Figure 3. Preliminary Findings and Representative Quotes from Post-Intervention Interviews with Clinicians

Benefits of the Patient Safety Display	Quotes
1. Prompts Discussion about Catheters and Skin Issues	"As a nurse practitioner, I am guilty of not bringing up the presence of these lines on rounds, and so we don't have that discussion. I do think it prompts the conversation and, hopefully, prompts also like an assessment of these lines." [Nurse Practitioner] "I think it's a good conversation starter ...[Attending Physician]
2. Increases Awareness of Catheters and Skin Issues	"Overall, I really liked it, specifically for my role. I also had seen some benefit from the physician standpoint too. I do think it did draw them in a little bit more and have a little bit more awareness." [Nurse]
3. Reminder to Assess Appropriateness of Catheters	"It may prompt me to ask questions. I mean, why is it in for five days? Why is it this patient has retention? Because it's out of sight, out of mind." [Attending Physician]
Limitations of the Patient Safety Display	**Quotes**
1. Clinicians Often Did Not Notice Display	"It kind of blends into the background so my eyes and my mind is so used to going straight to the monitor, that it blends into the background and if I don't remember that it's there, my eyes don't tend to go to it." [Nurse Practitioner]
2. Not as Useful for Attending Physicians	"Honestly it is not – for me, it's not useful. I think for nursing, for wound care, I think that's really useful." [Attending Physician]
3. Repetitive to the Electronic Medical Record	"I don't really spend too much time on it because other than just looking … it looks exactly like the avatar that we have in our computer system..." [Nurse]

Note: Interview participants included 4 attending physicians, 1 resident, 3 nurse practitioners, 2 physician assistants, and 3 nurses.

Fig. 3.

Meddings, University of Michigan, Veterans Affairs Ann Arbor Healthcare System

Background: Urinary catheters, vascular catheters, and wounds, such as pressure injuries are often hidden from view under gowns and sheets (ie, out of sight, out of mind), contributing to prolonged catheter use, infections, delayed interventions, and diagnostic errors for symptoms (eg, fever or delirium) related to catheters and wounds. We developed and pilot tested a digital bedside "Patient Safety Display" of catheter and wound information to improve awareness by rounding providers (ie, physicians and advanced practice providers, APPs). **Methods:** The display development was informed by clinical observations of provider rounds and nurse handoffs, interviews, and iterative prototype testing with clinicians in simulated cases using catheterized mannequins with wounds. The display reports the presence and duration of urinary and vascular catheter use, urinary catheter indication, and wound presence and severity, from real-time mandatory nurse documentation in the electronic medical record (Fig. 1). We conducted a pilot study in a tertiary-care medical-surgical step-down unit with 20 private rooms, including a preintervention period and a postintervention period including 10 rooms without the display (control rooms) and 10 rooms with the display (intervention rooms). We surveyed individual providers directly after rounds to assess their awareness of their patients' catheters and wounds compared to medical record documentation. We also assessed display utility and usability from postintervention clinician interviews and we identified major themes using an adapted grounded theory approach. **Results:** In total, 787 surveys were completed: 681 medicine service with 89% response rate, 106 surgery service with 47% response rate; 363 preintervention surveys, and 424 postintervention surveys. The surveys involved 176 unique patients and 47 unique providers. Among all 787 patient encounters, 156 (19.8%) had a transurethral indwelling urinary catheter (Foley), 314 (39.9%) had a central venous catheter (including PICCs), and 247 (31.4%) had at least 1 pressure injury. Figure 2 summarizes provider awareness of catheters and pressure injuries when present as assessed for patients in the preintervention and postintervention periods. Moreover, 13 clinician postintervention interviews yielded preliminary themes regarding the display's benefits and limitations (Fig. 3). **Conclusions:** In this pilot study of a novel Patient Safety Display, although provider awareness of Foley catheters, CVCs, and pressure injuries appeared higher for patients in the intervention rooms compared to awareness as measured in the preintervention rooms and/or postintervention control rooms, most of these comparisons did not meet statistical significance. Clinicians varied widely in their personal assessments of the display as a useful tool for improving awareness and prompting discussion about catheters and wounds.

