Hand Hygiene – New Frontiers in Messaging and Measurement
Dr. Kate Ellingson, Centers for Disease Control, Atlanta
Teleclass Sponsored by Diversey Inc (www.diversey.com)

Hand Hygiene:
New Frontiers in Messaging and Measurement

Kate Ellingson, PhD
CDC, Division of Healthcare Quality Promotion

Hosted by Paul Webber
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www.webbertraining.com March 22, 2012

Objectives

- Address “hot button” hand hygiene issues on recommendations and messaging
- Describe hand hygiene adherence measurement methods
  - Direct observation: issues and advances
  - Latest technologies for automated monitoring
- Review hand hygiene campaign efforts and provide resources for participation

Background

Hand Hygiene is Historical Cornerstone of Infection Control

- 1847: Vienna General Hospital, Austria
- “Childbed fever” claimed up to 13% of mothers on medical ward compared to midwifery ward (2%)
- Medical students handled corpses before delivering
- Dr. Ignaz Semmelweis recommends hand washing before examining patients on maternity ward
- Mortality rates drop quickly and significantly

Hand Hygiene Reduces Microbial Burden on Hands

- In-vitro and in-vivo studies show significant log reductions in epidemiologically important pathogens after performing hand hygiene

NIH-Sponsored Prospective, Controlled Trial of Handwashing


Slide courtesy of John Boyce


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Seminal Study: Impact of HH on MRSA  
University of Geneva Hospitals

Hand Hygiene Adherence Rates  
Low Worldwide

Relationship between HH and HAIs:  
More Complex than Often Conveyed

Guidelines  
- CDC Guidelines: 2002  
- WHO Guidelines: 2009  
- SHEA Compendium: 2013

Quick Rundown of Hand Hygiene Agents

- Soap and Water: reliably removes dirt from hands; associated with skin irritation after repeated use
- Alcohol based hand rub (ABHR): active against gram- and gram+ bacteria, but not against spores
- Quaternary Ammonium Compounds (e.g., benzalkoniumchloride): weak activity against gram negative bacteria
- Triclosan: broad range of activity but relatively non-effective against gram- bacteria, persistent activity

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Sampling of Hot Button Issues:  
Frequently Asked Questions to CDC

**Role of Hand Hygiene in *C. difficile* Prevention**

**Most Frequent Hand Hygiene Inquiries to CDC in 2011-2012**
- Can you clarify CDC’s position on soap and water versus alcohol-based handrub for patients *C. difficile* infection?
- What is CDC’s position on increasingly popular gel nails for healthcare workers?
- Does CDC recommend hand hygiene before putting on non-sterile gloves?

**Hand Hygiene in the Era of *C. diff***:  
Soap & Water vs. ABHR
- ABHR not efficacious against *C. difficile*
- 2009 WHO Hand Hygiene Guidelines:
  - Recommends S&W “if exposure to potential spore-forming organisms is strongly suspected or proven, including outbreaks of *C. difficile*”
  - For all other situations, ABHR recommended for routine hand hygiene in healthcare facilities
- SHEA/IDSA Clinical Practice Guidelines:
  - Preferential use of S&W for hand hygiene over alcohol-based hand hygiene products only in outbreak settings
  - Why only in outbreaks?

**Soap and Water Superior to ABHR for Efficacy against *C. difficile***

- While data supports role of hand hygiene in reducing incidence of pathogens like MRSA and VRE, no data to support HH for CDI
- Glove use is only CDI prevention recommendation supported by outcomes studies
- Recommendation for preferential use of S&W is based on clinical opinion, not on outcomes
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Increases in ABHR Use not Associated with C. diff Increases

![Graph showing increases in ABHR use not associated with C. diff increases]

Boyce et al. Infect Control Hosp Epidemiol, 2006

CDC Position: CDI FAQs on Website

- How can *Clostridium difficile* infection be prevented in hospitals and other healthcare settings?
  - Use antimicrobial soap
  - **ABHR** for patients with known or suspected *Clostridium difficile* infection:
    - Place these patients in private rooms. If private rooms are not available, these patients can be placed in rooms ( cohorted) with other patients with *Clostridium difficile* infection.
  - **Gloves** when entering patients’ rooms and during patient care.
  - **Direct contact isolation** after rectal/perianal drainage.

