Background: Surgical instruments that enter sterile tissue should be sterile because microbial contamination could result in disease transmission. Despite careful surgical instrument reprocessing, surgeons and other healthcare personnel (HCP) describe cases in which surgical instruments have been contaminated with organic material (eg, blood). Although most of these cases are observed before the instrument reaches the patient, in some cases the contaminated instrument contaminates the sterile field, or rarely, the patient. In this study, we evaluated the robustness of sterilization technologies when spores and bacteria mixed with blood were placed on "dirty" (uncleaned) instruments. **Methods:** "Dirty" surgical instruments were inoculated with 1.5×105 to 4.1×107 spores or vegetative bacteria (MRSA, VRE or *Mycobacterium terrae*) in the presence or absence of blood. The spores used were most resistant to the sterilization process tested (eg, *Geobacillus stearothermophilus* for steam and HPGP and *Bacillus atrophaeus* for ETO). Once the inoculum dried, the instruments were placed in a peel pouch and sterilized by steam sterilization, ethylene oxide (ETO), or hydrogen peroxide gas plasma (HPGP). These experiments are not representative of practice or manufacturer's recommendations because cleaning must always precede sterilization. **Results:** Steam sterilization killed all the *G. stearothermophilus* spores and *M. terrae* when inoculated onto "dirty" instruments in the presence or absence of blood (Table 1). ETO failed to inactivate all test spores (*B. atrophaeus*) when inoculated onto "dirty" instruments (60% failure) and "dirty" instruments with blood (90% failure). ETO did kill the vegetative bacteria (MRSA, VRE) under the same 2 test conditions (ie, "dirty" instruments with and without blood). The failure rates for HPGP for *G. stearothermophilus* spores and MRSA were 60% and 40%, respectively, when mixed with blood on a "dirty" instrument. **Conclusions:** This investigation demonstrated that steam sterilization is the most robust sterilization process and is effective even when instruments were not cleaned and the test organisms (*G. stearothermophilus* spores and MRSA) were mixed with blood. The low-temperature sterilization technologies tested (ie, ETO, HPGP) failed to inactivate the test spores but ETO did kill the test bacteria (ie, MRSA, VRE). These findings should assist HCP to assess the risk of infection to patients when potentially contaminated surgical instruments enter the sterile field or are unintentionally used on patients during surgery. Our data also demonstrate the importance of thorough cleaning prior to sterilization.

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Presentation Type:
Poster Presentation

Does Nursing Shift Influence Adherence to Central-Line Maintenance Bundles?

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Background: Proper care and maintenance of central lines is essential to prevent central-line–associated bloodstream infections (CLABSI). Our facility implemented a hospital-wide central-line maintenance bundle based on CLABSI prevention guidelines. The objective of this study was to determine whether maintenance bundle adherence was influenced by nursing shift or the day of week. **Methods:** A central-line maintenance bundle was implemented in April 2018 at a 1,266-bed academic medical center. The maintenance bundle components included alcohol-impregnated disinfection caps on all ports and infusion tubing, infusion tubing dated, dressings, not damp or soiled, no oozing at insertion site greater than the size of a quarter, dressings occlusive with all edges intact, transparent dressing change recorded within 7 days, and no gauze dressings in place for >48 hours. To monitor bundle compliance, 4 non–unit-based nurse observers were trained to audit central lines. Observations were collected between August 2018 and October 2019. Observations were performed during all shifts and 7 days per week. Just-in-time feedback was provided for noncompliant central lines. Nursing shifts were defined as day (7:00 A.M. to 3:00 P.M.), evening (3:00 P.M. to 11:00 P.M.), and night (11:00 P.M. to 7:00 A.M.). Central-line bundle compliance between shifts were compared using multinomial logistic regression. Bundle compliance between week day and weekend were compared using Mantel-Haenszel χ^2 analysis. **Results:** Of the 25,902 observations collected, 11,135 (42.9%) were day-shift observations, 11,559 (44.6%) occurred on evening shift, and 3,208 (12.4%) occurred on the night shift. Overall, 22,114 (85.9%) observations occurred on a week day versus 3,788 (14.6%) on a Saturday or Sunday (median observations per day of the week, 2,570; range, 1,680–6,800). In total, 4,599 CLs (17.8%) were noncompliant with ≥1 bundle component. The most common reasons for noncompliance were dressing not dated (n = 1,577; 44.0%) and dressings not occlusive with all edges intact (n = 1340; 37.4%). The noncompliant rates for central-line observations by shift were 12.8% (1,430 of 1,1,135) on day shift, 20.4% (2,361 of 11,559) on evening shift, and 25.2% (808 of 3,208) on night shift. Compared to day shift, evening shift (OR, 1.74; 95% CI, 1.62–1.87; $P < .001$) and night shift (OR, 2.29; 95% CI, 2.07–2.52; $P < .001$) were more likely to have a noncompliant central lines. Compared to a weekday, observations on weekend days were more likely to find a noncompliant central line: 914 of 3,788 (24.4%) weekend days versus 3,685 of 22,114 (16.7%) week days ($P < .001$). **Conclusions:** Noncompliance with central-line maintenance bundle was more likely on evening and night shifts and during the weekends.

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Does the Fist Bump Transfer Less Methicillin-Resistant *Staphylococcus aureus* Than a Handshake?

