# Hand Hygiene 2017
# The State of the State

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**Sponsor for this presentation: Elyptol, Inc.**

# Learning Objectives

At the end of the presentation, participants will be able to:

1. List 3 pathogens commonly transmitted by contaminated hands.
2. Discuss barriers to optimal healthcare worker hand hygiene compliance.
3. Describe how a bundle approach might improve hand hygiene.

# Disclosures

Presenter provides consultative services for Elyptol and PhoneSoap

# Hand Hygiene Compliance Rates

- Since 1846 when Semmelweis proved the association between hand hygiene and post partum puerperal fever, it has been considered the single most effective method of preventing healthcare associated infections (HAI).
- However, achieving and sustaining hand hygiene compliance has seen dismal progress in the last several decades.
- The Center for Disease Control and Prevention (CDC) concluded in 2002 that healthcare worker compliance with hand hygiene was no more than 40%[10]. And still today in 2017, the CDC reports that healthcare worker hand hygiene compliance is on average 50%[11].

# Healthcare Associated Infection Rates

There has been success in reducing HAI of multiple types according to the CDC HAI Progress report, though zero infections in any category is still an aspirational goal. The most recent HAI Progress Report published in 2016 describes the following:

- Central line associated bloodstream infection (CLABSI) and abdominal hysterectomy SSI show the greatest reduction.
- *Clostridium difficile* infection (CDI) and Methicillin resistant *Staph aureus* (MRSA): Some progress is shown in reducing hospital-onset MRSA bacteremia and hospital-onset CDI.
- Catheter associated urinary tract infections (CAUTI): The previous two reports showed an increase from the prior year, signaling a strong need for additional prevention efforts.

# Association Between HH and HAI

- The specific contribution of hand hygiene to HAI prevention is complicated, and not well defined by peer reviewed studies.
- There is one study, published in 2016, where an association between hand hygiene compliance and HAI was quantified. The study reported an overall 6% reduction in HAI when there was a 10% improvement in hand hygiene ($p = 0.086$). For CDI specifically, a 14% infection reduction was reported subsequent to a 10% improvement in hand hygiene ($p = 0.070$).

# HAI Specifically Impacted by Hand Hygiene

- Numerous studies conclude that hand hygiene can contribute to the reduction of *Clostridium difficile* infection (CDI), catheter associated urinary tract infection (CAUTI), catheter related bloodstream infection (CRBSI), ventilator associated pneumonia (VAP), hospital acquired pneumonia (HAP), methicillin resistant *Staph aureus* (MRSA) and surgical site infection (SSI) [3-7].

- The 2014 CDC National HAI Progress report notes that there are significant improvement opportunities remaining, especially relative to prevention of CAUTI and CDI, where hand hygiene compliance is critical.[2]

# Glove use and hand hygiene

- Gloves play a key role in preventing hand contamination—but do **NOT** replace hand hygiene
- Gloves should be changed during care when moving from a contaminated body site to a clean body site
- Gloves should be changed between patients.
- Gloves should be discarded after use, and not washed and re-used.

# Mobile devices and hand hygiene

- Mobile devices including cell phones, pagers, tablets are being used with increasing frequency in healthcare.
- As these devices are used within the patient environment, they can be implicated in transmission of pathogens.
- They can be used as teaching devices and so are subject to touch by patients and healthcare workers.
- They are often handled without prior hand hygiene.
- Healthcare facilities should have written protocols for the use, storage, and cleaning of mobile devices, and when to perform hand hygiene
- All HCW and other staff using mobile devices must be provided with training on the facility's protocols for use and cleaning.

# Mobile Devices and Hand Hygiene

- Morvai and Szabó (2015) performed a systematic review on the potential role of mobile communication devices in the dissemination of pathogens, finding 8% of healthcare workers routinely clean their mobile devices resulting in a high rate of contamination (40-100%).
- Heyba, et al. (2015) studied contamination of mobile phones in intensive care units (ICUs), pediatric intensive care units (PICUs), and neonatal care units (NCUs). Out of 213 mobile phones, 157 (73.7 %) were colonized. 33.5 % of clinicians reported that they disinfected their mobile phones, with the majority disinfecting their mobile phones only when they get dirty.