- Because alcohol does not kill *Clostridium difficile* spores, use of soap and water is more effective than alcohol-based hand rubs. However, recent experimental data suggest that, even using soap and water, removal of *C. difficile* spores is more challenging than the removal or inactivation of other common pathogens.
- Preventing contamination of the hands via glove use remains the cornerstone for preventing *Clostridium difficile* transmission via the hands of healthcare workers, any personnel in close contact with patients, and the patient. Hand hygiene is critical at all times, but especially when caring for patients with *Clostridium difficile* infection.

- **CDC in line with SHEA/IDSA/APIC update**
  - http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_faqs_HCP.html#a10

- **Balancing ABHR and CDI Messaging**
  - Impact of increased ABHR use on other epidemiologically important organisms
    - Available more often at patient bedside
    - Requires less time w/o hand drying
    - Well tolerated on hands of healthcare personnel
    - Associated with decreases in HAIs (e.g., MRSA)
  - **Uncertainties about role of HH in CDI prevention**

  Reexamining Methods and Messaging for Hand Hygiene in the Era of Increasing *Clostridium difficile* Colonization and Infection
  Katherine Ellingson, PhD; Clifford McDonald, MD
  Ellingson and McDonald. Infect Control Hosp Epidemiol, 2010

- **Recommendations Regarding Gel Nails/Manicures for Healthcare Workers**

  - Gel manicures (“Shellac”™) increasingly popular as a substitute to acrylic nails
  - Facilities vary in their policies on gel nails
  - No recommendation on gel nails in 2002 CDC guidelines
  - **Key Question: Are gel nails considered “artificial” or “polish”?**

  Current Guidelines: About Wearing Artificial Nails and Nail Polish in the Healthcare Setting
  Jane C. Rothrock, BSNc, MSN, RN, CNOR, FAAN

  - Association for periOperative Registered Nurses (AORN) describes artificial as: “extensions, tips, gels and acrylic overlay, resin wraps or acrylic fingernails”
  - If considered a polish, AORN recommends no more than 4d wear-time before removal (gels require acetone for removal)
  - Bottom line: there are no CDC recommendations specific to gel nails; deferring to the AORN guidelines would support banning them in high-risk settings (e.g., ICUs, ORs)

- **Gel Nails/Manicures in Healthcare**

  - Gel manicures (“Shellac”™) increasingly popular as a substitute to acrylic nails
  - Facilities vary in their policies on gel nails
  - No recommendation on gel nails in 2002 CDC guidelines
  - **For artificial nails:**
    6. Other Aspects of Hand Hygiene
       A. Do not wear artificial fingernails or extenders when having direct contact with patients at high risk (e.g., those in intensive-care units or operating rooms) (TA) (550-339.)

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Hand Hygiene before Donning Non-Sterile Gloves: CDC’s Position

CDC Position on Hand Hygiene Before Donning Non-Sterile Gloves

- CDC HH guidelines do not include a recommendation for HH prior to non-sterile glove use
- Indications for hand hygiene include: before and after patient care, after removing gloves, before inserting invasive devices, etc.

CDC Position on Hand Hygiene Before Donning Non-Sterile Gloves

- Concern that glove use is used as a substitute for HH
  - Recent publication: hand hygiene adherence is lower when gloves are worn (Fuller et al., ICHE. 2011; 32(12): 1194)
- Some facilities have created policies for HH before glove use; this is not a direct application of CDC guidelines
  - Solution: educate HCWs about appropriate indications for HH and glove use
- If following CDC recommendations, HCWs will perform HH prior to non-sterile glove use
  - There are exceptions (e.g., non-patient-related tasks)

