, SARS-CoV-2
- There are 4 genera of CoVs, α,β,γ,δ - SARS-Cov-2 is a β-CoV
- Two main types identified - type L and type S



COVID-19 - SELECT ETIOLOGICAL, EPIDEMIOLOGICAL AND TRANSMISSION ASPECTS

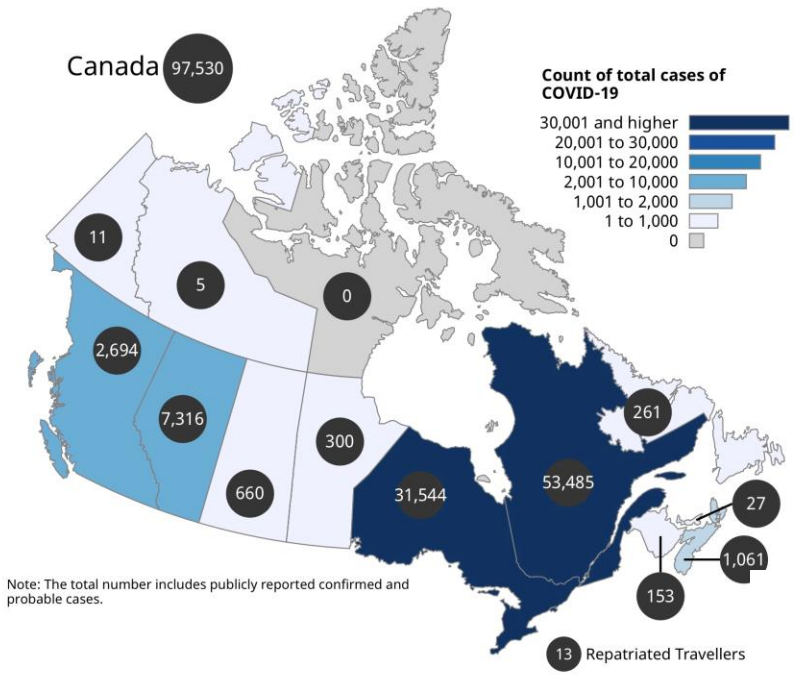
- Epidemiology



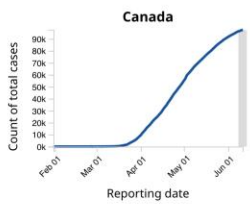


COVID-19 - SELECT ETIOLOGICAL, EPIDEMIOLOGICAL AND TRANSMISSION ASPECTS

- Epidemiology



The count of total cases of COVID-19 in **Canada** was **97,530** as of June 11, 2020.



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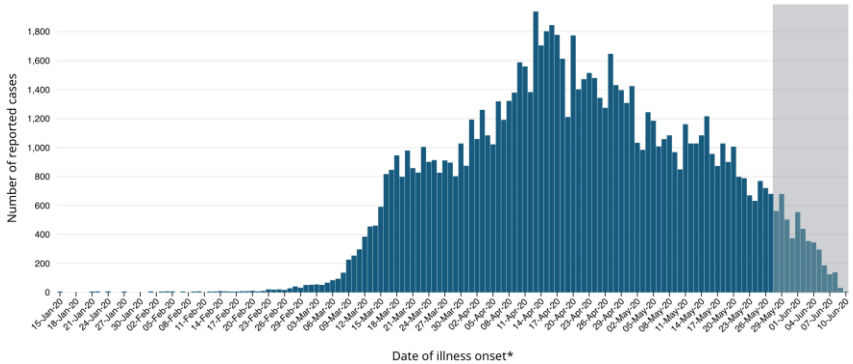

COVID-19 - SELECT ETIOLOGICAL, EPIDEMIOLOGICAL AND TRANSMISSION ASPECTS

- Epidemiology

COVID-19 - SELECT ETIOLOGICAL, EPIDEMIOLOGICAL, PATHOGENESIS AND TRANSMISSION ASPECTS

- Transmission
  - Main mode is direct person-to-person transmission - close range contact, mainly via respiratory droplets
  - Another mode is indirect, hand-contact with infected surface and then hand-touch eyes, nose or mouth.
  - No documented evidence of airborne transmission
  - Has been detected in stool, blood, ocular secretions and semen but in general, these are not practically relevant modes for respiratory diseases in general

GENERAL FRAMEWORK FOR INFECTION PREVENTION

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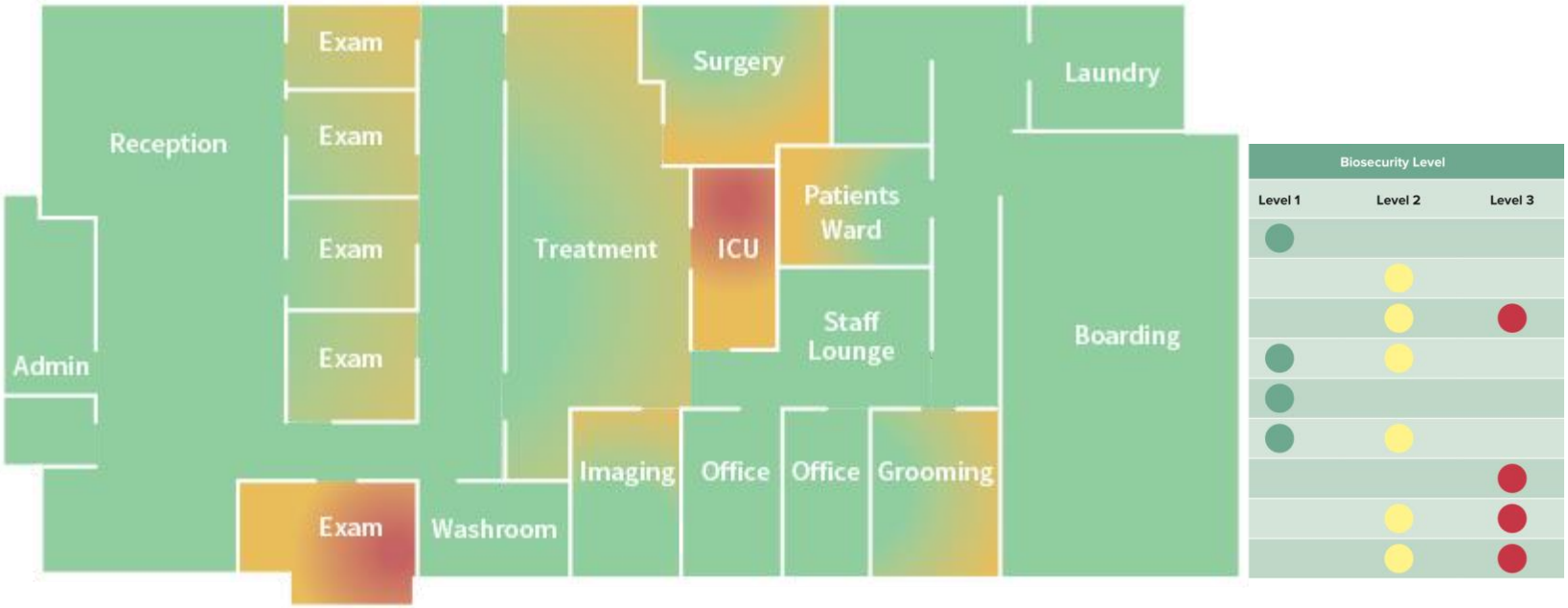
STEP 1: ROLES & RESPONSIBILITIES

