Table Iterative Performance of Antimicrobial Prophylaxis Identification Algorithm in Development Stage with Gold Standard CART-EP Program Data (Manual Review; n=2,102 procedures in 38 facilities) *

Data Elements in Algorithm	CART-EP-reviewed cardiac device procedures (n=2,102)	PPV (True flagged 'yes abx'/All flagged 'yes abx')	NPV (True flagged 'no abx'/All flagged 'no abx')	Sensitivity (All flagged 'yes abx'/Total 'yes abx' n=2,056)	Specificity (All flagged 'no abx'/Total 'no abx', n=46)
Manual review	2,056 (97.8%)	--	--	--	--
Text note searches	1,954 (93.0%)	1,930/1,954 (98.8%)	22/148 (14.9%)	1,930 (93.9%)	22 (47.8%)
Orders	1,899 (90.3%)	1,883/1,889 (99.2%)	30/203 (14.8%)	1,883 (91.6%)	30 (65.3%)
Administration	150 (7.14%)	150/150 (100%)	46/1952 (2.36%)	150 (7.30%)	46 (100%)
Text note searches + Orders	2,048 (97.4%)	2,019/2,048 (98.6%)	17/54 (31.5%)	2,019 (98.2%)	17 (37.0%)
Text note searches + Administration	1,955 (93.0%)	1,931/1,955 (98.8%)	22/147 (15.0%)	1,931 (93.9%)	22 (47.8%)
Orders + Administration	1,901 (90.4%)	1,885/1,901 (91.7%)	30/201 (14.9%)	1,885 (91.7%)	30 (65.2%)
Text note searches + Orders + Administration	2,048 (97.4%)	2,019/2,048 (98.6%)	17/54 (31.5%)	2,019 (98.2%)	17 (37.0%)
Round 2 Changes:					
Text note searches - Exclude oral medications	1,950 (92.8%)	1,928/1,950 (98.9%)	24/152 (15.8%)	1,928 (93.8%)	24 (52.2%)
Limit list to common prophylaxis medications	2,044 (97.2%)	2,017/2,044 (98.7%)	19/58 (32.8%)	2,017 (98.1%)	19 (41.3%)
Exclude notes from the day of the procedure	823 (39.1%)	823/825 (99.8%)	44/1,277 (2.09%)	823 (40.0%)	44 (95.7%)
Include term "prophylaxis" in text searches	2,048 (97.4%)	2,019/2,048 (98.6%)	17/54 (31.5%)	2,019 (98.2%)	17 (37.0%)

* CART-EP Program data included 2,102 cardiac device procedures with manually collected data on antimicrobial prophylaxis; of these, 2,056 cases (97.8%) received antimicrobials prior to incision. Shaded cell indicates the final algorithm.

Abx=antimicrobial; PPV=positive predictive value; NPV=negative predictive value

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Background: Antimicrobial prophylaxis is an evidence-proven strategy for reducing procedure-related infections; however, measuring this key quality metric typically requires manual review, due to the way antimicrobial prophylaxis is documented in the electronic medical record (EMR). Our objective was to combine structured and unstructured data from the Veterans' Health Administration (VA) EMR to create an electronic tool for measuring preincisional antimicrobial prophylaxis. We assessed this methodology in cardiac device implantation procedures. **Methods:** With clinician input and review of clinical guidelines, we developed a list of antimicrobial names recommended for the prevention of cardiac device infection. Next, we iteratively combined positive flags for an antimicrobial order or drug fill from structured data fields in the EMR and hits on text string searches of antimicrobial names documented in electronic clinical notes to optimize an algorithm to flag preincisional antimicrobial use with high sensitivity and specificity. We trained the algorithm using existing fiscal year (FY) 2008-15 data from the VA Clinical Assessment Reporting and Tracking-Electrophysiology (CART-EP), which contains manually determined information about antimicrobial prophylaxis. We then validated the performance of the final version of the algorithm using a national cohort of VA patients who underwent cardiac device procedures in FY 2016 or 2017. Discordant cases underwent expert manual review to identify reasons for algorithm misclassification and to identify potential future implementation barriers. **Results:** The CART-EP dataset included 2,102 procedures at 38 VA facilities with manually identified antimicrobial prophylaxis in 2,056 cases (97.8%). The final algorithm combining structured EMR fields and text-note search results flagged 2,048 of the CART-EP cases (97.4%). Algorithm validation identified antimicrobial prophylaxis in 16,334 of 19,212 cardiac device procedures (87.9%). Misclassifications occurred due to EMR documentation issues. **Conclusions:** We developed a methodology with high accuracy to measure guideline-concordant use of antimicrobial prophylaxis before cardiac device procedures using data fields present in modern EMRs that does not rely on manual review. In addition to broad applicability in the VA and other healthcare systems with EMRs, this method could be adapted for other procedural areas in which antimicrobial prophylaxis is recommended but comprehensive measurement has been limited to resource-intense manual review.