Pyrek K. "Mobile Technology Disinfection: Contaminated Devices Pose Threat to Patients" Infection Control Today. February 2017.

# Mobile Devices and Hand Hygiene

Guidelines for mobile devices should at a minimum include:

- Use with clean hands, and never with gloved hands.
- Hand hygiene should be done prior to and after using mobile device.
- Devices must be cleaned and disinfected if touched in a patient zone (per manufacturers' care instructions) or cover/skin changed/replaced if cannot be cleaned/disinfected per manufacturer guidelines.
- Devices should not be used in a room with a patient with active *Clostridium difficile* infection.

From: https://sealedair.com/news/portable-electronic-device-management-healthcare

# Double Gloves and Alcohol Based Brushless Surgical Hand Scrub for OR

- The antimicrobial efficacy of alcohol-based formulations is superior to that of all other currently available methods of preoperative surgical hand preparation.
- Glove perforation is a critical factor responsible for intra-operative contamination consequently double gloving practice should be employed regularly.


- ✓ Lee SW, Cho MR, Lee HH, Choi WK, Lee JH. Perforation of surgical gloves during lower extremity fracture surgery and hip joint replacement surgery. *Hip Pelvis*. 2015;27(1):17-22.
- ✓ WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care Is Safer Care. Geneva: World Health Organization; 2009. 13, Surgical hand preparation: state-of-the-art. Available from: https://www.ncbi.nlm.nih.gov/books/NBK144036/

# Double Gloves and Hand Hygiene for Anesthesia Providers

- Double glove for anesthesia induction - remove one pair after intubation
- Hand hygiene for all anesthesia providers


- Loftus RW, Muffly MK, Brown JR, et al. Hand contamination of anesthesia providers is an important risk factor for intraoperative bacterial transmission. *Anesth Analg.* 2011;112(1):98-105.
- Birnbach DJ, Rosen LF, Fitzpatrick M, Carling P, Arheart KL, Munoz-Price LS. Double gloves: a randomized trial to evaluate a simple strategy to reduce contamination in the operating room. *Anesth Analg*. 2015;120(4):848-852.

# Surgical Site Infections

- The prevention of SSI is increasingly important as the number of surgical procedures performed in the United States continues to rise.
- It has been estimated that approximately half of SSIs are preventable by application of evidence-based strategies.
- SSI risk factors include poor quality surgical hand scrubbing and gloving.

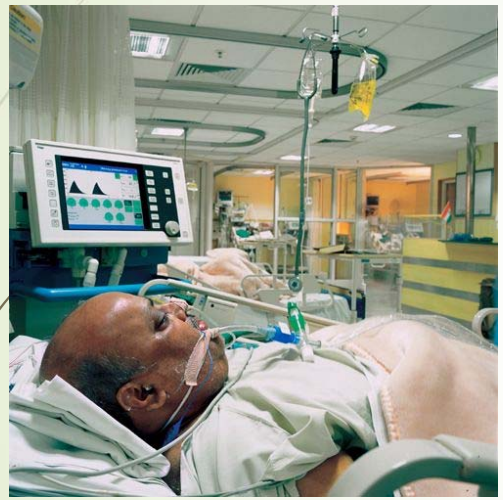

- ✓ Berríos-Torres SI, Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017. *JAMA Surg.* Published online May 03, 2017.
- ✓ Ban K. "Guideline for SSI Prevention SIS ACS" *Journal of American College of Surgeons*. 2016.10.029.

# CDI and MDRO

- ✓ *Clostridium difficile* infection (C. diff) increases hospital costs by 40% per case and puts those infected at high risk for longer hospital stays and readmissions.
- ✓ Infections and colonization with multidrug-resistant organisms (MDROs) are increasing worldwide, adding cost to healthcare and resulting in patient suffering. Examples of MDRO are MRSA, VRE, CRE and ESBL.
- ✓ A number of strategies exist to reduce *C. diff* and MDRO transmission including good hand hygiene practices.


