

## Outcomes per Medicaid Member per Quarter

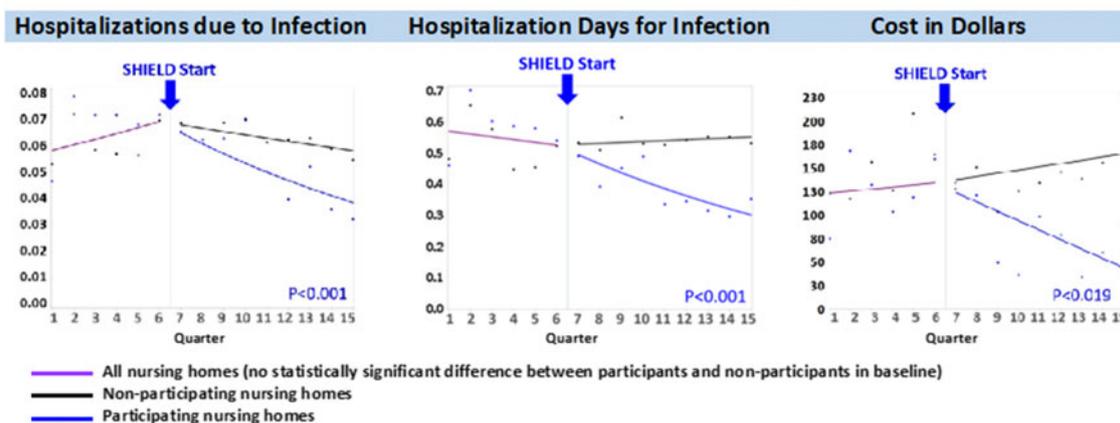


Fig. 1.

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**Background:** Shared Healthcare Intervention to Eliminate Life-threatening Dissemination of MDROs in Orange County, California (SHIELD OC) was a CDC-funded regional decolonization intervention from April 2017 through July 2019 involving 38 hospitals, nursing homes (NHs), and long-term acute-care hospitals (LTACHs) to reduce MDROs. Decolonization in NH and LTACHs consisted of universal antiseptic bathing with chlorhexidine (CHG) for routine bathing and showering plus nasal iodophor decolonization (Monday through Friday, twice daily every other week). Hospitals used universal CHG in ICUs and provided daily CHG and nasal iodophor to patients in contact precautions. We sought to evaluate whether decolonization reduced hospitalization and associated healthcare costs due to infections among residents of NHs participating in SHIELD compared to nonparticipating NHs. **Methods:** Medicaid insurer data covering NH residents in Orange County were used to calculate hospitalization rates due to a primary diagnosis of infection (counts per member quarter), hospital bed days/member-quarter, and expenditures/member quarter from the fourth quarter of 2015 to the second quarter of 2019. We used a time-series design and a segmented regression analysis to evaluate changes attributable to the SHIELD OC intervention among participating and nonparticipating NHs. **Results:** Across the SHIELD OC intervention period, intervention

NHs experienced a 44% decrease in hospitalization rates, a 43% decrease in hospital bed days, and a 53% decrease in Medicaid expenditures when comparing the last quarter of the intervention to the baseline period (Fig. 1). These data translated to a significant downward slope, with a reduction of 4% per quarter in hospital admissions due to infection ( $P < .001$ ), a reduction of 7% per quarter in hospitalization days due to infection ( $P < .001$ ), and a reduction of 9% per quarter in Medicaid expenditures ( $P = .019$ ) per NH resident. **Conclusions:** The universal CHG bathing and nasal decolonization intervention adopted by NHs in the SHIELD OC collaborative resulted in large, meaningful reductions in hospitalization events, hospitalization days, and healthcare expenditures among Medicaid-insured NH residents. The findings led CalOptima, the Medicaid provider in Orange County, California, to launch an NH incentive program that provides dedicated training and covers the cost of CHG and nasal iodophor for OC NHs that enroll.

