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AORN Recommended Practices for Environmental Cleaning (2014)



APIC Chapter 057 - San Diego
and Imperial County

- Describe the importance of a clean environment.
- Define common terminology.
- Explain the levels for cleaning.
- Describe the recommended practices for using disinfectants, tools, and equipment.



Lakeridge
Health

Clean!

- Think about the word “clean”
- What does it mean to you?



People

- Everything that we do has an impact on people
- The quality of the environment impacts the health and wellbeing of people

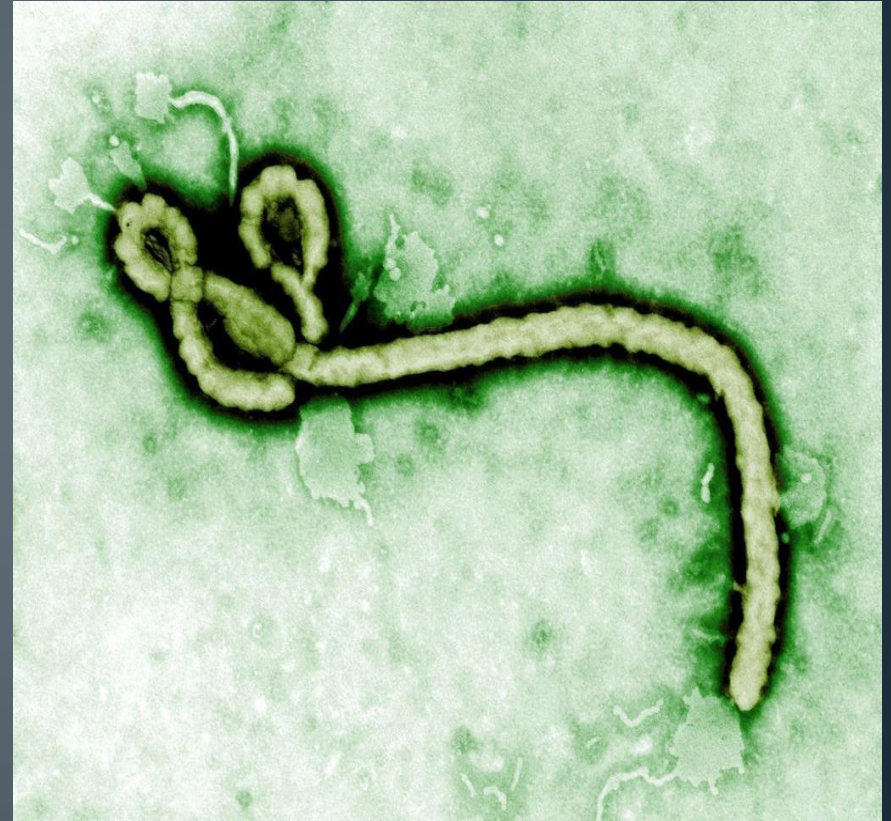


The Environment

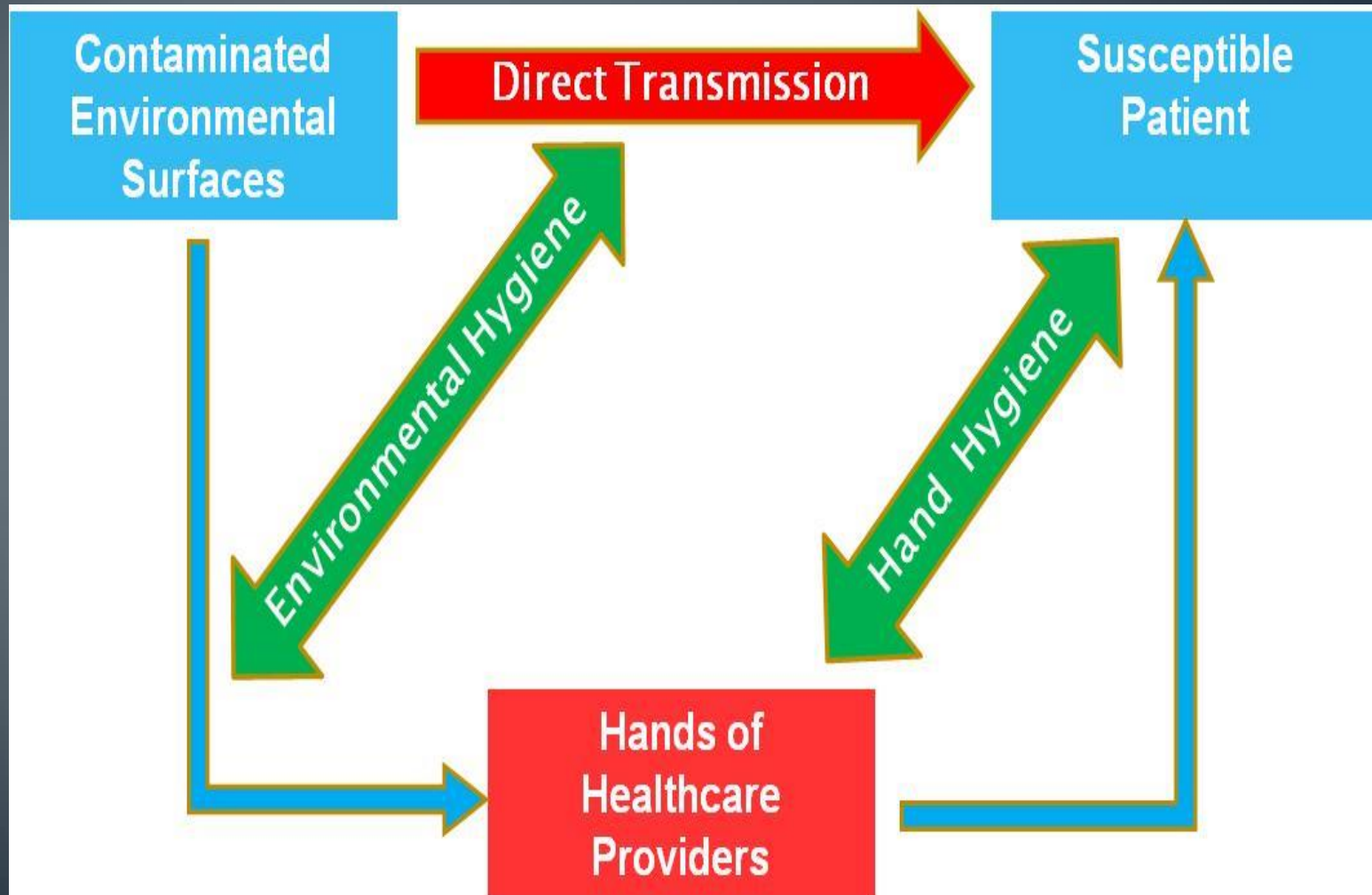
- We spend the majority of our time indoors (90%)
- The care given to the indoor environment has a significant impact on the well-being of people
- How we clean and how we dispose of cleaning products significantly impact the environment