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Background: Contaminated hands are the most important source for transmission of pathogens in healthcare settings. It has been proposed that replacing the handshake with alternative greetings such as the fist bump might reduce the risk for pathogen transmission. **Methods:** In a cohort of 50 patients with methicillin-resistant *Staphylococcus aureus* (MRSA) colonization, we compared the

Figure. Frequency of transfer of MRSA from MRSA-colonized patients by different greeting methods

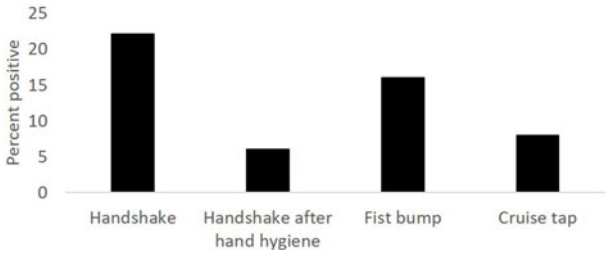

Fig. 1.

frequency of transfer of MRSA by handshake versus fist bump versus cruise tap (ie, a modified fist bump involving knuckle-to-knuckle contact with a single finger). MRSA-colonized patients performed each greeting with research personnel wearing sterile gloves, and cultures were obtained to determine the number of colonies transferred. Transfer by handshake was also assessed after MRSA-colonized patients used alcohol-based hand sanitizer. Quantitative cultures were obtained to compare the burden of MRSA on the palm versus dorsum of the hands of the MRSA carriers. **Results:** As shown in Fig. 1, there was a significant reduction in the frequency of MRSA transfer for the cruise tap compared to the handshake, but not for the fist bump. Use of alcohol-based hand sanitizer by MRSA carriers also significantly reduced the risk for transfer of MRSA. There was no significant difference in the burden of MRSA on the dorsum versus the palm of the hands (mean +SE colonies recovered, 32.7+12.3 vs 27.3+12.7; $P > .05$). **Conclusions:** The fist-bump greeting did not transfer less MRSA than a handshake. However, transfer was significantly reduced by a cruise-tap greeting or by handshake after the use of hand sanitizer. Modified greetings and patient hand hygiene are potential strategies to reduce transmission of healthcare-associated pathogens.

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Poster Presentation

Duodenoscope Medical Device Reports Associated with Patient Infection, Patient Exposure, or Device Contamination

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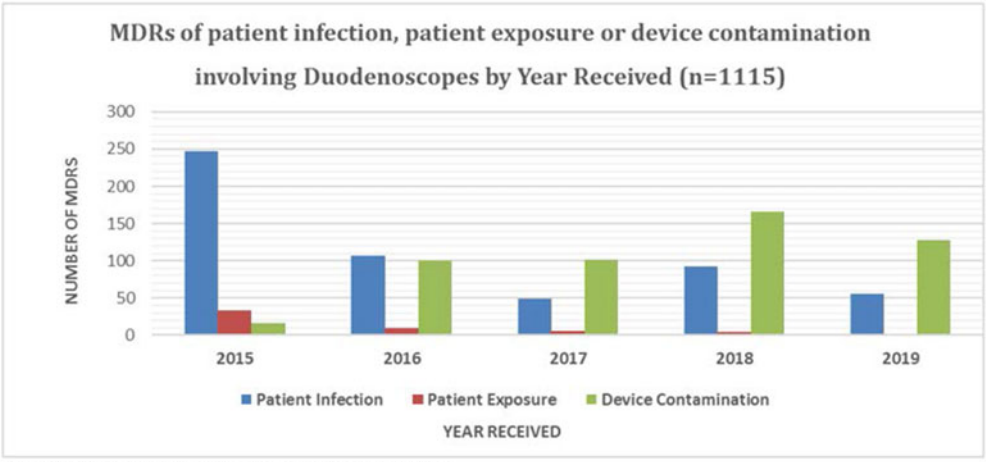
Background: Each year, the FDA receives more than a million reports of suspected device-associated deaths, serious injuries, and malfunctions. Medical device reports (MDRs) are submitted to the FDA by mandatory reporters (manufacturers, importers, and device user facilities) and voluntary reporters such as healthcare professionals, patients, and consumers. The FDA uses MDRs to monitor device performance, including monitoring reports of infection or device contamination to detect potential device-related safety issues and to share this information in public communications. In this analysis, the FDA presents MDRs for duodenoscopes, which are a type of flexible endoscope that have been associated with infections in patients. **Methods:** For this analysis, we searched the MDR database for duodenoscope reports submitted between January 2015 and July 1, 2019. MDRs were classified into clinical risk categories based on the MDR's text narratives as patient infection (indicated the presence of infection in patients potentially transmitted by the device), patient exposure (indicated a contaminated device has been used in a patient, but the MDR lacks clear mention of patient infection), or device contamination (indicated that the device was contaminated, but no mention of device use in patients or patient infection). **Results:** Overall, 1,115 duodenoscope reports related to a patient infection, patient exposure, or device contamination for devices marketed inside and outside the United States were received from January 2015 to mid-2019. Among them, 79 MDRs were received for deaths in patient infection, patient exposure, or device contamination reports. The

Figure 1. Number of MDR reports[1,2,3] received for duodenoscopes associated with patient infection, patient exposure or device contamination



1: Each MDR may report events associated with one or more patients
2: 2019 year only includes data received as of July 1, 2019
3. MDR event may occur prior to MDR received year

Fig. 1.