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Patients Discharged From Hospitals Without a *Clostridioides difficile* Infection Increase the Risk of CDI in Family Members

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Background: *Clostridioides difficile* infections (CDIs) present and are transmitted in both community and healthcare settings. Patients who become colonized or infected during hospitalization may be discharged into the community. Asymptomatic spread and/or community-based transmission have also been posited as alternative sources for healthcare-onset CDI cases. The objective of our study was to determine whether individuals are at greater risk for developing a CDI if they have a family member that spent time hospitalized in the prior 90 days, even if the hospitalized family member had no prior diagnosis of CDI. **Methods:** We

Table 1 – Incidence Rate Ratios (95% CI) from stratified regression model associated with the amount of time other family members spent hospitalized in prior 90-days

Total time other family members spent in hospital (prior 90 days)	All CDI Cases (N CDI = 224,818)	No prior CDI in family (N CDI – 223,744)	No prior CDI in family and no prior hospitalization (N CDI = 164,650)
≤5 days	(reference)	(reference)	(reference)
5-10 days	1.28 (1.12-1.46)	1.32 (1.12-1.55)	1.58 (1.28-1.96)
11-20 days	1.49 (1.22-1.82)	1.60 (1.25-2.04)	1.99 (1.44-2.76)
21-30 days	1.68 (1.19-2.37)	1.91 (1.25-2.92)	2.45 (1.38-4.36)
31-40 days	1.92 (1.19-3.11)	2.19 (1.20-3.99)	3.22 (1.45-7.14)
41-50 days	2.00 (1.03-3.87)	2.27 (1.00-5.19)	3.79 (1.32-10.89)
>50 days	4.05 (2.65-6.19)	4.30 (2.51-7.38)	6.14 (2.98-12.64)

conducted a retrospective cohort study using the Truven Marketscan database from 2001 through 2017; both commercial claims and Medicare supplemental data were included. We categorized enrollees by age, sex, month, year, exposure to a family member with CDI, hospitalization, or high- or low-risk antibiotic use in the prior 90 days. We then subdivided these groups based on the total amount of time that other family members spent hospitalized in the prior 90 days: ≤4 days, 5–10, 11–20, 21–30, 41–50 or >50 days. Within each subgroup, we computed the incidence of CDI. We then used a stratified regression model (log-linear quasi-Poisson) to estimate the incidence of CDI in each enrollment bin. Finally, we repeated our analysis using all CDI cases, CDI cases with no prior CDI in the family, and cases without prior hospitalization. **Results:** Over the 17-year study period, >5.1 billion enrollment months were represented in our dataset. We identified 224,818 cases of CDI, 223,744 cases without prior CDI in a family member and 164,650 CDI cases where the case patient had no prior hospitalization. Table 1 depicts the estimated risk (incident rate ratios) associated with the amount of time that other family members spent hospitalized in the prior 90 days. There is a very clear dose–response curve, and the relative risk for CDI increase as the amount of time other family members spent hospitalized increased. Other risk factors included prior hospitalization, low- and high-risk antibiotics, age, female sex and exposure to a family member with CDI. **Conclusions:** Having a family member who has been hospitalized in the prior 90 days significantly increases the risk for CDI, even if the family member did not have CDI. The total amount of time other family members spent in the hospital is positively associated with the level of risk.