- Magee, Glenn et al. Impact of *Clostridium difficile*-associated diarrhea on acute care length of stay, hospital costs, and readmission. American Journal of Infection Control , Volume 43 , Issue 11 , 1148 – 1153.
- Vasoo S, Barreto JN, Tosh PK. Emerging issues in gram-negative bacterial resistance: an update for the practicing clinician. Mayo Clin Proc. 2015 Mar;90(3):395-403.

# Device associated infections CLABSI, CAUTI, VAP)



- Device-related infections pose a huge financial burden on healthcare services and are associated with increased patient morbidity and mortality.
- A systematic review of hand hygiene in intensive care units (ICU) showed a mean compliance rate of 40%, and the lowest compliance rates were found among physicians.


- Percival S. “Healthcare-associated infections, medical devices and biofilms: risk, tolerance and control”. Journal of Medical Microbiology (2015), 64, 323–334
- Megeus V et al. Hand hygiene and aseptic techniques during routine anesthetic care - observations in the operating room. *Antimicrobial Resistance and Infection Control*. 2015;4:5.

# Barriers to Hand Hygiene

- Lack of executive support, inadequate knowledge, shortage of sanitizer/soap, glove use, etc.
- Skin irritation and/or damage with frequent hand hygiene
- Healthcare providers required to clean their hands as many as 100 times per 12-hour shift
- Use of mobile phones by healthcare workers increases contamination of hands and face – likely contribution to transmission of pathogens, including MDRO.


- Barnes S "Hand Hygiene 2017 Do we Need a Bundle?" Infection Control Today April 26, 2017.
- Selim HS, Abaza AF. Microbial contamination of mobile phones in a health care setting in Alexandria, Egypt. *GMS Hygiene and Infection Control*. 2015;10:Doc03.

# Barriers to Hand Hygiene

- Confusing messaging to healthcare workers - 5 moments vs. two moments (entering and leaving patient rooms)
- Touchless faucets associated with issues including contamination risk
- Interference with worker-patient relation
- Patient needs prioritized over hand hygiene
- Wearing gloves
- Insufficient time/high workload and understaffing
- Lack of scientific information demonstrating impact of improved hand hygiene on hospital infection rates.

https://wwwnc.cdc.gov/eid/article/7/2/70-0234_article

# Case Study #1 Optimizing Hand Hygiene

Cedars-Sinai in Los Angeles improved its hand hygiene performance from around 70% to 95% within the year of 2010.

This was sustained at **98% in 2013!**

Improvement program included:

1. **Hospital leaders** including Medical staff shifted the organization's prior goal of reducing HAIs to eliminating HAIs.
2. Hospital leaders including **Medical staff** added hand hygiene compliance to employee's performance evaluation.

http://www.beckershospitalreview.com/quality/20-hospitals-with-great-hand-hygiene-programs.html

# Case Study #2 Optimizing Hand Hygiene

Exempla Lutheran Medical Center achieved a compliance rate of over **90% for over 5 months, and continues to date**. Improvement program included:

1. The **Six Sigma** methodology employed to standardize hand hygiene and eliminate waste
2. Joined Joint Commission **Center for Transforming Healthcare** Project
3. Weekly **data on compliance** was collected and shared with all staff every.
4. **Executives** determined disciplinary consequences for non-compliance.

http://www.beckershospitalreview.com/quality/20-hospitals-with-great-hand-hygiene-programs.html

# Case Study #3 Optimizing Hand Hygiene

Froedtert Hospital in Milwaukee achieved a hand hygiene compliance rate of **80% over the course of two years.**

Improvement Program included:

1. Joined the Joint Commission **Center for Transforming Healthcare Project**
2. Applied the **Six Sigma** methodology to hand hygiene
3. **Added hand sanitizer dispensers** to high-traffic and high-touch areas such as by patients' doors, telephones in the hallway, elevators and other areas in the unit.
4. Provided **training** for designated HH observers

# Case Study #4 Optimizing Hand Hygiene

Johns Hopkins Hospital, located in Baltimore **doubled the hand hygiene compliance rate over two years**. Improvement Program included:

1. Hospital-wide communication and education campaign, **"WIPES"** five steps to help "wipe out hospital infections"
2. Installed hand **hygiene sanitizer dispensers** outside of each patient room
3. Provided **educational outreach** sessions for staff
4. Enhanced **leadership engagement**
5. **Online reporting tool** that made hand hygiene compliance data readily available.

