Cleaning & Disinfection:
What is the new norm?

CHICA-EO
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OUTBREAKS IN THE NEWS

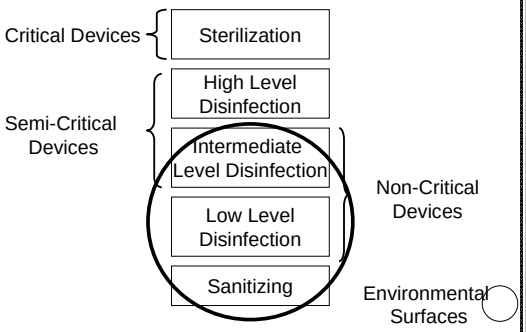
THE BOTTOM LINE

- Hospital executives believe the number of inpatients that acquire an HAI is far smaller than the actual rate
- A study of 1.69 million admissions from 77 hospitals four that patients with an **HAI reduced net margins by $286 million or $5 018 per infected person**.
- Last-minute absenteeism can cost employers in direct payroll losses, lost productivity, and staff morale
- A 2005 survey found that while the rate of unscheduled absenteeism barely budged since last year, the average per-employee cost has risen to **$660 per employee – costing some large employers over $1 million per year**

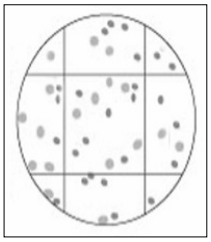
ON THE SAME PAGE

Terminology, Definitions, Common Words, Guidelines

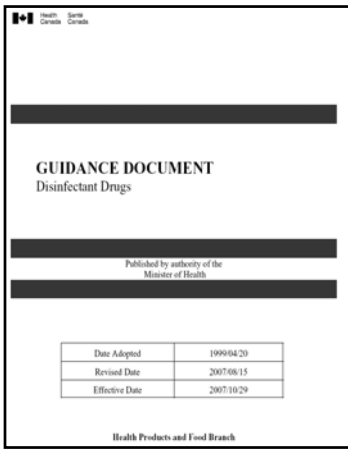
PROCESS FOR CHOOSING A DISINFECTANT



DID YOU KNOW?

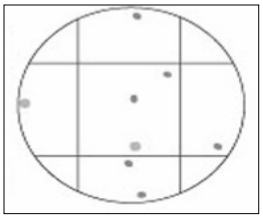


- Cleaning reduces or eliminates the reservoirs of potential pathogenic organisms
- Proper cleaning methods & the mechanical action of cleaning alone will physically remove 99 to 99.9% of organisms on a surface
- Cleaning alone will make most surfaces safe for staff, students or patients



The "Bible" for Registration of Disinfectants in Canada

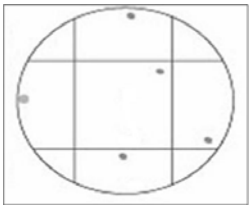
DEFINITION: SANITIZER



- **TPD:** A product that reduces the level of microorganisms present by significant numbers or to acceptable levels established by federal or provincial health authorities.

- Infection Control Guidelines refers to sanitizing as a process that reduces microorganisms on an inanimate object to a safe level

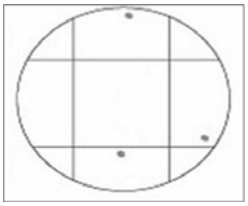
DEFINITION: LOW LEVEL DISINFECTANT



- **TPD:** A product that kills pathogenic and potentially pathogenic microorganisms on hard non-porous inanimate surfaces or inanimate objects when used according to labeling.

- Infection Control Guidelines refers to the level of disinfection required when processing noncritical items or some environmental surfaces and kills most vegetative bacteria and some fungi as well as enveloped viruses but not mycobacteria or bacterial

DEFINITION: INTERMEDIATE LEVEL DISINFECTANT



- **TPD:** A disinfectant that kills all microbial pathogens, except bacterial endospores, when used according to labeling.

o Infection Control Guidelines refers to disinfectant that kills vegetative bacteria, most viruses and most fungi but not resistant bacterial spores.