Clean vs. Cleanliness



Mechanism of Transmission of Pathogens in Healthcare

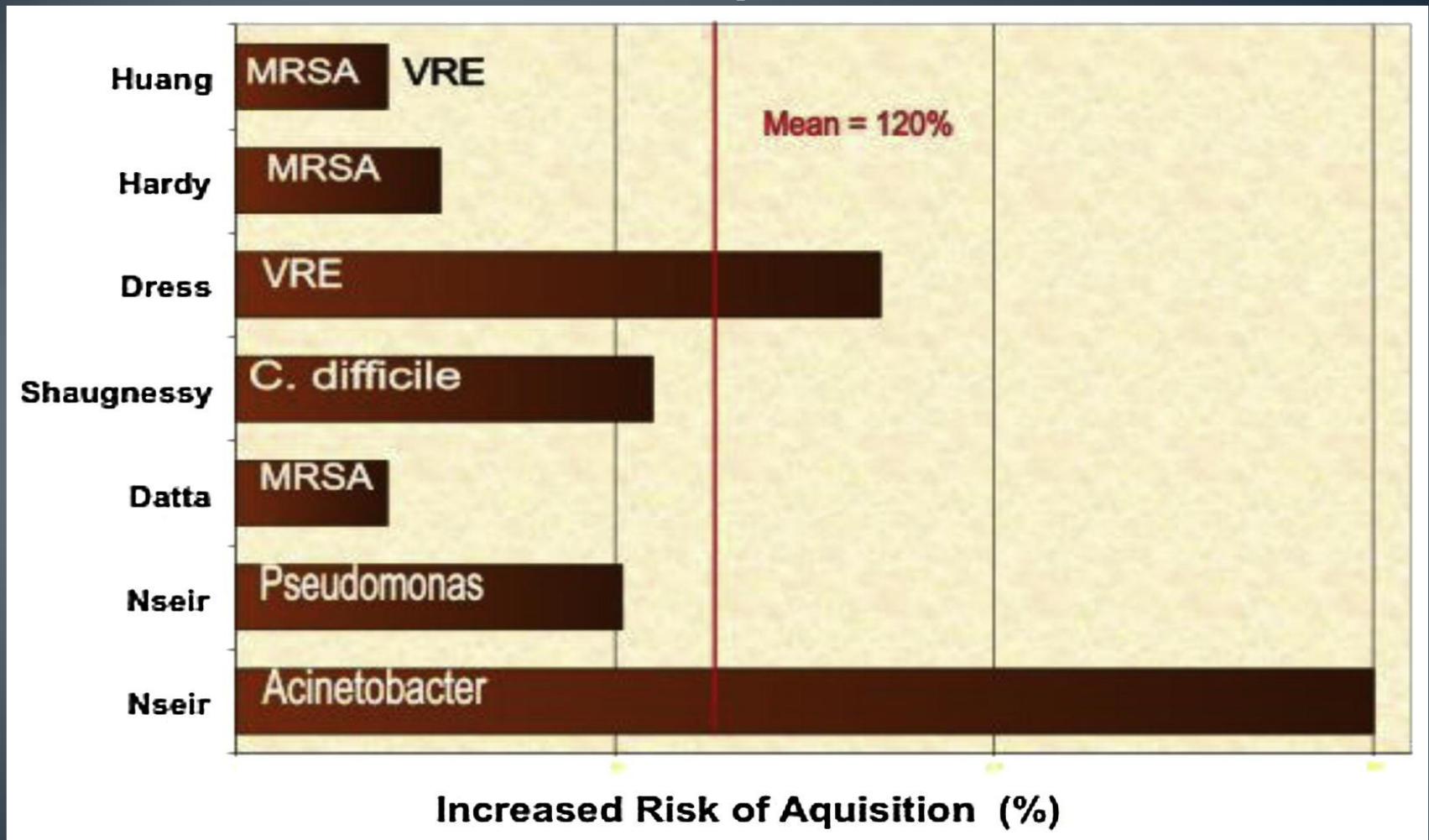


Survival of Microorganisms on Environmental Surfaces

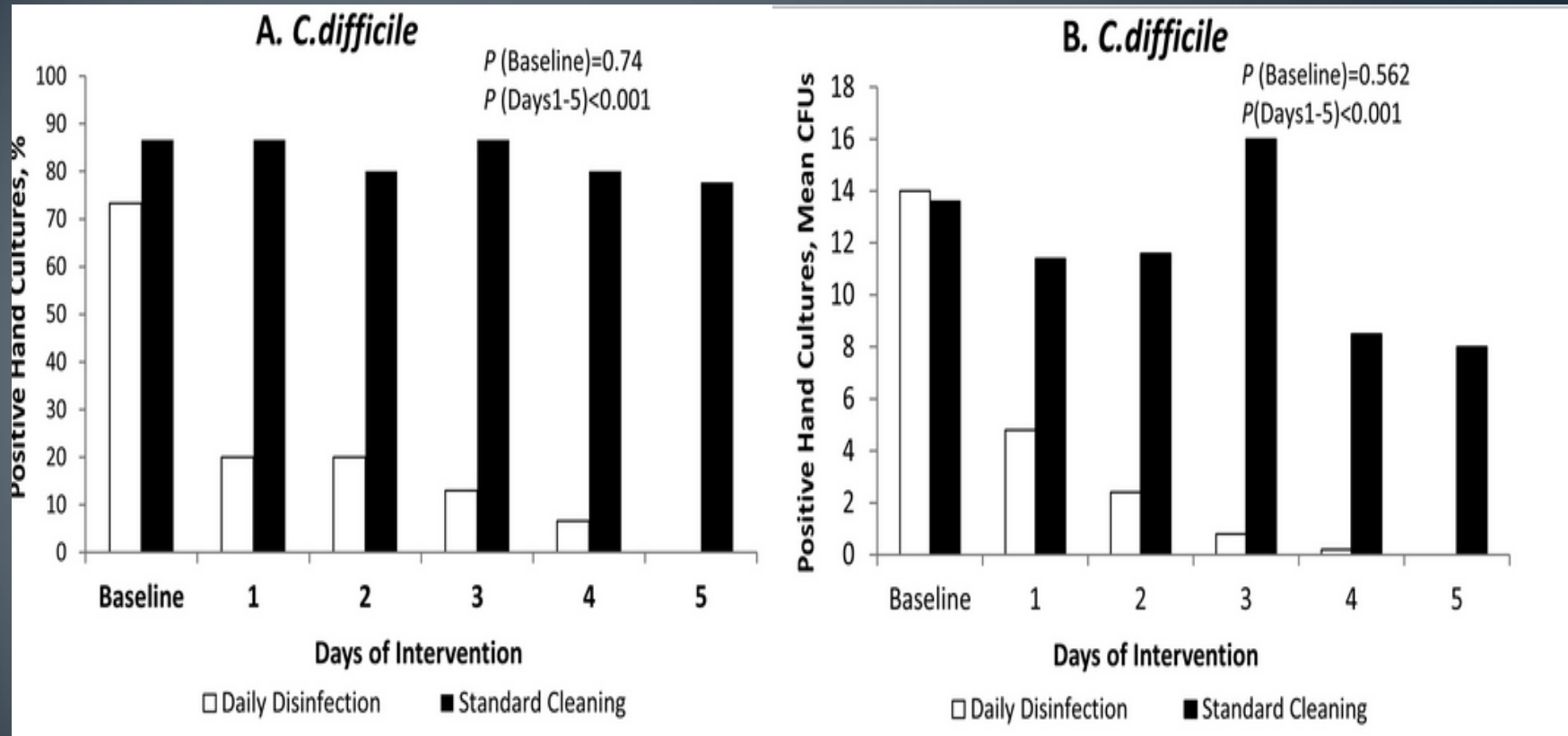
Microorganism	Survival
MRSA	7 months
<i>C. Difficile, Acinetobacter</i>	5 months
VRE	4 months
Adenovirus, Rotavirus	3 months
Norovirus	2-3 weeks
SARS, HIV, Influenza	Days to a week