# Multi-Modal/Bundle Approach?

- The one approach that is common to numerous reports of successful hand hygiene improvement is use of a multi-modal program – which could also be called a “bundle approach”.
- There is no consensus on what the elements of a hand hygiene bundle should be.

Pittet D, et al. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. Lancet. 2000;356:1307–1312.

# Proposed Hand Hygiene Bundle

- Bundles have been used successfully to improve care related to infection prevention by reducing variability.
- According to IHI, "a bundle is a structured way of improving the processes of care and patient outcomes: a small, straightforward set of evidence-based practices that, when performed collectively and reliably, improve patient outcomes".


✓ Resar R, Pronovost P, Haraden C, Simmonds T, et al. Using a bundle approach to improve ventilator care processes and reduce ventilator-associated pneumonia. Joint Commission Journal on Quality and Patient Safety. 2005;31(5):243-248.

✓ IHI: http://www.ihi.org/resources/Pages/ImprovementStories/WhatIsaBundle.aspx

# Proposed Hand Hygiene Bundle

Most hand hygiene improvement efforts fall into one of four categories:

1. Executive and MD Support
2. HH products
3. Hand held device cleaning
4. Tracking and reporting compliance

# Bundle element 1: MD and Executive champion support

- Possibly the most important factor in creating a culture of safety and social cohesion in healthcare, with can sustain good hand hygiene compliance, is visible and consistent support by local executives and physicians.
- Reward incentives, combined with top down requirement for personal accountability can lead to successful improvement and durability of hand hygiene compliance by leveraging dual theories of behavior change.


✓ Rosenbluth G et al. Hand Hygiene Success With a Partnership Between Graduate Medical Education, Hospital Leadership, and Physicians. Am J Med Qual. 2016 Nov;31(6):577-583.
✓ Luangasanatip N et al. Comparative efficacy of interventions to promote hand hygiene in hospital: systematic review and network meta-analysis. BMJ. 2015 Jul 28;351:h3728.

# Bundle element 2: HH products

- A variety of products designed to protect the surface of the skin and reduce bioburden are available to address skin damage reported with frequent hand cleaning by healthcare workers.
- These products include skin protectants, barrier creams and moisturizing lotion.
- When skin is healthy, there is less of a risk of avoiding hand cleaning, and fewer cracks and crevices in which pathogens can reside.

# Bundle element 3: Hand held device cleaning

Cleaning/disinfecting electronic and other hand held devices (if IFU permits)

- Clean thoroughly with germicidal wipe, allow to dry – approx. 2 minutes clean and dry time **OR**
- Provide UV disinfection with product designed for mobile devices – e.g. 30 second cycle time

Other products to support reduced contamination:

- Screen protectors
- Antimicrobial screen protector
- Disposable sleeve or regular baggy–
- Tablet covers

# Bundle element 4: Tracking and Feedback

- Direct observation
- Secret shopper
- Measuring product utilization
- Engaging patients in monitoring and feedback
- Automated hand hygiene compliance monitoring

# Tracking and Feedback
# 4a: Direct observation – Hawthorne method

- Observation involves directly watching and recording the hand hygiene behavior of health care workers and the physical environment.
- People realize they are being observed and tend to alter their behaviors (Hawthorne effect).
- Must determine who will conduct the observations; and when, where, and how often to observe.
- The success of this method depends on the accurate calculation of adherence rates, the careful training of data collectors, and the data collectors' use of clear, easy-to-understand forms.

# Tracking and Feedback
# 4b: Secret shopper

- Requires rotation of observers to that they are not known – so training may not be sustainable.
- Observers themselves introduce bias, as they may consciously or unconsciously choose observations to support compliance or non-compliance
- This process produces a limited sample size and reflects only the numerator of the equation, meaning a count of how many times healthcare providers actually washed or did not wash their hands.
- This process does not permit measuring the denominator, meaning the number of times per day or per shift the healthcare providers had the opportunity to wash their hands while entering or exiting patient rooms.