BIOSECURITY MANAGER
or IC Coordinator

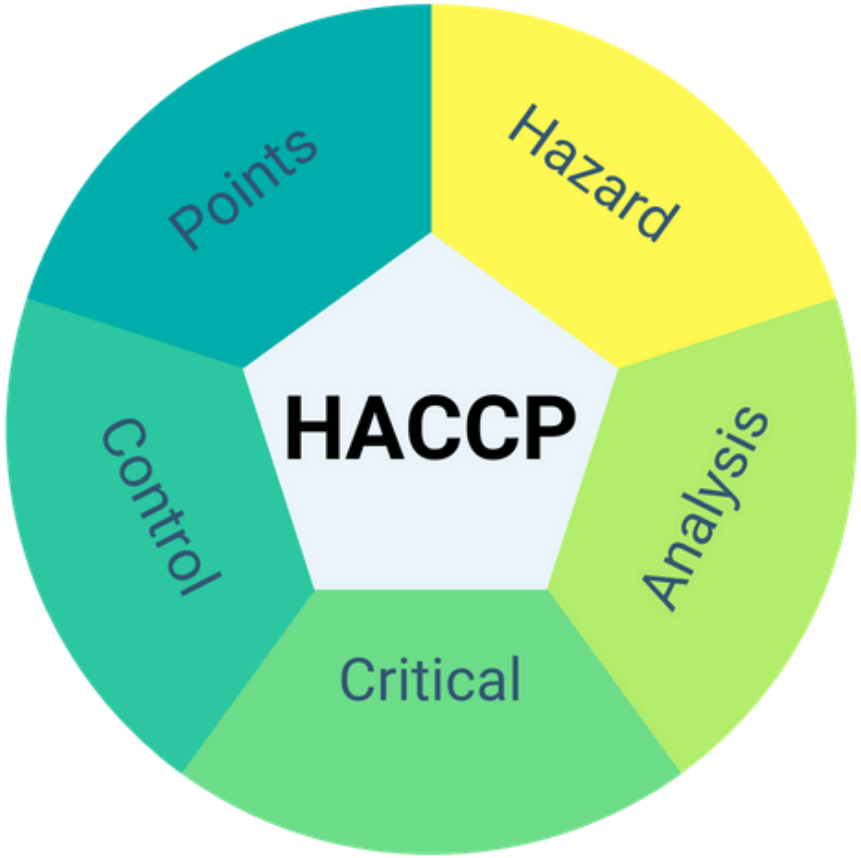
- Biosecurity auditor
- Training/Instructors
- C&D Crews
- Surveillance activities

- Biosecurity Manual
- Biosecurity training curriculum, materials, scheduled, records
- Ownership of Protocols/SOPs (issuance, revisions, review)
- C&D responsibilities, scheduling, etc
- Product and equipment selection, review
- Auditing & reporting
- Surveillance - data coordination & analysis, action plans

STEP 2: RISK-ASSESSMENT OF FACILITY



STEP 3: PROTOCOLS & SOPs



THE 7 ELEMENTS OF HACCP

- Hazard analysis: ID problem steps in every day tasks
- Identify Critical Control Points: Mitigation of Hazards
- Critical Limits: what measure on each CCP triggers an action
- Control: requirements for monitoring at CCP - you can only change what you measure
- Corrective actions
- Verification Procedures
- Record keeping

STEP 4: SELECTING CLEANING & DISINFECTANTS

PROPERTIES OF AN IDEAL DISINFECTANT, ACCORDING TO THE CDC

- Broad spectrum
- Fast acting
- Not affected by environmental factors
- Nontoxic
- Surface compatibility
- Odorless
- Soluble
- Stable
- Cleaner
- Environmentally friendly
- Economical
- Easy to use

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STEP 5: TRAINING

Sample Protocol for Entering and Exiting an Isolation (or Similarly Dedicated) Area[5]

Entering and exiting isolation rooms

1. Before entering the isolation area, remove practice outerwear (e.g., laboratory coat) and any equipment (e.g., stethoscope, scissors, thermometer, watch, cell phone) and leave outside the isolation unit/anteroom.
2. Gather any necessary supplies and medications before putting on PPE.
3. Wash hands or u
4. Attend to the pati room.
5. Clean and disinfe
6. Before leaving th boots). Clean and room. DO NOT S
7. Wash hands with any needed chart

PPE, personal protec

Identifying High-Risk Patients: Questions to Ask When Making Appointments[5]*

- Age of the patient.
- Vaccination history.
- Recent history:
  - Has the pet been to a b
  - Traveled to another are
  - Are other pets in the hc
- Acute vomiting?
- Acute diarrhea (defined a
- Acute coughing?
- Acute sneezing?
- Fever (if known)?

If the patient is acutely coug building or immediately tra If the hospital records indic
*Patients fitting these criter the pet through the receptio disinfect any waiting or exa

Example of an Environmental Cleaning and Disinfection Protocol (Adapted)[20]

