

Background: The current approach to measuring hand hygiene (HH) relies on human auditors who capture <1% of HH opportunities and rapidly become recognized by staff, resulting in inflation in performance. Our goal was to assess the impact of group electronic monitoring coupled with unit-led quality improvement on HH performance and prevention of healthcare-associated transmission and infection. **Methods:** A stepped-wedge cluster randomized quality improvement study was undertaken across 5 acute-care hospitals in Ontario, Canada. Overall, 746 inpatient beds were electronically monitored across 26 inpatient medical and surgical units. Daily HH performance as measured by group electronic monitoring was reported to inpatient units who discussed results to guide unit-led improvement strategies. The primary outcome was monthly HH adherence (%) between baseline and intervention. Secondary outcomes included transmission of antibiotic resistant organisms such as methicillin resistant *Staphylococcus aureus* (MRSA) and other healthcare-associated infections. **Results:** After adjusting for the correlation within inpatient units, there was a significant overall improvement in HH adherence associated with the intervention (IRR, 1.73; 95% CI, 1.47–1.99; $P < .0001$). Monthly HH adherence relative to the intervention increased from 29% (1,395,450 of 4,544,144) to 37% (598,035 of 1,536,643) within 1 month, followed by consecutive incremental increases up to 53% (804,108 of 1,515,537) by 10 months ($P < .0001$). We identified a trend toward reduced healthcare-associated transmission of MRSA (0.74; 95% CI, 0.53–1.04; $P = .08$). **Conclusions:** The introduction of a system for group electronic monitoring led to rapid, significant, and sustained improvements in HH performance within a 2-year period.

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Oral Presentation

HAI-Proactive: Development of an Automated Surveillance System for Healthcare-Associated Infections in Sweden

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Background: Healthcare-associated infection (HAI) surveillance is essential for most infection prevention programs and continuous epidemiological data can be used to inform healthcare personal, allocate resources, and evaluate interventions to prevent HAIs. Many HAI surveillance systems today are based on time-consuming and resource-intensive manual reviews of patient records. The objective of HAI-proactive, a Swedish triple-helix innovation project, is to develop and implement a fully automated HAI

surveillance system based on electronic health record data. Furthermore, the project aims to develop machine-learning-based screening algorithms for early prediction of HAI at the individual patient level. **Methods:** The project is performed with support from Sweden's Innovation Agency in collaboration among academic, health, and industry partners. Development of rule-based and machine-learning algorithms is performed within a research database, which consists of all electronic health record data from patients admitted to the Karolinska University Hospital. Natural language processing is used for processing free-text medical notes. To validate algorithm performance, manual annotation was performed based on international HAI definitions from the European Center for Disease Prevention and Control, Centers for Disease Control and Prevention, and Sepsis-3 criteria. Currently, the project is building a platform for real-time data access to implement the algorithms within Region Stockholm. **Results:** The project has developed a rule-based surveillance algorithm for sepsis that continuously monitors patients admitted to the hospital, with a sensitivity of 0.89 (95% CI, 0.85–0.93), a specificity of 0.99 (0.98–0.99), a positive predictive value of 0.88 (0.83–0.93), and a negative predictive value of 0.99 (0.98–0.99). The healthcare-associated urinary tract infection surveillance algorithm, which is based on free-text analysis and negations to define symptoms, had a sensitivity of 0.73 (0.66–0.80) and a positive predictive value of 0.68 (0.61–0.75). The sensitivity and positive predictive value of an algorithm based on significant bacterial growth in urine culture only was 0.99 (0.97–1.00) and 0.39 (0.34–0.44), respectively. The surveillance system detected differences in incidences between hospital wards and over time. Development of surveillance algorithms for pneumonia, catheter-related infections and *Clostridioides difficile* infections, as well as machine-learning-based models for early prediction, is ongoing. We intend to present results from all algorithms. **Conclusions:** With access to electronic health record data, we have shown that it is feasible to develop a fully automated HAI surveillance system based on algorithms using both structured data and free text for the main healthcare-associated infections.

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High-Risk Interactions for Transmission of CRE to Health Worker Gloves or Gown: A Multicenter Cohort Study

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Background: Carbapenem-resistant *Enterobacteriaceae* (CRE) are a serious threat to public health due to high associated morbidity and mortality. Healthcare personnel (HCP) gloves and gowns are frequently contaminated with antibiotic-resistant bacteria, including CRE. We aimed to identify patients more likely to transmit CRE to HCP gloves or gowns and HCP types and interactions more likely