47%; physicians (attending's, residents, fellows) 28%; service workers including Environmental Service, Food service, Patient transporter, Social worker, Pastoral care-14%; Allied Health Professions including Dietician, Blood Collection, Physiotherapist, Radiology Tech, Respiratory Therapist 4%; The OBC among all HCW were below 50%. For the ICC, HH (49%) was way below the gloving (80%,) and gowning (62%) compliance. HH compliance before donning was strikingly lower (40%) than the compliance after doffing (62%). This trend was similar in all HCW. Within a month of TEP, a drastic increase in both HH [↑ to 75% from 26% ($P < 0.001$)] and OBC [↑ to 68% from 16% ($P < 0.001$)] was seen.

Conclusion. Common misconception that gloves are substitute to HH could explain the low HH rates before donning. Recognition of this gap and focused education on HH before donning has led to improved compliance in all HCW.

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463. Healthcare Workers Perceptions Regarding the Use of an Electronic Hand Hygiene Monitoring System at a VA Hospital

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Background. A cornerstone of healthcare-associated infection prevention is hand hygiene which has resulted in regulatory requirements to monitor hand hygiene compliance. Direct observation is the gold standard for hand hygiene compliance monitoring, but has several drawbacks. Electronic monitoring systems have begun to replace direct observation with several potential advantages, including larger sample size and more timely feedback. End user acceptance and adoption is a critical step to evidence-based practice implementation. To evaluate potential barriers and facilitators to adoption, we conducted a qualitative evaluation of nursing perceptions following a trial of an electronic hand hygiene compliance monitoring system.

Methods. We conducted four focus groups of 21 nursing staff on a medical/surgical inpatient unit at a tertiary care VA hospital. Nursing staff consisted of Registered Nurses, Nursing Assistants, and Health Technicians; of which there were 19 females and 2 males. Groups were audio recorded and tapes transcribed. Content analysis of transcriptions was undertaken to identify codes, categories, and themes.

Results. Themes identified as facilitators included: (1) unit champion; (2) electronic observation (vs. human observation); and (3) timely feedback. Themes identified as barriers included: (1) concern with data accuracy; (2) feasibility of frequent (daily) goal setting; and (3) staff knowledge of how system works.

Conclusion. Nursing staff perceived electronic monitoring improved hand hygiene compliance. Staff verbalized negative perceptions with hand hygiene compliance monitoring but preferred electronic monitoring vs. human monitoring. Most barriers discussed revolved around the need to understanding how the electronic monitoring system works and need to believe the data are accurate. Implementation of this innovative technology will require extensive planning to address staff knowledge and understanding to ensure staff acceptance and adoption.

Disclosures. **All authors:** No reported disclosures.

464. The Efficacy of Alcohol Based Wipes, Gel, Foam, and Spray Compared With Liquid Soap in Eliminating Transient Hand Bacteria

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Background. Hand hygiene is a proven method of preventing the spread of pathogens and reducing healthcare-associated infections. Studies have shown that up to 50% of healthcare professionals' (HCPs) hands were contaminated with the same pathogen as a patient with a confirmed multidrug-resistant organism, such as MRSA or VRE, after exiting the room. This suggests that these bacteria were obtained through contact with the environment and/or patient. The objective of this study was to compare the efficacy of alcohol based hand rubs and liquid soap at the removal of transient hand bacteria.

Methods. Seventy-five healthy adults were randomly chosen to participate in one of the five hand hygiene tests. Before implementing hand hygiene, moistened sterile swabs were used to rub the fingers, thumbs, and palms of both hands. The volunteers then performed one of the hand hygiene methods following WHO recommendations for hand washing and hand rubs. Wipes were used by applying a pulling motion on fingers and thumbs followed by rubbing the palms. The swabs were agitated for 15 seconds in a peptone broth and poured onto Petrifilms for incubation of 48 hours at 37°C.

Results. The percent reduction in transient hand bacteria using aerobic colony counts were enumerated and calculated as follows: 90% for wipes, 82% for liquid soap, 80% for gel, 72% for foam, and 71% for spray. The wipes eliminated hand bacteria significantly better then the liquid soap ($P = 0.0247$) while the gel ($P = 0.7239$) and foam ($P = 0.0661$) showed no significance. Lastly, the soap preformed significantly better than the spray ($P = 0.0182$).

Conclusion. This study demonstrated that alcohol-based wipes performed better at removing transient bacteria from the hands than liquid soap and water. This result potentially provides another method for HCPs in reducing the risk of infection for their next patient and decreasing the likelihood of transmitting an infectious agent via hands.