Fig 1

Increased HAP Acquisition Risk from Prior Room Occupant

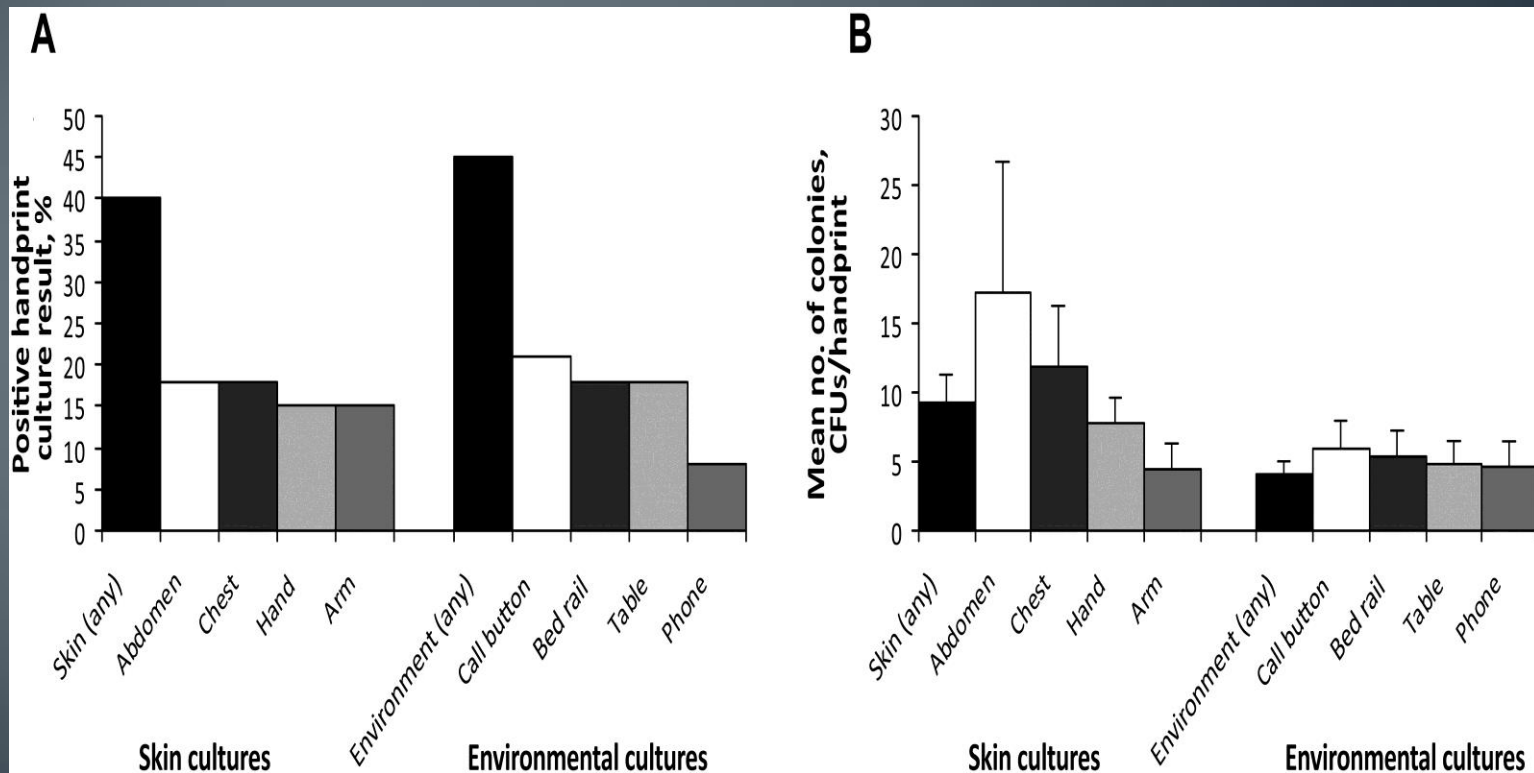


Impact of Daily Cleaning on Contamination of Healthcare Personnel Hands



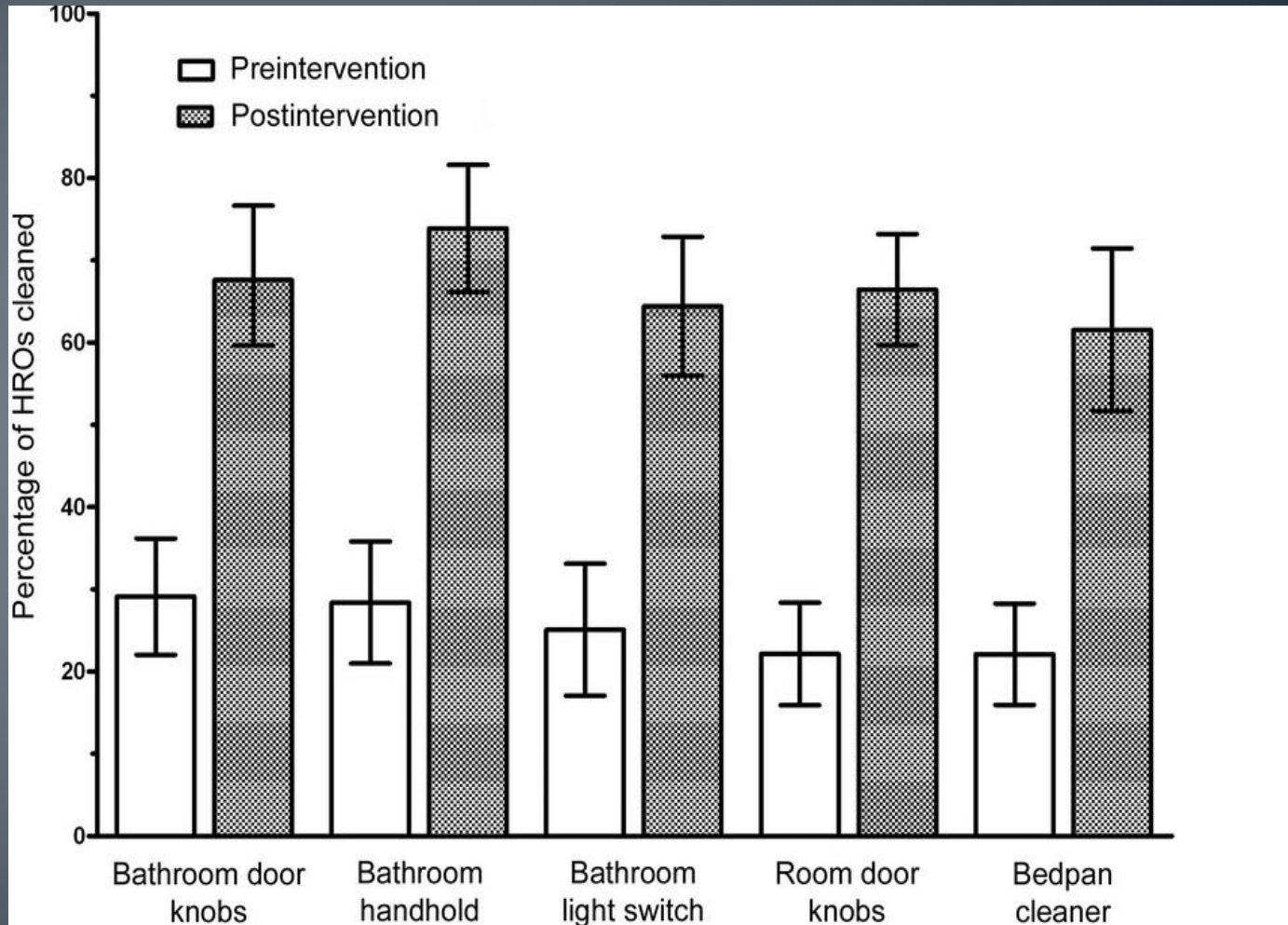
Kundrapu S, Sunkesula V, Jury LA, Sitzlar BM, Donskey CJ. Daily disinfection of high-touch surfaces in isolation rooms to reduce contamination of healthcare personnel' hands. *Infect Control Hosp Epidemiol* 2012;33:1039-42.

Acquisition of MRSA on gloved hands after contact with skin and environmental sites



Stiefel U, Cadnum JL, Eckstein BC, Guerrero DM, Tima MA, Donskey CJ. Contamination of hands with methicillin-resistant *Staphylococcus aureus* after contact with environmental surfaces and after contact with the skin of colonized patients. *Infect Control Hosp Epidemiol* 2011;32:185-7.

Comparison of pre- and post-intervention rates of cleaning for high-risk object (HRO)



Carling PC, Parry MM, Rupp ME, Po JL, Dick B, Von Beheren S. Improving cleaning of the environment surrounding patients in 36 acute care hospitals. *Infect Control Hosp Epidemiol* 2008; 29(11):1035–1041.