- Have all material safety data sheets or product safety data sheets for cleaning and disinfection materials available. Follow instructions for proper mixing, disposal, and PPE (e.g., gloves, eye protection). As able, ensure the area is well ventilated.
- Exam rooms and cages should be cleaned and disinfected immediately following use. Place signage at the room entry that it should not be used until cleaning and disinfection is completed.
- As applicable, remove all bedding and organic material (e.g., feces, feed, hair, linens, bandage, or other materials) and dispose in designated waste bin. Gloves should be worn during this procedure.
- "Dry"-clean surfaces (e.g., sweeping, wiping with disposable microfiber cloth) to remove loose organic material.
- "Wet"-clean surfaces with warm water and detergent. Scrubbing surfaces is often necessary to remove feces or bodily fluids, biofilms, and stubborn organic debris, especially in animal housing areas.
- Rinse with clean water. For all rinsing and product application procedures, care must be exercised to avoid overspray. High-pressure washing should be avoided. Higher pressures can help remove stubborn organic debris but may also force debris and organisms into crevices or porous materials, from which they can later emerge. Additionally, high-pressure washing causes aerosolization and overspray, which may spread organisms widely, even into previously uncontaminated areas.
- Allow the area to dry or manually do so. If excess water remains, subsequently applied disinfectants may be diluted to the point of inefficacy.
- Apply disinfectant solution at the indicated concentration and ensure the appropriate contact time (allotted time required for disinfectant to remain wet on the surface to kill the pathogens of interest; time is based on the product, concentration, and targeted pathogens but generally 5–10 min). Rinse thoroughly with clean water; this is especially important for disinfectants that leave a residue or for surfaces vulnerable to damage from the disinfectant. Always follow the disinfectant label (**Figure 2**) for appropriate use, concentration, and contact time (see **Figures 3, 4; Table 11** for choosing a disinfectant).
- Allow the treated area to dry as much as possible before reintroducing animals or reusing the area.
- In known contaminated or high-risk areas, a second application of a disinfectant with wide spectrum (e.g., accelerated hydrogen peroxide product) should be considered as a final decontamination step. Ensure appropriate contact time, rinse with clean water, and allow the treated area to dry, as stated above.

PPE, personal protective equipment.

Screen-shot from Stull et. al. (2018), J. AAHA, **54**, 297-326

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STEP 6: SURVEILLANCE

Surveillance: the routine collection of information to;

1. Determine which practices are effective or not
2. Identify areas for improvement
3. Provide early warning to emerging issue

Can be **Passive** or **Active**

Passive: involves data already available (tracking incidence of illnesses, e.g. diagnostic lab results) or any other elements of medical history recorded on admission

Active: routine collection of samples from high risk guests, environmental surveillance (culturing)

Screen-shot from Stull et. al. (2018), J. AAHA, **54**, 297-326

STEP 7: AUDITS & CONTINUOUS IMPROVEMENT

Sample Infection Control Audit Tool[4]

Audit Areas and Items	Fully Implemented	Partly Implemented	Not Implemented	Not Applicable	Comments
Designated practice areas available					
Isolation area					
Diagnostic specimen handling area					
Staff "break" area					
Protective equipment available					
Gloves					
Household rubber, reusable					
Latex, nitrile or other, disposable					
Masks					
Surgical					
N95 masks, including fit testing					
Gowns					
Lab coats					
Foot covers/booties					
Eye protection (e.g., goggles)					
Written policies for dress code					
No/limited jewelry (rings or bracelets) for staff with animal contact					
No artificial nails or nail enhancements (e.g., nail polish) for staff with direct patient care					
Hand hygiene					
AHS stations available					
Signage for AHS with instructions					
Hand washing stations available					
Signage for hand washing with instructions					
Staff trained on how and when to use hand hygiene					
Before and after patient contact					
Before aseptic procedures					
Before putting on and after taking off gloves					
After contact with body fluids or mucous membranes					
After contact with contaminated equipment or surfaces					
After personal body functions (i.e., sneezing, coughing, going to the bathroom)					
Before eating					
Cleaning and disinfecting procedures					
Written protocols and procedures for cleaning and disinfection developed and followed					
Safety Data Sheets for disinfectant products available					
Appropriate detergents available					
Appropriate disinfectant products available for patient-contact surfaces					
Approved and appropriate disinfectant products available for equipment and instruments					
Disinfection and sterilization of medical devices					
Proper technique used (i.e., product concentration, contact time, equipment properly cleaned before sterilized)					
Manufacturer's instructions followed					
Laundry					
Laundry performed on site or by a commercial service					
Laundry dried at high temperatures (65–70°C)					
Infectious laundry presoaked in bleach solution (9 parts water:1 part household bleach)					
Soiled laundry transported in a clean manner					
Clean laundry segregated from soiled laundry					
Hand hygiene available in laundry area					
Education provided regarding protective practices					
Sharps handling					
Approved puncture-resistant, labeled containers used					
Containers not more than 3/4 filled					
Containers accessible in all required areas					
Sharps disposed immediately after use					
Waste segregation					
Clear guidelines regarding waste that is:					
Biohazardous					
Nonbiohazardous					
Vector control					
Rodent control apparent					
Food debris and clutter eliminated					