# Tracking and Feedback
# 4c: Measuring product use

- Product measurement indirectly assesses hand hygiene guideline adherence by allowing health care workers to calculate the amount of liquid soap, alcohol-based hand rub, and paper towels used in a given area of the organization.
- Less resource intensive than observing health care workers directly.
- On the other hand, measuring product use does not reveal whether health care workers are performing hand hygiene when it is indicated or whether they are performing it correctly.

# When the HH Bundle is not Enough

# Innovations in Executive Support

- C suite executives join forces with the marketing directors to ensure that hand hygiene compliance campaigns integrate the best in print, video, audio and online communications.
- Hospital executives approve installation of technology to automate the monitoring of hand hygiene compliance.
- MDs participate in peer to peer simulation program. Once a year every MD must demonstrate and receive a return demonstration from a physician colleague, of hand sanitizing according to facility protocol.
- MD and Executives champion wide adoption of The Joint Commission Targeted Solutions Tool (TST), including trained Secret Observers, Just-in-Time Coaches, online educational training for robust measurement, and action plan monitoring. Timely data enables managers to benchmark and evaluate their improvement efforts.

# Product Innovations

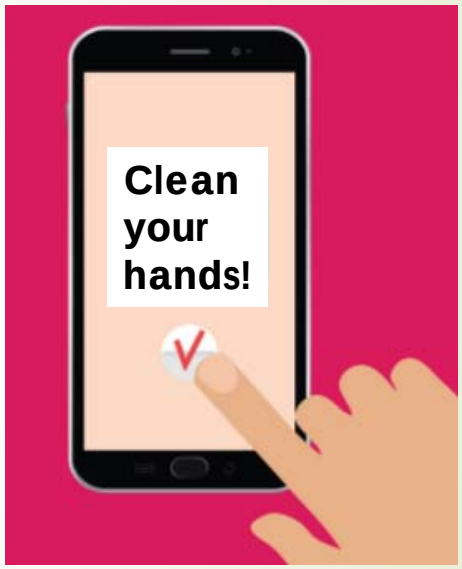
# Product Innovation: Alcohol based hand sanitizer with added essential oils

# Training Innovations

- Smart phone text reminders and recognition for hand hygiene
- Updated WHO 6 step technique “Fingertips First”
- Gaming and automated teaching technology
- Patient hand hygiene

# Training innovation: Smart phone text reminders

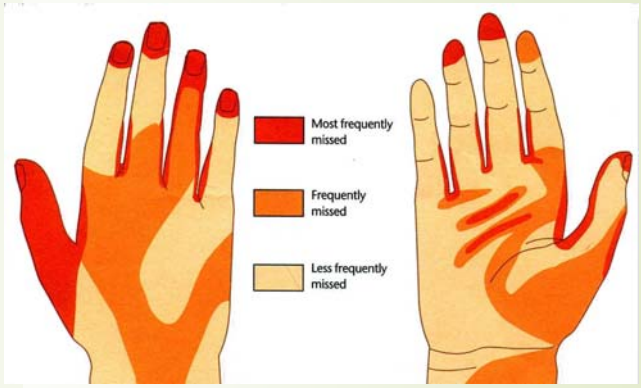
Text message reminders and feedback have been reported to enhance multimodal hand hygiene compliance programs.




Kerbaj J et al. “Smartphone text message service to foster hand hygiene compliance in health care workers”. Am J Infect Control. 2016 Dec 9. pii: S0196-6553(16)30971-3.

# Training Innovation: Updated WHO 6-step technique with "Fingertips First"

A 6-step hand rub technique with "Fingertips First" showed greater efficacy than the standard technique in reducing fingertip contamination, potentially improving hand hygiene action quality.




Pires D, Bellissimo-Rodrigues F, Soule H, Gayet-Ageron A, Pittet D. Revisiting HO "How to Handrub" Hand Hygiene Technique: Fingertips First? Hands are implicated in the cross transmission of microbial pathogens and fingertips are the crux of the problem. Infect Control Hosp Epidemiol 2017;38:230-233.