DEFINITION: HIGH LEVEL DISINFECTANT

- TPD: A disinfectant that kills all microbial pathogens, except large numbers of bacterial endospores, when used according to labeling.
- Infection Control refers to a process which destroys vegetative bacteria, mycobacteria, fungi, envelope and non-enveloped viruses, but not necessarily bacterial spores

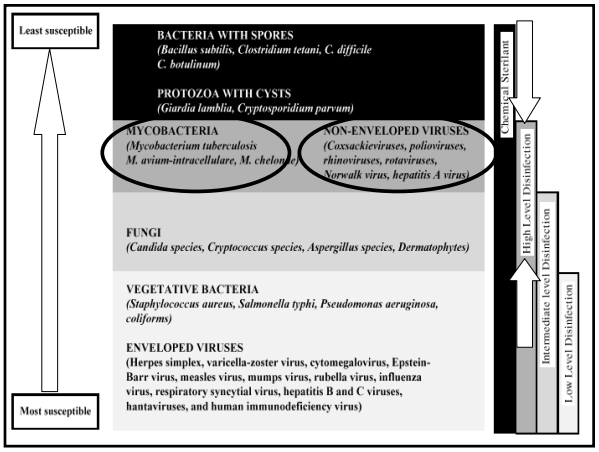
DEFINITION: CHEMOSTERILIZATION

- TPD: A disinfectant which helps achieve sterilization. A product classified as a Critical Sporicide.
- Infection Control refers to sterilization as the process that destroys all forms of microbial life including bacteria, viruses, spores and fungi.

MICROBIAL KILL SUMMARY

	Sanitizers*	LLD	ILD	HLD	Chemical Sterilants
Enveloped Viruses		**3 Log / 99.9%**	**3 Log / 99.9%**		
Vegetative Bacteria	**3 Log / 99.9%**	**6 Log / 99.9999%**	**6 Log / 99.9999%**		
Fungi		*5 Log / 99.999%*	**5 Log / 99.999%**	**5 Log / 99.999%**	**5 Log / 99.999%**
Non-Enveloped Viruses		*3 Log / 99.9%*	*3 Log / 99.9%*		
Mycobacteria			**4 Log / 99.99%**	**6 Log / 99.9999%**	**6 Log / 99.9999%**
Spores				**6 Log / 99.9999%**	**6 Log / 99.9999%**

*Food Contact Sanitizer requires 5 Log or 99.999%



DISINFECTANTS: DESIRED TRAITS & LIMITING FACTORS

BASIC FACTS

- Disinfectants are the backbone of Infection Control
- >8000 Products registered in the U.S. & Canada
- 50% of which are used for Healthcare Infection Control
- There are 300 different active chemistries
  - 14 are in 95% of the disinfectant products
  - 6 are the most common
    - Chlorine, Quaternary Ammonium Compounds, Phenolics, Alcohol, Aldehydes

FACTORS AFFECTING DISINFECTANTS

TRUE or FALSE:

The manufacturer's recommended contact time and dilution rate does not need to be adhered to in order to achieve disinfection?

FALSE!

Next Slide

REGISTRATION

- Government registered by Health Canada (DIN)
- Easy to Use with clear label instructions
  - Dilution to be used
  - Contact time required
  - Required Personal Protective Equipment
  - Disposal information

MICROBIOLOGICAL

- Detergency properties for cleaning
- Not Readily Neutralized in Organic or Inorganic Matter
- Microorganism Resistance will not develop
- Broad-Spectrum & Fast Acting Germicidal Activity

CHEMISTRY COMPARISONS

	Alcohols	Chlorine	Phenolics	QUATs	AHP
Must have good cleaning ability to remove organic soil load on surface.	**Unfavourable:** Alcohols are not effective cleaners as they do not contain detergency properties	**Unfavourable:** Chlorine can be inactivated by a soil load and do not contain detergency	**Unfavourable:** Phenolics are ineffective cleaners	**Unfavourable:** Quaternary Ammonia Compunds are not effective cleaners	**Favourable:** AHP contains a combination of superior surfactants that are proven effective cleaners in
Is effective in a soil load.	**Unfavourable:** Testing is done with no soil load.	**Unfavourable:** Neutralized by soil.	**Favourable:** Testing is done with a soil load	**Unfavourable:** Testing is generally done without a soil	**Favourable:** Testing is done with a soil load.
Will not lead to development of resistant organisms	**Favourable:** Active ingredient evaporates	**Favourable:** Active ingredient evaporates	**Unfavourable:** Leaves active ingredient residual on surface	**Unfavourable:** Leaves active ingredient residual on surface	**Favourable:** Active ingredient hydrogen peroxide evaporates from surface