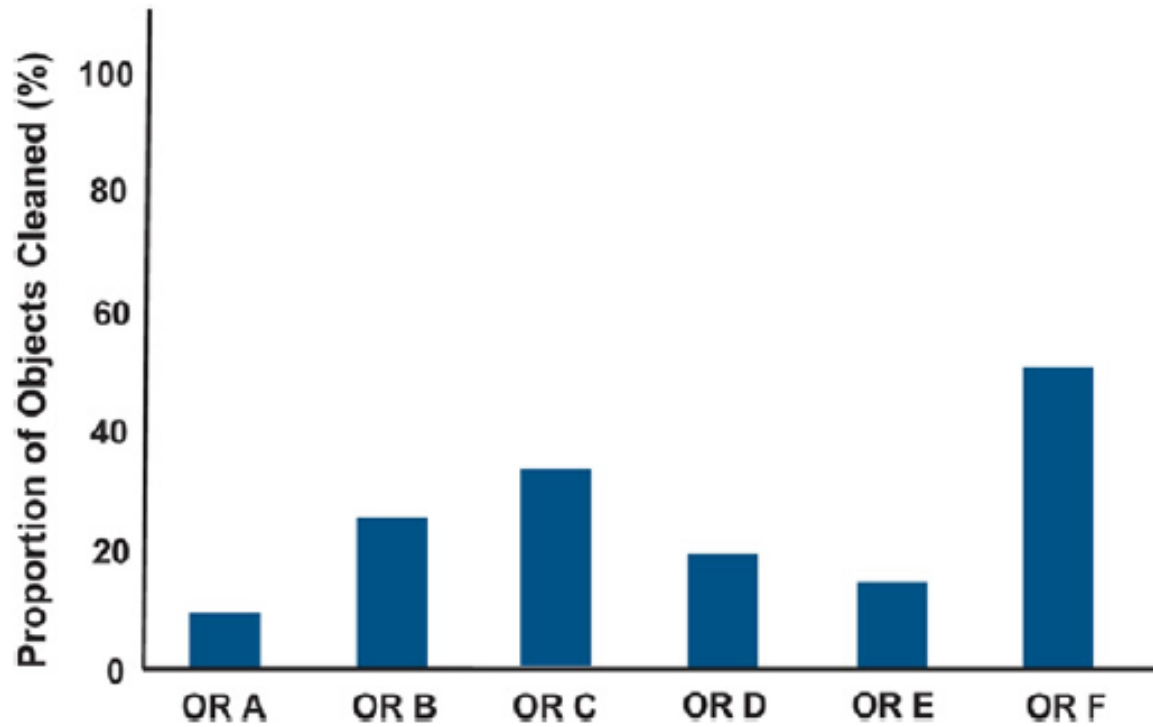


Figure 2. Thoroughness of implantation OR terminal cleaning.

- *AORN J* 93 (March 2011) 358-364.



Definitions

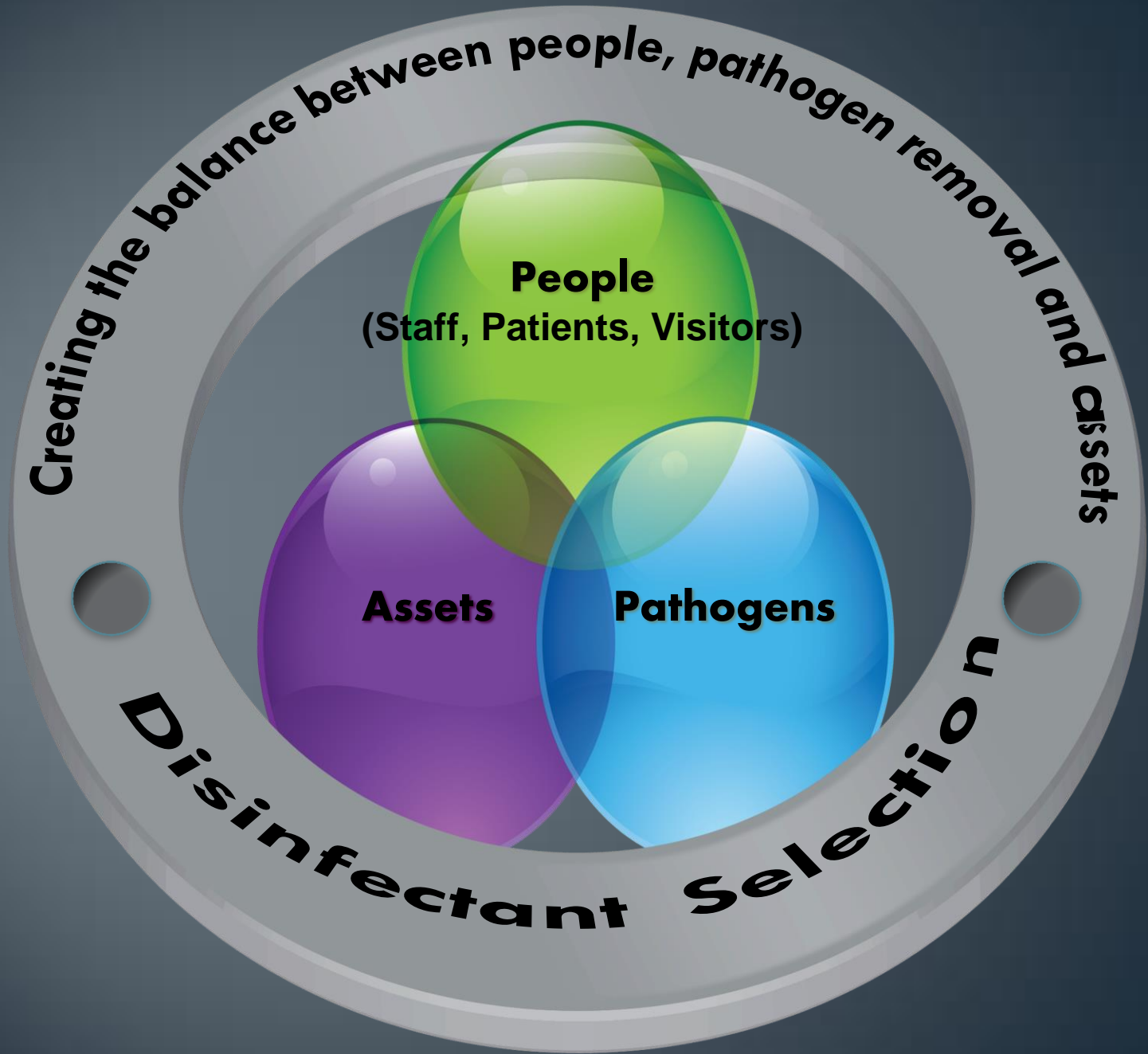
- **Clean:** the absence of visible dust, soil, debris, blood, or other potentially infectious material
- **Disinfection:** a process that kills most forms of microorganisms on inanimate surfaces
- **High-touch surfaces:** frequently touched items or surfaces

