How to Select a Disinfectant/ Wipe

Martin Kiernan
Visiting Clinical Fellow
University of West London
Clinical Director, GAMA Healthcare

@emrsa15

Antimicrobial Agents
Modes of Action

- Cellular targets of physical and chemical agents:
  - The cell wall – cell wall becomes fragile and cell lyses; some antimicrobial drugs, detergents, and alcohol
  - The cell membrane - loses integrity; detergent surfactants
  - Cellular synthetic processes (DNA, RNA) – prevention of replication, transcription; some antimicrobial drugs, radiation, formaldehyde, ethylene oxide
  - Proteins – interfere at ribosomes to prevent translation, disrupt or denature proteins; alcohols, phenols, acids, heat

Disinfection methods- Chemical

- Chlorine releasing agents
- Phenolics
- Alcohols
- Quaternary ammonium compounds
- Chloroxynols
- Chlorhexidine
- Hexachlorophane
- Triclosan
- Glutaraldehyde
- Hydrogen peroxide and related products
  - Peracetic Acid

Germicidal Categories According to Chemical Group

- Halogen Antimicrobial Chemicals
  - Fluorine, bromine, chlorine, and iodine
  - Microbicidal and sporicidal with longer exposure
  - Chlorine compounds: liquid and gaseous chlorine, hypochlorites, chloramines
    - Kills bacteria and endospores
    - Also kills fungi and viruses
    - Example: Household bleach
  - Iodine compounds: free iodine and iodophors
    - Topical antiseptic
    - Disinfectant

Chlorine-Releasing Disinfectants

Rutala WA et al. Infect Control Hosp Epidemiol 2014;35:855

- Frequently used if Clostridium difficile, Ebola virus, Norovirus or other non-enveloped viruses are of concern
- Advantages
  - Bactericidal, tuberculocidal, virucidal, and sporicidal; Fast efficacy; Inexpensive (in dilutable forms); Not flammable; Relatively stable
- Disadvantages
  - Reaction hazard with acids and ammonias; May be corrosive to metals; Affected by organic matter; Discolors/stains fabrics; May have unpleasant smell; Irritating in high concentrations; Leaves salt residue
- Major concerns now about respiratory effects on staff

Alcohols as Antimicrobial Agents

- Only ethyl and isopropyl alcohols are suitable for microbial control
- Mechanism of action depends upon concentration
  - 50% and higher dissolve membrane lipids, disrupt cell surface tension, and compromise membrane integrity
  - 50% to 90% denatures proteins through coagulation; but higher concentration does not increase microbicidal activity
  - 100% (absolute alcohol) dehydrates cells and inhibits their growth
- Does not destroy spores at room temperature but can destroy resistant vegetative forms
- More effective in inactivating enveloped than non-enveloped viruses

Hydrogen Peroxide

- Weak (3%) to strong (25%)
- Produce highly reactive hydroxyl-free radicals that damage protein and DNA while also decomposing to O2 gas – toxic to anaerobes
- Fast efficacy, easier to comply with contact times, good compatibility
- Antiseptic at low concentrations; strong solutions are sporicidal
- More expensive; Unstable and is affected by organic matter

Peracetic Acid

- Germicidal effects are due to the direct and indirect actions of oxygen
- Oxygen forms hydroxyl free radicals which are highly toxic and reactive to cells
- Bactericidal, virucidal, and fungicidal
- Environmentally friendly by-products
  - Acetic acid, O_2, H_2O
- Good compatibility
- In higher concentrations is highly sporicidal
- Not affected by organic matter
  - May even enhance activity
- Stability issues, more expensive

Chemicals with Surface Action:
Quaternary Ammonium Compounds and Detergents

- Act as surfactants
  - Anionic detergents have limited microbicidal power
  - Cationic detergents more effective because positively charged end binds well with predominantly negatively charged bacterial surface proteins
    - mechanical rather than a chemical action
  - Soaps are weak microbicides but gain germicidal value when mixed with agents such as chlorhexidine or iodine

QUATS are bad!

Wishart & Riley, Med J Aus (1970)

INFECTION WITH *PSEUDOMONAS MALTOPHILIA* HOSPITAL OUTBREAK DUE TO CONTAMINATED DISINFECTANT

MICHAEL M. WISHART, M.B., B.S., M.R.C.O.G., F.R.C.P.A.* AND THOMAS V. RILEY, B.APP.SCI.
Department of Pathology, King Edward Memorial Hospital for Women, Subiaco, Western Australia

Pseudomonas in Quats

- Paper cited >87 timed in journals as evidence that QUATs are contaminated with Pseudomonas (maltophilia)
- Paper actually says that it was a contaminated water supply used to dilute Savlon solution (CHG 1.5%, Cetrimide 15%)
  - Which remained in use in the warm wards for many months following reconstitution
  - The method of washing the bottles was not effective
- When the water and cleaning methods was sorted, problem disappeared

QUAT-Based Disinfectants

Rutala WA et al. Infect Control Hosp Epidemiol 2014;35:855

- Quaternary ammonium-based disinfectants (Quats) are widely for low-level disinfection of surfaces in healthcare facilities in the USA and a number of other countries
- Now on to the 5th Generation of QUAT formulations
  - Combinations of agents
  - Cheap, clean well, good compatibility, some persistent activity
  - Inhibit outgrowth of spores and mycobacteria, not sporicidal, some formulations not good for non-enveloped viruses, look at contact times

Rutala WA et al. Infect Control Hosp Epidemiol 2014;35:855

A formulation may look like this

Agent	Product type
Benzalkonium chloride *(Alkyl dimethylbenzyl ammonium chloride)*	Quaternary ammonium biocide
Didecyldimethylammonium chloride (DDAC)	Quaternary ammonium biocide
Polyhexamethylene biguanide *(PHMB)*	Polymeric biguanide biocide
Phenylethanol	Slow acting preservative biocide
Phenoxyethanol	Slow acting preservative biocide
Dodecyl dimethyl amine oxide	Surfactant, improves wetting and soil penetration
EDTA di Na	Chelating agent, helps in hard water wettings
2,4-dichlorobenzyl alcohol	Biocide and vapour phase preservative, helps penetrate waxy coat of Mycobacteria
Water	Solvent

Aldehydes

- Glutaraldehyde and formaldehyde kill by alkylating protein and DNA.
- Glutaraldehyde in 2% solution (Cidex) used as sterilant for heat sensitive instruments
- High level
- Formaldehyde - disinfectant, preservative, toxicity limits use
  - formalin – 37% aqueous solution
- Intermediate to high level

Sporicidal and Sporistatic Activity

SPORICIDAL ACTIVITY

- Ethylene oxide
- Glutaraldehyde
- Formaldehyde
- *ortho*-phthalaldehyde
- Hydrogen peroxide
- Peracetic acid
- Chlorine dioxide
- Ozone
- Sodium hypochlorite
- Sodium dichlororisocyanurate
- Chloramine-T
- Calcium hypochlorite
- Iodine and iodophors

SPORISTATIC ACTIVITY

- Phenols and cresols
- Quaternary ammonium compounds
- Biguanides
- Organic acids and esters
- Alcohols

Commonly used Disinfectants
Summary

- Hypochlorite
  - a good general purpose disinfectant
  - Is dilution sensitive
  - rapidly deactivated by organic matter
  - May affect poor quality plated items
  - Cheap
  - Now being linked with Asthma and Chronic Airways disease in frequent users
- Alcohol
  - surface disinfectant
  - prior cleaning essential
    - Fixes proteins
  - min 30 sec contact time required
  - Useful for electrical items but compatibility issues with some plastics
  - Not effective against
    - Non-enveloped viruses
    - Spores

Transmission MDR Organisms

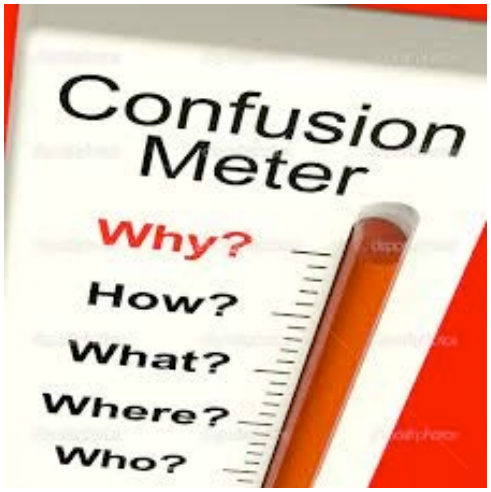
Nseir S et al. Clin Micro and Inf (2011) 17 pp1201-8

- Direct observational audits showed that 56% of rooms were not cleaned correctly
  - Failure in room door knobs (45%)
  - Monitor screens (27%)
  - Bedside tables (16%)
- Did not look to see if transmission occurred when cleaning was poor
- No description of divisions in cleaning duties
  - Cleanliness of clinical equipment not mentioned

Who is really caring for your environment?

Dumigan DG, Boyce JM et al AJIC 38:387-92 (2010)

- Cleaning is either carried out by
  - Lowly paid staff of low status who have been trained
  - Highly paid staff of higher status, who have not been trained
- Procedures for cleaning patient care environments
  - Confusion about division of labour over cleaning responsibilities
- Systems to monitor cleaning are often ineffective
  - ‘Housekeeping’ yes; ‘Clinical’ No



Audit of Equipment

Anderson RE, Young V et al, JHI 78(3) 2011

- Many items of *clinical* equipment do not receive appropriate cleaning attention
  - ATP score showed surfaces cleaned by professional cleaning staff 64% lower than those by other staff (P=0.019)
- Nurses do not clean very well
  - of 27 items cleaned by clinical staff, 89% failed the benchmark
- Nurses are not very good at going to get the right equipment for cleaning

Wipes

- Over recent years, wipes have become firmly established in clinical areas in the UK and other countries
- Used on patients, equipment (from nasendoscopes to commodes) and the environment
- For cleaning and/or disinfection
- Advantages:
  - Convenient – can be placed at point of care
  - Premixed and premeasured
  - Ready to use

Wipes can help

Lopez GU, et al. Evaluation of a disinfectant wipe intervention on fomite-to-finger microbial transfer. Appl Environ Microbiol. 2014;80(10):3113-8.

- Evaluated impact of surface disinfection on the level of pathogen transfer from fomites to fingers
  - Mean $\log_{10}$ reduction of test microorganisms on fomites by disinfectant wipe treatment varied from 1.9 to 5.0, depending on microorganism and the fomite
- Microbial transfer from disinfectant-wipe treated fomites was lower (up to<0.1% on average) than from non-treated surfaces (up to 36.3% on average for all types of microorganisms and fomites

Choosing a wipe

- A wipe is a wipe is a wipe
  - Thank you for listening

Contamination of Reusable Buckets used to Dispense Wipes

- Two studies in Germany assessed frequency of contamination of reusable buckets used to dispense disinfectant wipes used for surfaces
  - 42.4% of buckets containing surface-active disinfectants heavily contaminated with bacteria (e.g., Achromobacter species)
    - Kampf G et al.. BMC Infect Dis 2014;14:37
  - In a second study, 47% of reusable buckets were contaminated
    - Kupfahl C et al. Infect Control Hosp Epidemiol 2015;36:1362
- Failure to process reusable buckets according to manufacturer recommendations contributed to frequent contamination of disinfectant solutions

Wipes have one or two functions

- Cleaning: Physical removal of microbial contamination
  - Dependent on contamination level (blood, faeces, vomit etc.), how it was applied (e.g. thin or thick smear), how long it was left to dry and how difficult the surface is to clean (textured vs. rough vs. smooth)
- Disinfection
  - How long before the disinfectant evaporates; how much is it inactivated by the organic matter in which the microbes are deposited; whether the microbe tested is innately susceptible to the disinfectant

Disinfectant tests

- There are European Standard (“EN”) and other (e.g. TGA, ASTM, OECD .....) tests for disinfectants
  - A disinfectant test is a single, repeatable, highly controlled situation – real life is not
- “Phase 1” tests (e.g. EN 1040) are essentially screening tests to allow disinfectants to proceed to further, more targeted testing
  - Quantitative suspension test for the evaluation of basic bactericidal activity
  - They should not be seen as validation for any particular application

Disinfection tests: applied

- “Phase 2, step 1” tests (e.g. EN 13727) are suspension tests simulating specific use situations (none of which are wipes)
  - Quantitative suspension test for the evaluation of bactericidal activity of chemical disinfectants for instruments used in medicine
  - Suspension tests allow greater access to the target than would normally be the case with wipes

Disinfection tests: applied to surfaces

- “Phase 2, step 2” tests (e.g. EN 14561) are surface tests – more accurately simulate the situation in which wipes are used
  - Quantitative carrier test for evaluation of bactericidal activity for instruments used in medicine
  - All of these tests can be done either in “clean” or “dirty” conditions
    - “Clean” is easier to pass
    - “Dirty” is more difficult but may simulate use conditions such as commodes better

Factors affecting the performance of chemical disinfectants

- *Activity*: Microbicidal range; inactivation by organic matter, detergents, other chemicals; pH; dilution ....
- *Contact*: Proteinaceous barriers; air bubbles; full immersion, coverage of large or intricate areas.
- *Time*: Avoid short exposures (due to evaporation, dunking .....)

- *Those pertinent to disinfectant wipes are in red*

Disinfection tests: applied to wipes

- There are no standard tests for disinfectant wipes
- Any such test, standard or bespoke, would need to assess two components:
  - Cleaning: The physical removal of microbial contamination
    - This would depend on what the contamination was applied in (blood, faeces, vomit etc. simulants), how it was applied (e.g. thin or thick smear) , how long it was left to dry and how difficult the surface is to clean (textured vs. rough vs. smooth).
  - The effect of disinfection
    - How long before the disinfectant evaporates; how much is it inactivated by the organic matter in which the microbes are deposited, whether the microbe tested is innately susceptible to the disinfectant

Contact times are important

- Manufacturers will give an indication of the contact time necessary to achieve the stated reductions
  - These may not be that realistic in practice
- Recent study looked at producing a validated cleaning procedure for cleaning blood glucose monitoring machines had to wipe the surface 10 times with a chlorine wipe to achieve the recommended 1 minute contact time
  - Lin, S. Et al 2017. Demonstration of disinfection procedure for the development of accurate blood glucose meters in accordance with ISO 15197:2013. *PLoS One,* 12**,** e0180617.

Are contact times of surface disinfectants achievable?

- Oral paper delivered at CHICA conference in 2008
  - Omidbakhsh N. Surface Disinfectants and label claims: Realistically can contact times be met to achieve antimicrobial efficacy ? Canadian Journal of Infection Control. 2008;23(1):49.
  - Small study carried out by a Virox employee that was never published except in abstract form

The Study

- Aim was to determine the efficacy of several different disinfectant chemistries against common pathogens using a realistic contact time for each chemistry based on its evaporation rate and compare the results to the efficacy claims listed on the product labels
  - Accelerated Hydrogen Peroxide (AHP) , bleach, a quat, a quat-alcohol and a phenol, were tested for their drying time on a surface
  - Also tested for their antimicrobial activity at their drying time against S. aureus, P. aeruginosa, and MRSA, as representative bacteria using a quantitative carrier test method with the criteria of at least 6-log reduction to pass

Results

- All tested products dried in less than 5 min contact time with alcohol-based products drying significantly faster than any other chemistry (p-value of 0.000)
  - Quat and phenol carried a label claim of 10 min, but dried at less than 2-3 min, and those contact times, they were found ineffective
  - AHP dried at 3-4 min, regardless it was still efficacious
  - Bleach dried at less than 2 min, and it was not efficacious
  - Quat/alcohol dried at less than 30 seconds, and was not effective

What about the wipe itself?

- Various physical variables do make a difference to wipe properties and selection
  - Wet strength
  - Absorbency
  - Grammage
  - Size

  - But price usually rules

Nonwoven wipes

- Advantages
  - May be saturated with an active ingredient
  - Delivers optimal concentration to the surface that it is used on
    - As long as contact times are achieved
  - Stabilised, so can be used for extended periods
  - Closed, single use system minimises risk of contamination
  - Flexible placement
- Majority of raw materials used for nonwoven wipes are polyester (PES) or polypropylene (PP)

Factors influencing moisture retention

- Disinfectant Absorbency and Release
  - How the disinfectant is absorbed by the wipe and then released onto the surface is a function of both wipe material and disinfectant formulation
    - fibre used will either enhance or hinder disinfectant absorption rate, as will the amount and type of surfactant used in the formulation
    - These properties play a key role in the wettability, compliance and cost of the product

The Adsorption Issue

- Problem
  - "Tests carried out by the manufacturer on these wipes showed an interaction between the active disinfectant and the wipe material resulting in inadequate disinfection properties. This interaction is attributed to the adsorption of active ingredients in the disinfecting solution onto the tissue fibres of the wipe"
    - Cationics bind to cellulose-derived fibre
  - Solution: Test fluid that is squeezed from a wipe, not the fluid that will be added to the wipe

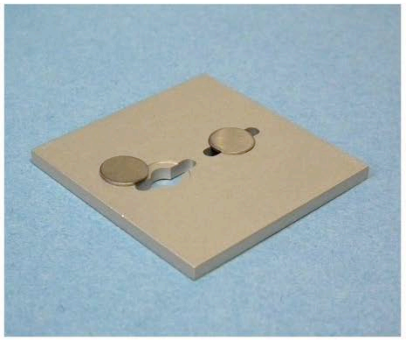
Adsorption

- The adsorption of surfactants at the interface between fiber/fabric and liquid is influenced by many factors, such as the length and nature of surfactants, the nature of the fiber surface, temperature, pH, and the nature of the liquid
  - Significant factors for fibre adsorption properties include molecular structure (functional groups), molecular orientation, degree of crystallinity (amount of amorphous region), the sizes and shapes of surface porous structures
- cotton has negative charge, which favours adsorption of cationic surfactants

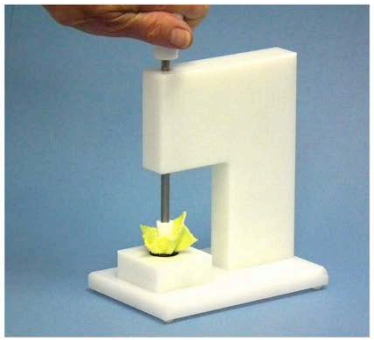
3-Step Wipe Test

New ASTM Intl. Standard (E2967-15) (04-15)

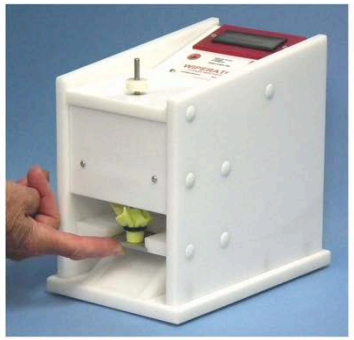
Purpose	Stage
Remove bioburden from a surface	Stage 1 – bacterial removal How good are the wipes in removing microbial contaminants? (not killing effect)
Prevent transfer of bioburden from the wipe to other surfaces	Stage 2 – bacterial transfer "adpression tests" Can the wipes transfer survivors to other surfaces (i.e. cross-contaminate)?
Where antimicrobial is present – kill the microbial bioburden	Stage 3 – Antimicrobial activity Can the wipes kill the bacteria they remove?



Sample Carrier with two 10-mm dia stainless steel disks

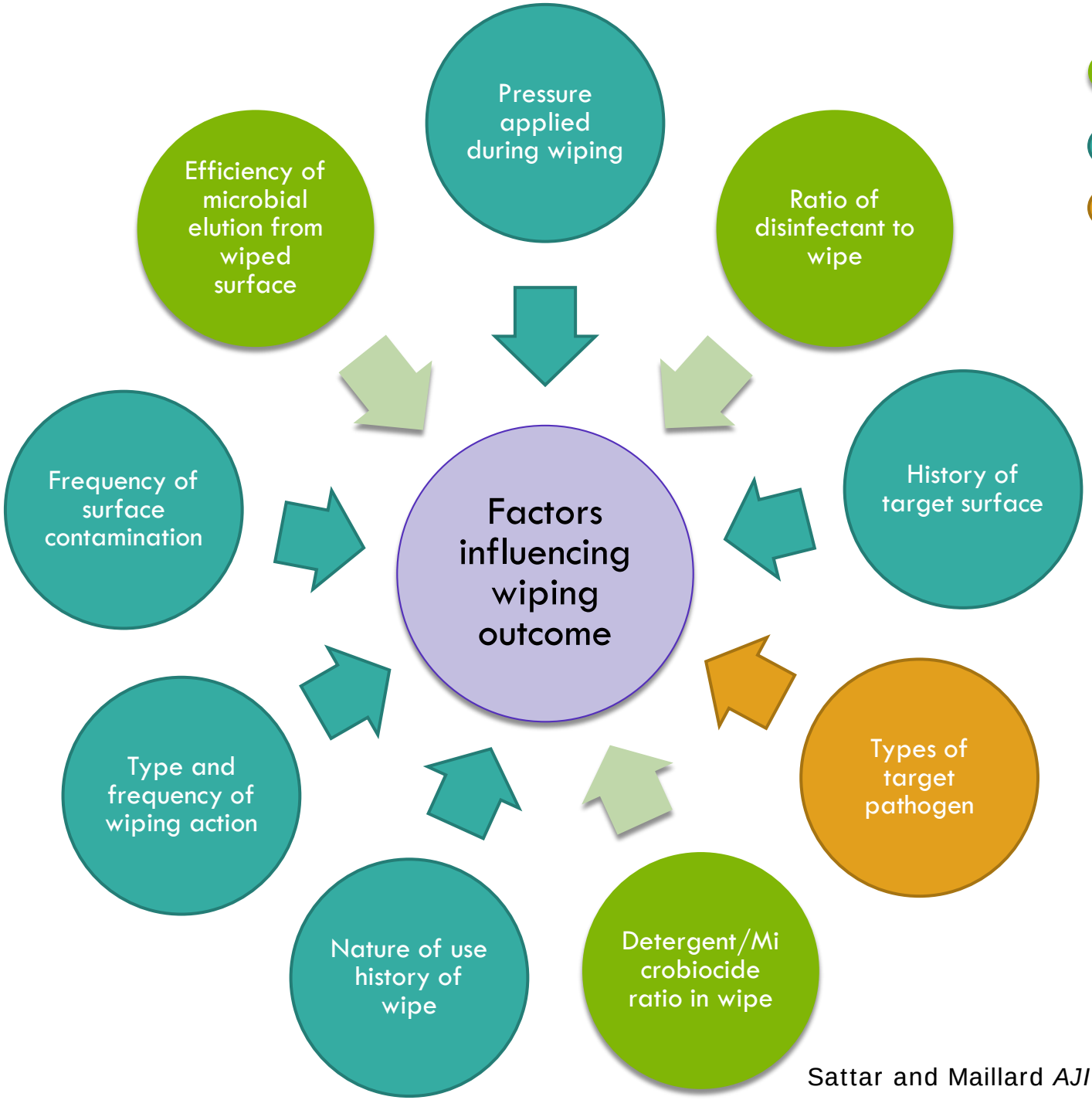


Loading a wipe onto a Boss using the Wipe Loader



The Wiperator wipes sample disks with an orbital motion

Sattar *et al.* *J Hosp Infect* 2015, 10.1016/j.jhin.2015.08.026



Sattar and Maillard *AJIC* 2013;41:S97-S104

Observation of wipes in use

Williams et al. J Hosp Infect 2007

Surface initially wiped	Time applied (seconds)	Number of consecutive surfaces wiped (other surfaces)
Bed Rail	4	5: (bedside table, monitor X2, monitor stand)
Steel Trolley	6	2: (both shelves on the trolley wiped)
Monitor	4	5: (monitors, two keypads, monitor stand)
Bed rail	7	4: (table, monitor, keypad)
Bedside table	10	4: (folder, two bed rails)

Not all wipes are the same

- Study comparing seven detergent wipes composed of nonionic surfactants, preservatives, and perfume
  - Ramm et at, (2015) AJIC 43(7)
- Significant differences in performance
  - Transfer and removal
  - Performance of wipes may be influenced by
    - type of nonwoven
    - quality of the raw materials and nonwoven
    - liquid to wipe ratio
    - product packaging

Formulations

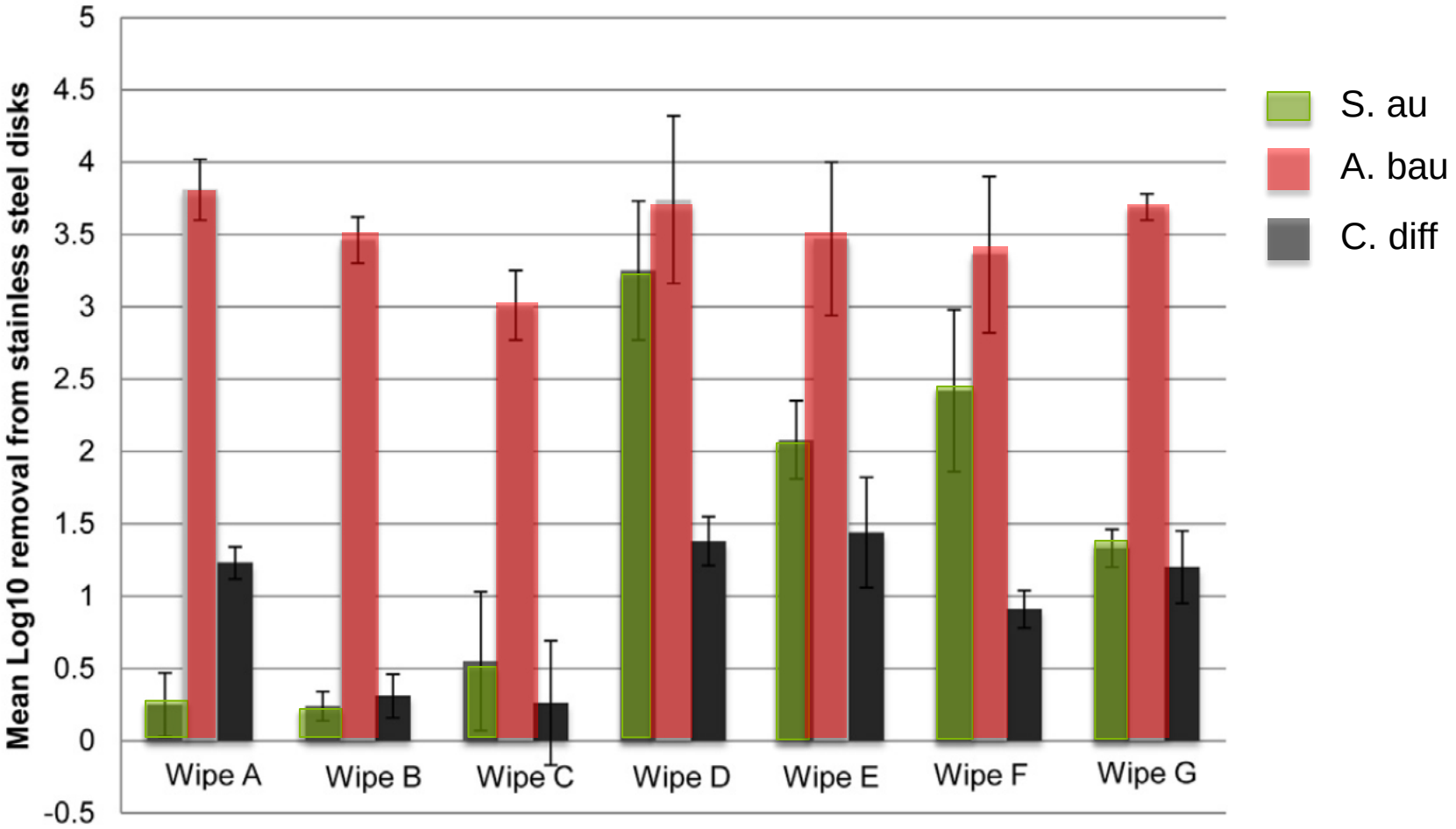
- Many wipes are formulated with multiple disinfectants to contain a number of agents to widen the spectrum of activity and reduce the risk of resistance
  - Formulated products reduce the risk of resistance
    - Cowley, N. et al (2015). "The Effect of Formulation on Microbicide Potency and Mitigation of the Development of Bacterial Insusceptibility." Appl Environ Microbiol. 81(20) 7330-8
- This is an accepted approach with Antibiotic therapy
  - Rifampicin/Fucidin etc

Substrate affects wipe action

- Polypropylene does not absorb, so very good for delivering the disinfectant ensuring that contact times are achieved
- More absorbent fibres like viscose will pick up more effectively but there is a potential that not enough ingredient will be applied to the surface
- Mixed fibre helps achieve the best balance

Detergent wipe efficacy

Ramm et al. AJIC; 43(7), 724-728



Transfer from Detergent Wipes

Wipes	Spores on wipes* (CFU)	Transfer first surface	Transfer second surface	Transfer third surface	Total transferred (%)
		% microbe/spore transfer			
S aureus					
A	66,890	66.43	82.28	64.74	213.45
B	3,633,282	11.01	9.75	13.14	33.90
C	5,078,282	8.58	66.05	44.83	119.46
D	4,941,786	0.04	0.03	0.04	0.11
E	14,537,759	0.43	0.39	0.37	1.20
F	13,388,894	0.09	0.07	0.21	0.37
G	16,705,056	0.00	0.00	0.00	0.00
A baumannii					
A	13,388,894	0.02	0.01	0.01	0.04
B	1,505,426	0.02	0.01	0.02	0.05
C	3,442,779	8.00	0.03	0.02	8.05
D	1,505,426	0.01	0.01	0.01	0.03
E	507,976	0.03	0.02	0.03	0.08
F	507,804	0.02	0.02	0.02	0.06
G	777,048	0.00	0.00	0.00	0.00
C difficile					
A	92,684	2.88	13.10	11.68	27.66
B	24,111	2.89	7.18	2.69	12.76
C	29,907	114.95	71.78	36.52	223.25
D	25,275	8.16	20.88	1.76	30.80
E	5,928	5.34	3.09	2.53	10.96
F	5,360	16.61	20.42	31.10	68.13
G	9,070	5.33	6.43	1.29	13.05

Ramm *et al. AJIC;* 43(7), 724-728

Testing Sporicidal Wipe Activity

Efficacy of “antimicrobial” wipes: Quantitative – three stage test

Observation of usage in practice –cleaning staff in ITUs Williams *et al. J Hosp Infect* 2007;67:329-35

- use of wipes – surface area
- contact
- rotation

Stage 1 – bacterial removal

How good are the wipes in removing microbial contaminants? (not killing effect)

Stage 2 – bacterial transfer “adpression tests”

Can the wipes transfer survivors to other surfaces (i.e. cross-contaminate)?

Stage 3 – Antimicrobial activity

Can the wipes kill the bacteria they remove?

C. diff transfer from ‘sporicidal’ wipes

Efficacy testing against C. difficile NCTC12727

Wipes	Bacterial Removal (log_{10} cfu / disk ± SD) 500 g surface pressure	Bacterial transfer following 10 s wiping time at 500 g surface pressure
Negative control	1.13 (± 0.36)	5 consecutive transfers. TNTC
NaOCl soaked wipe	2.02 (± 0.21)	5 consecutive transfers. TNTC
WIPE A	4.09 (± 0.79)	No spore transferred
WIPE B	0.22 (± 0.07)	5 consecutive transfers. From 0 to TNTC
WIPE C	1.30 (± 0.33)	5 consecutive transfers. From 0 to TNTC
WIPE D	0.57 (± 0.07)	5 consecutive transfers. From 1 to TNTC
WIPE E	+0.08 (± 0.08)	5 consecutive transfers. TNTC
WIPE F	1.14 (± 0.65)	5 consecutive transfers. From 83 to TNTC
WIPE G	0.67 (± 0.11)	5 consecutive transfers of ≤43 bacteria
WIPE H	0.88 (± 0.13)	5 consecutive transfers. From 2 to TNTC
WIPE J	0.84 (± 0.66)	5 consecutive transfers. From 40 to TNTC

Siani *et al. AJIC* 2011; 39(3), 212-218

C. diff transfer from ‘sporicidal’ wipes

Efficacy testing against C. difficile NCTC12727

Sporicidal Effect (against C.difficile 20291 Ribotype 027)	
	Sporicidal effect (log10 reduction ±SD) 5 min contact time
Unmedicated wipe	+0.42 (± 0.07)
Hypochlorite soaked wipe	4.64 (± 0.00)
Wipe A	3.74 (± 2.26)
Wipe B	+0.05 (± 0.10)
Wipe C	+0.11 (± 0.10)
Wipe D	+0.20 (± 0.04)
Wipe E	+0.26 (± 0.08)
Wipe F	+0.41 (± 0.20)
Wipe G	+0.32 (± 0.04)
Wipe H	+0.30 (± 0.05)
Wipe I	+0.12 (± 0.08)

Siani *et al. AJIC* 2011; 39(3), 212-218

Choice of Disinfectant Product

- In the healthcare setting a number of disinfectants are available either as single substance products or in combinations
  - Choice will depend on intended use and target organism
  - Manufacturers instructions need to be followed to ensure correct application
  - Incorrect selection and/or use can lead to transference of microorganisms to clean surfaces or persistence from use of suboptimal concentrations of biocide

Key Points

- Wipes are not the perfect solution to environmental decontamination and are not the best option for ‘routine’ cleaning
  - However many items need cleaning regularly or between patient contacts and not always by staff that are professionally trained to clean
- So they do fit into an IPC programme
  - Convenient
  - Fast
  - Available at the point of care
  - Consistent application of active agent

