Hand Hygiene Over the Decade: 2004-2014
Prof. Elaine Larson, Columbia University
Teleclass broadcast sponsored by GOJO (www.gojo.com)

Hand Hygiene Over the Decade: 2004-2014

SUCCESSES AND CHALLENGES

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Evidence-Based Indicators

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- Designed to improve patient outcomes and will ultimately (but not in the short term) improve publicly reportable indicators
- Favored in organizations focused on improving patient outcomes

Example

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- Patients with community-acquired pneumonia have better outcomes if they receive early antibiotic treatment (within 4 hours of ED arrival)
- Strategy: Focus on early identification, rapid diagnosis, and prompt therapy for CAP

Indicator-Based Strategy

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- Follow a rule-based indicator
- Favored in organizations focused on protecting their reputations

Example

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- Patients with community-acquired pneumonia have better outcomes if they receive early antibiotic treatment (within 4 hours of ED arrival)
- Strategy: Mandate policy that antibiotics be administered within 4 hours to ED patients suspected of CAP

Result of Indicator-Based Strategy

6

- Unintended consequence was widespread treatment of patients who did not have CAP
- Ultimately this indicator was withdrawn

- **Muller & Detsky JAMA, 2010; 304:1116**
- **Wachter, et al. Ann Intern Med 2008; 149:29**
- **Pines, et al. J Emerg Med 2009; 37:335**

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Is This Happening With Hand Hygiene?

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- Hand hygiene adherence is now a quality indicator and reporting is mandated
- Standard indicator measure for hand hygiene is observation
- Observation is subject to observer bias, selection bias, Hawthorne effect
- There is no single, simple strategy to improve hand hygiene

Potential Result

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- As pressure to perform increases, the hospital seeks rapid improvement and are more likely to use methods that overestimate adherence and are 'quick fixes'

Hence,

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- In the absence of sustained, evidence-based efforts, public reporting of hand hygiene rates will lead to more indicator-based strategies and little true improvement
- High reported rates of HH undermine incentives to make real, sustainable change, especially in the absence of changes in infection rates
- Vicious cycle of 'pseudo improvement'

Hospitals must choose:

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STRIVE FOR REAL IMPROVEMENT OR PROTECT THEIR REPUTATIONS BY REPORTING HIGH RATES OF ADHERENCE

No Quick Fix

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- Since 2007, only a few high quality studies have assessed short and longer term impact of strategies to improve hand hygiene
- Clearly multifaceted campaigns with social marketing and staff involvement are essential

Gould, et.al., Cochrane Database Syst Rev 2010; Sept 8; 9:CD005186

And worse...

12

- "The current emphasis (on hand hygiene) diverts attention and resources from other control interventions..."

Dancer S. Infect Control Hosp Epidemiol 2010; 31:960.

Times Are Changing!

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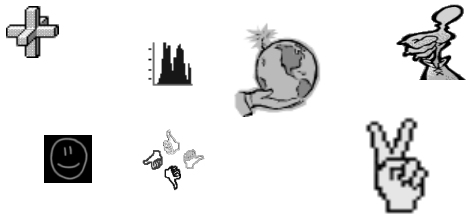

Intervention Studies on Behavior Change
(before 2009, n=49)

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- Simplistic interventions: education, guidelines, feedback, audits, approvals processes/standing orders, gatekeeping
- 76% yielded desired behavior change
- Many methodologic flaws, no improvement over time
- None used behavior change models or applied rigorous evaluation over longer periods of observation

Systematic Review

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- Between 2007-9, only two high quality studies assessed short and longer term impact of strategies to improve hand hygiene
- Clearly multifaceted campaigns with social marketing and staff involvement are essential

Gould, et.al., Cochrane Database Syst Rev 2010; Sept 8; 9:CD005186

After 2010

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- At least 30 multi-modal interventions which have included 25 countries to improve adherence were published between 2011-now
- All are uniformly positive, but beware of publication bias!

What Educational Interventions Work?