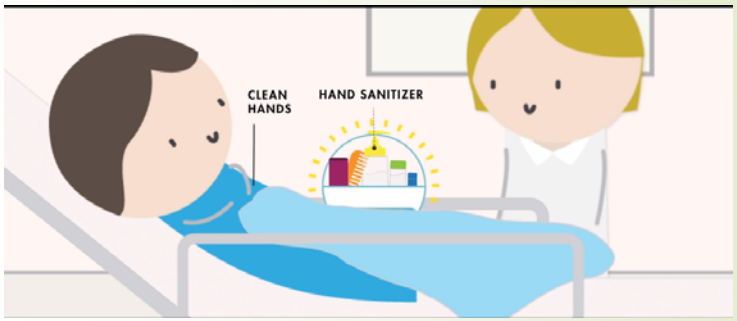
# Training Innovation: Gaming and automated teaching technology

Incorporation of new automated teaching technology, including automated image analysis of fluorescence to assess quality of hand hygiene, can encourage staff participation in learning, and ultimately improve hand hygiene compliance and technique in the acute healthcare setting.


- ✓ Deochand N, Deochand ME. Brief Report on Hand-Hygiene Monitoring Systems: A Pilot Study of a Computer-Assisted Image Analysis Technique. J Environ Health. 2016 Jun;78(10):14-20.
- ✓ Higgins A, Hannan MM. Improved hand hygiene technique and compliance in healthcare workers using gaming technology. J Hosp Infect. 2013 May;84(1):32-7.

# Training Innovation: Patient Hand Hygiene

- One study estimates only 15% of healthcare facilities include patient hand hygiene in their overall hand hygiene programs.
- The patients' own bacterial flora is one of the primary sources of healthcare associated infections.





- ✓ Landers T. et al "Patient centered hand hygiene: the next step in infection prevention". AJIC Vol 40, Issue 4, S11-S17.
- ✓ Istenes N, Bingham J. Patients' potential role in the transmission of health care-associated infections: prevalence of contamination with bacterial pathogens and patient attitudes toward hand hygiene. Am J Infect Control. 2013 Sep;41(9):793-8.

# Tracking Innovations

- Automated compliance monitoring
- Mobile device apps to track hand hygiene compliance
- Video auditing

# Tracking Innovation: Mobile device apps to track HH compliance

Mobile apps can facilitate direct observation of compliance with the WHO five moments of hand hygiene compliance which remains the de-facto “gold standard”.


- Schnall R, Iribarren S. “Review and analysis of existing mobile phone applications for health care associated infection prevention”. AJIC, Vol 43, Issue 6, p 572-576.
- Viswanath SK,et al. An Android app for recording hand hygiene observation data. J Hosp Infect.2016 Apr;92(4):344-5.

# Tracking Innovation: Automated compliance monitoring

- Automated HH compliance monitoring systems have been reported to provide exponentially more measurements than direct observation
- Automated systems are impartial.
- Automated systems provide immediate feedback.
- Studies report that these systems have resulted in a reduction in HAI rates.
- Challenges: measures compliance not competency, expensive and complicated to install, and compliance can return to pre-intervention levels without human intervention/interaction.

Michael H et al. “Durable improvement in hand hygiene compliance following implementation of an automated observation system with visual feedback”. Am J Infect Control. 2016 Nov 2.

# Tracking Innovation: Video auditing

- Video surveillance with feedback for hand hygiene has been found to be effective in measuring and increasing hand hygiene compliance.
- Video auditing (covert) can provide a different distribution of hand hygiene performances compared with overt observation.

Brotfain E et al. “Monitoring the hand hygiene compliance of health care workers in a general intensive care unit: Use of continuous closed circle television versus overt observation”. Am J Infect Control. 2017 May 4.

# Conclusions


- Studies conclude a successful hand hygiene program must be multi-modal, or what could be considered a Bundle.
- Bundle should include 4 categories: Executive Champion, HH Products, Hand Held Device Cleaning, Tracking
- Consideration should additionally be given to rapidly evolving innovations supporting hand hygiene compliance.

# Resources

- CDC
  https://www.cdc.gov/handhygiene/campaign/index.html
- WHO
  http://www.who.int/gpsc/5may/en/