Disclosures. **All authors:** No reported disclosures.

465. Microbial Removal Efficacy of a Novel Nonantimicrobial Hand Soap

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Background. The CDC Hand Hygiene Guidelines recommend washing hands with soap when hands are visibly soiled. Pending changes to the United States healthcare antiseptic regulations are decreasing the availability of antimicrobial soap active ingredients making it important to understand key performance differences across soap types. The purpose of this study was to investigate the germ removal properties of a novel, nonantimicrobial soap exhibiting improved interfacial tension properties, a measure of the interaction of the soap with skin.

Methods. The novel nonantimicrobial soap was compared with a control nonantimicrobial soap. In study 1, the soaps were tested according to ASTM E2755 to determine reduction of *Serratia marcescens* after one use where 5 mL of soap was applied to dry hands, lathered 30s and rinsed 30s ($N = 12$). Studies 2 and 3 compared the products under more realistic test conditions, including a more relevant healthcare pathogen, more realistic product application and in study three skin condition representative of healthcare worker skin. The second study compared the novel soap and the control soap for *Staphylococcus aureus* removal using ASTM E2755 with 1.8 mL of soap applied to dry hands, lathered for 30s and rinsed for 10s ($N = 12$). The third study used an *ex vivo* skin model of dry, irritated human skin to evaluate *S. aureus* removal. Statistical comparisons between soaps were made using a paired t-test ($\alpha = 0.05$).

Results. In all three studies, the novel nonantimicrobial soap was superior to the control soap for bacteria removal. In study 1, the novel soap achieved a 2.26 $\log_{10}$ reduction compared with a 1.70 $\log_{10}$ reduction for the control soap ($P < 0.0001$). In studies 2 and 3, the nonantimicrobial soap achieved $\log_{10}$ reductions that were 0.34 ($P = 0.0236$) and 0.53 ($P = 0.005$) greater than the control soap, respectively.

Conclusion. This study indicates that a nonantimicrobial soap can achieve a high level of microbe removal (>99%) on skin. Additionally, product formulation appears to impact the microbial removal properties of nonantimicrobial soap on both healthy human subjects, and on dry irritated human skin. Therefore, this novel soap may be a good option in a high-frequency hand hygiene environment such as healthcare.

Disclosures. **S. Edmonds-Wilson**, GOJO Industries: Employee, Salary. **K. Tian**, GOJO Industries: Employee, Salary. **J. Bingham**, GOJO Industries: Employee, Salary.

466. Use of Administrative Data to Characterize *Clostridium difficile* Infections (CDI) Reported by California Hospitals to the California Department of Public Health (CDPH) via the National Healthcare Safety Network (NHSN): 2014–2015

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Background. In 2014–2015, CDI accounted for more than half of all healthcare-associated infections (HAI) reported by California hospitals. The CDPH HAI Program used an administrative dataset from the California Office of Statewide Health Planning and Development (OSHPD) to identify admission source (e.g., home, skilled nursing facility), length of stay, payer category, and outcome (e.g., death) of patients with CDI reported by California hospitals via NHSN.

Methods. We merged NHSN CDI events with OSHPD hospital discharge data for the period January 1, 2014, to December 31, 2015. NHSN classifies CDI cases as community onset (CO) if the CDI test specimen was collected during the first three hospital days and hospital onset (HO) if collected on day 4 or later. We used OSHPD discharge records that listed CDI as a diagnosis (ICD-9-CM: 00845 and ICD-10-CM: A047 codes). We matched NHSN CDI records with OSHPD hospital discharge records by hospital, admission date, and date of birth.

Results. Hospitals reported 58,841 NHSN inpatient incident and recurrent CDI events in 2014–2015. We matched 42,172 (71.7%) NHSN CDI records with an OSHPD hospital discharge record; 60.5% of matched cases were CO-CDI and 39.5% were HO-CDI. Sources of admission included home (78.2%; CO: 81.0% and HO: 74.0%), skilled nursing/intermediate care facility (10.7%; CO: 10.9% and HO: 10.4%), acute care hospital (6.0%; CO: 3.2% and HO: 10.4%), and residential care facility (1.7%; CO: 2.0% and HO: 1.4%). Payers included Medicare (61.8%), Medi-Cal (18.7%), and private insurance (16.8%). The median length of stay for CO cases was 5 days (interquartile range [IQR]: 3–9), and for HO cases, 15 days (IQR: 9–25); 8.7% (CO: 7.1% and HO: 11.2%) of patients with CDI died during hospitalization.