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- Systematic review of 16 electronic databases to identify features of educational interventions for improving hand hygiene
- 30/8845 articles met inclusion criteria
- All multi-modal in six categories: with or without demonstration, with self-study module, video, video and demonstration, or online component

Results

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- No individual educational features could be identified
- Multiple, continuous interventions better than single
- Data 'not available to determine the time, nature and type of booster sessions with feedback needed for a permanent change in compliance'

Cherry, et.al. Med Teacher 2012; 34(6):406-20

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One of the Best

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- Cluster randomized trial (HELPING HANDS) in 67 patient units of three hospitals (Netherlands)
- Compared state-of-the-science multi-modal intervention (education, reminders, feedback) with multi-modal PLUS theory-based social influence and leadership strategies
- Compliance monitored at baseline, 3 and 6 months
- Observed 10,785 hand hygiene opportunities in 2,733 nurses

Huis A, et. al. Helping hands: a cluster randomised trial to evaluate the effectiveness of two different strategies for promoting hand hygiene in hospital nurses. 2011; Implement Sci 6:101.

Hand Hygiene Adherence Rates

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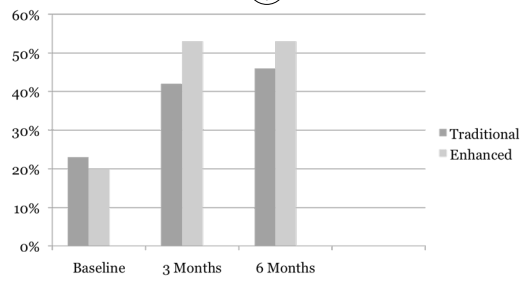

Huis, et. al., Int J Nurs Stud 2013; 50(4):464-74

What about patient involvement?

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- Literature review, 1997-2012
- Some patients may be willing to remind staff, but it varies by the organization's culture
- Actual proportions who remind staff varies from 5-80%
- Improves if staff give explicit permission

McGuckin & Govednik. J Hosp Infect 2013, Apr 19

It's Not All About Me

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Hand hygiene improved when the message was for patient safety rather than personal protection

Discipline	Condition	Adherence	P value*
Nurses	Personal Consequences (HH prevents you from catching diseases)	83.9%	.77
	Patient Consequences (HH prevents the patient from catching diseases)	88.4%	.06
Physicians	Personal Consequences (HH prevents you from catching diseases)	87.5%	.27
	Patient Consequences (HH prevents the patient from catching diseases)	92.9%	.04

*Comparing pre-to-post adherence rates

Grant & Hofmann. Psychol Sci Nov 2011

Local Culture More Important than Discipline

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- Physician hand hygiene varied from 4% (gynecology) to 96% (neonatal ICU) within a single hospital
- Varied by a mean of 33% and 77% between hospitals
- "consistent with an important role of the local ward culture"

Cantrell, et al. 2008 Jul 9; AJIC

From one-on-one to the whole place

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Safety System is a set of managed interdependent organizational activities that reliably make potential errors visible, reduce risks, and mitigate the effects of errors

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Safety Management System contains:

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- Specific and regular executive board activities (e.g. reviews)
- Ongoing, frequent, graphic, scientifically sound monitoring
- Detailed accident investigation

Safety System....

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- Ongoing processes for learning from research
- Processes for maintaining and encouraging a participative culture, free of blame
- Alignment of internal incentives with safety improvement aims
- Effective, efficient prevention methods and regular audits

Berwick, JAMA, 1/99

Promoting Mindfulness in Education

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- Developed a web-based hazard and near-miss reporting system for entry-level nurses
- 25% (886/3492) of responses from 500 nursing students related to infection control practices.
- 16% of those related to hand hygiene

Currie, et al. Stud Health Technol Inform 2007; 129 (Pt 1): 285-90 and Geller, et al. AJIC 2010; Jul 9.

Does Delivery System Make a Difference?