CHEMISTRY COMPARISONS

	Alcohols	Chlorine	Phenolics	QUATs	AHP
Vegetative Bacteria	**YES**	**YES**	**YES**	**YES**	**YES** 30 sec to 20 min
Enveloped Viruses	**YES**	**YES**	**YES**	**YES**	**YES** 1 min to 5 min
Fungi	**YES**	**YES**	**YES**	**YES**	**YES** 3 min to 5 min
Non-Enveloped Viruses	**NO**	**YES**		**NO**	**YES** 1 min to 5 min
Mycobacteria	**YES**	**YES**	**YES**	**ONLY WITH SOLVENT OR ALCOHOL**	**YES** 1 min to 5 min
Bacterial Spores	**NO**	**YES** 10 min	**NO**	**NO**	**YES** 10 min

FACTORS AFFECTING DISINFECTANTS

TRUE or FALSE: The following can cause an adverse affect to the efficacy of a disinfectant?

- pH
- Water Quality
- Temperature
- Dirty Surface
- Shelf Life

TRUE!

Next Slide

CHEMICAL

- Safe to Transport & Easy to Store
  - Improper storage of disinfectants may lead to explosions or fires
- Long Shelf Life
  - Improper or prolonged storage of disinfectants may lead to growth of bacteria in them
- Non-Corrosive & Material Compatible
  - Using the wrong type or level of disinfectant may cause corrosion or other damage to expensive items such as flexible endoscopes

CHEMICAL PROFILE

	Alcohols	Chlorine	Phenolics	QUATs	AHP
Does not have storage limitations	**Unfavourable:** Flammable	**Unfavourable:** Highly reactive with other chemicals creating toxic by-products	**Unfavourable:** Toxicity poses risk for water and food contamination. Cannot be used around	**Favourable:**	**Favourable:** Non-flammable or combustible
Realistic Shelf life and stabilty	**Unfavourable:** Readily evaporates decreasing concentration	**Unfavourable:** Readily degrades once open, diluted product must be made fresh	**Favourable:** Relatively stable in both concentration and Use Dilution	**Favourable:** Relatively stable in both concentration and Use Dilution	**Favourable:** Stable in concentrate and Use Dilution
Compatible with a wide variety of surfaces and materials	**Favourable:** Concerns with plastics and glues	**Favourable:** Concerns with stainless steel and fabric materials	**Favourable:** Concerns with residue build up on vinyl	**Favourable:** Concerns with residue build up or Quat burn on some flooring and vinyl	**Favourable:** Concerns with prolonged exposure to copper and brass

TOXICITY

- Non-Toxic to humans & animals
- Non-Allergenic & non-sensitizing
- Non-Hormone disruption
  - Certain microbicidal chemicals or their breakdown products can disrupt hormone function in humans & animals
- Safe for the User and Patient
  - Exposure to cleaner & disinfectant vapours may cause respiratory sensitization
  - Improperly rinsed endoscopes or other devices may release residues of disinfectants into body cavity

HEALTH & SAFETY

	Alcohols	Chlorine	Phenolics	QUATs	AHP
Indoor Air Quality (VOCs)	**Unfavourable:** Contains high levels of VOCs which contribute to poor indoor air	**Unfavourable:** Creates high levels of VOCs through reactions with surface and	**Unfavourable:** Contain VOCs; Toxicity poses risk for water and food contamination	**Unfavourable:** Contain VOCs;	**Favourable:** Contains no VOCs
Does not contain hormone disrupting or carcinogenic chemicals	**Favourable:** Does not contain APEs / NPEs	**Unfavourable:** Highly reactive creating toxic / carcinogenic	**Unfavourable:** Phenolic Compounds have been found to be	**Unfavourable:** Many formulations contain APEs / NPEs	**Favourable:** Does not contain APEs/NPEs ; is not carcinogenic
Will not lead to development of resistant organisms	**Favourable:** Active ingredient evaporates	**Favourable:** Active ingredient evaporates	**Unfavourable:** Leaves active ingredient residual on surface	**Unfavourable:** Leaves active ingredient residual on surface	**Favourable:** Active ingredient hydrogen peroxide evaporates from surface