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**Presentation Type:**

Distinguished Oral

**Implementation of the Comprehensive Unit-Based Safety Program to Improve Hand Hygiene in Four NICUs in Pune, India**

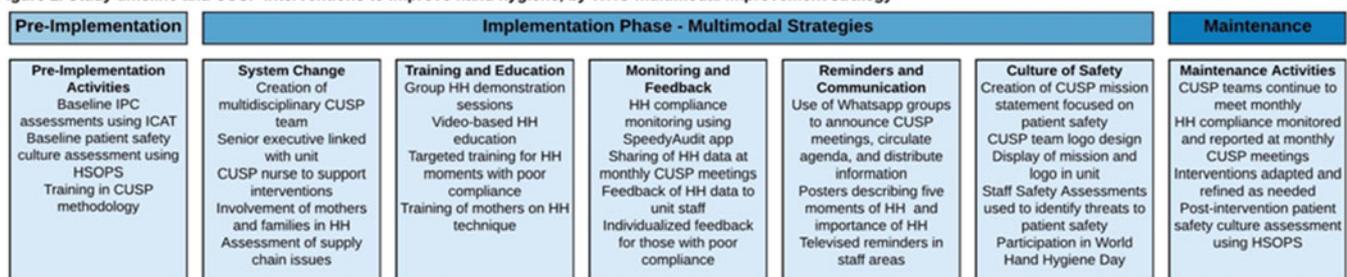
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**Background:** In low- and middle-income country (LMIC) health-care facilities, gaps in infection prevention and control (IPC) practices increase risk of healthcare-associated infections (HAIs) and mortality among hospitalized neonates. **Method:** In this quasi-experimental study, we implemented the Comprehensive Unit-based Safety Program (CUSP) to improve adherence to evidence-based IPC practices in neonatal intensive care units (NICUs) in 4 tertiary-care facilities in Pune, India. CUSP is a validated strategy to empower staff to improve unit-level patient safety. Baseline safety culture was measured using the Hospital

Survey on Patient Safety Culture (HSOPS). Baseline IPC assessments using the Infection Control Assessment Tool (ICAT) were completed to describe existing IPC practices to identify focus areas, the first of which was hand hygiene (HH). Sites received training in CUSP methodology and formed multidisciplinary CUSP teams, which met monthly and were supported by monthly coaching calls. Staff safety assessments (SSAs) guided selection of multimodal interventions. HH compliance was measured by direct observation using trained external observers. The primary outcome was HH compliance, evaluated monthly during the implementation and maintenance phases. Secondary outcomes included CUSP meeting frequency and HH compliance by healthcare worker (HCW) role. **Result:** In March 2018, 144 HCWs and administrators participated in CUSP training. Site meetings occurred monthly. During the implementation phase (June 2018–January 2019), HH monitoring commenced, sites formed their teams, completed the SSA, and selected interventions to improve HH based on the WHO's IPC multimodal improvement strategy: (1) system change; (2) training and education; (3) monitoring and feedback; (4) reminders and communication; and (5) a culture of safety (Fig. 1). During the maintenance phase (February–September 2019), HH was monitored monthly and sites adapted interventions as needed. HH compliance improved from 58% to 70% at participant sites from implementation to maintenance phases (Fig. 2), with an odds ratio

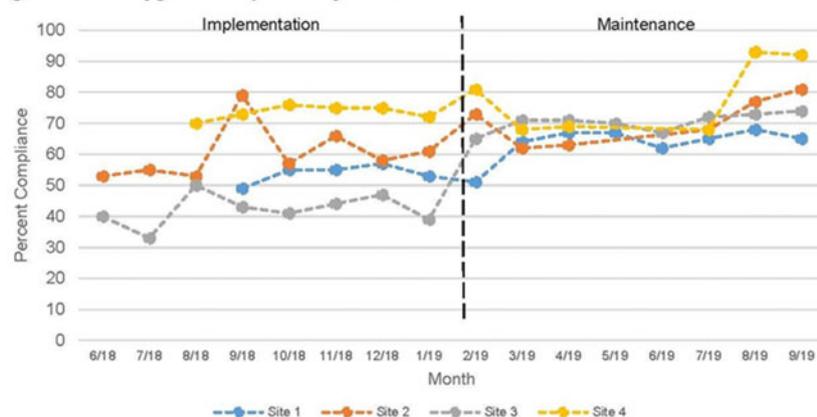
Figure 1. Study timeline and CUSP interventions to improve hand hygiene, by WHO multimodal improvement strategy



**Figure 1 notes.** Multimodal strategies listed encompass a selection of interventions to improve HH at each site; not all interventions were implemented at all sites. Abbreviations: CUSP - Comprehensive Unit-based Safety Program; HH - hand hygiene; HSOPS - Hospital Survey on Patient Safety Culture; ICAT - Infection Control Assessment Tool; IPC - infection prevention and control; WHO - World Health Organization.

Fig. 1

Figure 2. Hand Hygiene Compliance by Site and Month



**Figure 2 notes.** Hand hygiene was monitored monthly by participant sites by direct observation by external observers. There were 8684 opportunities for hand hygiene across all four sites over the course of the study period. Hand hygiene improved at all four sites from implementation to maintenance phases: site 1 (n=4143) improved from 54% to 65%, site 2 (n=1554) from 60% to 75%, site 3 (n=1660) from 42% to 71%, and site 4 (n=1327) from 74% to 83%.

Fig. 2.

(OR) of 1.66 (95% CI, 1.50–1.84;  $P < .001$ ). HH compliance improved across all HCW roles: (1) physician compliance improved from 55% to 67% (OR, 1.69; 95% CI, 1.42–2.01;  $P < .001$ ); (2) nurse compliance from 61% to 73% (OR, 1.68; 95% CI, 1.46–1.93;  $P < .001$ ); and (3) other HCW compliance from 52% to 62% (OR, 1.48; 95% CI, 1.10–1.99;  $P = .010$ ).