Definitions

- **Dwell time:** the amount of time required for contact of a disinfectant.
- **Terminal cleaning:** thorough environmental cleaning that is performed at the end of each day when the area is being used
- **Turnover clean:** cleaning and disinfecting done to a room between patients throughout the day

Why disinfectant?

- There is a high risk for spreading microorganism in the perioperative environment
 - common equipment used on every patient
 - team members touch the patient, touch equipment, then touch the patient again
 - patient is at higher risk for infection because of surgery





COMMENTARY

Selection of the Ideal Disinfectant

William A. Rutala, PhD, MPH;¹ David J. Weber, MD, MPH¹

Healthcare-associated infections (HAIs) remain an important cause of morbidity and mortality, with an estimated 1.7 million infections and 99,000 deaths annually.¹ A major source of nosocomial pathogens is thought to be the patient's

in the peer-reviewed literature on this topic. Disinfectant selection, or the product, is one of the 2 components for effective disinfection. The other component is thorough application such that the disinfectant

Components essential for effective disinfection:

- 1) Disinfectant selection.

- 2) Practice.

TABLE 2. Key Considerations for Selecting the Optimal Disinfectant for Your Facility

Consideration	Questions to ask	Score (1–10)
Kill claims	<p>Does the product kill the most prevalent healthcare pathogens, including those that</p> <ul style="list-style-type: none"> • Cause most HAIs? • Cause most outbreaks? • Are of concern in your facility? 	
Kill and wet-contact times	<p>How quickly does the product kill the prevalent healthcare pathogens?</p> <p>Does the product keep surfaces visibly wet for the kill times listed on its label?</p>	
Safety	<p>Does the product have an acceptable toxicity rating?</p> <p>Does the product have an acceptable flammability rating?</p> <p>Is a minimum level of personal protective equipment required?</p> <p>Is the product compatible with the common surfaces in your facility?</p>	
Ease of use	<p>Is the product odor considered acceptable?</p> <p>Does the product have an acceptable shelf life?</p> <p>Does the product come in convenient forms to meet your facility's needs (eg, liquids, sprays, refills, multiple wipe sizes)?</p> <p>Does the product work in the presence of organic matter?</p> <p>Is the product water soluble?</p> <p>Does the product clean and disinfect in a single step?</p> <p>Are the directions for use simple and clear?</p>	

TABLE 2. Key Considerations for Selecting the Optimal Disinfectant for Your Facility

Consideration	Questions to ask	Score (1–10)
Other factors	<p>Does the supplier offer comprehensive training and ongoing education, both in person and virtual?</p> <p>Does the supplier offer 24-7 customer support?</p> <p>Is the overall cost of the product acceptable (considering product capabilities, costs of infections that may be prevented, and costs per compliant use)?</p> <p>Can the product help standardize disinfectants used in your facility?</p>	

TABLE 3. Most Prevalent Pathogens Causing Healthcare-Associated Infections (HAIs)

Recommended organism (% of HAIs caused)	Why organisms are relevant
<i>Staphylococcus aureus</i> (15.6%) <i>Escherichia coli</i> (11.5%) Coagulase-negative <i>Staphylococcus</i> (11.4%) <i>Klebsiella</i> (8.0%) <i>Pseudomonas aeruginosa</i> (7.5%) <i>Enterococcus faecalis</i> (6.8%) <i>Candida albicans</i> (5.3%) <i>Enterobacter</i> species (4.7%) Other <i>Candida</i> species (4.2%) <i>Enterococcus faecium</i> (4.1%) <i>Enterococcus</i> species (3.0%) <i>Proteus</i> species (2.5%) <i>Serratia</i> species (2.1%) <i>Acinetobacter baumannii</i> (1.8%)	Most prevalent overall contributors to HAIs (NHSN/CDC) ¹¹
<i>Clostridium difficile</i> spores ^a Norovirus <i>Aspergillus</i> Rotavirus Adenovirus	Most common causes of outbreaks and ward closures by causative pathogen, which are relatively hard to kill ⁴⁰
Facility-specific pathogens, eg, <i>Burkholderia cepacia</i>	Other pathogens of concern in your facility

NOTE. CDC, Centers for Disease Control and Prevention; NHSN, National Healthcare Safety Network.

^a Over the past decade, an increasing incidence of *C. difficile* has been recognized, and in some healthcare facilities it is the most common cause of HAIs.

