

# Hand Hygiene Technology 2005-2014

## Dr. Maryanne McGuckin & John Govednik, McGuckin Methods International

### Teleclass broadcast sponsored by GOJO ([www.GOJO.com/SMARTLINK](http://www.GOJO.com/SMARTLINK))


### HAND HYGIENE TECHNOLOGY 2005 - 2014

**ARE TODAY'S ELECTRONIC HAND HYGIENE MONITORING SYSTEMS THE MISSING LINK IN HAND HYGIENE COMPLIANCE?**

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McGuckin Methods International  
Listed Patient Safety Organization (PSO) with AHRQ

Hosted by Dr. Hugo Sax MD, PhD  
University of Zurich Hospital

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### ABBREVIATIONS AND TERMINOLOGY FOR THIS PRESENTATION

- HH = Hand Hygiene
- HCW = Healthcare Worker/s
- HAI = Healthcare-associated infection/s
- IP = Infection Preventionist (or Infection Control Professional)
- "Interventions"
  - We use the term interventions to refer to any type of electronic system that shows potential to educate or improve HCWs in their frequency and quality of HH performance. Electronics by themselves don't improve compliance, only people can do so, with the help of measurement and feedback!

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### ELECTRONIC HH INTERVENTION TYPES

- Based on the degree of effort needed by the IP to utilize these various systems, we categorize them as:
  - **Automated** systems
  - **Semi-automated** systems
  - **Data management** tools
  - **Technique improvement** tools

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### AUTOMATED INTERVENTIONS

- The system has capabilities to perform observing, counting, recording, data compilation and analysis, and feedback reporting
- Minimal human labor to make the system function
- Any system where room sensors, HCW badges, and data hubs communicate with one another, and feedback is automatically sent back to the HCW indicating compliance
  - Amron, CenTrak, HanGenix, HandGiene, HigenX, HyGreen, Hymed, MedSense, Miscea, nGage, Ophardt, Safe-Hands, Toronto Rehab. Inst., UltraClenz, Versus
  - McGuckin M, Govednik J. Electronic hand hygiene compliance interventions: a descriptive guide for the infection prevention team. Am J Med Qual. 2012 Nov-Dec;27(6):540-1.

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### SEMI-AUTOMATED INTERVENTIONS

- The system has capabilities to perform observing, counting, recording, data compilation or analysis, or feedback reporting
- However, a human worker is needed as part of the process to download, interpret, or provide direction for feedback to HCW.
  - Sprinx, Semmelweis Tracker
    - McGuckin & Govednik (2012)

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### DATA MANAGEMENT TOOLS

- Any software, touchscreen applications, web page forms, etc. where direct observation or product usage data, gathered by humans instead of sensors, is entered, analyzed, and returned as feedback to the team.
  - iScrub, observation analytical software (e.g. CDC's Epi-Info, Duke University's DOHA), and on the horizon... smartphone apps for patients to report their own observations via their own smartphone directly to hospital administration!

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## TECHNIQUE IMPROVEMENT TOOLS

- Assistance with knowledge and skills for performing a better HH event. These don't necessarily track compliance for HH opportunities, but they ensure proper use of soap and sanitizer when HH is performed.
- Various levels of automation vs. need for human operation
  - Hands-on video training like SureWash, sink faucet timers like SaniTimer

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## RESEARCH & MARKETING: READING THE MESSAGES

- If tested, was the timeframe long enough to gather realistic data?
- Did the authors disclose any limitations? If not, why not?
- If any awards were received, were the judges from the healthcare industry?
- Is this a peer reviewed manuscript or a "special advertising section"?
- Did your information source give you a complete "pro vs. con" picture?

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## THE FIRST COMPARATIVE STUDY OF PROPRIETARY ELECTRONIC HH MONITORING SYSTEMS

- McGuckin & Govednik (2012) identified and invited 38 different intervention developers to complete a questionnaire
- 18 responded
- Published: American Journal of Medical Quality, May 2012
- The first time anyone targeted purchase-ready systems and asked the questions nobody was reporting

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## SURVEY TOPICS

- |                       |                          |
|-----------------------|--------------------------|
| ✓ DEVELOPMENT         | ✓ HARDWARE               |
| ✓ SCIENTIFIC EVIDENCE | ✓ POWER SOURCE/S         |
| ✓ CAPITAL COSTS       | ✓ DATA COLLECTION        |
| ✓ CONSUMABLES COST    | ✓ ANALYSIS AND REPORTING |
| ✓ APPROVALS           |                          |
| ✓ MEASURES            |                          |

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## RESULTS

Features and services change over time  
Hospitals have a wide variety of options for measurement, feedback  
Purchasing requirements also vary widely

Respondents:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1. Amron																			
2. Centrak																			
3. HandGenix																			
4. HandGenie																			
5. HigienX																			
6. HyGreen																			
7. Hyveed																			
8. MedSense																			
9. Miscea																			
10. nPage																			
11. Ophardt																			
12. Safe-Hands																			
13. Semmelweis Tracker																			
14. Sprix																			
15. SureWash																			
16. Toronto Rehab. Inst.																			
17. UltraGenz																			
18. Veritas																			

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## DO YOUR HOMEWORK: IF IT SOUNDS TOO GOOD!

