Disinfection management
COVID-19 disease (SARS-CoV-2 virus)

Virus forges on, as world hunts solutions

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FACT SHEET
COVID-19 disease (SARS-CoV-2 virus)

- **Taxonomy:**
  - COVID-19 is caused by the virus SARS-CoV-2. This virus belongs to the Coronaviridae

- **Structure:**
  - Coronaviruses are **65-125nm** in diameter, encapsulated viruses with a crown-like appearance under an electron microscope, due to the presence of spike glycoproteins on the envelope

- **SARS-CoV-2** is a β-coronavirus.
  - β-coronaviruses also include SARS-CoV and MERS-CoV, other acute lung-injury causing diseases
  - SARS-CoV-2 is most closely related to SARS-CoV
Consensus Hierarchy

Most Resistant

- Geobacillus stearothermophilus
- Bacillus subtilis
- Bacillus anthracis

- Hypro Technical kills the Bacillus Subtilis with a certitude of > log 3.18

Most Susceptible

- Novel coronavirus (2019-nCoV)
- MERS-SARS

Report: Decon-X effect on bacteria and viruses Created by Decon-X microbiologist Lars Corlin Christensen
Globally, as of 9:45am CEST, 7 May 2020, there have been 3,634,172 confirmed cases of COVID-19, including 251,446 deaths, reported to WHO.
Physical and chemical resistance of the virus

- In the absence of any ventilation, SARS-CoV-2 remains viable in aerosols for 3 hours, with median half-life 1.1-1.2 hours
  - Aerosols differ from droplets because of their smaller size, which allows them to stay suspended in the air for much longer
- SARS-CoV-2 was most stable on plastic and stainless steel, with viable virus detected up to 72 hours (median half-life of 5.6 hours on steel and 6.8 hours on plastic) in the absence of any intervention (eg. no disinfection of surfaces).
- No viable virus could be measured after 4 hours on copper and after 24 hours on cardboard.
- Importantly, on all surfaces and in the air, exponential decay in virus titer was recorded over time.
The Importance of Environmental Decontamination

- flat surfaces (bedside tables, locker tops,...) are cleaned more often than small vertical surfaces, i.e. door handles and light switches
- walls and electronic equipment are not routinely cleaned but can still harbor potential pathogens
- organisms such as MRSA/MRSE, C. difficile, *Acinetobacter* and Vancomycin-Resistant Enterococci (VRE) can persist on surfaces in the environment – even after discharge cleaning – for significant periods of time, facilitating their transmission between people, patients, staff and the environment
The importance of the disinfection management: THE OPTIONS

- Strict hand hygiene
- Importance of masks
- Manual cleaning
- Air disinfection
- Surface disinfection
- Whole “room” disinfection
  - H2O2 Nebulisation
  - UV Disinfection Robot
  - UV Lamps
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Cleaner air means cleaner surfaces and hands

- Hand hygiene and surface disinfection have long been the international gold standard for infection control in “healthcare environments”.
- But as our hospitals/hotels/venues become more crowded, infections become harder to treat, and costs become unmanageable, **traditional protocols need reinforcement.**
Close Loop Disinfection

**BODY**
- **GETTING CONTAMINATED:** Breathing, Touching
- **SPREADING CONTAMINATION:** Coughing, Sneezing, Talking, Breathing, Touching, Shedding

**HAND**
- **GETTING CONTAMINATED:** Touching surface/body, Contaminated Air settling
- **SPREADING CONTAMINATION:** Touching

**SURFACES**
- **GETTING CONTAMINATED:** Contaminated Air settling, Touching
- **SPREADING CONTAMINATION:** Re-suspension, Touching
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Different types of masks exist
Surgical Masks vs. FFP2

- **Surgical masks (3-PLY)** are loose fitting, covering the nose and mouth
  - Designed for one way protection, to capture bodily fluid leaving the wearer
  - Example – worn during surgery to prevent coughing, sneezing, etc on the vulnerable patient
- Surgical masks are NOT designed to protect the wearer
- they do not protect against airborne infectious agents such as viruses
  - they will not prevent the wearer from being potentially infected by COVID-19.
- Respirators are tight fitting masks, designed to create a facial seal
  - **Non-valved respirators** provide good two way protection, by filtering both inflow and outflow of air
  - **Valved respirators** will only protect the individual wearing it but should never be given to a possible patient, as it will not protect the environment
- protects the wearer from aqueous and oily aerosols, smoke, and fine dust
  - is also more effective at protecting against airborne infectious agents such as COVID-19 and SARS
Filter Capacity
removes x% of all particles that are 0.3 microns -300 nm- in diameter or larger

N95 (95%) = FFP2 / P2 (94%)
N99 (99%) = FFP3 (99%)
N100 (99.97%) = P3 (99.95%)

• The most commonly discussed respirator type is N95. This is an American standard managed by NIOSH – part of the Center for Disease Control (CDC).

