Decontamination of High-Touch Environmental Surfaces in Healthcare
Prof. Syed A Sattar, Centre for Research on Environmental Microbiology, University of Ottawa, Canada
Sponsored by the World Health Organization Patient Safety Agency – Clean Care is SAFER Care

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Pour un futur plus sain

DECONTAMINATION OF HIGH-TOUCH ENVIRONMENTAL SURFACES IN HEALTHCARE: A CRITICAL LOOK AT CURRENT PRACTICES AND NEWER APPROACHES

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- STAFF & STUDENTS, CREM, UNIV. OF OTTAWA, OTTAWA, CANADA

THE MAIN ISSUE

- WIDER APPRECIATION OF HIGH-TOUCH ENVIRONMENTAL SURFACES IN SPREAD OF HEALTHCARE-ASSOCIATED INFECTIONS (HAI)
- CORRESPONDING UPSURGE IN MARKETING OF PRODUCTS & TECHNOLOGIES TO COMBAT SUCH SPREAD
- MOUNTING CONCERNS ON TESTING, CLAIMS OF ACTIVITY & SAFETY OF WHAT IS BEING MARKETED AND USED
- A CRITICAL LOOK AT CURRENT SITUATION & A LOOK AHEAD

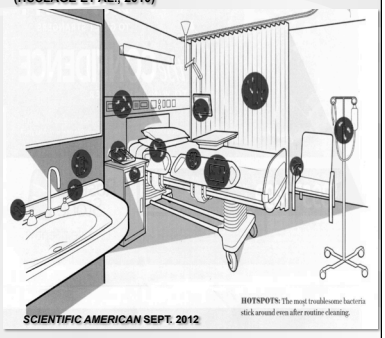
DEFINITIONS

- MICROBICIDE: ANY PHYSICAL/CHEMICAL AGENT TO KILL MICROBES
- INCLUDES 'DISINFECTANTS' & 'ANTISEPTICS'
  - ALSO CALLED 'GERMICIDE' IN NORTH AMERICA & 'BIOCIDE' IN EUROPE
  - NEITHER TERM IS SUITABLE
- DECONTAMINATION: COMBINED OUTCOME OF REMOVAL & KILLING
- FOCUS HERE ON CHEMICALS TO DECONTAMINATE HIGH-TOUCH, *NON-POROUS* ENVIRONMENTAL SURFACES

WHAT ARE 'HIGH-TOUCH' ENVIRONMENTAL SURFACES?

(HUSLAGE ET AL., 2010)

- OBSERVED 50 INTERACTIONS BETWEEN STAFF & PATIENTS & LIST "HIGH-TOUCH" AS:
  - BED RAILS
  - BED SURFACE
  - SUPPLY CART
  - OVER-BED TABLE
  - INTRAVENOUS PUMP



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WHICH ENVIRONMENTAL SURFACES TO TARGET?

- PRINCIPAL CONSIDERATION IS *POTENTIAL* OF A GIVEN SURFACE TO HARBOR & 'DONATE' PATHOGENS DURING ROUTINE/CASUAL CONTACT
- MUST INCLUDE:
  - PROBABILITY OF CONTAMINATION WITH PATHOGENS
  - ABILITY TO ALLOW FOR PATHOGEN SURVIVAL
  - RELEASE OR 'DONATE' PATHOGENS WITH RELATIVE EASE
  - LOCATION & FREQUENCY OF DIRECT CONTACT WITH HANDS AND/OR MUCOUS SURFACES

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WHICH PATHOGENS TO FOCUS ON?

- HIGH-PROFILE PATHOGENS (E.G., HIV, INFLUENZA- & SARS VIRUS *SHOULD NOT BE* THE TARGETS IN TESTING
  - LESS STABLE & LESS RESISTANT THAN NON-ENVELOPED VIRUSES
  - POOR SPREAD VIA CONTAMINATED SURFACES
- EXAMPLES OF PATHOGENS FOR GREATER FOCUS:
  - SPORES OF *CLOSTRIDIUM DIFFICILE* (SPORICIDAL PRODUCTS)
  - NOROVIRUS & OTHER NON-ENVELOPED VIRUSES
  - METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA)
  - VANCOMYCIN-RESISTANT *ENTEROCOCCUS* (VRE)
  - *ACINETOBACTER BAUMANNII*
- TARGETING THE MORE RESISTANT SHOULD COVER WEAKER ONES!

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WHAT ABOUT CURRENTLY AVAILABLE DISINFECTANTS?

- LONG LISTS OF IRRELEVANT ORGANISMS
- MANY ARE ONLY WEAK BACTERICIDES (LOW-LEVEL)
- TESTING FOR MICROBICIDAL ACTIVITY INAPPROPRIATE
- ACTIVITY FURTHER COMPROMISED DURING FIELD USE DUE TO:
  - MUCH SHORTER CONTACT TIMES; HIGH VOLUME:SURFACE RATIO
  - SOIL LOAD AS WELL AS DEMAND FROM APPLICATOR/SURFACE
- OVERALL, GENERATE A FALSE SENSE OF SECURITY
- MAY INCREASE RISK OF PATHOGEN SPREAD!
- LABEL CLAIMS NOT BASED ON WIPE-TESTING

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WHAT ABOUT GOVERNMENT-REGISTRATION?

- REGISTRATION PROCESS FLAWED & OUT-DATED!
- BASED ON UNSUITABLE TEST METHODS & EFFICACY CRITERIA
- LACK OF REGIONAL & GLOBAL HARMONIZATION
- DISCOURAGE INNOVATION
- THIS ISSUE NEEDS URGENT REVIEW

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WHAT ABOUT WIPING OF HIGH-TOUCH SURFACES?

- INSUFFICIENT TRAINING & MONITORING OF STAFF
- WIPING OFTEN CURSORY; MAY ACTUALLY SPREAD PATHOGENS!
- APPLICATOR HAS ITS OWN DISINFECTANT DEMAND
- CONTACT TIME ONLY SECONDS; MINISCULE VOLUMES OF DISINFECTANT DEPOSITED
- CURRENT WIPE TEST METHODS UNSUITABLE

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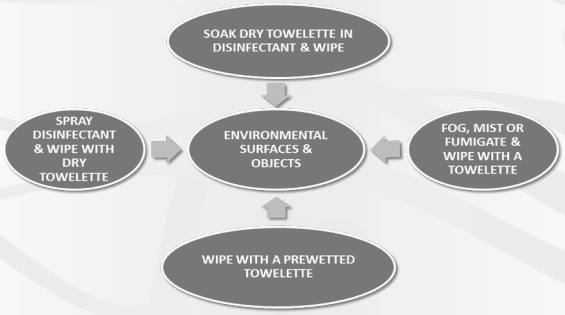
POSSIBLE WAYS TO DECONTAMINATE HIGH-TOUCH ENVIRONMENTAL SURFACES BY WIPING (SATTAR & MAILLARD, AJIC 2013:41;S97-S104)



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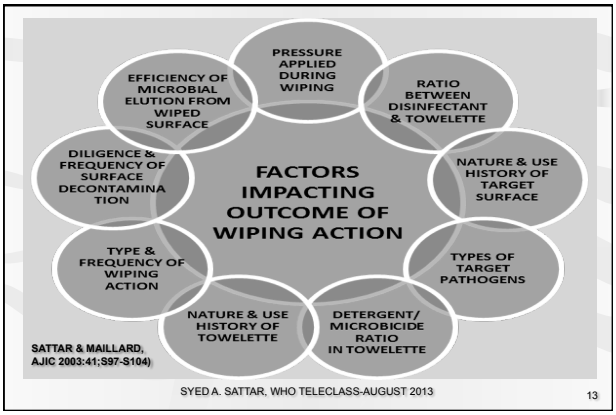


WIPING HIGH-TOUCH SURFACES WITH PRE-SOAKED WIPES

- **PROS:**
  - COMBINES CHEMICAL/MECHANICAL ACTION WITH CONVENIENCE
  - SHORT CONTACT TIMES & SMALLER DISINFECTANT VOLUMES
  - SURFACE ORIENTATION/GEOMETRY LESS RELEVANT
  - REDUCES RESUSPENSION OF DUST
  - REDUCES RESPIRATORY EXPOSURE TO CHEMICALS
- **CONS:**
  - MAY SPREAD CONTAMINATION OVER A WIDER AREA
  - APPLICATOR HAS ITS DISINFECTANT DEMAND
  - ADDS TO SOLID-WASTE STREAM
  - HIGHER COST?

CAN WE PROPERLY TEST DISINFECTING WIPES?

- TWO STANDARD METHODS (ASTM & AOAC) & ONE GUIDE (EPA)
  - SEMI-QUANTITATIVE AT BEST & ALSO DO NOT REFLECT FIELD USE
- EPA'S PETRI PLATE METHOD FOR BACTERIA
- ONE PEER-REVIEWED METHOD FROM CARDIFF, WALES
  - USES DRILL-BIT-MOUNTED WIPES TO TEST DECONTAMINATION OF HARD, NON-POROUS SURFACES; SEVERAL PUBLICATIONS
  - SHOWED SPREAD OF LOCALIZED CONTAMINATION OVER A WIDER AREA WITH USE OF INEFFECTIVE DISINFECTANTS
- A GENERAL & FIELD-RELEVANT METHOD NEEDED FOR:
  - R&D, INTERNATIONAL STANDARDIZATION & PRODUCT REGISTRATION

WIPERATOR®

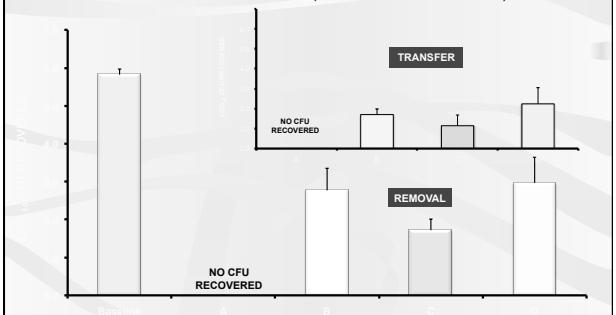
- INVENTED AT CREM WITH DR. T. SHARPE
- CAN TEST TOWELETTES AT SET PRESSURE, TIME, TYPE & NUMBER OF WIPING MOTIONS
- 10 µL DRIED INOCULUM ON DISK (1 CM DIA.) WIPED FOR 5-10 SEC; ELUATES ASSAYED
- WORKS WITH ALL MAJOR PATHOGEN TYPES
- CAN BE USED WITH INANIMATE OR ANIMATE SURFACES & ALSO TO TEST PATHOGEN TRANSFER BETWEEN THEM
- AN INTERNATIONAL COLLABORATIVE JUST COMPLETED

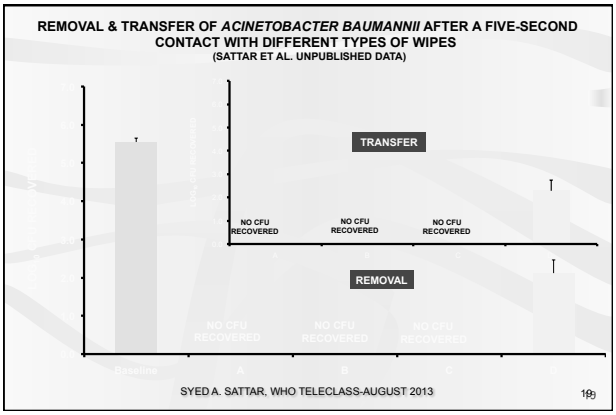
WIPERATOR®

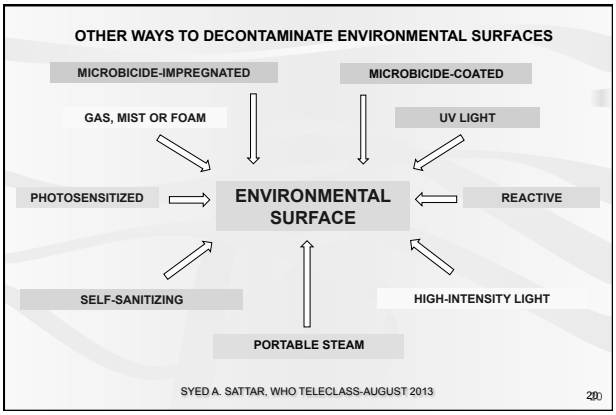
SURROGATES FOR TESTING DISINFECTANT WIPES
(SATTAR & MAILLARD 2013)

ORGANISM (ATCC #)	CATEGORY	NOSOCOMIAL PATHOGEN?
STAPHYLOCOCCUS AUREUS (6538)	GRAM+ COCCUS	YES
ACINETOBACTER BAUMANNII (19606)	GRAM- BACILLUS	YES
CANDIDA ALBICANS (10231)	YEAST-LIKE FUNGUS	YES
ASPERGILLUS NIGER (64958)	FILAMENTOUS FUNGUS	YES
MYCOBACTERIUM TERRAE (15755)	ENVIRONMENTAL MYCOBACTERIUM	RARE CASES OF INFECTIONS
BACILLUS SUBTILIS (19659)	AEROBIC SPORE-FORMER	NO
CLOSTRIDIUM SPIROIDE (43398)	ANAEROBIC SPORE-FORMER	YES
FELINE CALICIVIRUS (VR-782)	SMALL, NON-ENVELOPED	NO

REMOVAL & TRANSFER OF *STAPH AUREUS* AFTER A FIVE-SECOND CONTACT WITH DIFFERENT TYPES OF WIPES (SATTAR ET AL. UNPUBLISHED DATA)







CHANGES UNDERWAY

- MAJOR CHANGES IN TEST METHODOLOGY AFOOT
  - ORGANIZATION FOR ECONOMIC CO-OP. & DEVELOPMENT (OECD)
    - GUIDANCE DOCUMENT ON FOUR UNIFIED/HARMONIZED QUANTITATIVE CARRIER TEST METHODS FOR USE IN 34 MEMBER STATES PUBLISHED IN JULY 2013
  - ASTM: WIPE TEST STANDARD TO BE PROPOSED SOON
  - AOAC: RECENT WORK ON TESTING AGAINST SPORES OF *C. DIFFICILE*
  - U.S. EPA'S PETRI PLATE-BASED METHOD FOR TESTING DISINFECTANT WIPES
  - EUROPEAN UNION
- HEALTH CANADA GUIDELINES NOW UNDER UPDATE

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WHERE SHOULD WE BE GOING?

- DISCOURAGE CLAIMS AGAINST 'BUG-OF-THE-MONTH' (FEAR-FACTOR!!)
- INCORPORATE SUITABLE SURROGATES IN REALISTIC TESTS
- TEST MICROBICIDES WITH WIPING ACTION
- ENCOURAGE USE OF SAFER & BETTER MICROBICIDES
- HARMONIZE TESTING/REGISTRATION GLOBALLY
- TRAIN & RECOGNIZE HOUSE-KEEPING STAFF BETTER

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CONCLUSIONS

- ENVIRONMENTAL SURFACE DISINFECTANTS NEED REVIEW
  - MANY FORMULATIONS HAVE LIMITED MICROBICIDAL ACTIVITY
  - THE CONTACT TIME ON LABELS TOO LONG!
  - MANY SUCH CHEMICALS POTENTIALLY TOXIC & DAMAGING
- WIPE TESTING TO BE REFINED & PROMOTED
- SUB-LETHAL EXPOSURES TO MICROBICIDES MAY INCREASE POTENTIAL FOR MICROBICIDE & ANTIBIOTIC RESISTANCE
- INFECTION PREVENTIONISTS NEED BETTER AWARENESS

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FURTHER READING

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- ASTM #E2362. STANDARD PRACTICE FOR EVALUATION OF PRE-SATURATED OR IMPREGNATED TOWELETTES FOR HARD SURFACE DISINFECTION; W. CONSHOHOCKEN, PA.
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- HUSLAGE K. (2010). A QUANTITATIVE APPROACH TO DEFINING "HIGH-TOUCH" SURFACES IN HOSPITALS. INFECT CONTROL HOSP EPIDEMIOL 31:850-3.
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- SATTAR SA & MAILLARD J-Y (2013). THE CRUCIAL ROLE OF WIPING IN DECONTAMINATION OF HIGH-TOUCH ENVIRONMENTAL SURFACES: REVIEW OF CURRENT STATUS AND DIRECTIONS FOR THE FUTURE. AJIC 41;S97-S104.
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THANK YOU!
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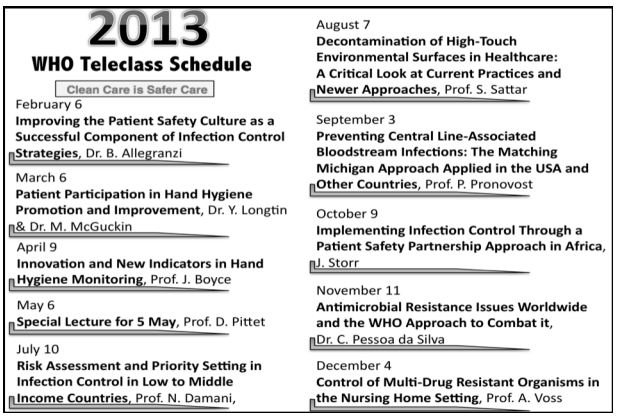
2013
WHO Teleclass Schedule
Clean Care is Safer Care
February 6
Improving the Patient Safety Culture as a Successful Component of Infection Control Strategies, Dr. B. Allegranzi
March 6
Patient Participation in Hand Hygiene Promotion and Improvement, Dr. Y. Longtin & Dr. M. McGuckin
April 9
Innovation and New Indicators in Hand Hygiene Monitoring, Prof. J. Boyce
May 6
Special Lecture for 5 May, Prof. D. Pittet
July 10
Risk Assessment and Priority Setting in Infection Control in Low to Middle Income Countries, Prof. N. Damani,
August 7
Decontamination of High-Touch Environmental Surfaces in Healthcare: A Critical Look at Current Practices and Newer Approaches, Prof. S. Sattar
September 3
Preventing Central Line-Associated Bloodstream Infections: The Matching Michigan Approach Applied in the USA and Other Countries, Prof. P. Pronovost
October 9
Implementing Infection Control Through a Patient Safety Partnership Approach in Africa, J. Storr
November 11
Antimicrobial Resistance Issues Worldwide and the WHO Approach to Combat it, Dr. C. Pessoa da Silva
December 4
Control of Multi-Drug Resistant Organisms in the Nursing Home Setting, Prof. A. Voss


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