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Poster Presentation

Piloting a Quality Improvement Intervention for Urinary Catheter Removal to Reduce Catheter-Associated Urinary Tract Infection in a Medical Intensive Care Unit

Dinh Thi Thu Huong, National Hospital of Tropical Diseases; Ha Quang Doan, National hospital of Tropical Diseases; Phu Dinh Vu, National hospital of Tropical Diseases; Nga Nguyen, PATH; Vasquez Amber, US Centers for Disease Control and Prevention; Ha Tran Thi Thu, PATH; Lan Nguyen Thi Phong, US Centers for Disease Control and Prevention; Unarose Hogan, PATH, Hanoi, Viet Nam; Lien Thi Le, National hospital of Tropical Diseases; Trang Thi Nguyen, National Hospital Tropical Diseases, Hanoi, Viet Nam; Thuong Thi Nguyen, National Hospital Tropical Diseases, Hanoi, Viet Nam

Background: Catheter-associated urinary tract infections (CAUTIs) are among the most prevalent healthcare-associated infections (HAIs) globally, contributing to increased morbidity, prolonged hospital stays, and increased healthcare costs. Interventions that support prompt removal of the urinary catheter are evidence-based actions to effectively reduce CAUTI rates.[1] **Objective:** At the National Hospital of Tropical Disease (NHTD), catheter removal interventions in the intensive care unit (ICU) were implemented using quality improvement (QI) methodology to reduce CAUTI incidence and urinary catheter device utilization. **Methods:** Training was performed for ICU clinical staff with knowledge checks before and after the program. A bedside visual reminder of CAUTI risk and checklist to assess catheter need were implemented. Weekly compliance of provided visual reminders and checklists were measured using a simple audit tool. Device utilization ratios (DURs, ratios of device days to patient days), and CAUTI incidence rates (per 1,000 device days) were collected at baseline (July–September 2018) and quarterly thereafter until June 2019. Statistical significance was determined by an independent *t* test. **Results:** In the first quarter (October–December 2018), the CAUTI incidence rate decreased from 8.9 to 1.3 per 1,000 device days ($P = .036$). The ICU staff trained in CAUTI prevention, mean knowledge scores before and after training increased from 68% to 87%. The DUR decreased slightly from 0.59 to 0.55 after the first-quarter training then steadily increased in the following quarter (0.60; January–March 2019) and after the intervention (0.54; April–June 2019). CAUTI incidence rates also increased but were still lower than at baseline: 4.8 and 6.3 per 1,000 days of device use. Compliance of reminders was 51% during the first quarter, increased slightly in the second quarter 62%, then

decreased to 40% during the last quarter. The nurses' adherence to the daily checklist remained stable (>75%). **Conclusions:** This CAUTI prevention project was the first use of quality improvement methodology to implement change at NHTD. A trend decrease in CAUTI was observed, though a greater decrease occurred at the beginning of the intervention. Limited compliance of daily reminders is likely reflected in no statistically significant decrease in DUR. Possibly, this quality improvement project raised awareness among clinicians to improve general CAUTI prevention practices in the ICU without decreasing DUR. Given limited compliance with reminder and checklists, the intervention will be revised during the next PDSA cycle to improve adherence.

[1]Meddings J, Rogers MA, Krein SL, Fakih MG, Olmsted RN, Saint S. Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infection: an integrative review. *BMJ Qual Saf* 2014;23:277–289.

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Pitfalls of a Staged Implementation of an Automated Hand Hygiene System: Lessons Learned