Hand Hygiene Adherence Measurement

Measuring Hand Hygiene Adherence

1. Direct Observation
2. Measuring Product Use
3. Surveys (self-report)
4. Automated Oversight Technology

http://www.jointcommission.org/patientsafety/infectioncontrol/hh_monograph.htm

Little Standardization of Hand Hygiene Measurement in the US

- Without standardization, cannot properly
  - Benchmark
  - Assess adherence nationally
  - Interpret and compare published studies

- Sources of variability
  - In-Out versus 5 Moments monitoring
  - Observer schedules and frequency of monitoring
  - Monitoring of indications versus technique
  - Use of emerging technologies

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WHO Observation Tool:
5 Moments for Hand Hygiene

<table>
<thead>
<tr>
<th>Facility</th>
<th>Service</th>
<th>Mode</th>
<th>Start</th>
<th>End</th>
<th>Time</th>
<th>Observation Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>active</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>static</td>
<td></td>
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</tbody>
</table>

WHO 5 Moments Observation Protocol Not Universally Used in US
- 5 Moments observation protocol is validated and used broadly worldwide
- In the US, alternative monitoring protocols often used, mainly focused on “in-out” HH
- Reasons cited for alternatives (anecdotal):
  - Primary concern is about patient-to-patient transmission
  - Measurement difficulties for hand hygiene indications occurring inside of patient rooms
  - Need for practical, broadly applicable protocols for external inspectors (e.g., survey and certification officials)
  - Expansion of automated technologies, which primarily identify in-out hand hygiene opportunities

iScrub
An iPhone / iPod touch application for collecting hand-hygiene adherence data

The Old Way
Grab a clipboard
Pull up a chair
Record opportunities
Transcribe observations
Generate reports
Post a bar chart

Introducing the iScrub Way
Replaces pen and paper
Intuitive touch interface
Minimizes data entry errors
Easily customized
No phone contract required with an iPod touch

Entering Observations
Tap to select an opportunity
Attach notes to observations, e.g., “patient coding”
Slide to confirm observation

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Isolation Precautions

iScrub knows required PPE
Tap required isolation precautions and indicate adherence

Key Features

Record opportunities for the World Health Organization’s 5 Moments of Hand Hygiene
Observations are time and location stamped

Additional Features

The device name (e.g., “Pat’s iPod”) is included in exported data
Observations entered for training purposes can be cleared prior to exporting
Conduct observations discretely; pretend you’re just listening to music

iScrub Lite 1.5

Exports to Excel for analysis
Re-export last few data sets
Easily customized on the iPhone or iPod touch
Free!

iScrub Lite is Customizable

Easily edit the default lists for locations, job roles, and observation notes
Easily modify and delete existing items and add new ones

Example of data feedback

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Maximizing Efficiency and Quality of Hand Hygiene Auditing

- HH audits by direct observation are to be a reflection of overall performance
  - Rates can be affected by sporadic or inconsistent sampling
  - New technologies emerging, but direct observation is still the dominant method for assessing HH adherence
- Direct observation requires “sampling” of HH opportunities to observe
  - Maximize number of opportunities and number of individuals observed
  - Positioning of observers and observer scheduling matters
  (Fries et al., ICHE, In Press)

Measuring Product Usage

- Volume measurement is a common, low-cost way to measure compliance
  - Provides a crude measure of adherence
  - No characterization of opportunities and
- Counting technologies
  - Hand hygiene events time- and date-stamped
  - Data downloaded wirelessly using data logger
  (Boyce JM et al. ICHE, 2011)

Technological Innovation in Hand Hygiene Measurement

- Increase in hand hygiene “oversight” technology
- Generates a lot of data with real-time feedback
- Ongoing research to evaluate sustainability, cost-effectiveness, and optimal use of data
  Alcohol “Sniffers” RFID Monitoring Hospital Video Auditing

Early Study on Video Auditing

- Video Auditing w/Real-time Feedback
  - 10% pre-intervention adherence
  - 87.9% post-intervention adherence
- More research on broad dissemination, cost and feasibility needed
  (Armellino et al. CID, 2011)

