The Semmelweis Tracker: Monitoring and Improving Hand Hygiene Compliance

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hands for limited time periods, personnel often fail to cover all surfaces of their hands and fingers (288).

**Adherence of HCWs to Recommended Hand-Hygiene Practices**

Observational Studies of Hand-Hygiene Adherence. Adherence of HCWs to recommended hand-hygiene procedures has been poor, with mean baseline rates of 5%–81% (overall average: 40%) (Table 8) (71,74,86,87,276,280,281,283,285, 289–313). The methods used for defining adherence (or non-adherence) and those used for conducting observations vary considerably among studies, and reports do not provide detailed information concerning the methods and criteria used. The majority of studies were conducted with hand-hygiene adherence as the major outcome measure, whereas a limited number measured adherence as part of a broader investigation. Several investigators reported improved adherence after implementing various interventions, but the majority of studies had short follow-up periods and did not confirm whether behavioral improvements were long-lasting. Other studies established that sustained improvements in handwashing behavior occurred during a long-term program to improve adherence to hand-hygiene policies (74,75).
Your 5 Moments for Hand Hygiene

1. BEFORE TOUCHING A PATIENT
   - WASH: Clean your hands before touching a patient when approaching the patient.
   - RINSE: To protect the patient against harmful germs carried on your hands.

2. BEFORE CLEANING/ASEPTIC PROCEDURE
   - WASH: Clean your hands immediately before performing a clean/aseptic procedure.
   - RINSE: To protect the patient against harmful germs, including the patient’s own, from entering the patient’s body.

3. AFTER BODY FLUID EXPOSURE RISK
   - WASH: Clean your hands immediately after an exposure risk to body fluids and after glove removal.
   - RINSE: To protect yourself and the healthcare environment from harmful patient germs.

4. AFTER TOUCHING A PATIENT
   - WASH: Clean your hands after touching a patient and his/her immediate surroundings, when leaving the patient's side.
   - RINSE: To protect yourself and the healthcare environment from harmful patient germs.

5. AFTER TOUCHING PATIENT SURROUNDINGS
   - WASH: Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving the patient's side.
   - RINSE: To protect yourself and the healthcare environment from harmful patient germs.

World Health Organization
Patient Safety
SAVE LIVES
Clean Your Hands

May 2000
<table>
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<tr>
<th>Time:</th>
<th>Before Contact</th>
<th>After Contact</th>
<th>Intervention</th>
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<td>Hand Hygiene Performed:</td>
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METHOD AND SYSTEM TO MONITOR HAND HYGIENE COMPLIANCE

Inventor: Andrew Graham Sahud, Pittsburgh, PA (US)

Assignee: Allegheny-Singer Research Institute, Pittsburgh, PA (US)

Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

Appl. No.: 12/851,847
Filed: Aug. 6, 2010

Prior Publication Data

Related U.S. Application Data
Continuation of application No. 11/581,124, filed on Oct. 13, 2006, now Pat. No. 7,770,782.

ABSTRACT
A system which allows healthcare providers to monitor hand hygiene compliance includes a data reader adapted to be worn by a healthcare provider. The system includes a portal trigger...
The Goals of the Invention:

- Hand Hygiene Compliance determined by Passive “Observation”

- A Surrogate Marker for HHC: must be reliable and simple

- Individual Feedback: Critical to enabling behavioral modification
The Concept
Triggers

• Patient Rooms:
  – Room Trigger Devices

• Hand Sanitizer and Liquid Soap Dispensers:
  – Dispensing Triggers
Reader Device

- LCD readout display
  - IP protected feature
- Data uploaded via USB port
Technical Obstacles

- RF lacks precision
- Blue Tooth unable to quickly “pair” device
- Battery life: Limited
- HHC for multiple providers inaccurate
- The WHO 5 Moments are difficult to capture
Semmelweis I
Semmelweis I: The Hand Hygienometer

- Hardware/Software Development 2006-2009
- Pilot Study 2009
- Proof of Concept
- Publication of Original Article
• **Direct Observations:**
  • 8 months
  • 378 observations
  • Physician compliance: 34.7%
  • RN compliance: 34.5%

• **Semmelweis:**
  • 6 weeks
  • 622 room entries
  • Physician 24.6%
  • RN 25.3%
  • Student 28.5%
Context of Invention

Measuring Healthcare Worker Hand Hygiene Activity: Current Practices and Emerging Technologies