Before engaging a sales rep for any system, know the research and practical, real-world examples that show both pros and cons of any purchase-ready system.

- Proof of Concept Studies
- Clinical Trials
- HCW, IP, and patient perspectives

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#### PROOF OF CONCEPT

- Many studies suggest electronic counters and/or behavior sensors have potential for compliance measurement.
  - McGuckin (2006), Boyce (2009), Li (2010) Marra (2010) Polgreen (2010) , Ghosh (2012) Morgan (2012), Sodr  da Costa (2013), Fisher (2013) and many others suggest electronic monitoring, either via alerts, counters, location identification technology, or artificial intelligence, are capable of monitoring hand hygiene compliance.
  - Some of these did not confirm if they studied purchase-ready systems and many in fact confirm their electronics were prototypes.

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#### CLINICAL TRIALS 2011-2013

- Abstracts submitted for APIC, SHEA
- Various counters and/or behavior monitors (e.g. RFID)
- Most limited to 1 or 2 units
- Many noted proprietary systems available for purchase but did not actually name their systems in the text
- Not known if hospitals adopted systems facility-wide after study completed

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#### RESULTS SUGGEST ELECTRONIC INTERVENTIONS...

- ...show some capabilities of measurement
  - Barbosa 2012, Conway 2013, Goeringer 2012, Gratton 2013, Richards 2013, Schleder 2013, Simmonds 2011a, Simmonds 2011b, Ventruc  2011
- ...contribute to increase in HH compliance
  - Barley 2012, Blumstein 2012, Edmonds 2013, Gratton 2013, Matina 2012, Northey 2012, Plasters 2013, Richards 2013, Schleder 2013, Simmonds 2011a, Wofford 2013
- ...contribute to decrease in HAIs
  - Barley 2012, Blumstein 2012, Brazzell 2011, Simmonds 2011a, Simmonds 2012, Wofford 2013
- ...contribute to HAI cost reduction
  - Barley 2012, Blumstein 2012, Brazzell 2011, Simmonds 2011a, Simmonds 2012, Wofford 2013

• First author name shown only due to space limitations

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#### HCW / IP PERSPECTIVES: PROS AND CONS DISCUSSED IN PEER REVIEW

- Conway et al.(2013) implemented a dispenser using wireless communications technology in dispensers (DebMed) in a 140 bed acute care facility and **noted challenges:**
  - Determining the number of expected HH opportunities
  - Obtaining accurate census data
  - Ensuring the information reached HCW
  - Engendering confidence in the electronic system
  - Early on, managers were inconsistent in disseminating the information because of difficulty interpreting the reports.
  - The rates reported by the electronic system were much lower than those previously reported based on direct observation and the denominator calculation was difficult to understand, so HCW initially lacked confidence in the feedback.

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#### HCW / IP PERSPECTIVE (CONT'D.)

- Schleder et al (2013) trialed a system (unnamed) that tracked personal HH behavior, but HCWs were assigned numbers instead of using their names, and feedback did not go to management but to the team via TV monitors in the work area.
  - *"When introducing a new product and process, change theory becomes important to achieve the goal. One approach to holding staff accountable was through peer mentoring versus traditional top down management. This approach was greatly appreciated by the staff and relieved some anxiety about the introduction of this program"*

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#### HCW / IP PERSPECTIVE (CONT'D.)

- Barley & Chapman (2013) trialed an RFID monitoring system (unnamed) in three hospitals, two units each. At the end of the trial:
  - The two hospitals with heavily engaged nurse managers achieved dispensing increases of 70.8% and 130.2% and hand-hygiene compliance rate increases of 33.6% and 50.4% respectively.
  - The hospital with only peripheral nurse manager involvement saw a dispensing increase of only 2.8 % and a 43.6% decrease in compliance.
- Engaged unit level leadership can impact the application of technology and can positively affect clinical outcomes.

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## PUTTING SYSTEMS TO THE TEST: REAL WORLD

- Pineless et al. (AJIC 2014) tested an RFID system ready to purchase for any hospital (nGage by Proventix):
  - The RFID tag was unable to transmit a signal to the sensor if any portion of the body is between the badge and the reader.
  - In simulated environment, high accuracy when the badged test subject stood directly in front of the dispenser when performing HH and entered room within range of reader.
  - In the real environment, HCWs were not told how to enter or stand while performing HH, reflecting regular practice activity.
  - System correctly identified only half of all HH events.
  - HCWs were occasionally recorded as entering or exiting a room adjacent to the room they actually entered or exited.