Low-Cost Wireless Devices to Study Implementation Optimization: U. Iowa

- 89 HCP participated in 10 focus groups
  - 1 university hospital, 1 VA hospital, 1 community hospital
  - Focus groups homogenous by HCP type
- Level of familiarity and comfort varied
  - Leadership most familiar and comfortable with technology, front-line staff least
- Common concerns
  - Accuracy of technology
  - Intended use of data – for punitive purposes?
  - Participants recommended transparency about intended use of data
  (Ellingson et al. ICHE, 2011)
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Review of HH Monitoring Technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Advantages</th>
<th>Disadvantages</th>
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</thead>
<tbody>
<tr>
<td>NIR</td>
<td>-detects hand hygiene with reflectometric sensors</td>
<td>- requires calibration</td>
</tr>
<tr>
<td>RDH</td>
<td>- continuous hand hygiene monitoring</td>
<td>- expensive</td>
</tr>
<tr>
<td>EDS</td>
<td>- continuous hand hygiene monitoring</td>
<td>- requires calibration</td>
</tr>
<tr>
<td>ECT</td>
<td>- continuous hand hygiene monitoring</td>
<td>- expensive</td>
</tr>
<tr>
<td>AXN</td>
<td>- continuous hand hygiene monitoring</td>
<td>- requires calibration</td>
</tr>
<tr>
<td>Infrared RE</td>
<td>- non-contact, non-intrusive hand hygiene monitoring</td>
<td>- requires calibration</td>
</tr>
<tr>
<td>Ultraviolet</td>
<td>- continuous hand hygiene monitoring</td>
<td>- requires calibration</td>
</tr>
<tr>
<td>RHE-DS combination</td>
<td>- continuous hand hygiene monitoring</td>
<td>- requires calibration</td>
</tr>
</tbody>
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Hand Hygiene Resources and Campaigns

- Updated hand hygiene website
  - Guidelines
  - Training and education tools
  - Implementation tools
  - Measurement tools
  - Patient empowerment

Example Resources:
- Videos
- Training modules
- State campaigns
- Hand hygiene promotional materials relevant to US settings

CDC Hand Hygiene Website

- Updated hand hygiene website
- Guidelines
- Training and education tools
- Implementation tools
- Measurement tools
- Patient empowerment

Example Resources:
- Videos
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- Hand hygiene promotional materials relevant to US settings

WHO Website

http://www.who.int/gpsc5may/en/

Global Campaign Enrollment Information

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WHO Tools: Examples

Summary
- Hand hygiene is important in preventing the transmission of pathogens in healthcare settings
  - In aggregate adherence is low worldwide
- Hand hygiene is one element of robust IP programs needed in complex care environment
- Thoughtful messaging needed for HH and C. difficile
  - Emphasis on glove use for prevention of transmission
  - HH after glove use – S&W during outbreaks
  - ABHR preferred in non-CDI outbreak settings
- New technologies emerging for HH monitoring – follow early impact and feasibility studies
- CDC and WHO tools/resources available; opportunities for participation in global campaign

We welcome your feedback and comments!
Kate Ellingson: fev@cdc.gov

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Division of Healthcare Quality Promotion

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29 March Water Bug Management for Infection Prevention
Speaker: Andrew Streifel, University of Minnesota

5 April Standardized Training for Environmental Cleaning in Healthcare
Speaker: Grace Volkering, Brenda Smith, Nora Boyd, Public Health Ontario
Sponsor: Virox Technologies Inc

13 April FREE A.D. Russell Memorial Teleclass Inmate Resistance to Sporicides and Potential Failure to Decontaminate
Speaker: Prof. Jean-Yves Maillard, Cardiff University, Wales

17 April FREE WHO Teleclass – North America Implementing Change: The Technical & Socio-Adaptive Aspects of Preventing Catheter-Associated Urinary Tract Infection
Speaker: Prof. Sanjay Saint, University of Michigan
Sponsor: World Health Organization First Global Patient Safety Challenge

www.webbertraining.com/schedulepl.php