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- Hands of 30 volunteers inoculated with H1N1 and randomized to treatment with foam, gel, or hand wipe
- All product treatments resulted in a significant reduction in viral titers (> 3 logs)

Larson, Cohen, Baxter. AJIC 2012; 40:806

A major component: Leadership

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Characteristics of successful leaders

- **Cultivate a culture of excellence**
- **Communicate this to staff**
- **Focus on overcoming barriers**
- **Deal directly with resistant staff**
- **Inspire**
- **Think strategically, act locally**
- **Leverage personal prestige**
- **Form interdisciplinary partnerships**

Saint, et al. Importance of leadership in preventing HAI. Infect Control Hosp Epidemiol 2010; 31:901

Challenges in Implementing the WHO Program

30

- **'Campaign fatigue' (hand hygiene rates plateau and remain the same)**
- **Competing priorities**

You need an umpire

Seto, et.al., AJIC 2013; 25 July

A multi-factorial approach includes

31

- Education: how, when, why with specific emphasis on elective hygiene
- Motivation: peer pressure and modelling, overt and continuing administrative support
- Cues to action: posters, easy access
- Patient/staff empowerment ("Ask me if I have cleaned my hands")

Jamal, et.al., Postgrad Med J 2012; 88:353-8
Son, et.al., AJIC 2011; 39:716-24
Henderson, et.al., J Healthc Qual 2012; 34(5): 39-49

Systematic Review of Adherence

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- "All articles published before 1/1/09"
- 96 articles reviewed
- All used direct observation and/or self-report
- All used self-developed scoring form
- Only 18% (17/96) reported any reliability testing
- Compliance reported in different ways

Erasmus, et al. ICHE 2010; 31:283-94

Systematic Review: Behavioral Improvement Strategies

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- Knowledge
- Awareness
- Social influence
- Attitude
- Self-efficacy
- Intention
- Action control, maintenance, facilitation of behavior

Systematic Review: Results

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- Few studies addressed social influence, attitude, self-efficacy, intention
- Maximum effect in addressing 5 determinants
- "Specific team-oriented activities were hardly identified…activities directed at behavioural maintenance following behaviour change were not identified…"

Huis, et.al. Implementation Science 2012; Sep 14;7(1):92.

Optimal HH Bundle? Meta-Analysis

35

- Among 8,148 studies, found six randomized controlled trials and 39 quasi-experimental studies
- Two bundles (3 studies each) were effective:
  - education, reminders, feedback, administrative support, and access to alcohol-based hand rub, Pooled OR: 1.82 (1.69-1.97)
  - education, reminders, and feedback, Pooled OR: 1.45 (1.12, 1.94)

Schweizer ML, et.al. Clin Infect Dis 2013, Oct 8 (e pub ahead of print).

Observation Is Still 'Gold Standard'

36

….BUT WE HAVE A BIG PROBLEM!

How Much Training Is Required to Get Good Inter-Rater Reliability?

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- **Observer training: 2 classroom hours, 5 unit-based hours, 2 assessment hours**
- **Total: 9 hours X 2 people**
- **Raw agreement between observers was >92% (p<.001)**
- **But, 9 hours of training**

Fuller, et.al. AJIC 2010; 38:332

What Does Observation Cost?

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- **820-bed urban tertiary care center**
- **Employed college and graduate students to do random observation**
- **For 2,074 hours of observation, cost was $21,252 ($0.66/observation)**
- **It's costly!**

Stevens, et al. ICHE 2010; 31:198-9

How Accurate Is Observation?

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- **12-week observational study in Brazil in 40-bed medical-surgical ICU**
- **2,249 hand hygiene opportunities observed; 76,389 product dispensings**
- **No significant correlation between observed practice and product used (r=.27, p=.40)**

Marra, et al. ICHE 2010; 31(8): 796-801

2013 Survey of Practices: 141 (100%) US Veterans Hospitals

40

- 98.6% used direct observation
- 45.3% validated observer process at the onset, and fewer still (39.6%) continued to validate
- Main behaviors were HH at room entry (69.1%) and exit (71.9%).
- Improvement interventions included posters (97.2%), feedback (98.6% to leadership), and improved access to HH products (90.6% provide individual hand sanitizers to staff)

Reisinger, et.al. AJIC 2013 Aug 13; epub ahead of print

Electronic Monitoring vs Observation

41

- **13,694 hand hygiene opportunities monitored: overall compliance of 35.1%**
- **In four 20-minute sessions when hand hygiene was monitored concurrently by the system and infection control nurse, adherence rates were 88.9% and 95.6% respectively**

Cheng, et.al., BMC Infect Dis 2011; 11:151.