**Conclusion:** CUSP was successfully adapted by 4 diverse tertiary-care NICUs in Pune, India, and it resulted in increased HH compliance at all sites. This multimodal strategy is a promising framework for LMIC healthcare facilities to sustainably address IPC gaps and reduce HAI and mortality in neonates.

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### Presentation Type:

Distinguished Oral

### Increase in Surgical Site Infections Caused by Gram-Negative Pathogens in Warmer Weathers Data From More Than 2 Million Surgeries

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**Background:** Various studies have linked periods of warmer temperatures to an increased occurrence of surgical site infections (SSIs) and healthcare-associated infections in general. In an observational study, we sought to determine the pathogens for which this association was especially strong. **Method:** Patient- and procedure-related data of the SSI-module of the German nosocomial infection surveillance system were linked with monthly aggregated meteorological data from the German Meteorological Service for a period from 2000 to 2016. Due to high correlation with other meteorological parameters, analyses were executed focusing on the outside ambient temperature. Temperature was regarded as both a continuous variable and a categorical variable with different temperature intervals (5°C steps ranging from <5°C to ≥20°C). Through multivariable logistic regression analysis, adjusted odds ratios (OR) with 95% confidence intervals were calculated for SSI rates relating to temperature. SSIs were stratified by pathogen and depth of infiltration. **Result:** Altogether, 2,004,793 procedures, conducted in 1,455 German surgical departments and resulting in 32,118 SSIs, were included. A general association of warmer mean temperatures in the month of surgery with an increased SSI-risk was observed, particularly for SSIs caused by gram-negative pathogens. Stratification by pathogen revealed that the association was especially prominent for *Acinetobacter* spp, *Pseudomonas aeruginosa*, and certain *Enterobacteriaceae*. Per additional 1°C, we observed a 6% increase in the risk for SSIs caused by *Acinetobacter* spp (OR, 1.06; 95% CI, 1.04–1.09), and a 4% increase in the risk for SSIs caused by *Enterobacter* spp (OR, 1.04; 95% CI, 1.03–1.05). Among gram-positive pathogens, temperature-association was strongest for *Staphylococcus aureus*. Superficial SSIs showed a higher

temperature-association than deeper SSIs. The risk for superficial SSIs with *Acinetobacter* spp significantly increased >10-fold after surgeries conducted in months with a mean temperature of ≥20°C in reference to <5°C. For *Pseudomonas aeruginosa*, we observed a >2-fold statistically significant increase in the risk for superficial SSIs, when comparing the same temperature categories (≥20°C vs <5°C). **Conclusions:** Our study demonstrated that higher temperatures were associated with increased SSI-rates caused by gram-negative bacteria. As a consequence, future SSI-prevention measures should place a higher emphasis on the parameter season as part of a more tailored, personalized approach at infection prevention. For instance, it may be conceivable to seasonally adjust decolonizing regimens and certain prophylaxes. Underlying shifts in microbiome composition due to meteorological factors should be considered in further analyses. Given the expected rise of global temperatures until the end of the century, the topic gains relevance from multiple perspectives.

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**Disclosures:** None

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### Presentation Type:

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### Investigation of Events Related to Laboratory-Confirmed Contamination of Pharmaceutical Products: Summary of CDC Consultation

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**Background:** Contaminated pharmaceutical products pose serious infection risks to patients and can lead to significant morbidity and mortality. Contamination at the point of manufacturing or compounding (intrinsic contamination) has the potential to affect large numbers of patients. Public health plays a critical role in detecting and investigating such events. We identified investigations involving intrinsically contaminated pharmaceuticals to characterize the burden and scope of harm associated with these events. **Methods:** We reviewed Centers for Disease Control and Prevention records to identify US investigations between January 1, 2009, and December 31, 2018, involving laboratory-confirmed contamination of manufactured medications and pharmacy-compounded preparations (P-CPs), using relevant search terms (eg, “medication contamination”). Laboratory confirmation was defined as identification of a pathogen from a manufactured medication or P-CP. We determined the number and type of patient infections associated with these investigations, the number of states involved, pathogens identified, type of medication (sterile or nonsterile), route of administration, and how the contamination event was first identified. We excluded investigations when the mode of production was unknown. **Results:** We identified 20 investigations in at least 20 states involving laboratory-confirmed contamination of manufactured medications (n = 12) and P-CPs (n = 8). Patient infections were identified in 16 (80%) investigations (9 involving manufactured medications and 7 involving P-CPs) resulting in at least 1,183 infections and at least 73 deaths. Bloodstream infections were the most common infection type (n = 7, 44%). Waterborne pathogens (eg, *Serratia marcescens*, *Burkholderia*