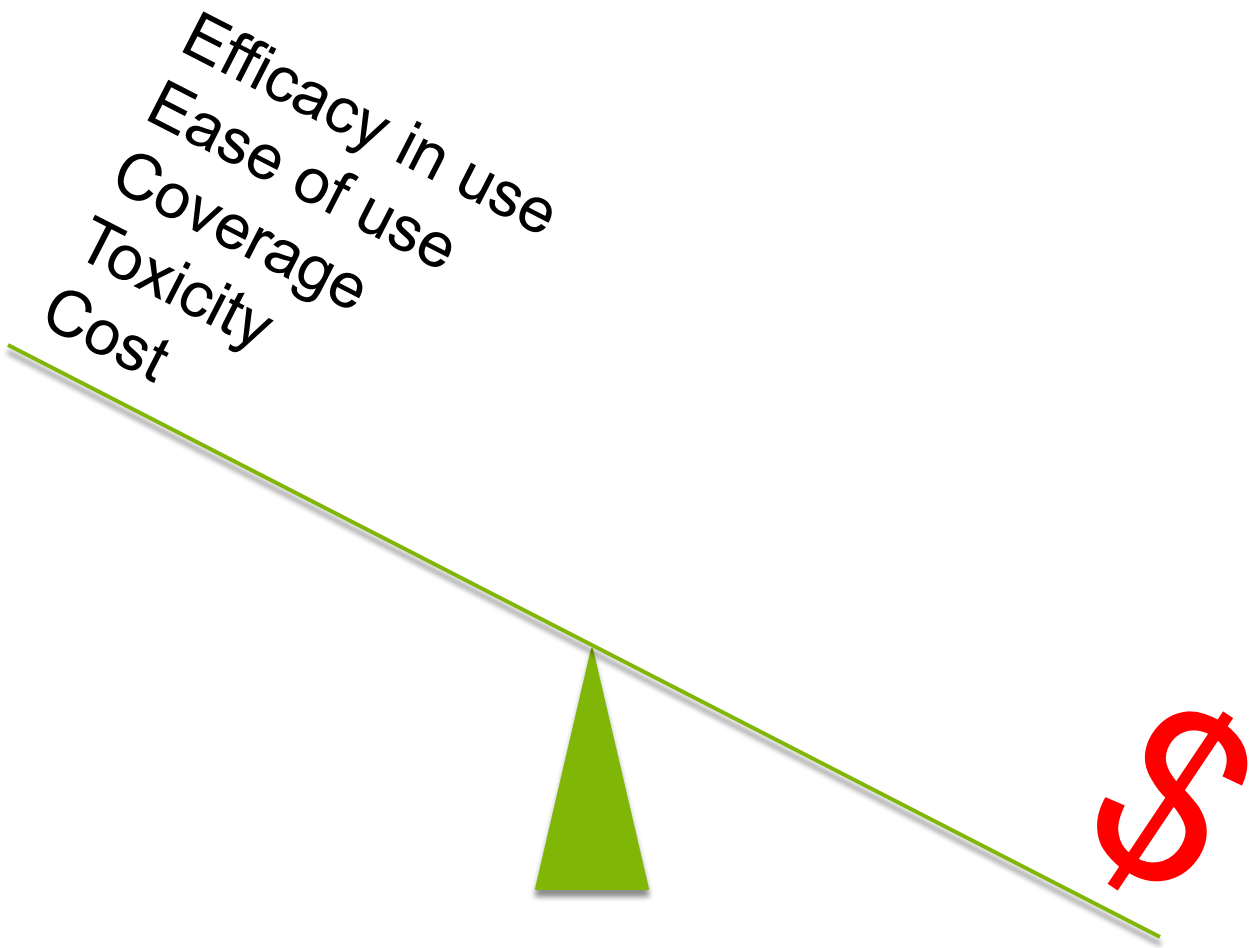
Factors to consider

IPC

- Efficacy against target pathogen(s)
- Finance
- Flexibility
- Ease of use
- Coverage
- Toxicity

Purchasing Dept.

Balance must be achieved



Check the true cost

	Product 1	Product 2
Cost/wipe	£0.05	£0.04
Surface area covered by 1 wipe (sq. ft)	11.5	6.5
No of wipes to disinfect a bed	8	14
Total cost (Consumables only)	£0.40	£0.56

Conclusion

- All wipes could be better
  - Better wipe materials would mean more effective removal of micro-organisms
    - However no procurement/supplies manager would pay for them
    - We need some cost-effectiveness studies
- Ask about testing, contact time, wipe materials, coverage and not just HK$
  - A wipe is not a wipe is not a wipe

Case Study
Acinetobacter outbreak

- Large University Hospital in the UK
  - No electronic epidemiology
  - Different staff looking at results
- Fully sensitive Acinetobacter seen in NICU
  - 3 colonisations in four months (April to July), all seen by different ICNs
  - No outbreak called
- August – 2 cases, screening takes place

Boom

- 16 babies are colonised – Unit closed
- Review of practice
  - Cleaning
  - All cots decontaminated with 1000 ppm chlorine used on cloths, then hydrogen peroxide vapour
- Other factors
  - Wrong staffing ratio
  - Unsuitable buildings
  - August (hot and humid – for the UK..)

What else?

- Holidays
  - HPV operative was off for the month of August
- Assumption that practice was perfect
  - Observation of practice showed that it was not
  - Poor cleaning prior to disinfection
  - Chlorine solution was applied to the cots and immediately wiped off (<10 seconds contact time)
  - Chlorine solution not consistently diluted
    - Used in a confined space
- Lesson – always go and have a look at practice!