Observer Bias

42

- **In two hospitals, unit-based observers reported higher adherence rates than non-unit-based observers (79% vs 58.6%, p<.001)**

Dhar, et al Infec Contr Hosp Epidemiol 2010; 31(8):869-70

Huge Variations by Sampling Strategy

43

- Based on 33,721 entries and exits from patient rooms, simulations were made of observation times of 1-15, 15-30, 30, and 60 minutes
- 60-min observations, captured 0.5-1.7% of average opportunities per day
- 1-15-minute schedule captured 16% fewer events than 60-min schedule, but sampled 17% more unique individuals. Also provided best estimate of compliance for the shift

Fries, et.al., ICHE 2012; 33:689-95

No Wonder People Don't Believe Reported Rates!

Time for a change

Gould, et.al., Routine hand hygiene audit by direct observation: Has nemesis arrived? J Hosp Infect 2011; 77:290-3

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How do staff perceive hand hygiene monitoring?

45

- 10 focus groups with 89 healthcare workers in three hospitals (VA, university, community)
- Most common concerns: lack of data accuracy and potential punitive use of data
- Poor tolerance for electronic collection of data ('Big Brother')
- Recommendations: addressing accuracy issues and transparent communication about the intended use of the data

Ellingson, et.al., ICHE 2011; 32:1091-6

Newer Monitoring Technology

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- Radio-frequency sensory systems with which staff wear RFID-enabled badges or wristbands that monitor movement
- Light-emitting diode (LED) sensors that convert voltage to light for digital displays
- Wi-Fi technology which communicates with wearer's Wi-Fi badge
- Monitoring product usage
- Video monitoring

Automated Monitoring More Accurate

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- Compared 424,682 dispenser counts and 338 hours of human observation
- 'Passive electronic monitoring of hand hygiene dispenser counts does not closely correlate with direct human observation and was more responsive than observation to a feedback intervention

Morgan, et.al., AJIC 2012; 40(10):955-959

Advantages

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- May be less costly than observation once installed
- Availability of large data sets
- Less observation bias or Hawthorne effect
- Enhanced credibility of data among staff
- Possible to examine other important factors (e.g., impact of dispenser type and location, practices by shift and unit)

Disadvantages

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- Expensive, especially initially or with maintenance fees (e.g., cost/badge or per year)
- May monitor the wrong things because of technical feasibility (e.g., hand hygiene on entry/ exit to wards or rooms)
- Possible reduced interaction between infection prevention staff and HCWs (although could also be opportunity for increased interaction)
- Often lack denominator (opportunities) or assessment of quality/technique

So…

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- It is not possible (and probably not desirable or necessary) to monitor all opportunities; we should use meaningful surrogates
- We MUST balance getting good data that is actionable with resource use and other priorities

Monitor group or individual feedback?

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- If goal is to create a team effort, shared ownership of the problem, and a culture of safety and change without shame and blame, consider unit or group-level feedback
- Problem: electronic monitoring often provides numerator (# HH episodes) but no denominator (# HH opportunities)

Group Monitoring System (GMS)

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- Installed in 140 bed community hospital
- Focus groups of staff held to determine feedback preferences
- Major challenges:
  - determining the number of expected HH opportunities;
  - obtaining accurate census data;
  - ensuring the information reached HCW;
  - engendering confidence in the system
- Lesson: A substantial investment of human capital was required to fully adopt the GMS

Conway, et.al. Poster presentation, APIC 2013.