Lori Sisler, WVU Medicine; Kathy Nigh, WVU Medicine

Background: Hand hygiene is the first defense against healthcare-associated infections, yet studies show that adherence to hand hygiene still remains low. An academic medical center selected a beacon-based automated hand hygiene reminder system to improve hand hygiene adherence. Accountability is challenging to enforce without a reliable means to measure hand hygiene adherence. The hospital used secret shoppers to observe hand hygiene adherence. This method captures an estimated 0.5%–1.7% of opportunities and may be influenced by the Hawthorne effect. **Methods:** In November 2018, a phased trial of an electronic hand hygiene reminder system began in 4 intensive care units (ICUs). The system selected used a badge and beacon technology. The badge identifies each care provider and displays colored lights to show adherence status. Beacons are present on the patient's bed, soap, and hand sanitizer dispenser. These beacons establish a "patient zone" that captures opportunities for hand hygiene. The specialty beds in the ICUs were supposed to remain on the units. A patient transferring to a lower level of care would be placed on another bed or gurney when leaving the ICU. ICU staff were badged for the system. **Results:** The phased implementation strategy had challenges with beds, badges, and the system. Despite planning, education, and communication, the beds left the ICU area, so the beaconed beds were outside the ICU, and staff did not always wear their assigned badge. There were issues with the system router as well. Unit leadership and the infection control team worked on processes to get beds back into the units. The implementation team decided to provide badges to staff who regularly worked in the ICU to differentiate from consultation groups that came to the ICU (and were not badged). The system routers were plugged in at various places on the units and had become unplugged so information was not sent for reports. Despite these issues, over the year of implementation, the units did achieve an increase in hand hygiene adherence from 48% to 85%. Collectively, the units achieved a 53% reduction in central-line–associated blood stream infection (CLABSI), reducing infections from 13 to 7 and a 35% reduction in methicillin-resistant *Staphylococcus aureus* (MRSA), reducing infections from 8 to 3 as defined by the NHSN. **Conclusions:** When implementing a beacon-based, automated hand hygiene system, staged implementation can be challenging. To avoid these challenges, facility-wide implementation is preferable.

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Point-Prevalence Surveys of Antibiotic Use at Three Large Public Hospitals in Kenya

Sylvia Omulo, Washington State University; Margaret Oluka, University of Nairobi; Loice Ombajo, University of Nairobi; Eric Osoro, Washington State University Global Health Kenya Program; Rosaline Kinuthia, Kenyatta National Hospital, Nairobi, Kenya; Anastasia Guantai, University of Nairobi; Marion Ong'ayo, Mbagathi Hospital, Nairobi, Kenya; Linus Ndegwa, Centers for Disease Control and Prevention; Jennifer Verani, Centers for Disease Control and Prevention; Sylvia Opanga, University of Nairobi; Evelyn Wesangula, Ministry of Health, Nairobi, Kenya; Jarred Nyakiba, Ministry of Health, Nairobi, Kenya; Jones Makori, Coast Provincial General Hospital, Mombasa, Kenya; Charles Kwobah, Moi Teaching and Referral Hospital, Eldoret, Kenya; Wilson Sugut, Moi Teaching and Referral Hospital, Eldoret, Kenya; Hanako Osuka, Centers for Disease Control and Prevention; M. Kariuki Njenga, Washington State University; Douglas Call, Washington State University; Guy H. Palmer, Washington State University; Daniel VanderEnde, Centers for Disease Control and Prevention; Ulzii-Oshikh Luvsansharav, Centers for Disease Control and Prevention

Background: Antibiotics are the most prescribed medicines worldwide, accounting for 20%–30% of total drug expenditures in most settings. Antimicrobial stewardship activities can provide guidance for the most appropriate antibiotic use. **Objective:** In an effort to generate baseline data to guide antimicrobial stewardship recommendations, we conducted point-prevalence surveys at 3 hospitals in Kenya. **Methods:** Sites included referral hospitals located in Nairobi (2,000 beds), Eldoret (900 beds) and Mombasa (700 beds). [Results are presented in this order.] Hospital administrators, heads of infection prevention and control units, and laboratory department heads were interviewed about ongoing antimicrobial stewardship activities, existing infection prevention and control programs, and microbiology diagnostic capacities. Patient-level data were collected by a clinical or medical officer and a pharmacist. A subset of randomly selected, consenting hospital patients was enrolled, and data were abstracted from their medical records, treatment sheets, and nursing notes using a modified WHO point-prevalence survey form. **Results:** Overall, 1,071 consenting patients were surveyed from the 3 hospitals (n = 579, n = 263, and n = 229, respectively) of whom >60% were aged >18 years and 53% were female. Overall, 489 of 1,071 of patients (46%) received ≥1 antibiotic, of whom 254 of 489 (52%) received 1 antibiotic, 201 of 489 (41%) received 2 antibiotics, 31 of 489 (6%) received 3 antibiotics, and 3 of 489 (1%) received 4 antibiotics. Antibiotic use was higher among those aged <5 years: 150 of 244 (62%) compared with older individuals (337 of 822, 41%). Amoxicillin/clavulanate was the most commonly used antibiotic (66 of 387, 17%) at the largest hospital (in Nairobi) whereas ceftriaxone was the most common at the other 2 facilities: 57 of