TABLE 5. Hierarchy of Microbial Resistance to Disinfectants and Sterilants

Microorganism	Examples
Prions	Creutzfeldt-Jakob disease agent, scrapie
Bacterial spores	<i>Bacillus</i> , <i>Geobacillus</i> , <i>Clostridium</i>
Protozoan oocytes ^a	<i>Cryptosporidium</i>
Helminth eggs ^a	<i>Ascaris</i> , <i>Enterobius</i>
Mycobacteria	<i>Mycobacterium tuberculosis</i> , <i>M. chelonae</i>
Small, nonenveloped viruses	Poliovirus, parvovirus, papilloma virus, norovirus
Protozoal cysts ^a	<i>Giardia</i> , <i>Acanthamoeba</i>
Fungal spores	<i>Aspergillus</i> , <i>Penicillium</i>
Gram-negative bacteria	<i>Pseudomonas</i> , <i>Escherichia</i>
Vegetative fungi and algae	<i>Aspergillus</i> , <i>Candida</i> , <i>Trichophyton</i>
Vegetative helminthes and protozoa ^a	<i>Ascaris</i> , <i>Giardia</i>
Large, nonenveloped viruses	Adenovirus, rotavirus
Gram-positive bacteria	<i>Staphylococcus</i> , <i>Enterococcus</i>
Enveloped viruses	Herpes, influenza, HIV, HBV

NOTE. Microorganisms are listed from the most resistant (prions) to the most susceptible (enveloped viruses) to disinfectants.¹⁷ This hierarchical scale is only a guide to microbial susceptibility of pathogens to disinfectants, and it may vary depending on several factors (see text). Modified from McDonnell and Burke.¹⁷ HBV, hepatitis B virus; HIV, human immunodeficiency virus.

^a Many of the microbes listed are not causes of healthcare-associated infections.¹⁷

Effect of Disinfectants on Microorganism



Organism	Type	
Virus (enveloped)	Virus	Influenza, HIV, HBV, HCV
Gram-positive bacteria	Bacteria	Staphylococcus including MRSA Enterococcus including VRE
Large Virus (non-enveloped)	Virus	Adenovirus Rotavirus
Gram-negative bacteria	Bacteria	<i>Acinetobacter</i> <i>Klebsiella</i> including CRE
Fungi		Aspergillus
Small Virus (non-enveloped)	Virus	Polio, Norovirus
Mycobacteria	Bacteria	<i>M. tuberculosis</i>
Bacterial Spores	Bacteria	<i>Bacillus</i> , <i>C. difficile</i>

Resistant
* Sensitive

TABLE 1. Bactericidal Activity of Disinfectants (\log_{10} Reduction) with a Contact Time of 30 Seconds or 1 Minute at 20°C with and without Fetal Calf Serum (FCS)

Organism	Oxivir TB (0.5% H ₂ O ₂)	0.5% H ₂ O ₂	CHHPCD (1.4% H ₂ O ₂)	1.4% H ₂ O ₂	3.0% H ₂ O ₂	A456-II (QUAT)
~10 ⁶ inoculum, contact time = 1 minute, no 5% FCS						
MRSA	>6.62	≤4.04	>6.54	≤4.04	≤4.04	5.55
VRE	>6.34	≤3.61	>6.13	≤3.61	≤3.61	4.58
MDR <i>A. baumannii</i>	>6.76	≤4.28	>6.76	≤4.28	≤4.28	>6.76
~10 ⁶ inoculum, contact time = 30 seconds, no 5% FCS						
MRSA	>6.64	NT	>6.64	NT	≤4.16	≤4.16
VRE	>6.28	NT	>6.28	NT	≤3.80	≤3.80
MDR <i>A. baumannii</i>	>6.76	NT	>6.76	NT	≤4.28	6.11
~10 ³ inoculum, contact time = 1 minute, no 5% FCS						
MRSA	>3.71	≤1.23	>3.71	≤1.23	≤1.23	>3.71
VRE	>3.26	1.45	>3.26	NT	1.40	>3.26
MDR <i>A. baumannii</i>	>3.53	≤1.05	>3.53	1.75	>3.53	>3.53
~10 ⁶ inoculum, contact time = 1 minute, 5% FCS present						
MRSA	>6.72	NT	>6.72	NT	≤4.24	≤4.24
VRE	>6.26	NT	>6.26	NT	≤3.78	≤3.78
MDR <i>A. baumannii</i>	>6.56	NT	>6.56	NT	≤4.08	>6.56

NOTE. Individual mean values may have the same result because the same inoculums on the same day may have been run against multiple disinfectants. If complete killing occurred, the minimum inactivation would equal the initial inoculum. Some results reported as "greater than X" because complete killing of the inoculums occurred. *A. baumannii*, *Acinetobacter baumannii*; CHHPCD, Clorox Healthcare Hydrogen Peroxide Cleaner Disinfectant; MDR, multidrug-resistant; MRSA, methicillin-resistant *Staphylococcus aureus*; NT, not tested; VRE, vancomycin-resistant *Enterococcus*.

Frequency of Cleaning

- Follow facility's policy regarding frequency of cleaning patient rooms
 - terminally clean all patient rooms terminally daily if being used
 - clean every room between patients, especially high-touch objects
 - damp dust horizontal surfaces at the beginning of the day

Types of Environmental Cleaning

- Terminal cleaning
- Damp dusting
- Turnover cleaning

Terminal cleaning

- performed every day when the room is being used
- Involves
 - cleaning and disinfecting of all exposed surfaces, including wheels and casters, of all equipment
 - cleaning and disinfecting the floor with a wet vacuum or single-use mop
 - moving equipment around the room to clean the floor underneath

Turnover cleaning

- patient rooms must be cleaned after each patient
- high-touch objects and equipment
- contamination of items that are frequently touched can lead to contaminated hands for health care personnel

Damp dusting

- use a clean, low-linting cloth moistened with disinfectant
- damp dust first thing in the morning before additional items or equipment are brought into the room
- damp dust from top to bottom
- Why damp dust?
 - removes dust from horizontal surfaces

High-touch surfaces

- anesthesia machine, carts, and equipment
- call lights
- IV poles and pumps
- OR bed
- over-bed tables
- patient beds
- patient monitors
- reusable table straps (safety straps)
- television remote controls

What must be cleaned?

- Mobile and fixed equipment
 - imaging viewers
 - patient warming equipment
 - medical gas regulators
 - radiology equipment
 - suction regulators
 - Chairs and stools
 - Furniture
 - Storage cabinets
 - Supply carts
 - Trash and linen receptacles
- Computers and accessories
 - Keyboard
 - Mouse
- Touch screen
- Door handles & push plates
- Light switches
- Telephones & mobile communication devices

Diagram 1. Copyright protected

Diagram 2. Copyright protected

Diagram 3. Copyright protected

Cleaning is Directional!