Results

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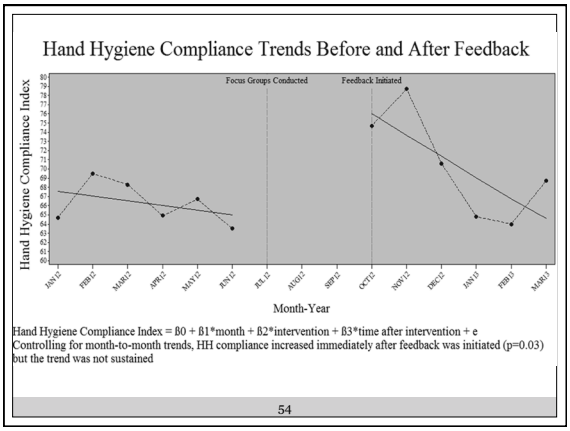
- Between 1/12 -3/13 the GMS recorded 1,778,852 HH events in 8 inpatient and 6 outpatient procedural areas
- Number of HH events per patient hour significantly increased in inpatient areas (median difference 0.17 events/patient hour, p=0.008), but remained unchanged in outpatient areas (mean difference 0.40 events/patient visit, p=0.29).
- In perioperative areas that did not receive feedback, the number of HH events per patient visit did not change significantly (mean difference -0.20 events/patient visit, p=0.38).



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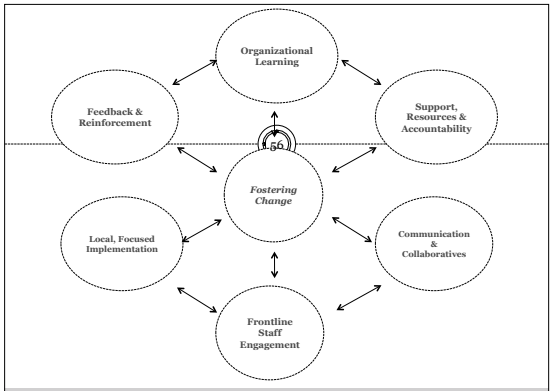
Quality Hospital-Acquired Infection Collaborative (AHRQ)

55

- 33 hospitals participated
- Data on successes, challenges, lessons learned collected from key informants and case report forms
- Seven commonly cited themes identified
- "Despite the diversity of hospital settings… hospitals encounter similar challenges and facilitators across projects"

Welsh, et.al. AJIC 2012;40(1):29



Key elements of behavior change in health care. Welsh, et.al. AJIC 2012;40(1):29

Key Messages

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- Simplistic, single strategy educational interventions such as an 'inservice' program are ineffective.
- Multi-modal, institution-wide interventions which include staff education as well as explicit, positive support from leaders show promise for effecting sustained improvement in hand hygiene practices.
- Specific, individual educational strategies to improve hand hygiene adherence are poorly understood and have not been identified.

So what works?

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- Multi-factorial interventions
- Positive deviance
- Motivational interviewing
- Report cards
- Performance feedback
- Culture/organizational change
- Patient safety program
- That is, about anything that involves behavioral, theoretically-based interventions

"The time has come for the infection control community to move on…we must reacquaint ourselves with that lonely feeling familiar to clinicians when they realize a case is much more difficult than it appeared…we should embrace the intellectual audacity of our beloved Semmelweis but let go of his how-to manual."

Sepkowitz KA. Lancet ID 2012; 12:96-7.

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Thank you for your attention and collaboration

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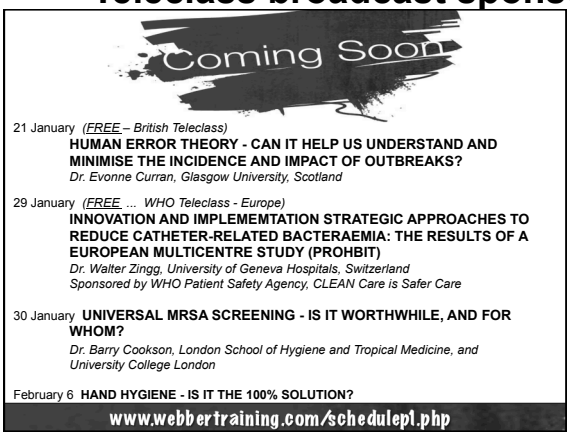

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