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## REAL-WORLD EXPERIENCE WILL TELL YOU LIKE IT IS

- Pineless et al. (2014): "A recent abstract highlights the importance of HCP confidence that the system is actually monitoring their compliance accurately. [Boyce 2012] showed that poor accuracy can lead to a counterproductive reduction in HH compliance. In this study, an automated system with 60% accuracy for detecting HCP HH was introduced. After introduction of the system, compliance decreased by 32-36%."
- Sharma (2012) compared accuracy between direct observation with an infrared sensor system and noted: "if 2 people entered a room in rapid succession, an observer may have counted 2 entries while the equipment counted only 1."

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## MESSAGE: EMPOWER THE HCW & IP

- From one respondent: *"It could have an impact that could be sustainable, as long as it was done as part of a comprehensive program that the employees felt involved in ... if it was seen as something that helps us to manage our patient care better"*
- Ellingston et al. (2011): A common theme throughout all supervisory level focus groups and across multiple responses was that HCW did not know enough about automated oversight technologies to strongly endorse them.

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## PATIENT / CONSUMER PERSPECTIVE: WHAT WE KNOW SO FAR

- Michaelsen et al. (ICHE 2013) voluntary patient survey at bedside (n=250)
  - 98% percent of patients believed reminding physicians to clean their hands might help prevent them from contracting an HAI.
  - Without prompting, patients were only moderately comfortable asking physicians to clean their hands before touching them (median 5 out of 10).
  - If patients received a specific reminder, they were significantly more comfortable discussing hand hygiene (8 out of 10).
  - Compared with receiving an information packet on HAIs, patients more comfortable discussing HH with their physician if the physician wore a button or light that indicated that he/she did not clean his/her hands (7% vs 93%).
- "We found that the vast majority of patients accept the idea of electronic alert prompts to increase their comfort with asking physicians to clean their hands."

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## DON'T ASSUME PATIENT BEHAVIOR; MORE STUDIES NEEDED ON REAL WORLD PATIENT (RE)ACTIONS

- Michelson et al. (2013) *"...More importantly, if patients knew that physicians had not cleaned their hands, those patients would be less likely to seek that doctor's care or care from that hospital."*
- We invite hospitals do study real patient/consumer actions as well as opinions.

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## FOUNDATION FOR SUSTAINED COMPLIANCE

1. Good Products / Multimodal Programs
2. Personal accountability
3. Reminders ( Patient and HCW)
4. Measurement
5. Feedback
6. Technology?

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#### HCWS AND PATIENTS WILL DRIVE THE MARKET

- 2012
  - McGuckin study focused on purchasing and proprietary capabilities
- 2014
  - Studies evolved to focus on **HCW and patient perspectives**
- Beyond:
  - More clinical application of proprietary devices, not tested in a sterile environment, is needed to gather more evidence of HCW and patient reactions
  - Research needs to foster an atmosphere of full disclosure. Don't just tell us how wonderfully these things improve the compliance rate, tell us more about what HCWs and patients are doing with them. The whole picture, please.

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#### WORLD HEALTH ORGANIZATION

- In the words of Sir Liam Donaldson, WHO Patient Safety:
 

*"...a device should not only function under ideal conditions – it needs to function for real users, who may have limited training or be tired, in the real world, with all its pressures and distractions. In short, it should be simple, robust and sustainable.*

*WHO Patient Safety Newsletter, 6/2010*

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#### WHAT DO YOU THINK, HAVE WE FOUND THE MISSING LINK YET FOR HH COMPLIANCE?



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Slide from Infection Control Today "Infection Prevention Compliance" survey of IP.  
<https://www.infectioncontroltoday.com/galleries/2014/03/infection-prevention-compliance.aspx>

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What's the most challenging area of infection prevention when it comes to ensuring compliance?

Area	Percentage
Hand hygiene	50%
Environmental cleaning and disinfection	16%
PPE usage	6%
Other (such as SSI prevention, observing standard precautions)	6%
Sharps safety	3%
All of the above	1%

#### Coming Soon

- 14 August (FREE Teleclass)  
**INFECTION PREVENTION AND CONTROL – THE ARGENTINA EXPERIENCE**  
Carolina Giuffrè, Buenos Aires British Hospital, Argentina
- 27 August (South Pacific Teleclass)  
**DIAGNOSIS, TREATMENT AND PREVENTION OF PROSTHETION JOINT INFECTIONS – A SURGEON'S PERSPECTIVE**  
Prof. Gary Hooper, University of Otago, New Zealand
- 03 September (FREE WHO Teleclass - Europe)  
**NEW WHO GLOBAL CAMPAIGN TO ELIMINATE UNSAFE THERAPEUTIC INJECTIONS**  
Dr. Benedetta Allegranzi, World Health Organization, Geneva  
Sponsored by the World Health Organization
- 04 September **ANTIMICROBIAL-IMPREGNATED SURFACES IN PREVENTING HEALTHCARE-ACQUIRED INFECTIONS – DIFFERENTIATING HYPE FROM HOPE**  
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