ENVIRONMENTAL

- Environmentally sound (Biodegradable)
  - Environmentally-stable sanitizers & disinfectants can contaminate food or water (groundwater & surface water)
- No Active Residual Chemistry
- Good Air Quality
  - Free of any pungent smell
  - No Volatile Organic Compounds (VOCs)
  - Use of gaseous or volatile products may negatively affect indoor air quality
  - Fragrance Free

ENVIRONMENTAL SUSTAINABILITY

	Alcohols	Chlorine	Phenolics	QUATs	AHP
Positive environmental profile including indoor air quality.	**Unfavourable:** Contains high levels of VOCs which contribute to poor indoor air	**Unfavourable:** Creates high levels of VOCs through reactions with surface and	**Unfavourable:** Contain VOCs; Toxicity poses risk for water and food contamination	**Unfavourable:** Contain VOCs; often contain hormone disruptors	**Favourable:** Contains no VOCs and no hormone disruptors
Will not lead to development of resistant organisms	**Favourable:** Active ingredient evaporates	**Favourable:** Active ingredient evaporates	**Unfavourable:** Leaves active ingredient residual on surface	**Unfavourable:** Leaves active ingredient residual on surface	**Favourable:** Active ingredient hydrogen peroxide evaporates from surface
Carries EcoLogo or Green Seal Certification	**Unfavourable:** Does not meet certification criteria	**Unfavourable:** Does not meet certification criteria	**Unfavourable:** Does not meet certification criteria	**Favourable:** Only1 product meets Canada's EcoLogo criteria	**Favourable:** Received certifications by EcoLogo and Green Seal

UNDERSTANDING THE LABEL

TPD: DISINFECTANT DRUGS

- Clearly outlines the requirements of what must be included on a label
  - Name of Product & Manufacturer
  - DIN must be on the main panel
  - Active Ingredients
  - Intended Use
  - Net contents
  - Lot Number & Expiry Date
  - Precautionary symbols and cautionary statements

TPD: DISINFECTANT DRUGS

- Label requirements continued:
  - Claims
  - Area or Site of Use
  - Directions for Use
    - Specific directions for preparing in-use dilution including ratios or metric units
    - Reference to level of hardness of product diluent at time of testing
    - Pre-cleaning or cleaning requirements
    - Contact Times
    - Temperature
    - Stability of diluted or in-use product

TPD: DISINFECTANT DRUGS

- Label requirements continued:
  - Rinse procedures
  - Directions for Use for intended use against bloodborne pathogens
    - Reference to PPE
    - Directions for disposal of infectious waste

A BIT ABOUT THE ENVIRONMENT

(WHAT MIGHT SHOCK YOUR MOTHER!)

POROUS VS NON-POROUS SURFACES

- Transfer rates from hard, nonporous surfaces is more efficient than from porous surfaces
- Porous surfaces (ie sponge) offers many deep recesses in which organisms reside and become less accessible to the human hand
- Hard smooth surfaces do not offer crevices hence higher transmission

FOMITES & INFECTION TRANSMISSION

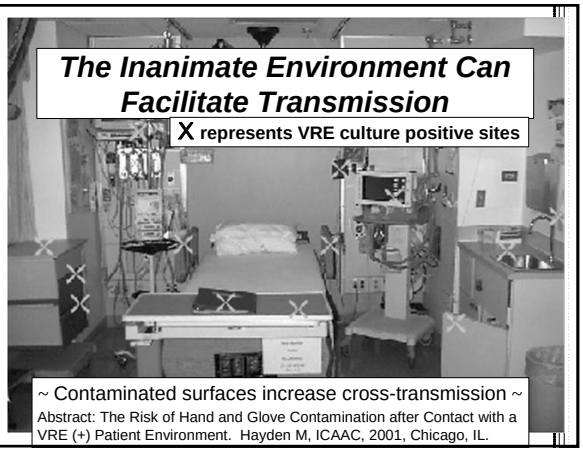
- Gram Positive bacteria (VRE, MRSA, *Streptococcus spp*.) can survive for months on surfaces
- No obvious difference in survival between multiresistant and susceptible strains of *Staphylococcus aureus* or *Enterococcus spp.*
- *S. aureus* found to persist longer at lower humidities