Dedicated hand hygiene monitoring systems and RTLS are currently not capable of detecting whether HCWs perform hand hygiene before an aseptic procedure (Moment 2) or after a potential body fluid exposure (Moment 3). However, several studies have found that Moments 1, 4, and 5, which would likely be captured by electronic systems, account for approximately 80% of all hand hygiene opportunities. Further...
Semmelweis II
Semmelweis II: The Semmelweis Tracker

- 2009–2011
- Rechargeable Battery
- Motion Detector
- Web Interface
- Urgent Care Center Study
  - May 2011–Dec 2011

Short report:
Feasibility and effectiveness of an electronic hand hygiene feedback device targeted to improve rates of hand hygiene

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SUMMARY
Various electronic tools have been developed to monitor hand hygiene compliance (HHC). A prospective, investigator-blinded, pilot study was conducted to evaluate the feasibility and effectiveness of an electronic hand hygiene feedback device to improve rates of hand hygiene. The first month of participation provided baseline rates of HHC (37%). During months 2–5, mean HHC rates were 43%, 44%, 45%, and 49% respectively (P < 0.001). Implementing this electronic device was feasible and showed a modest improvement in rates of HHC. Subsequent studies are warranted to validate the impact of such electronic devices on a larger scale.

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Web Interface

THE SEMMELWEIS TRACKER
Study Findings
Hand Hygiene Compliance

Table 1. Descriptive Statistics of Compliance by Month (proportion)

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Semmelweis III
Robinson Memorial Hospital Study

- 22% increase in electronic monitoring compliance rate from:
  Phase I 38.3% (36.1-40.5%)
  Phase II 46.8% (43.7-50.0%)

- There was a significant increase in HHC from the Phase I to Phase II (P<0.0001) paired-difference t-test

- Control data 93.4%
# Semm Tracker Report Card

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Behavioral Obstacles

“Buy-in” and willingness to participate in study challenged by:

Lack of accuracy concern for “Big Brother”

Medical liability

No touch/No wash concept

Medical Staff opposition to clinician autonomy

Increasing environment of oversight and antagonism with hospital administration
Healthcare Personnel Perceptions of Hand Hygiene Monitoring Technology

Katherine Ellingson, PhD;1 Philip M. Polgreen, MD;2,3 Amy Schneider, MPH;1 Laura Shinkunas;3 Lauris C. Kaldjian, MD, PhD;3 Donald Wright, MD;4 Geb W. Thomas, PhD;1,5 Alberto M. Segre, PhD;1,6 Ted Herman, PhD;2,6 L. Clifford McDonald, MD;1 Ronda Sinkowitz-Cochran, MPH1

OBJECTIVE. To assess healthcare personnel (HCP) perceptions regarding implementation of sensor-based electronic systems for automated hand hygiene adherence monitoring.

DESIGN. Using a mixed-methods approach, structured focus groups were designed to elicit quantitative and qualitative responses on familiarity, comfort level, and perceived impact of sensor-based hand hygiene adherence monitoring.

SETTING. A university hospital, a Veterans Affairs hospital, and a community hospital in the Midwest.

PARTICIPANTS. Focus groups were homogenous by HCP type, with separate groups held for leadership, midlevel management, and frontline personnel at each hospital.

RESULTS. Overall, 89 HCP participated in 10 focus groups. Levels of familiarity and comfort with electronic oversight technology varied by HCP type; when compared with frontline HCP, those in leadership positions were significantly more familiar with (P<.01) and more comfortable with (P<.01) the technology. The most common concerns cited by participants across groups included lack of accuracy in the data produced, such as the inability of the technology to assess the situational context of hand hygiene opportunities, and the potential punitive use of data produced. Across groups, HCP had decreased tolerance for electronic collection of spatial-temporal data, describing such oversight as Big Brother.

CONCLUSIONS. While substantial concerns were expressed by all types of HCP, participants’ recommendations for effective implementation of electronic oversight technologies for hand hygiene monitoring included addressing accuracy issues before implementation and transparent communication with frontline HCP about the intended use of the data.

Infect Control Hosp Epidemiol 2011;32(11):1091-1096
Semmelweis IV

- LE Bluetooth
- Room Tags
- Smart phone (i phone/android) app
- Directional antenna
- Use of signal strength ratios to validate room entry discriminate between HCW
Insights

What we need:
- Surrogate marker for HHC
- Feedback to HCW
- HCW “buy-in”
- Simple Implementation
- Incentivize behavior/invoke competitive spirit
- Ability to use any dispenser

What to avoid:
- “Big Brother” model
- Tracking movement
- Need to carry separate device/unit
- Changes to HH accepted behavior
- Medical liability
- High cost
Thank You