Conclusion. Our analysis demonstrates use of an administrative dataset to supplement NHSN HAI data. Patients with CDI were predominantly admitted from home and had prolonged hospitalizations and substantial in-hospital mortality. We are evaluating use of these data to identify hospital admissions at various time intervals before

and after CDI events. The CDPH HAI Program is using these analyses to inform CDI prevention outreach to California healthcare facilities and provider networks.

Disclosures. **All authors:** No reported disclosures.

467. Investigation of a *Clostridium difficile* Infection (CDI) Outbreak in a Community Teaching Hospital

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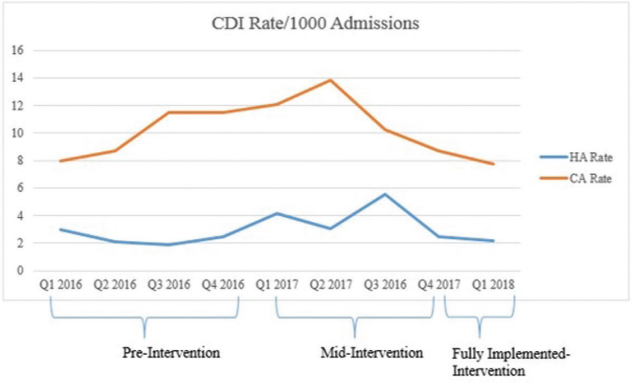
Background. An abrupt change in baseline CDI from 2016 to 2017 prompted a response team task force including senior administration, the CMO, infection prevention, environmental services, laboratory, pharmacy, emergency department (ED), and nursing to address the problem.

Methods. Hospital-acquired (HA) and community-acquired (CA) CDI cases were tracked using an epidemic curve and institutional case mapping. A multipronged intervention was implemented that included molecular typing of isolates, quarterly terminal cleaning of the ED, improved CDI screening and testing, intensified antimicrobial stewardship (AS) with mandatory education for key clinicians, and rigorously enhanced enforcement of hand hygiene with secret observers and directed feedback. Pre-, mid-, and fully-implemented intervention HA and CA CDI rates were observed.

Results. Ninety-five percent of CA CDI and 98% of all patients who developed HA CDI were admitted through the ED. Cases of CDI were distributed throughout the hospital. The genotyping did not identify a single strain outbreak. Sixteen percent of all CDI samples (23% of CA and 9% of HA cases) sent to the DOH tested positive for BINAP1. Preintervention rates of HA CDI were found to be lower than mid-intervention rates (2.4, 95% CI= 1.5–3.1 vs. 4.3, 95% CI= 1.13–7.37). HA CDI rates after full-intervention in fourth quarter 2017 and first quarter 2018 trended toward baseline (2.1, 95% CI = 0–5.93) but had not achieved statistical improvement (Figure 1). A significant correlation between HA CDI rates and CA CDI rates was not found ($r = 0.241$, $P < 0.5$), suggesting that HA CDI rates were not driven by CA CDI rates. Hospital and ED hand hygiene improved significantly; hospital preintervention = 0.84 vs. intervention = 0.91, $P < 0.01$; ED hand hygiene preintervention = 0.72 vs. intervention = 0.86, $P < 0.04$. No statistically significant changes in antimicrobial use were noted.

Conclusion. A rapid, aggressive team-based approach for a CDI outbreak successfully reversed a rising rate and SIR. Although no one specific intervention was clearly responsible for the reversal, we did observe a statistically significant increase in hand hygiene. This outbreak and its management illustrate the importance of active surveillance and a rapid team-based response to CDI outbreaks.



Disclosures. **All authors:** No reported disclosures.

468. Diagnosis of Clinical *Clostridium difficile* Infection: An Unmet Challenge

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Background. Diagnosis of *Clostridium difficile* infection (CDI) is challenging. The reason is two-fold: (a) lack of unique symptoms and (b) lack of a gold standard test for CDI. We studied variation in CDI rates when different diagnostic algorithms were utilized. In addition, we compared patients who met the clinical definition of CDI with different diagnostic assays.

Methods. This is a retrospective study at an academic medical center (401-bed) conducted over 12 months (January 2017–December 2017). A stool sample that tested positive by polymerase chain reaction (PCR) for *C. difficile* ($n = 81$) was then tested for glutamate dehydrogenase (GDH) and toxin enzyme immunoassay (EIA). Additionally, all PCR-positive cases were also tested for toxin production by cytotoxic neutralization assay (CCNA). Clinical *C. difficile* was defined as three or more loose stools within 24-hour time period. Clinical data were obtained from review of charts. This definition was applied to all community-onset and hospital-onset cases.

Results. *C. difficile* was detected in 81 symptomatic patients by PCR test. Of these, 41.9% met the clinical definition of diarrhea. Of the 81 patients, toxin EIA and GDH were positive in 29.6% (24/81) and 4% met the clinical definition. CCNA was positive in 66.67% (54/81) and only 9% met the clinical definition. The CDI rate (per 10,000 patient days) was 10.2 in the PCR positive group; 3.02 in toxin EIA and GDH group and 6.81 in CCNA group. Duration of diarrhea was longer when functional assays (toxin EIA and/or CCNA) were positive, i.e., 48 hours after diagnosis, 22.7% (18/79) of patients with a positive CCNA and EIA had diarrhea while only 6% (3/49) of the patients with GDH and PCR positive tests (nonfunctional assays) had diarrhea ($P = 0.013$). The difference was statistically significant. All 81 patients were started on CDI treatment within 24 hours of diagnosis. Of note, there was no laxative use contributing to symptoms in these cases.

Conclusion. CDI rates differ with various diagnostic algorithms. Duration of diarrhea was significantly longer when functional assays (CCNA or toxin EIA) were positive. Inclusion of both a functional assay (EIA and/or CCNA) and a clinical definition of CDI can improve the diagnostic accuracy of CDI. A combination of clinical judgment and functional assays is required for an accurate diagnosis of CDI.

Disclosures. **All authors:** No reported disclosures.

469. Validation and Characterization of Community-Acquired *Clostridium difficile* Infections from the Quebec *C. difficile* Infection Surveillance Program (QCISP)

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Background. Community-acquired *Clostridium difficile* infections (CA-CDI) are under a mandatory reporting program starting in August 2004 across 95 healthcare institutions from the QCISP. There has been a slow and continuous increase in the incidence rate of hospitalized CA-CDI since 2007 without any known obvious explanation. The objectives of this study were to characterize cases of CA-CDI and investigate the potential causes of this increase.

Methods. A retrospective study was carried out using a survey sent to eligible healthcare institutions. Hospitals participating in QCISP that reported ≥3 cases of CA-CDI in 2016–2017 were invited to participate. To identify potential causes of the apparent increase in CA-CDI incidence, they were asked to provide clinical information regarding up to three cases of CA-CDI for two distinct surveillance years (2011–2012 and 2016–2017). To characterize each CA-CDI cases, a broad range of demographic, clinical, and laboratory variables were collected, including medical history, history of contact with primary and secondary healthcare institutions, previous antibiotics use as well as laboratory diagnostic test. A χ^2 test have been used to test year differences in indicator distributions.

Results. A total of 49 healthcare institutions provided data on 172 cases of CA-CDI. Overall, 92% ($n = 159$) of them meet the QCISP CA-CDI criteria definition. Among them, most patients (67%) were female, and average age was 66.7 ± 20.5 year old. Seventy-four percent had received antibiotic in the previous year. Between the two years, there was no significant change in the socio-demographic and clinical variables of CA-CDI cases. The proportion of patients receiving immunosuppressive drugs and proton pump inhibitors at the time of diagnosis was 11% and 45%, respectively. The proportion of cases visiting ambulatory healthcare settings during the year previous to patient admission increased from 61% (2011–2012) to 69% (2016–2017) ($P = 0.18$). Moreover, there was a significant increase in the proportion of CA-CDI diagnosed by laboratory PCR test (from 8% to 55%; $P < 0.0001$).

Conclusion. This study provided important data to characterize CA-CDI using the QCISP. The increase in the use of PCR is associated with the incidence of CA-CDI but may not be the cause of it.

Disclosures. **Y. Longtin**, Merck: Grant Investigator, Research grant. Becton Dickinson: Grant Investigator, Grant recipient.

470. Concomitant Antibiotic Use and Death Among a National Cohort of Veterans With *Clostridium difficile* Infection (CDI)

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Background. Antibiotic use is a well-known risk factor for development of CDI, and there is preliminary evidence suggesting concomitant antibiotic use may result in poor outcomes, including death. This work investigated the effect of concomitant antibiotic exposure during CDI treatment on mortality among patients with CDI.