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Repeated Prevalence Surveys and Admission Screening for *Candida auris* at One Long-Term Acute-Care Hospital, Chicago, 2016–2019

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Background: Since the initial identification of *Candida auris* in 2016 in Chicago, ongoing spread has been documented in the Chicago area, primarily among older adults with complex medical issues admitted to high-acuity long-term care facilities, including long-term acute-care hospitals (LTACHs). As of October 2019, 790 cases have been reported in Illinois. Knowing *C. auris* colonization status on admission is important for prompt implementation of infection control precautions. We describe periodic facility point-prevalence surveys (PPSs) and admission screening at LTACH A. Methods: Beginning September 2016, we conducted repeated PPSs for *C. auris* colonization at LTACH A. After a baseline PPS, we initiated admission screening in May 2019 for patients without prior evidence of *C. auris* colonization or infection. *C. auris* screening specimens consisted of composite bilateral axillary/inguinal swabs tested at public health laboratories. We compared a limited set of patient characteristics based on admission screening results. Results: From September 2016 through October 2019, 277 unique patients were screened at LTACH A during 10 PPSs. Overall, 36 patients (13%) were identified to be colonized. The median facility *C. auris* prevalence increased from 2.8% in 2016 to 37% in 2019 (Fig. 1). During May–September 2019, among 174 unique patients admitted, 151 (87%) were screened for *C. auris* colonization on admission, of whom 18 (12%) were found to be colonized. Overall, 14 patients were known to have *C. auris* colonization on admission and were not rescreened, and 9 patients were discharged before screening specimens could be collected. A significantly higher proportion of patients testing positive for *C. auris* on admission had a central venous catheter or a peripherally inserted central catheter or were already on contact precautions (Table 1). The PPS conducted on October 1, 2019, revealed 5 new *C. auris* colonized patients who had screened negative on admission. **Conclusions:** Repeated PPSs at LTACH A indicated control of *C. auris* transmission in 2016–2017, followed by increasing prevalence beginning in May 2018, likely from patients admitted with unrecognized *C. auris* colonization and subsequent facility spread. Admission screening allowed for early detection of *C. auris* colonization. However, identification during subsequent PPS of additional colonized patients indicates that facility transmission is ongoing. Both admission screening and periodic PPSs are needed for timely detection of colonized patients. Given the high *C. auris* prevalence in LTACHs and challenges in identifying readily apparent differences between *C. auris* positive and negative patients on admission, we recommend that all patients being admitted to an LTACH in endemic areas should be screened for *C. auris*.

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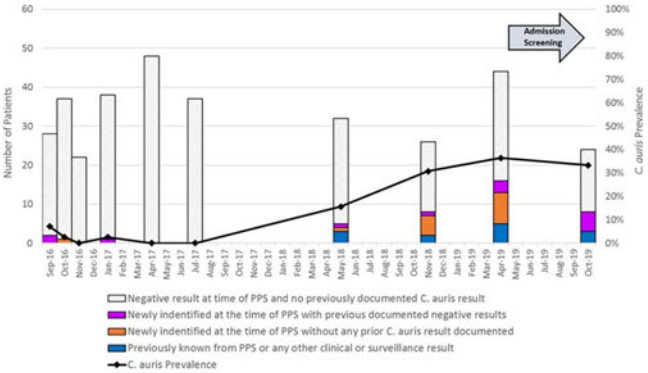

Figure. Patient *C. auris* colonization status identified during point prevalence surveys, LTACH A, September 2016-October 2019.

Fig. 1.