- Clean to Dirty
- Top to Bottom
- Edge to Center

Floor Cleaning

- Clean and disinfect the floor surfaces at the
 - edge of the room first
 - moving toward the center of the room
- The center of the room is where most patient care happens
 - the center is likely to be dirtier

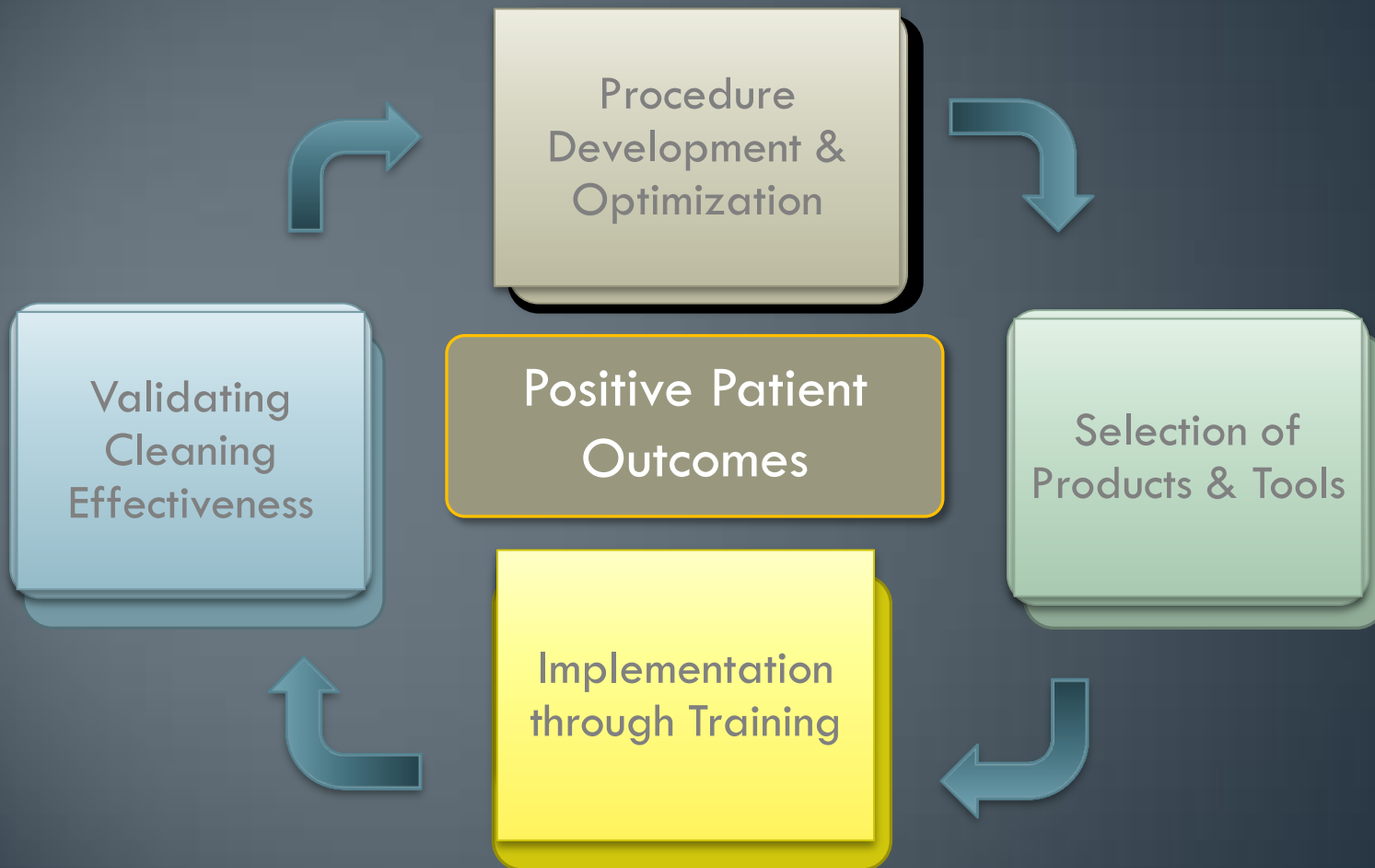
Turnover Cleaning

- Cleaning and disinfecting the preoperative/postoperative room between patients throughout the day
- This step is very important!
 - stopping the spread of microorganisms from one patient to the next
 - decreasing the amount of microorganisms in the environment
- Do not begin cleaning until the patient has left the area
- Steps in turnover cleaning
 - 1) wearing correct PPE upon entering room
 - 2) cleaning of patient care items and equipment
 - 3) removing trash and linen bags from the room

Selection of Disinfectants

- Always follow
 - your facility's policy when using cleaning and disinfecting chemicals in your facility
 - the manufacturer's instructions for use

An Evidence-Based Surface Disinfection and Cleaning Validation Program



Procedures

- Procedure Diagram: Copyright protected

- Checklist: Copyright protected

Tools and Equipment

- The tools and equipment you will use to clean your facility may vary based on what your facility provides
 - reusable or single-use mops
 - microfiber cloths
 - single-use wipes
- Do not use spray bottles for cleaning surfaces
 - they could cause germs to go into the air


Traffic in the Surgical Area

- The surgical area is composed of unrestricted, semirestricted, and restricted zones
 - traffic patterns show how the patient and team members move into, through, and out of the areas
 - signage helps clarify the requirements for what team members must wear in each area
 - defined by the activities performed in each area

Cleaning Before Disinfecting

- Cleaning of visible soil or dirt from objects is very important
 - soil and dirt can be a barrier stopping the disinfectant from working to kill germs on the surface



A man in a white dress shirt, dark tie, and dark trousers stands against a dark blue background. He is holding a large, rectangular brown sign in front of his chest. The sign has the text "That was easy!" written on it in white. The man's face is partially visible above the sign, showing his eyes and glasses. The sign is held with both hands, and the man's body is outlined in white, suggesting it might be a cutout or a stylized representation.

That was
easy!