WHAT TO ASK FOR AND LOOOK FOR WHEN EVALUATING CLEANING/DISINFECTING PRODUCTS … IN 5 EASY STEPS

Jason A. Tetro
Centre for Research on Environmental Microbiology (CREM)
University of Ottawa, Ottawa, ON

Hosted by Paul Webber
paul@webbertraining.com

Sponsored by
Virox Technologies Inc.
www.virox.com

2011 TELECLASS EDUCATION TEN YEARS ANNIVERSARY

www.webbertraining.com March 3, 2011

OBJECTIVES

- ASSESS: TO BEST UNDERSTAND THE CURRENT STATE OF MICROBIAL CHALLENGES IN HEALTHCARE SETTINGS REQUIRING CLEANING/DISINFECTION.
- ANALYZE: TO BEST UNDERSTAND HOW TO INACTIVATE UNDESIRABLE MICROBES IN THE ENVIRONMENT.
- ACQUIRE: TO UNDERSTAND WHICH DISINFECTANTS AND CLEANING PRODUCTS ARE EFFECTIVE AGAINST THE TARGET PATHOGENS.
- APPLY: HOW TO READ LABELS, FOLLOW INSTRUCTIONS AND ENSURE THAT PROPER PROCEDURES ARE BEING USED.
- AUDIT: TO ENSURE THAT CLEANING/DISINFECTION PRODUCTS AND PROCEDURES BEING USED ARE IN FACT WORKING.

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 2

ASSESS

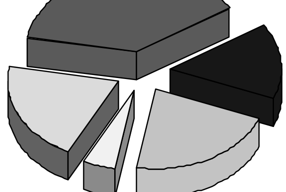
WHAT ARE WE DEALING WITH AND WHAT ARE THE IMPLICATIONS?

MICROBIAL CHALLENGES

- OVER 1,400 KNOWN PATHOGENS FOR HUMANS
- THE MEANS OF SPREAD OF SOME 200 SUCH PATHOGENS STILL UNKNOWN
- IN THE LAST 30 YEARS, SOME 300 NEW AND EMERGING INFECTIOUS DISEASE EVENTS HAVE OCCURRED
- MANY HAVE HAD IMPLICATIONS ON A GLOBAL SCALE
  - SARS, H1N1, MRSA, *C. DIFFICILE*, MDR/XDR TB
- EACH PATHOGEN COMES WITH SPECIFIC PHYSICAL, CHEMICAL AND BIOLOGICAL PROPERTIES

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 4

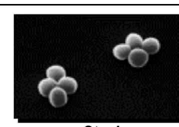
BREAKDOWN OF KNOWN HUMAN PATHOGENS



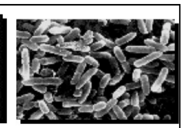
(TAYLOR ET AL. PHIL. TRANS. R. SOC. LOND. B. 2001; 356:983-989)

5

BACTERIA



Staph. aureus

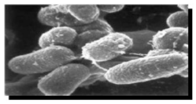


Escherichia coli

- UBIQUITOUS IN MANY ENVIRONMENTAL SETTINGS
  - BIOFILMS ARE A PRIMARY CONCERN
- SEVERAL ENVIRONMENTAL PATHOGENS
  - GRAM-POSITIVE BACTERIA
    - *STAPHYLOCOCCUS, STREPTOCOCCUS, BACILLUS*
  - GRAM-NEGATIVE
    - *ESCHERICHIA, PSEUDOMONAS, ACINETOBACTER*
- GENERALLY EASY TO KILL WITH DISINFECTION AND ANTISEPTICS
  - BIOFILMS MAY PROVIDE INCREASED RESISTANCE

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 6

MYCOBACTERIA

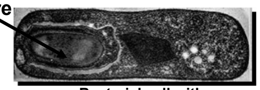


Mycobacterium tuberculosis

- CAUSE DISEASES SUCH AS TUBERCULOSIS
- MANY NON-TUBERCULOUS (ENVIRONMENTAL) TYPES CAUSE DISEASE IN THE IMMUNO-SUPPRESSED
- MANY ARE SLOW & HARD TO GROW IN THE LAB
- EMERGING FOOD- & WATERBORNE PATHOGENS
- BIOFILMS HARBOUR NUMEROUS MYCOBACTERIAL SPECIES
- HIGHER RESISTANCE THAN NORMAL BACTERIA TO INACTIVATION

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 7

BACTERIAL SPORES

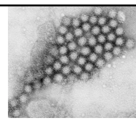


Bacterial cell with spore

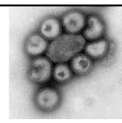
- PRODUCED BY CERTAIN TYPES OF GRAM-POSITIVE BACTERIA (BACILLUS, CLOSTRIDIUM)
- SPORES SURVIVE WELL IN THE ENVIRONMENT
  - ABLE TO WITHSTAND HEAT, EXTREMES OF pH AND OTHER STRESSORS
- *CLOSTRIDIUM DIFFICILE* IS AN IMPORTANT PATHOGEN
  - TETANUS & ANTHRAX ALSO CAUSED BY SPORE-FORMERS
- ONE OF THE MOST DIFFICULT MICROBIAL FORMS TO KILL
- COMMONLY USED AS BIOINDICATORS
  - GOLD STANDARD TO TEST PHYSICAL/CHEMICAL STERILIZATION

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 8

VIRUSES



NOROVIRUS

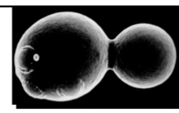


INFLUENZAVIRUS

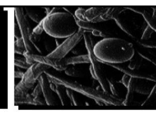
- TWO MAJOR FORMS OF VIRUSES
  - ENVELOPED VIRUSES
    - INFLUENZA, CORONAVIRUS AND HIV
  - NON-ENVELOPED VIRUSES
    - NOROVIRUS, POLIOVIRUS, ADENOVIRUS, ROTAVIRUS
- ENVELOPED VIRUSES ARE EASIER TO INACTIVATE DUE TO THEIR LIPID-CONTAINING ENVELOPE
- NON-ENVELOPED VIRUSES GENERALLY MORE RESISTANT DUE TO A TIGHT PROTEIN COAT WHICH IS MORE DIFFICULT TO DISRUPT

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 9

FUNGI



CANDIDA



FILAMENTOUS FUNGUS

- UNI-CELLULAR OR MULTI-CELLULAR PLANTS
- CAUSE MANY DISEASES
- A SERIOUS PROBLEM FOR THE IMMUNOSUPPRESSED
  - ORGAN TRANSPLANT, CANCER TREATMENT, ETC.
- FUNGI ASSOCIATED WITH PUBLICALLY KNOWN PROBLEMS
  - MOLD AND MILDEW
  - SICK-BUILDING SYNDROME

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 10

PROTOZOA

GIARDIA

CRYPTOSPORIDIUM

- MICROSCOPIC, SINGLE-CELLED ANIMALS
  - MANY HAVE COMPLEX LIFE CYCLES
  - E.G. CYSTS, TROPHOZOITES
- EMERGING AS WATER- & FOODBORNE PATHOGENS
  - *GIARDIA & CRYPTOSPORIDIUM*
  - *TOXOPLASMA GONDII*
  - *ACANTHAMOEBA SPP.*
- GASTROINTESTINAL, EYE INFECTIONS
- "OOCYSTS" ARE VERY DIFFICULT TO INACTIVATE BY CHEMICALS
  - RELATIVELY SENSITIVE TO DRYING AND HEAT

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 11

PRIONS

- CAUSE MANY SLOWLY PROGRESSIVE DISEASES OF THE CENTRAL NERVOUS SYSTEM
  - KURU
  - CREUTZFELDT-JAKOB DISEASE (CJD)
  - IATROGENIC CASES
  - NEW VARIANT CJD
- ONCE THOUGHT TO BE HIGHLY RESISTANT TO DISINFECTION BUT EVIDENCE SUGGESTS OTHERWISE
  - 134 DEGREES C FOR 18 MIN OR 121 DEGREES C FOR 30 MIN
  - 1N SODIUM HYDROXIDE FOR 15 MIN
  - ENZYMATIC CLEANERS
  - PHENOLIC DISINFECTANT
  - *FICHET ET AL. LANCET 2004:521-526*

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 12

ANALYZE

HOW CAN WE MAKE OUR ENVIRONMENT SAFE?

INTERRUPTING THE ENVIRONMENTAL SPREAD OF PATHOGENS

14

PRINCIPLES OF MICROBICIDE USE

- DISINFECTANTS VS ANTISEPTICS
  - DIFFERENCE IS TARGET
  - DISINFECTION FOR DECONTAMINATION OF SURFACES AND OBJECTS
  - ANTISEPSIS FOR DECONTAMINATION OF SKIN & MUCOUS MEMBRANES
- ISSUES FOR CONSIDERATION ARE THE SAME
  - CLAIMS
  - PHYSICAL ENVIRONMENT
  - MICROBIAL RESISTANCE
- APPLICATION ENVIRONMENT
  - OBJECTS; FREQUENTLY TOUCHED SURFACES, SKIN

JASON A. TETRO   EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS   15

PHYSICAL FACTORS

- pH
  - MICROBICIDES HAVE SPECIFIC pH OPTIMAL LEVELS
    - BLEACH IS BEST ACTIVE AT LOW pH ~5.0
    - ALDEHYDES ARE BEST AT HIGHER pH ~8.0
- TEMPERATURE
  - ACTIVITY SHOULD BE OPTIMAL AT ROOM TEMPERATURE
  - FOR ANTISEPTICS, ACTIVITY SHOULD BE OPTIMAL AT SKIN TEMPERATURE (~33°C)
- RELATIVE HUMIDITY (RH)
  - ENVELOPED VIRUSES PREFER LOWER RH
  - NON-ENVELOPED VIRUSES PREFER HIGHER RH
  - BACTERIA & FUNGI PREFER HIGHER RH
  - SPORES CAN SURVIVE WELL UNDER A WIDE RANGE OF RH
  - OPTIMAL RANGE OF USE SHOULD BE 40-60%

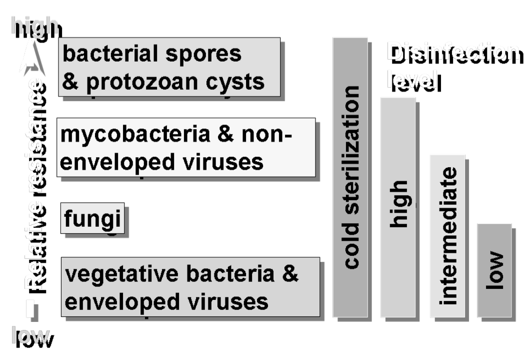
JASON A. TETRO   EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS   16

MICROBIAL RESISTANCE

- RESISTANCE IS A MAJOR ISSUE TO CONSIDER
  - NEED A GOOD KNOWLEDGE OF THE TARGET ORGANISMS
  - NEED TO DETERMINE THE HIGHEST LEVEL OF AN ACTIVE
  - ALWAYS ERR ON THE SIDE OF CAUTION
- RESISTANCE CAN BE GENERALIZED BASED ON THE NATURE OF THE ORGANISM
  - BACTERIA AND ENVELOPED VIRUSES ARE EASIEST TO KILL
  - NON-ENVELOPED VIRUSES ARE MID-RANGE
  - PROTOZOAN CYSTS AND SPORES HAVE HIGH RESISTANCE
  - PRIONS ARE THE MOST DIFFICULT TO INACTIVATE

JASON A. TETRO   EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS   17

RELATIVE MICROBIAL RESISTANCE



JASON A. TETRO   EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS   18

DISINFECTION LEVELS

- *COLD STERILANT*
  - KILLS ALL ORGANISMS AND ENSURES STERILITY
- *HIGH-LEVEL DISINFECTANT*
  - KILLS ALL ORGANISMS, EXCEPT HIGH LEVELS OF BACTERIAL SPORES
- *INTERMEDIATE-LEVEL DISINFECTANT*
  - KILLS MYCOBACTERIA, MOST VIRUSES, AND BACTERIA WITH A CHEMICAL MICROBICIDE REGISTERED AS A "TUBERCULOCIDE"
- *LOW-LEVEL DISINFECTANT*
  - KILLS SOME VIRUSES AND BACTERIA WITH A CHEMICAL MICROBICIDE

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 19

ACQUIRE

HOW CAN WE TELL THE DIFFERENCE BETWEEN DISINFECTANTS AND CLEANING PRODUCTS?

FACTORS IN CHOOSING AN ACTIVE

- MATERIALS COMPATIBILITY
  - PLASTICS, STAINLESS STEEL, METAL ALLOYS, SKIN, ETC.
- DOSAGE & RATE OF APPLICATION
  - LEAST AMOUNT OF ACTIVE AS INFREQUENT AS POSSIBLE
- TRAINING AND EASE OF USE
  - PERSONAL PROTECTION, OPEN VS. CLOSED ENVIRONMENT, DILUTION CONSIDERATIONS
- SAFETY OF PERSONNEL & ENVIRONMENT
  - ODOR, ENVIRONMENTAL POLLUTION, EXPOSURE LIMITS

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 21

LIST OF ACTIVES

- MANY ACTIVES KNOWN AND AVAILABLE COMMERCIALLY
  - ONLY A FEW ARE RELEVANT TO THIS SCOPE
- FOCUS WILL BE ON THE MECHANISM AND THE CLAIMS
  - CHEMICAL STRUCTURE
  - GENERAL CONCEPTS ON ACTIVITY
  - CLAIMS THAT ARE KNOWN FOR THE ACTIVE
- ISSUES REGARDING ANY CONTROVERSIES WILL BE MENTIONED BUT NOT THOROUGHLY DISCUSSED

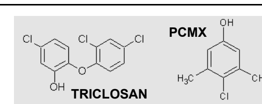
JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 22

CHLORINE: GAS, LIQUID OR POWDER

- MOST WIDELY USED MICROBICIDE
- EFFECTIVE AGAINST MOST PATHOGENS
  - DISRUPTION OF CELL WALLS, MEMBRANES AND PROTEINS
  - AMOUNT OF CHLORINE NEEDED DEPENDS ON
    - NATURE OF THE PATHOGEN
    - ORGANIC DEMAND FOR CHLORINE
    - pH OF THE ENVIRONMENT (LOWER = MORE ACTIVE)
- SODIUM HYPOCHLORITE (BLEACH) IS MOST COMMON
  - CHLORINE GAS USED FOR WATER & SEWAGE DISINFECTION
  - CHLORINE DIOXIDE & MONOCHLORAMINE ALSO USED FOR WATER DISINFECTION

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 23

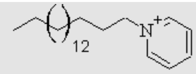
PHENOLIC COMPOUNDS



- LONG-STANDING MICROBICIDAL AGENTS
  - VARIETY OF USES DEPENDING ON MODIFICATIONS
    - RESORCINOL – LOZENGES
    - P-CHLORO-M-XYLENOL (PCMX) – DISINFECTANT (DETTOL)
    - TRICLOSAN - ANTIBACTERIAL
- USED FOR LIPID AND PROTEIN DISRUPTION
  - LIPID NATURE OF PHENOLICS DISRUPT MEMBRANES
- GOOD BACTERICIDES & MYCOBACTERICIDES BUT LIMITED ACTIVITY AGAINST NON-ENVELOPED VIRUSES
- TOXICITY NEEDS TO BE FULLY UNDERSTOOD
  - PHENOL IS A HUMAN TOXIN IN NATURAL FORM

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 24

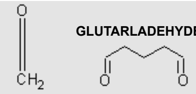
SURFACTANTS



CETYLPYRIDIUM CHLORIDE

- POSSESS ONE HYDROPHOBIC AND ONE HYDROPHILIC TAIL
- MOST COMMON ARE QUATERNARY AMMONIUM COMPOUNDS
  - CAUSE MEMBRANE DISRUPTION
- EXCELLENT AGAINST BACTERIA AND ENVELOPED VIRUSES
- POOR AGAINST NON-ENVELOPED VIRUSES, MYCOBACTERIA AND SPORES
- ENVIRONMENTAL CONCERNS BECAUSE OF LOW BIODEGRADABILITY

ALDEHYDES



GLUTARLADEHYDE

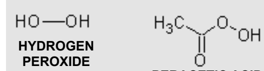
FORMALDEHYDE

- ALKYLATING AGENTS
  - FORMALDEHYDE
  - GLUTARALDEHYDE
  - *ORTHO*-PHTHALALDEHYDE (OPA)
- USED IN LOW CONCENTRATIONS TO 'FIX' PROTEINS
  - REQUIRES HIGH pH (>8) FOR OPTIMAL ACTIVITY
  - HIGHLY LIPOPHILIC
- GOOD AGAINST MOST PATHOGENS EXCEPT PRIONS AND SOME PROTOZOAN CYSTS
- FORMALDEHYDE AND GLUTARALDEHYDE ARE TOXIC
  - OPA IS LESS SO BUT STILL REQUIRES CARE

METALS

- DOSE-DEPENDENT ACTION
  - TOXIC FOR ALL ORGANISMS IN HIGH DOSES
  - AT LOWER DOSES, SOME DEMONSTRATE ANTIMICROBIAL PROPERTIES
  - HEAVY METALS ARE BACTERICIDAL AND FUNGICIDAL
  - HAVE LITTLE EFFECT ON VIRUSES AND SPORES
- COPPER IS NOW A REGISTERED ANTIMICROBIAL IN THE U.S.
  - COPPER SURFACES SHOWN TO KILL AND RESIST MICROBIAL GROWTH
  - CAUSES DAMAGE TO THIOL (-SH_2) GROUPS PREVENTING GROWTH
  - COMPATIBILITY WITH OXIDIZER-BASED DISINFECTANTS AN ISSUE
- SILVER HAS BEEN USED AS AN ANTIMICROBIAL FOR CENTURIES
  - SILVER NITRATE ($AgNO_3$) INTERACTS WITH MEMBRANES AND DNA
  - ELEMENTAL SILVER IS USED FOR IMPREGNATION
  - NOW CONSIDERED AS A BACTERIOSTATIC AGENT IN TEXTILES
  - SILVER RESISTANCE IN BACTERIA HAS BEEN KNOWN TO EXIST

PEROXYGENS



HYDROGEN PEROXIDE

PERACETIC ACID

- STRONG OXIDIZING AGENTS
  - PRODUCE FREE RADICALS THAT DAMAGE CELLS
  - HYDROGEN PEROXIDE, PERACETIC ACID
- EFFECTIVE AGAINST MOST PATHOGENS INCLUSING SPORES AT HIGHER CONCENTRATIONS
  - CONC. DEPENDS ON ACTIVITY REQUIRED
  - DETERGENTS, ORGANIC ACIDS & ANTI-CORROSIVES ADDED
- ISSUES WITH PEROXYGENS
  - PERACETIC ACID IS HIGHLY CORROSIVE AND ONLY USED IN CONTROLLED ENVIRONMENTS
  - PEROXIDE REQUIRES STABILIZATION FOR LONG-TERM USE
  - NO RESIDUE; ENVIRONMENTALLY SAFE

ALCOHOLS

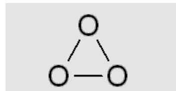
- FIXATIVE ACTION THROUGH DISRUPTION OF PROTEIN STRUCTURE
- TWO MAJOR ALCOHOL TYPES
  - ETHANOL (USUALLY 62-80%) – GOOD WIDE-SPECTRUM MICROBICIDE
  - ISOPROPANOL (60-95%) – ONLY GOOD BACTERICIDE
- BOTH ARE INEFFECTIVE AGAINST SPORES
- CONCERNS OVER BEST CONCENTRATION FOR USE
  - 62%, 70%, 80%, 95%
  - STUDIES IN OUR LAB SHOW THAT 62% MAY BE THE BEST AS ANTISEPTIC

COLD STERILIZATION

- ONLY THREE ARE APPROVED BY THE FDA
  - ETHYLENE OXIDE
  - OZONE
  - HYDROGEN PEROXIDE
- MUST BE USED UNDER HIGHLY CONTROLLED ENVIRONMENTS
  - MORE MODERN USES INCLUDE 'AUTOCLAVE-LIKE' MODELS THAT STERILIZE MEDICAL DEVICES IN HOSPITALS
- ONLY TRAINED INDIVIDUALS MAY WORK WITH COLD STERILANTS
  - WORKING WITH GASEOUS AGENTS BRINGS HIGHER RISK
  - MORE CONTROLLED MACHINERY HELPING

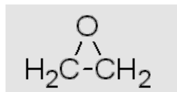
OZONE

- STRONG OXIDIZER
- HIGHLY TOXIC
  - THRESHOLD FOR HUMANS < 0.1 PPM/DAY
  - USUALLY 1-3 PPM ARE USED



ETHYLENE OXIDE

- STRONG ALKYLATOR
- HIGHLY TOXIC
  - THRESHOLD FOR HUMANS IS < 5 PPM/DAY
  - SOME COMPANIES USE UP TO 1500 PPM
  - REQUIRED AERATION TIMES MAY TAKE HOURS



JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 31

GASEOUS HYRDROGEN PEROXIDE

- IN GASEOUS/PLASMA OR VAPORIZED FORM
  - OXIDIZATION IS AS POTENT AS OR BETTER THAN IN LIQUID FORM
  - INCREASED POTENTIAL WHEN CHARGED (PLASMA)
  - COMPATIBILITY WITH ALMOST ALL MATERIALS
  - EASILY AERATED
- USED AT ROOM TEMPERATURE AND RH BETWEEN 35-80%
- TOXICITY IS LOW AS ONLY 10 PPM REQUIRED FOR USE
- LONGER TIMES NEEDED OVER OTHERS
  - CONTROLLED SETTINGS ALSO NEEDED
  - NUMBER OF MODELS USING HYDROGEN PEROXIDE INCREASING

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 32

OVERVIEW OF ACTIVITIES

ACTIVE INGREDIENT	ACTIVITY AGAINST
SOD. HYPOCHLORITE (1 PPM)	B
SOD. HYPOCHLORITE (1000 PPM)	B,EV,NEV,F,M
O-PHENYLPHENOL (200 PPM)	B,M,EV
QUATERNARY AMMONIUM COMPOUNDS (100-3000 ppm)	B,EV,F
ALKALINE GLUTARALDEHYDE (2%)	B,EV,NEV,M,F,S
HYDROGEN PEROXIDE (3%)	B
ACCELERATED HYDROGEN PEROXIDE (7.5%)	B,EV,NEV,M,F,S
PERACETIC ACID (1-1000 PPM)	B,EV,NEV,M,F,S
ETHANOL 62% (V/V)	B,EV,NEV,F

B – BACTERIA, EV- ENVELOPED VIRUSES, NEV-NON-ENVELOPED VIRUSES, M-MYCOBACTERIA
F – FUNGI, S- BACTERIAL SPORES

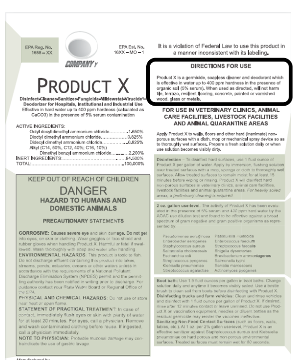
JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 33

APPLY

READ THE LABELS,
FOLLOW INSTRUCTIONS AND
ENSURE THAT THE PROPER PROCEDURE IS USED

THE LABEL

- EXTENSIVE INFORMATION IN A LIMITED SPACE
- CAN BE DIFFICULT TO INTERPRET
- KNOWLEDGE OF WHAT'S ON THE LABEL IS NOT ENOUGH!
- TAKE A CLOSER LOOK AT SOME OF THE MORE IMPORTANT ASPECTS OF WHAT IS ON THE LABEL
- CENTER FOR FOOD SECURITY AND PUBLIC HEALTH, IOWA STATE UNIVERSITY



JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 35

DIRECTIONS ARE NOT AS THEY SEEM

- LABELS MAY CAUSE CONFUSION
  - WATER AS A DILUENT (MEANS DISTILLED WATER)
    - TAP WATER IS NORMALLY USED IN THE FIELD
  - CONTACT TIME
    - A FEW SECONDS IN APPLICATION VS. A FEW MINUTES ON THE LABEL
  - DIFFERENT DILUTIONS
    - SEPARATE DILUTIONS FOR DIFFERENT CLASSES OF PATHOGENS (TARGET UNKNOWN IN THE FIELD!)
- DIRECTIONS ARE BASED ON EXTENSIVE TESTING OF THE ACTIVE IN LABORATORY ENVIRONMENTS
  - LABORATORY TESTS ARE INDICATIVE OF FIELD USE
  - ASSESSMENT OF ENVIRONMENT IS KEY TO PROPER USE

JASON A. TETRO EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS 36

LABORATORY-BASED CLAIMS

- CLAIMS ARE VALIDATED USING VARIOUS TESTING METHODS
  - TESTS METHODS ARE STANDARDIZED (AOAC, ASTM, EU)
  - WHICH METHOD USED DEPENDS ON LOCATION (EUR, US, CAN)
  - ACTIVES MUST MEET REDUCTION LEVELS TO VALIDATE A CLAIM
- SPORICIDAL, MYCOBACTERICIDAL & BACTERICIDAL ACTIVITY
  - PRODUCT REQUIRED TO REDUCE THE VIABILITY TITRE OF TEST ORGANISMS BY A REQUIRED LEVEL (4 TO $\geq$ 6 LOG10)
- VIRUCIDAL ACTIVITY
  - PRODUCT REQUIRED TO REDUCE THE VIABILITY TITRE OF THE TEST ORGANISMS BY AT LEAST 3 LOG10 IS NEEDED
- FUNGICIDAL ACTIVITY
  - A MINIMUM REDUCTION OF 5 LOG10 IS REQUIRED

JASON A. TETRO — EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS — 37

ISSUES WITH TESTING CLAIMS

- LEVELS OF ACTIVE
  - DIFFERENT CONCENTRATIONS OFFER DIFFERENT CLAIMS
  - HYPOCHLORITE, PEROXIDE, ETHANOL
- TEST PROTOCOL ISSUES
  - SUSPENSION TESTS
  - CARRIER TESTS
  - SKIN-BASED TESTS (*IN VIVO*)
- CONTACT TIMES
  - REQUIRES 'WET CONTACT' BETWEEN ACTIVE AND ORGANISM
  - MOST CONTACT TIMES ARE NOT IN LINE WITH REALITIES OF USE
  - SEVERAL SECONDS VS. SEVERAL MINUTES ON LABEL
- RESIDUAL/PERSISTENT ACTIVITY
  - HOW IS THE ACTIVITY MEASURED OVER SEVERAL HOURS?

JASON A. TETRO — EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS — 38

FACTORS TO CONSIDER

- WHAT IS THE LOADING IN THE ENVIRONMENT?
  - HOW MUCH SOIL IS PRESENT IN THE TARGET ENVIRONMENT?
  - BODILY FLUIDS, ORGANIC/INORGANIC MATERIAL
- MANUAL PRE-CLEANING
  - MANY DISINFECTANTS REQUIRE A STEP INVOLVING CLEANING
  - IS THAT CLEANING COMPATIBLE WITH THE TARGET ENV.?
- DILUENT
  - IN WHAT LIQUID SHOULD THE PRODUCT BE DILUTED?
  - HARD WATER/STERILE WATER/TAP WATER
- FRESH VS. REUSEABLE
  - DOES THE ACTIVE HAVE A SHELF-LIFE AFTER PREPARATION
  - IS THERE POTENTIAL FOR REUSE?
  - COST VS. BENEFIT

JASON A. TETRO — EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS — 39

AUDIT

HOW CAN YOU TELL YOU'RE DOING A GOOD JOB?

JASON A. TETRO — 40

AUDITS REQUIRE COLLABORATION

- AN AUDIT OF DISINFECTION/ANTISEPSIS REQUIRES INVOLVEMENT OF NUMEROUS DEPARTMENTS
  - ENVIRONMENTAL SERVICES
  - INFECTION CONTROL
  - ADMINISTRATION
- AUDITS SHOULD BE CONDUCTED WITH DEFINED OBJECTIVES
  - CLEAN VS. DISINFECTED
  - ROUTINE VS. TERMINAL
  - ACCEPTABLE RESIDUAL LOADS
- REPORTS ON AUDITS SHOULD REFLECT GOALS OF HOSPITAL
  - WORK PLANS ARE DEFINED AND OBJECTIVES MUST BE MET
  - AUDITS SHOULD REFLECT THESE OBJECTIVES

JASON A. TETRO — EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS — 41

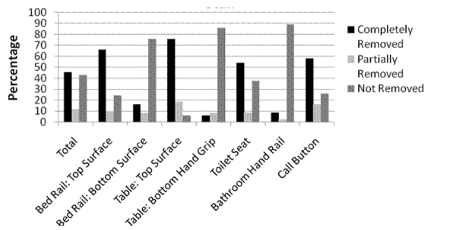
METHODS FOR AUDITING

- EACH HOSPITAL WILL HAVE A SPECIFIC METHOD FOR AUDITING
  - BENEFITS AND DRAWBACKS
- MICROBIAL CULTURE & LAB ANALYSIS
  - SWABBING FOLLOWED BY LAB ANALYSIS
  - LOW-COST BUT TIME-CONSUMING
  - GOOD UNDERSTANDING OF THE PATHOGENS IN THE ENV.
- ATP (ADENOSINE TRIPHOSPHATE)
  - METHOD USED IN CLEAN ROOMS AND FOOD FACILITIES
  - USED TO DETECT ANY POTENTIAL ORGANIC/BIOLOGICAL PROCESSES
  - RAPID RESULTS THAT ARE QUANTIFIABLE
  - DOES NOT REFLECT ACTUAL MICROBIAL LOAD

JASON A. TETRO — EVALUATING CLEANING/DISINFECTING PRODUCTS IN 5 EASY STEPS — 42

A NOVEL FORM OF AUDIT

- FLUORESCENT TARGETING METHOD
  - FLUORESCENT "GOO" TO HELP MONITOR CLEANING
  - USED FOR BOTH TRAINING AND EVALUATION



Is it really clean? Evaluation of the DAZO Fluorescent Marker Method for Monitoring Environmental Cleaning, SHEA 2011

A DIFFERENT KIND OF AUDIT

- LONG TERM QUALITATIVE AUDIT
  - LEVELS OF HAI
  - ADOPTION OF STAFF
  - APPRECIATION OF THE PUBLIC
- WALK THROUGH AUDIT
  - IMPORTANT TO VISUALIZE CLEANLINESS
  - USE ALL SENSES WHILE GOING THROUGH THE HOSPITAL
- ATTITUDE AUDIT
  - DO STAFF FEEL CURRENT PROTOCOLS ARE WORKING?
  - ARE ENV. SERV. , INFECT. CTRL, AND ADMIN WORKING AS TEAM?
  - IS THERE A GENERAL JOB SATISFACTION DUE TO ENVIRONMENT?

A DIFFERENT KIND OF AUDIT

- SATISFACTION
  - DO PATIENTS FEEL SAFER?
  - DO VISITORS FEEL MORE COMFORTABLE IN THE HOSPTIAL SETTING?
  - WILL VISITORS ADOPT BETTER HYGIENE AS A RESULT?
    - INCREASED USE OF HAND SANITIZERS AT ENTRANCES

LAST THOUGHTS

- DISINFECTION AND ANTISEPSIS ARE NO LONGER JUST AN ENVIRONMENTAL SERVICES ISSUE
  - REQUIREMENTS FOR MANY DEPARTMENTS
  - FRAMEWORK FOR DECISION-MAKING IS FUNDAMENTAL TO SUCCESS
  - THE FIVE A's PROVIDE THE BACKBONE TO THIS FRAMEWORK
- INFORMATION NEEDS TO BE AVAILABLE AND ACCESSIBLE
  - THE FIVE A's POINT TO HOW DECISION TREES AND DATA CAN BE CLASSIFIED AND DISPLAYED
- PATHOGENS REPRESENT ONE OF THE GREATEST THREATS TO HEALTH IN THE HOSPITAL
  - PATIENTS, VISITORS, HEALTHCARE STAFF (SARS)
- THE EASIER THE MODEL, THE FASTER THE ADOPTION ONCE A DECISION IS MADE (KISS RULE)

THANK YOU