- Have an auditing program (auditing tool, schedule, reporting, etc)
- Spot checks, correct/reinforce on the spot
- Audit should include audit of logs and records
- Results analysis and action plan

Screen-shot from Stull et. al. (2018), J. AAHA, **54**, 297-326

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CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

PROPERTIES OF AN IDEAL DISINFECTANT, ACCORDING TO THE CDC

- Broad spectrum
- Fast acting
- Not affected by environmental factors
- Nontoxic
- Surface compatibility
- Odorless
- Soluble
- Stable
- Cleaner
- Environmentally friendly
- Economical
- Easy to use

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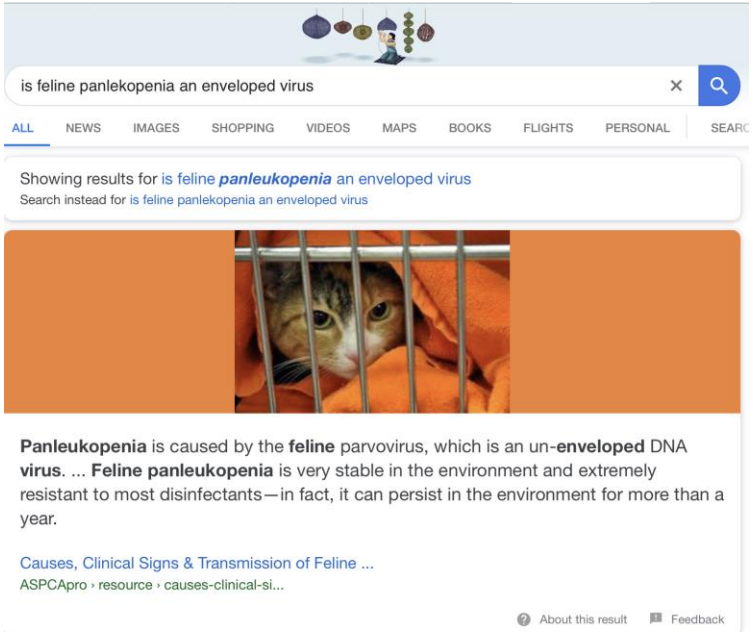
CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

Broad spectrum

	Micro-organism
Most Difficult	Bacterial spores
	Mycobacteria
	Small nonenveloped virus
	Fungal spores
	Gram negative bacteria
	Large nonenveloped virus
	Gram positive bacteria
	Enveloped virus
Least Difficult	Mycoplasmas



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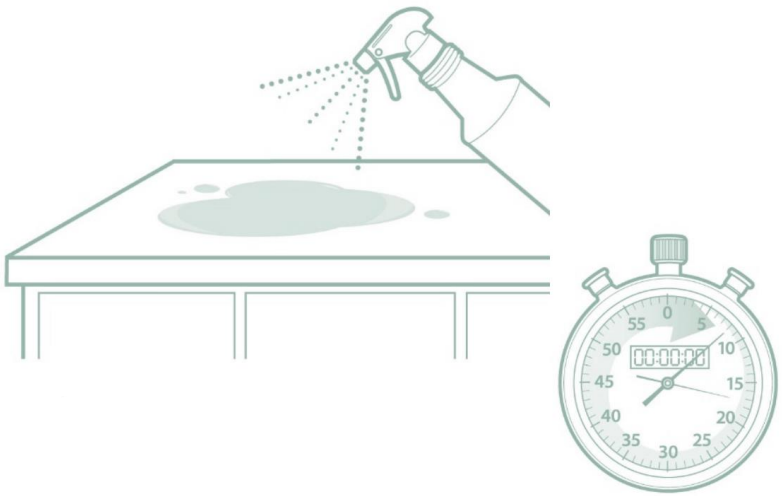
CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

Fast acting



- Reasonable contact time, surface must remain wet for disinfectant action
- Realistic contact time considering operational requirements

CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

Not affected by environmental factors

Tolerance to:

- Soils
- Water hardness
- Temperature
- Humidity
- Light
- Other chemicals, e.g. detergents

Stable

Chemical & Physical stability:

- Reasonable shelf life in bottle
- Reasonable shelf-life on dilution
- Stable to other chemicals

CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

Nontoxic

Odorless

- Review SDS sheet for toxicity and precautionary statements
- Avoid products containing chemical sensitizers (e.g. asthmatogens such as quats, glutaraldehyde, bleach)
- Avoid products containing carcinogens or reproductive toxins like ortho-phenyl-phenol
- Stronger odor ≠ Stronger Biocide

Chemical Classifications

The Globally Harmonized System (GHS) created these category ratings to rank the physical hazards for labeling and chemicals.