FOMITES & INFECTION TRANSMISSION

- Gram Negative species such as *Acinetobacter spp*., *E. coli*, *Klebsiella spp*., and *Pseudomonas aeruginosa* can survive on inanimate objects for months
- Gram Negative species persist for longer periods than Gram Positive
- Humid conditions increase survival times

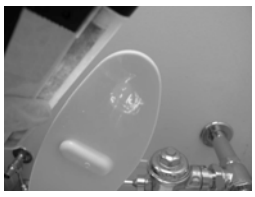
TRANSMISSION TO HANDS

- 100% success rate with *E. coli*, *Salmonella spp.* and *S. aureus*
- 90% with *Candida albicans*
- 61% with Rhinovirus
- 22% – 33% with HAV
- 16% with Rotavirus
- Contaminated hands can be the source of recontaminating the surface
- Compliance rates with HCWs in HH is ~50%

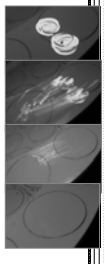


VERIFICATION OF CLEANING

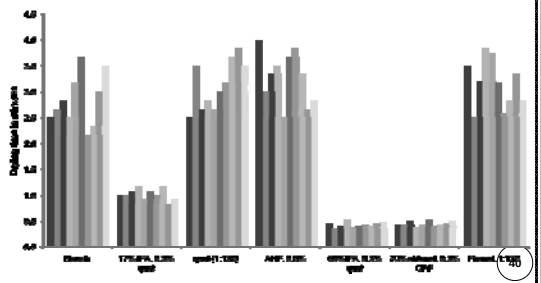
Average Cleaning score:
Semi-quantitative assessment of cleaning based on UV marker removal → 0 indicates complete cleaning, 3 indicates no cleaning



"UV water soluble mark"

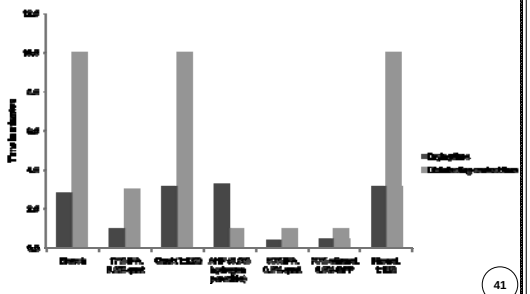


DRYING TIME FOR DIFFERENT DISINFECTING CHEMISTRIES



40

DRYING TIME VERSUS DISINFECTING CONTACT TIME



41

CHEMISTRIES THAT DRY BEFORE THEY ACHIEVE KILL

Chemistry	Dry time	Label claim	*Staphylococcus aureus*	*Pseudomonas aeruginosa*	*MRSA*
17% IPA, 0.3% quat	1 min	3 min	5.9	6	3.7
Quat (1:128)	3 min	10 min	<2	<2	<2
60% IPA, 0.3% quat	30 sec	1 min	<2	<2	<2
70% ethanol, 0.3% OPP	30 sec	1 min	1.59	<4	5.13
Phenol, 1:128	3 min	10 min	<2	2.52	<3

Quantitative carrier test, tier II, using 5% soil load at room temperature

42

CHEMISTRIES THAT MARGINALLY KILL BEFORE THEY DRY

Chemistry	Dry time	Label claim	*Staphylococcus aureus*	*Pseudomonas aeruginosa*	*MRSA*
Bleach, 1:100	3 min	10 min	6	5.9	6

Quantitative carrier test, tier II, using 5% soil load at room temperature

43

CHEMISTRIES THAT ACHIEVE KILL BEFORE THEY DRY

Chemistry	Dry time	Label claim	*Staphylococcus aureus*	*Pseudomonas aeruginosa*	*MRSA*
0.5% AHP	3 min	1 min	6.67	7.13	6.3

Quantitative carrier test, tier II, using 5% soil load at room temperature

44

CONCLUSIONS

DISINFECTANT SELECTION

Remember:

- Match Product with Protocol
  - Surfaces vs Instruments
- Cleaning = 1st step
- Disinfection = 2nd step
- Contact Time is **MANDITORY!**

TEAM

- Controlling Infectious Disease is everybody's business
- Environmental Services department plays an important role in closing the gap in Infection Control
- Engage all personnel from every department

VIROX TECHNOLOGIES INC.

Engineering Revolutionary Disinfectants for the War Against Microbes

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