• Europe uses two different standards. The “filtering face piece” score (FFP) and the P1/P2/P3 ratings. Both standards are maintained by CEN (European Committee for Standardization).
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The importance of the disinfection management (cont’d)

- **Cleaning** is an essential **first step** prior to any disinfection process
  - the use of a neutral detergent solution is essential for effective cleaning
    - removes dirt
    - prevents the build-up of biofilms
  - disinfectants must be prepared and diluted according to the manufacturer’s instructions
    - too high and/or too low concentrations reduce the effectiveness of disinfectants
    - high concentrations of disinfectants may damage surfaces
  - always start:
    - from the cleanest areas to the dirtiest ones
    - from higher to lower levels
The importance of the disinfection management: THE OPTIONS

- Strict hand hygiene
- Importance of masks
- Manual cleaning
- **Air disinfection**
- Surface disinfection
- Whole “room” disinfection
  - UV Disinfection Robot
  - UV Lamps
  - H2O2 Nebulisation
Novareus Protect 1050

- Has been independently tested and shown effective at reducing MS2 Bacteriophage, a surrogate for SARS-CoV-2 (COVID-19), by 99.99% in 15 minutes.

- Designed for continuous cleaning of the air in large spaces and rapid remediation in situations with a high risk of infection,
  - patented ultra-low energy plasma technology
  - combined with a triple-stage filtration system from Camfil®.
  - is a non-selective, rapid killing technology, it offers a unique and safe solution to kill airborne viruses 24/7, reducing the risk of disease and infectious outbreaks
The importance of the disinfection management: THE OPTIONS

- Strict hand hygiene
- Importance of masks
- Manual cleaning
- Air disinfection
- **Surface disinfection**
- Whole “room” disinfection
  - UV Disinfection Robot
  - UV Lamps
  - H2O2 Nebulisation
## Choice of the disinfection products

### EVALUATION of the PRODUCTS CHEMISTRY

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**Moderate**: 3-4
**LOW**: 1-3
**BROAD**: 10-9
**HIGH**: 11-15
**NA**: Not applicable
4. Choice of the disinfection products (cont’d)

<table>
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<tr>
<th>Chemical Disinfectants</th>
<th>Acids (hydrochloric acid, acetic acid, citric acid)</th>
<th>Alcohols (ethyl alcohol, isopropyl alcohol)</th>
<th>Alddehydes (formaldehyde, paraformaldehyde, glutaraldehyde)</th>
<th>Alkalis (sodium or ammonium hydroxide, sodium carbonate)</th>
<th>Biguanides (chlorhexidine, N,N,N',N'-tetraethyl-3,4-dihydroxypropylbiguanide, Virosan, Virosan, Hibitor)</th>
<th>Halogens (hypochlorite, iodine)</th>
<th>Oxidizing Agents (hydrogen peroxide, peroxycylic acid, Tectatrain, Wilkin-S, Oxy-Sept 3337)</th>
<th>Phenolic Compounds (Lyosol, Cynet, Aniphyl, Tektor, Pheno-fok’s)</th>
<th>Quaternary Ammonium Compounds (Boccal, Zephalin, Diquat, Farvosol, D-226)</th>
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**LEGEND**
- ++: highly effective
- +: effective
- : no activity
- : limited activity
- N: information not available

Note: Removal of organic material must always precede the use of any disinfectant.
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The Importance of Environmental Decontamination

- there has been an increased interest in the development of new „whole-room“ environmental decontamination technologies (3)

- Whole Room Disinfection is the ability of a given disinfection technology to thoroughly reach all surfaces, nooks and crannies in a room or given space that it is intended to disinfect.
  - supplement of standard cleaning and infection control procedures
  - aim: providing enhanced hygiene

- Best results are shown with H₂O₂ decontamination
  - Log 3-5 reduction (killing 99.9% up to 99.999% of all micro-organism in the room)
  - Non corrosive, non-toxic, no residues, environmental friendly (H₂O₂=O₂+H₂O)
Whole Room Disinfection
UV Disinfection

- Ultraviolet or UV light comes in three varieties.
  - UVA causes changes to skin pigmentation
  - UVB alters the DNA of the skin and is the component of sunlight that can lead to skin cancer.
  - UVC light is more dangerous. UVC affects the DNA and RNA of all organisms, including micro-organisms, and can be deadly.
    - UVC cannot be used on the human body to combat a virus, as it would kill the host as well.
    - It can be used to clean empty spaces, and is in common use for operating rooms, water supplies and passenger aircraft.
Conclusion

- Strict hand hygiene - Alcohol gels everywhere
- Importance of masks - for Staff and Personal (Guests?)
- Manual cleaning – with strict protocol (all surfaces horizontal and vertical)
- Air disinfection – should be on a continuous basis
- Surface disinfection – Should be implemented after manual cleaning
- Whole “room” disinfection (After each stay of a guest?)
  - H202 Nebulisation
  - UV Disinfection Robot
  - UV Lamps
- Every day clinical testing of the personal/staff before entering the hotel?
  - Covid 19 rapid test
- Air-conditioning and filter replacement
- Testing of the hotel guest before entering the hotel?