Most Severe Hazard Category 1

Least Hazardous Category 5

HEALTH HAZARDS					
HAZARD CLASS	†HAZARD CATEGORY				
Acute Toxicity	1	2	3	4	5
Skin Corrosion/Irritation	1A	1B	1C	2	3
Serious Eye Damage/Eye Irritation	1	2A	2B		
Respiratory or Skin Sensitization	1				
Germ Cell Mutagenicity	1A	1B	2		
Carcinogenicity	1A	1B	2		
Reproductive Toxicity	1A	1B	2		
Specific Target Organ Toxicity – Single Exposure	1	2	3		
Specific Target Organ Toxicity – Repeated Exposure	1	2			
Aspiration	1				

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CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

Cleaner

- Disinfectants “built” with detergency, provide an extra level of protection;
  - The use of surface active agents (detersive chemicals) reduces surface tension of the solution, increasing penetration on porous surfaces and fabrics
  - Chelants typically present in “built” formulations provide higher tolerance to poor quality of dilution water (hardness, metals)
  - Cleaning in itself is critical in the overall process of disinfection, if disinfectant has poor detergency, a separate precleaning product may be needed
  - Some disinfectant actives actually act to chemically fixate soils to surfaces, for example, alcohols and glutaraldehyde.

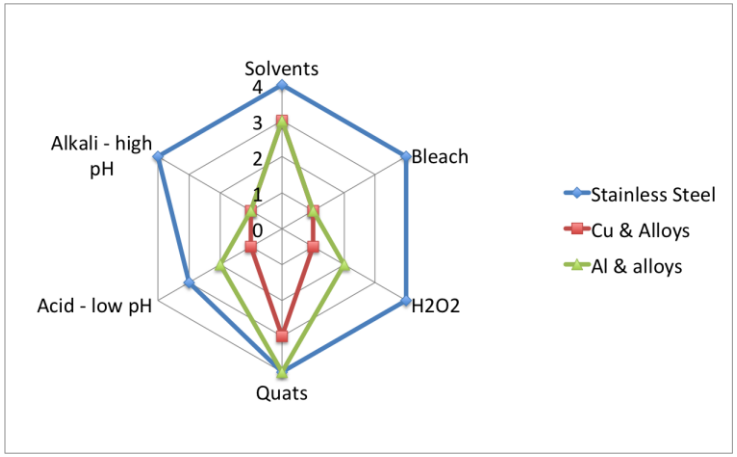
CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

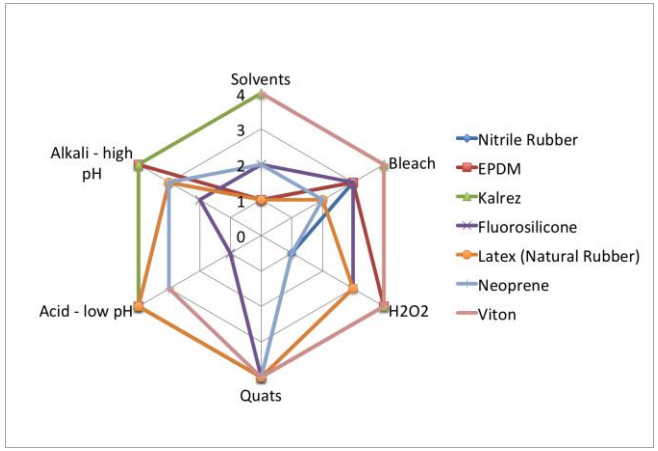
Environmentally friendly

- Avoid actives that persist in the sewage works and environment
- Disinfectant Formulations should be inherently biodegradable at a minimum
- Should not contain any endocrine disrupters (e.g. nonylphenol ethoxylates)
- Review aquatic toxicity values in SDS (or ask for them), look for 48 hr EC50 for Daphnia of > 100 mg/L and 96 hr LC50 for Trout of >100 mg/L
- Stronger odor $\not\approx$ Stronger Biocide
- Ensure products do not contribute to reduced IAQ (e.g. meet no VOCs of CARB, or less than 0.5% VOC content by weight)

CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

Surface compatibility





The spot test:

- Soak a substrate (cotton or gauze) in the product to be tested
- Place on inconspicuous area
- Cover for duration of test (at least 24 hours)
- Remove cover, discard substrate (ensure it was still wet) and observe surface or material

CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

Easy to use **Soluble** **Economical**

- Easily dilutable in water - powders are difficult to prepare in small or large quantities
- Easily rinsable (high water solubility)
- Can be stored for extended time period when prepared
- Highly visible when applied, avoids reapplication (wastage)
- Proper concentration can be easily validated
- Overall in-use $/sqft works within facility P&L - in-use trial recommended (vs. theoretical $/gal estimate)

MISTAKES & OVERSIGHTS

1. NOT REALIZING THE IMPORTANCE OF CLEANING

Cleaning prior to disinfection is at least as important as the disinfection step itself. Soils hamper the disinfection process by:

- Providing a physical barrier for the disinfectant to access the infectious agent
- Potentially providing a reactive substrate to consume disinfectant molecules therefore reducing the concentration available for disinfection

Cleaning can reduce the bioburden load by up to 2-logs (99%), thus lightening the load for the disinfectant step. More dramatic if cleaning agent has some biocidal activity.

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MISTAKES & OVERSIGHTS

2. IMPROPER PREPARATION OF DISINFECTANT

Always follow label instructions for dilution and use of a disinfectant. Ensure staff understand dilution terminology (e.g. 1%, or 1:32 for example) and that they know how and actually measure on preparation of a mixture. If an easy means of validating product concentration is available it should be used regularly with dispensing equipment or every time a ready-to-use bottle or bucket is prepared.

If dilution equipment is used, do not use equipment with adjustable knobs if possible. Restrict access of dilution tips and always validate proper concentration when changing a dilution tip.

MISTAKES & OVERSIGHTS

3. IMPROPER TRAINING OF STAFF RESPONSIBLE FOR C&D

Most mistakes/oversights are rooted in improper training. Dilution of concentrates, proper cleaning priori to disinfection, mixing chemicals, not enough contact time, not enough surface saturation with liquid, maintaining workplace diluted product, etc.

Ensure staff receive training on C&D regularly, with annual reviews. Maintain records of whose has been trained and keep a training schedule. Make training in biosecurity and C&D an integral part of the on-boarding process for new employees.

MISTAKES & OVERSIGHTS

4. FAILING TO REACH DESIGNATED CONTACT TIME

In other words, the surface being treated does not remain wet for the required time for disinfectant action. Specially prevalent with products that do not have an easily visible cue (like foam) indicating surface coverage.

Also common with the use of trigger sprayer application, where the surface is sprayed and immediately wiped with a dry cloth, but this event is so common-place that it has a 'mistake' box of its own.

MISTAKES & OVERSIGHTS

5. SPRAYING SURFACE AND WIPING IMMEDIATELY WITH A DRY CLOTH

Generally speaking, surfaces should remain visibly wet for disinfection action to occur. Spraying the surface and immediately drying it do not allow for the proper contact time for biocidal action to transpire.

Secondly, spraying directly on the surface could aerosolize loose pathogens on the surface, hence it is best to spray the disinfectant unto the cloth so that it becomes wet, and use the necessary pressure in wiping to wet the surface being wiped. An alternative to this is to use disinfectant pre-moistened wipes.

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MISTAKES & OVERSIGHTS

6. NOT KNOWING THE SHELF-LIFE OF THE DISINFECTANT

Given ready-to-use products should have a clear stamp on the label showing the expiry date, this is particularly relevant with products diluted for use from a concentrate.

While the concentrate bottle should have a clear expiry date, it is difficult to keep track of expiry dates on diluted workplace bottles. Some disinfectants have a very short half life on dilution - look for disinfectants with long diluted shelf life, at least 7 days or more are preferred.

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MISTAKES & OVERSIGHTS

7. KNOW THE DIFFERENCE BETWEEN SANITATION AND DISINFECTION

Sanitation of inanimate, non-food contact surfaces is defined as reducing the pathogen load by 99.9% (or commonly referred to as 3-logs), while disinfection is defined as the reduction of the pathogen by 99.9999% (6-logs).

Some organisms have infective doses of 1,000, and if expelled in feces or vomit can number over 1,000,000 per gr. If you are sanitizing, you are reducing the load of organism per gram from say 1,000,000 per gr to 1,000 vs. in disinfecting it is reduced to ~1 per gram.

