COVID-19 & COMPANION ANIMAL SETTINGS:
Practical measures for protecting your team and your clients in returning back to business

Jose A. Ramirez, MS. PhD
EVP & Lead Science Advisor
• 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
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

Reported Cases
- 0 to 1,000
- 1,001 to 5,000
- 5,001 to 10,000
- 10,001 to 20,000
- 20,001 to 40,000
- 40,001 or more

Number of New Cases
01/22/2020 02/06/2020 02/21/2020 03/07/2020 03/22/2020 04/06/2020 04/21/2020 05/06/2020 05/21/2020 06/05/2020

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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. The total number includes publicly reported confirmed and probable cases.
COVID-19 - SELECT ETIOLOGICAL, EPIDEMIOLOGICAL AND TRANSMISSION ASPECTS

• Epidemiology
• 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

1. Organization: Clarify roles & responsibilities for IC/BS amongst staff
2. Designate facility areas according to biosecurity risk
3. HACCP-based protocols and SOPs - easily available
4. Select the cleaning & disinfectant chemistries for your program
5. Training Program, including schedules & record keeping
6. Surveillance Program - passive & active surveillance
7. Auditing & Continuous Improvement

7 Steps to Good Infection Control
STEP 1: ROLES & RESPONSIBILITIES

- 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

Area
- Reception
- Indoor play/activity area
- Isolation Kennel
- External corridors
- Office
- Internal Corridor
- Kennel areas
- Beauty parlor
- Waste management/storage

Biosecurity Level

<table>
<thead>
<tr>
<th>Area</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Staff Lounge</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Grooming</td>
<td>□</td>
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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
### Properties of an Ideal Disinfectant, According to the CDC

<table>
<thead>
<tr>
<th>Property</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Broad spectrum</td>
<td>Soluble</td>
</tr>
<tr>
<td>Fast acting</td>
<td>Stable</td>
</tr>
<tr>
<td>Not affected by environmental factors</td>
<td>Cleaner</td>
</tr>
<tr>
<td>Nontoxic</td>
<td>Environmentally friendly</td>
</tr>
<tr>
<td>Surface compatibility</td>
<td>Economical</td>
</tr>
<tr>
<td>Odorless</td>
<td>Easy to use</td>
</tr>
</tbody>
</table>
STEP 5: TRAINING

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

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/room.

2. Gather any necessary supplies and medications before putting on PPE.

3. Wash hands or use hand sanitizer.

4. Attend to the patient in the room.

5. Clean and disinfect before leaving the room. Do NOT leave PPE. Clean and disinfect the room. DO NOT leave PPE.

6. Wash hands with any needed chart/PPE, personal protective equipment.

Identifying High-Risk Patients: Questions to Ask When Making Appointments

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

If the patient is acutely coughing or immediately trasmitting the hospital:

- Patients fitting these criteria for the pet through the receptacle, disinfect any waiting or exit areas.

Example of an Environmental Cleaning and Disinfection Protocol (Adapted)

- 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.
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)
STEP 7: AUDITS & CONTINUOUS IMPROVEMENT

- 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
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CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

Broad spectrum

<table>
<thead>
<tr>
<th>Most Difficult</th>
<th>Micro-organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>( )</td>
<td>Bacterial spores</td>
</tr>
<tr>
<td></td>
<td>Mycobacteria</td>
</tr>
<tr>
<td></td>
<td>Small nonenveloped virus</td>
</tr>
<tr>
<td></td>
<td>Fungal spores</td>
</tr>
<tr>
<td></td>
<td>Gram negative bacteria</td>
</tr>
<tr>
<td></td>
<td>Large nonenveloped virus</td>
</tr>
<tr>
<td></td>
<td>Gram positive bacteria</td>
</tr>
<tr>
<td></td>
<td>Enveloped virus</td>
</tr>
<tr>
<td></td>
<td>Mycoplasmas</td>
</tr>
</tbody>
</table>

Least Difficult

**Panleukopenia** is caused by the feline parvovirus, which is an un-enveloped DNA virus. ... *Feline panleukopenia* is very stable in the environment and extremely resistant to most disinfectants—in fact, it can persist in the environment for more than a year.

Causes, Clinical Signs & Transmission of Feline ... ASPCApro - resource - causes-clinical-si...
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

Tolerance to:
• Soils
• Water hardness
• Temperature
• Humidity
• Light
• Other chemicals, e.g. detergents

Chemical & Physical stability:
• Reasonable shelf life in bottle
• Reasonable shelf-life on dilution
• Stable to other chemicals
• 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.

<table>
<thead>
<tr>
<th>HEALTH HAZARDS</th>
<th>HAZARD CLASS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>Acute Toxicity</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Skin Corrosion/Irritation</td>
<td>1A</td>
<td>1B</td>
<td>1C</td>
<td>2</td>
<td>3</td>
<td></td>
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<tr>
<td>Serious Eye Damage/Eye Irritation</td>
<td>1</td>
<td>2A</td>
<td>2B</td>
<td></td>
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<tr>
<td>Respiratory or Skin Sensitization</td>
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<td></td>
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<tr>
<td>Germ Cell Mutagenicity</td>
<td>1A</td>
<td>1B</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Carcinogenicity</td>
<td>1A</td>
<td>1B</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Reproductive Toxicity</td>
<td>1A</td>
<td>1B</td>
<td>2</td>
<td></td>
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<tr>
<td>Specific Target Organ Toxicity – Single Exposure</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Specific Target Organ Toxicity – Repeated Exposure</td>
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<td>Aspiration</td>
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<td></td>
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</tr>
</tbody>
</table>

Most Severe Hazard Category 1
Least Hazardous Category 5
CRITERIA FOR CHEMICAL DISINFECTANT SELECTION

- 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

- 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 ≠ 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)
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

- 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)
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.
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.
3. IMPROPER TRAINING OF STAFF RESPONSIBLE FOR C&D

Most mistakes/oversights are rooted in improper training. Dilution of concentrates, proper cleaning prior 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.
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.
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.
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.
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 aquat-based disinfectant.
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.
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
Where to Buy Rescue:
Where to Buy Prevail: