

# Viruses and Hand Hygiene

Prof. Syed Sattar, University of Ottawa  
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## VIRUSES AND HAND HYGIENE

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- CREM STAFF & STUDENTS

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## DECLARATION

- IN ADDITION TO PEER-REVIEWED GRANTS, MY CENTRE RECEIVES RESEARCH SERVICE CONTRACTS FROM COMPANIES AROUND THE WORLD
- GOJO INDUSTRIES HAS BEEN ONE SUCH COMPANY
- I HAVE ACTED AS A PAID CONSULTANT TO GOJO & ALSO CO-AUTHORED A PEER-REVIEWED PAPER WITH THEM (Appl Environ Microbiol. 2008;74:5047-5052)

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## OBJECTIVES

- VIRUSES AS HUMAN PATHOGENS & HOW THEY CONTAMINATE HANDS
  - VIRUS SURVIVAL ON HANDS & TRANSFER
- HANDWASH & HANDRUB AGENTS AGAINST VIRUSES
- METHODS FOR TESTING HAND HYGIENE AGENTS
- STATUS OF GOVT. REGULATIONS IN U.S. & CANADA
- WHO'S & OTHER GUIDELINES ON HAND HYGIENE
- CONCLUSIONS & FUTURE DIRECTIONS

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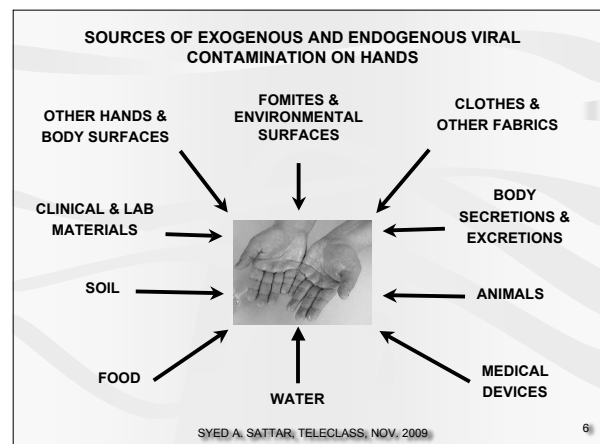
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## IMPORTANCE OF VIRUSES OF HUMANS

- HUNDREDS OF VIRUSES CAN INFECT HUMANS
- LIMITED CHEMOTHERAPY & VACCINES
- DELAYED OUTCOME OF DAMAGE
- 'NEW' VIRAL AGENTS OF SERIOUS DISEASES STILL BEING DISCOVERED
- LOW MINIMAL INFECTIVE DOSE
- HIGH PROPORTION OF SUBCLINICAL CASES
- INCREASING HEALTH IMPACT DUE TO:
  - GROUPING OF SUSCEPTIBLES
  - MORE IMMUNOSUPPRESSION
  - INCREASING LIFE EXPECTANCY
  - CHANGING LIFE PATTERNS (TRAVEL, FOOD)

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### VIRUSES IMPORTANT IN HAND HYGIENE

- ADENOVIRUSES (CONJUNCTIVITIS, DIARRHEA, RESP. INFECT.)
- ASTROVIRUSES (ACUTE DIARRHEA)
- ENTEROVIRUSES (FEVER, RASH, COLDS, ETC.)
- HEPATITIS A VIRUS (LIVER INFECTION)
- HEPATITIS E VIRUS (LIVER INFECTION)
- NOROVIRUSES (ACUTE DIARRHEA)
- PAPILLOMAVIRUSES (WARTS, CANCERS)
- PARVOVIRUSES (DIARRHEA, RESP. INFECTIONS, ETC.)
- RHINOVIRUSES (COMMON COLD)
- ROTAVIRUSES (ACUTE DIARRHEA)

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### TESTING OF HAND HYGIENE AGENTS

- IN NORTH AMERICA, ASTM INTERNATIONAL IS THE ONLY STANDARDS-SETTING ORGANIZATION ACTIVE IN THIS FIELD
  - FINGERPAD METHOD (E1838)
  - WHOLE-HAND METHOD (E2011)
- IN EUROPE, THE EUROPEAN COMMITTEE FOR STANDARDS (CEN) DEVELOPS METHODS FOR TESTING HAND ANTISEPTICS

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### ALCOHOL-BASED RUBS - STRENGTHS

- CONVENIENT, SAFE, FAST-ACTING
- SAVE TIME, WATER & DO NOT REQUIRE HAND DRYING
- LESS IRRITATING TO SKIN THAN SOAP WHEN PROPERLY FORMULATED
- AVAILABLE AT POINT-OF-USE AND/OR EASILY CARRIED
- FORMULATIONS WITH  $\geq 60\%$  ALCOHOL BROAD-SPECTRUM MICROBICIDES, INCLUDING ACTIVITY AGAINST MANY NON-ENVELOPED VIRUSES WITHOUT NEED FOR OTHER ACTIVES

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### ALCOHOL-BASED RUBS - LIMITATIONS

- HEPATITIS A, CALICI- & PARVOVIRUSES MAY BE LESS SUSCEPTIBLE
- NO ACTIVITY AGAINST BACTERIAL SPORES
- MAY LOWER INDOOR AIR QUALITY
- SOME TRANS-DETMAL ABSORPTION
- POTENTIAL FOR ABUSE/MISUSE
- FLAMMABILITY
- RELIGIOUS/CULTURAL LIMITATIONS

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### HAND ANTISEPTICS WITH GENERALLY POOR ACTIVITY AGAINST NON-ENVELOPED VIRUSES

- BENZALKONIUM CHLORIDE
- TRICLOSAN
- CHLORHEXIDINE GLUCONATE
- TRICLOCARBAN
- PCMX

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### ALCOHOL-FREE HANDRUBS

- SUCH CURRENTLY AVAILABLE RUBS HAVE VIRTUALLY NO ACTIVITY AGAINST NON-ENVELOPED VIRUSES; MAY WORK AGAINST ENVELOPED ONES
- RUBBING HANDS WITH THEM MAY SPREAD LOCALIZED CONTAMINATION OVER A WIDER AREA
- NEWER ALCOHOL-FREE FORMULATIONS ARE UNDER DEVELOPMENT & TESTING

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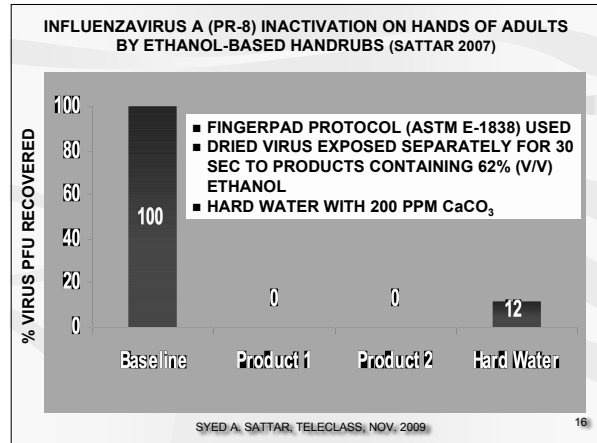
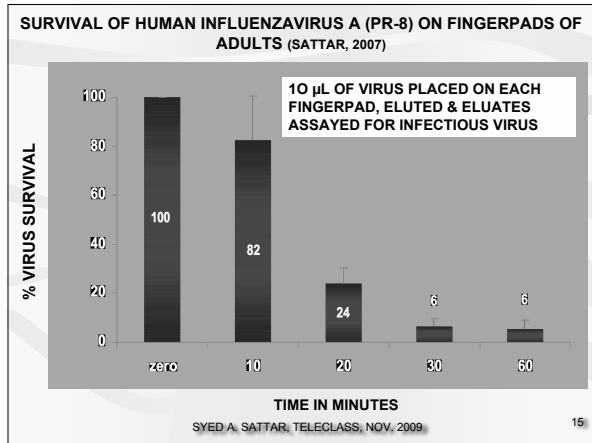
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### H1N1 (SWINE INFLUENZA)

- AN ENVELOPED VIRUS
- CAUSE OF CURRENT PANDEMIC
- RELATIVE IMPORTANCE OF HANDS IN ITS SPREAD IS UNKNOWN!
- ANOTHER FLU VIRUS OF HUMANS REMAINS VIABLE ON HANDS OF ADULTS FOR ABOUT ONE HOUR
- ACTIVITY OF HANDWASH AGENTS
  - ANY DETERGENT, INCLUDING PLAIN SOAPS, CAN READILY INACTIVATE THE VIRUS
- ACTIVITY OF HANDRUB AGENTS
  - HIGHLY SUSCEPTIBLE TO ALCOHOL-BASED HANDRUBS

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#### STUDY BY GRAYSON ET AL (CLIN INFECT DIS 2009;8:285-291)

- HANDS OF 20 VACCINATED, ANTIBODY+ ADULTS RECEIVED HUMAN INFLUENZAVIRUS A (H1N1)
- HANDS TREATED WITH SOAP & WATER OR ALCOHOL-BASED HANDRUBS WITH CHG
- IMMEDIATE REDUCTION IN VIABILITY OF VIRUS ON AIR DRYING OF SKIN
- ALL PROTOCOLS PROVED HIGHLY EFFECTIVE WITH SOAP & WATER BEING THE BEST

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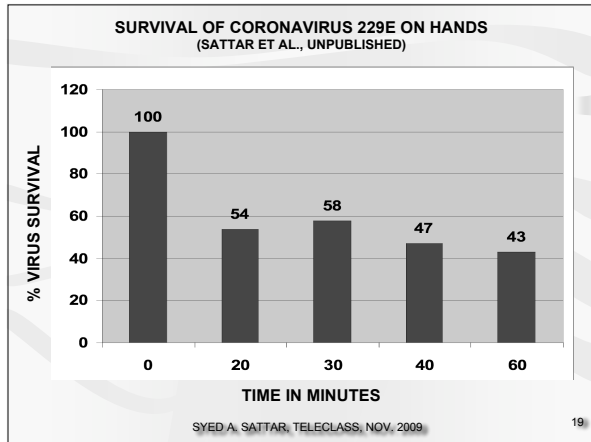
#### SEVERE ACUTE RESP. SYNDROME (SARS)

- CAUSED BY A NEW CORONAVIRUS (ENVELOPED)
- A ZOOZOSIS
- IN 2003, CAUSED >8,000 CLINICAL CASES IN 21 DIFFERENT COUNTRIES WITH A CASE FATALITY RATE OF NEARLY 10%
- ROLE OF HANDS IN SPREAD NOT KNOWN
- VIRUS SURVIVES BETTER ON HANDS THAN MOST ENVELOPED VIRUSES
- READILY INACTIVATED BY ALCOHOL-BASED RUBS

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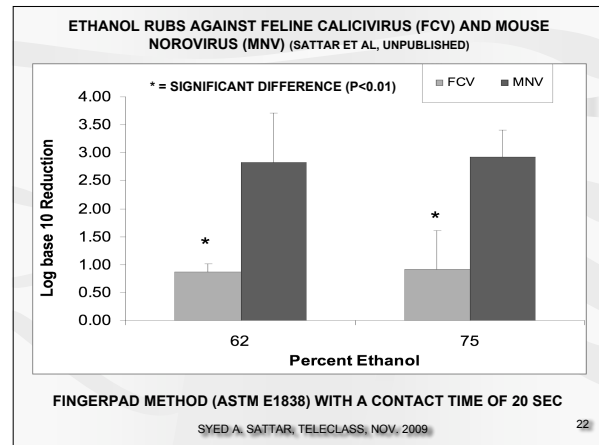


**ACTIVITY OF ALCOHOL-BASED RUBS AGAINST CORONAVIRUS 229E, A SURROGATE FOR THE SARS VIRUS** (WOLFF ET AL., 2004)

TREATMENT	MEAN ± SD	% REDUCTION
BASELINE	1.32 X 10 <sup>4</sup> ± 0.4	-
HARD WATER (200 PPM CaCO <sub>3</sub> )	3.02 X 10 <sup>3</sup> ± 2.0	77.0
75% (V/V) ETHANOL	0	>99.99
ALCOHOL (60%) GEL	0	>99.99

FINGERPAD METHOD (ASTM 1838) USED. TEN µL OF VIRUS IN SOIL LOAD PLACED ON EACH FINGERPAD & DRIED. DRIED INOCULUM EXPOSED TO CONTROL OR TEST SOLUTION FOR 30 SEC. FINGERPADS ELUTED & ELUATES PLAQUE ASSAYED.  
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- NOROVIRUSES**
- FREQUENT CAUSE OF ACUTE GASTROENTERITIS
  - OUTBREAKS COMMON IN HEALTHCARE, COMMUNITY SETTINGS & ON CRUISE SHIPS
  - VIRUS RELATIVELY RESISTANT TO MICROBICIDES
  - DIFFICULT TO CULTURE IN THE LAB
  - FELINE CALCIVIRUS (FCV) OFTEN USED AS A SURROGATE; MOUSE NOROVIRUS (MNV) NOW RECOMMENDED INSTEAD
  - MNV LESS RESISTANT THAN FCV TO ALCOHOL-BASED HANDRUBS
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## GOVERNMENT REGISTRATION OF HAND HYGIENE AGENTS

- HEALTH CANADA**
- HEALTH CANADA'S *GUIDANCE DOCUMENT: HUMAN-USE ANTISEPTIC DRUGS* (TO BE POSTED AT HEALTH CANADA WEBSITE BY END OF THIS MONTH)
  - HIGHLY SIGNIFICANT DOCUMENT PUTTING CANADA AHEAD IN AWARDED DRUG IDENTIFICATION NUMBERS (DINs) TO HAND HYGIENE AGENTS
  - INCLUDES GUIDANCE ON CLAIMS AGAINST VIRUSES
  - RECOMMENDS EUROPEAN (CEN) & NORTH AMERICAN (ASTM) STANDARD TEST METHODS
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**U.S. FOOD & DRUG ADMINISTRATION'S TENTATIVE FINAL MONOGRAPH**  
 ([http://www.fda.gov/ohrms/DOCKETS/ac/05/briefing/2005-4184B1\\_01\\_16-FDA-TAB15.pdf](http://www.fda.gov/ohrms/DOCKETS/ac/05/briefing/2005-4184B1_01_16-FDA-TAB15.pdf))

- FIRST ISSUED IN JUNE 1994; STILL UNDER REVIEW
- NO MENTION OF ACTIVITY OF HANDWASH & HANDRUB AGENTS AGAINST VIRUSES
- ONE PART OF FDA REQUIRES CLINICAL STUDIES AS EVIDENCE FOR SIGNIFICANT REDUCTIONS IN CASES OF HANDBORNE INFECTIONS BEFORE ALLOWING FOR ANY LABEL CLAIMS
- ANOTHER PART OF FDA ACTIVELY PROMOTES HAND HYGIENE AGENTS FOR FOOD SAFETY

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**RECENT GUIDANCE DOCUMENTS ON HAND HYGIENE**

**GOVT. OF ONTARIO**

- **BEST PRACTICES FOR HAND HYGIENE IN ALL HEALTH CARE SETTINGS**
- A DOCUMENT PREPARED BY THE PROVINCIAL INFECT. DIS. ADVISORY COMMITTEE & ISSUED BY MINISTRY OF HEALTH & LONG-TERM CARE IN MAY 2008
- CONTAINS GENERALLY GOOD DEFINITIONS & CLEAR RECOMMENDATIONS ON HAND HYGIENE, EXCEPT:
  - DOES NOT RECOMMEND FORMULATIONS WITH <70% ALCOHOL
  - INCLUDES 'SURGICAL HAND ANTISEPSIS' IN THE GENERAL DEFINITION OF HAND HYGIENE & WITHOUT ANY MENTION OF 'RESIDENT FLORA' OF HANDS

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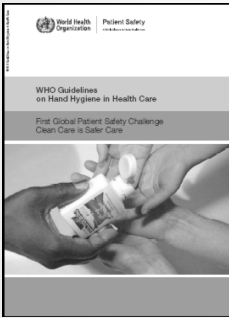
**CANADIAN PUBLIC HEALTH AGENCY**  
 (<http://www.phac-aspc.gc.ca/alert-alerte/h1n1/public/handhygiene-eng.php>)

- **HAND HYGIENE RECOMMENDATIONS FOR REMOTE & ISOLATED COMMUNITY SETTINGS** - DOCUMENT ISSUED BY CAN. PUB. HLTH. AGENCY IN OCT. 2009
- PROMPTED BY CONCERNS WITH SEVERE H1N1 INFECTIONS IN FIRST NATIONS COMMUNITIES
- SOON EVOLVED INTO A USEFUL GENERAL GUIDE ON HAND HYGIENE IN ANY COMMUNITY WITH LIMITED RESOURCES OR FACILITIES FOR HAND HYGIENE

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**WHO GUIDELINES RELEASED IN MAY 2009**  
 ([http://whqlibdoc.who.int/publications/2009/9789241597906\\_eng.pdf](http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf))

- FAR-REACHING DOCUMENT WITH GLOBAL IMPACT
- EMPHASIS ON ALCOHOL-BASED HANDRUBS
- TWO FORMULAS FOR LOCAL PRODUCTION
- PERMITS USE OF COMMERCIALY-AVAILABLE PRODUCTS IF THEY MEET STATED EFFICACY REQUIREMENTS



WHO Guidelines on Hand Hygiene in Health Care  
 First Global Patient Safety Challenge: Clean Care is Safer Care

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**WHO'S CAMPAIGN ON SAVE LIVES: CLEAN YOUR HANDS**

- GLOBAL INITIATIVE LAUNCHED IN 2008
- BY MAY 2009, HAD 5 000 FACILITIES REGISTERED
- 5 MAY EACH YEAR A GLOBAL MOVEMENT TO SAVE LIVES & REAFFIRM THAT HAND HYGIENE IS CRITICAL FOR PATIENT SAFETY
- TARGET FOR 2010 IS 10 000 REGISTRATIONS BY SPREADING INFORMATION ON IMPORTANCE OF HAND HYGIENE & ENCOURAGE COMPLIANCE FOR REDUCING HEALTHCARE ASSOCIATED INFECTIONS
- REGISTER FOR THIS GLOBAL INITIATIVE NOW AT:  
[HTTP://WWW.WHO.INT/GPSC/5MAY/REGISTER/EN/INDEX.HTML](http://www.who.int/gpsc/5may/register/en/index.html)

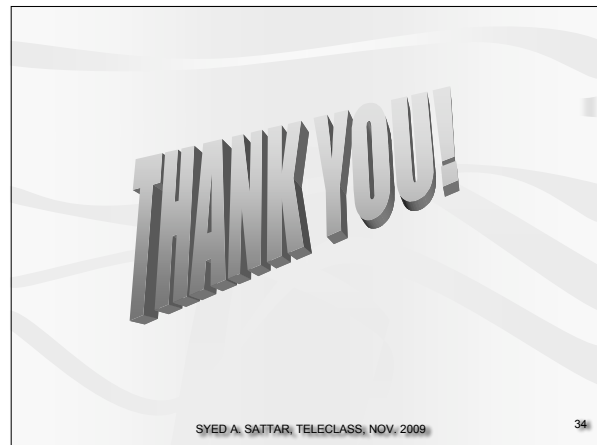
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- THE FUTURE?**
- NEW VIRAL PATHOGENS BOUND TO BE DISCOVERED
  - HANDS MAY PLAY A ROLE IN THEIR SPREAD
  - SEARCH FOR BETTER & SAFER HAND HYGIENE AGENTS MUST CONTINUE
  - HAND WIPES AGAINST VIRUSES URGENTLY NEEDED
  - HAND HYGIENE COMPLIANCE REMAINS A WEAK LINK
  - MORE GOVERNMENT AGENCIES MUST DEVELOP MEANS OF REGISTERING HAND HYGIENE AGENTS
  - END-USERS MUST BE BETTER INFORMED ON ROLE OF HANDS TO SPREAD INFECTIONS IN GENERAL
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- CONCLUDING STATEMENTS**
- HAND HYGIENE *ONE OF SEVERAL* PREVENTIVE MEASURES AGAINST VIRUSES
  - ETHANOL MORE EFFECTIVE THAN ISOPROPYL ALCOHOL AGAINST NON-ENVELOPED VIRUSES
  - MINIMUM CONC. OF ETHANOL 60% (V/V)
  - DEMONSTRATED ACTIVITY AGAINST NON-ENVELOPED VIRUSES GOOD PREDICTOR OF ACTIVITY AGAINST ENVELOPED VIRUSES, VEGETATIVE BACTERIA AS WELL AS FUNGI
  - USE OF ALCOHOL-BASED HANDRUBS AN IMPORTANT ADJUNCT TO & NOT A SUBSTITUTE FOR PROPER HANDWASHING WITH PLAIN SOAP & WATER
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(2009)

**THE NEXT FEW TELECLASSES**

03 Dec. 09	Infection Control During and After Natural Disasters Speaker: Pam Falk, UTMB Healthcare
10 Dec. 09	Environmental Cleaning Audits: Do They Help Reduce the Spread of C. difficile and Antibiotic Resistant Organisms in Healthcare Facilities? Speaker: Dr. Michelle Alfa, Diagnostic Services Manitoba

Coming December 7 ...

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