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MISTAKES & OVERSIGHTS

8. DO NOT MIX CHEMICALS

Mixing chemicals should never be done on the grounds of safety. For example, mixing bleach with acid will produce highly poisonous chlorine gas.

Adding a fragrance to a disinfectant should also be avoided, there may be interactions between the fragrance and the disinfectants that can result in potency loss.

As importantly, chemicals can be mixed without intending it or even realizing it - for example, using an anionic detergent for precleaning and failing to adequately rinse it off could result in inactivation of a quat-based disifnectant.

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MISTAKES & OVERSIGHTS

9. Topping off diluted disinfectant bottles

C&D protocols should provide the means for ensuring workplace diluted products once prepared, have a maximum useful life. Once this period is reached, any remaining product is discarded, the bottle is properly rinsed and a fresh dilution is prepared.

This helps ensure diluted product is always within appropriate useful period and reduces the risk of diluting a new fresh solution with expired, lower potency product.

MISTAKES & OVERSIGHTS

10. NOT GETTING BUY-IN FROM STAFF ON PROTOCOLS

Proper protocols are based on redundancies and fail-safe checklists and steps that sometimes seem trivial and tedious to staff. Ensure staff understands the reasoning behind the protocols to ensure maximum compliance.

This is specially relevant when changing or modifying protocols, including switching chemical products, adding a step (e.g. precleaning) or introducing a new tool (say validation strips) or dilution or application equipment.

Deliberately Different.

ADDITIONAL RESOURCES

VETERINARY PRACTICE GUIDELINES

2018 AAHA Infection Control, Prevention, and Biosecurity Guidelines*

Jason W. Stull, VMD, MPVM, PhD, DACVPM†, Erin Bjorvik, BS, CVT, Joshua Bub, DVM, DABVP (C/F), Glenda Dvorak, MS, DVM, MPH, DACVPM, Christine Petersen, DVM, PhD, Heather L. Troyer, DVM, DABVP (C/F), CVA, CVFP

ABSTRACT

A veterinary team's best work can be undone by a breach in infection control, prevention, and biosecurity (ICPB). Such a breach, in the practice or home-care setting, can lead to medical, social, and financial impacts on patients, clients, and staff, as well as damage the reputation of the hospital. To mitigate these negative outcomes, the AAHA ICPB Guidelines Task Force believes that hospital teams should improve upon their current efforts by limiting pathogen exposure from entering or being transmitted throughout the hospital population and using surveillance methods to detect any new entry of a pathogen into the practice. To support these recommendations, these practice-oriented guidelines include step-by-step instructions to upgrade ICPB efforts in any hospital, including recommendations on the following: establishing an infection control practitioner to coordinate and implement the ICPB program; developing evidence-based standard operating procedures related to tasks performed frequently by the veterinary team (hand hygiene, cleaning and disinfection, phone triage, etc.); assessing the facility's ICPB strengths and areas of improvement; creating a staff education and training plan; cataloging client education material specific for use in the practice; implementing a surveillance program; and maintaining a compliance evaluation program. Practices with few or no ICPB protocols should be encouraged to take small steps. Creating visible evidence that these protocols are consistently implemented within the hospital will invariably strengthen the loyalties of clients to the hospital as well as deepen the pride the staff have in their roles, both of which are the basis of successful veterinary practice. (*J Am Anim Hosp Assoc* 2018; 54:297–326. DOI 10.5326/JAAHA-MS-6903)

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* These guidelines were prepared by a task force of experts convened by AAHA. This document is intended as a guideline only, not an AAHA standard of care. These guidelines and recommendations should not be construed as dictating an exclusive protocol, course of treatment, or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to each individual practice setting. Evidence-based support for specific recommendations has been cited wherever possible and appropriate. Other recommendations are based on practical clinical experience and a consensus of expert opinion. Further research is needed to document some of these recommendations. Because each case is different, veterinarians must base their decisions on the best available scientific evidence in conjunction with their own knowledge and experience.

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AHS (alcohol-based hand sanitizer); HAI (hospital-acquired infections); ICP (infection control practitioner); ICPB (infection control, prevention, and biosecurity); MDR (multidrug-resistant); MRSP (methicillin-resistant *Staphylococcus pseudintermedius*); PPE (personal protective equipment); SOP (standard operating procedure); SSI (surgical site infection)

† J. Stull was the chair of the Infection Control, Prevention, and Biosecurity Guidelines Task Force.

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