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Poster Presentation

Extending the Use of Healthcare-Associated Infections and Antibiotic Use and Resistance Surveillance Data

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Background: The CDC National Healthcare Safety Network (NHSN) is the nation's most widely used healthcare-associated infection (HAI) and antibiotic use and resistance (AUR) surveillance system. More than 22,000 healthcare facilities report data to the NHSN. The NHSN data are used by facilities, the CDC, health departments, the CMS, among other organizations and agencies. In 2017, the CDC updated the NHSN Agreement to Participate and Consent ("Agreement"), completed by facilities, broadening health department access to NHSN data and extending eligibility for data use agreements (DUAs) to local and territorial health departments. DUAs enable access to NHSN data reported by facilities in the health department's jurisdiction and have been available to state health departments since 2011. The updated agreement also enables the CDC to provide NHSN data to health departments for targeted prevention projects outbreak investigations and responses. **Methods:** We reviewed the current NHSN DUA inventory to assess the extent to which health departments use the NHSN's new data access provisions and used semistructured interviews with health department staff, conducted via emails, phone, and in person conversations, to identify and describe their NHSN data uses. **Results:** As of late 2019, the NHSN has DUAs with health departments in 17 states, 7 local health departments (including municipalities and counties), and 1 US territory. The NHSN also has received requests from 2 state health departments for data supporting HAI prevention projects. Health departments with DUAs described improved relationships with facilities in their jurisdictions because of new opportunities to offer NHSN data analysis assistance to facilities. One local health department analyzed their NHSN carbapenem-resistant Enterobacteriaceae (CRE) data to identify (1) facilities in its jurisdiction with comparatively high CRE infection burden and (2) geographic areas to target for a CRE isolate submission program. Outreach to facilities with high CRE burden led to enrollment of 15 clinical laboratories into a voluntary isolate submission program to analyze CRE isolates for additional characterization. Examples of health departments' use of data for action include: notifying facilities with high standardized infection ratios (SIRs) and sharing Targeted Assessment for Prevention (TAP) reports. **Conclusions:** The NHSN's role as a shared surveillance resource has expanded in multiple public health jurisdictions as a result of new data access provisions. Health departments are using NHSN data in their programmatic responses to HAI and AR challenges. New access to NHSN data is enabling public health jurisdictions to assess problems and opportunities, provide guidance for prevention projects, and support program evaluations.

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Factors Associated With Inappropriate Antibiotic Use in Hospitalized Patients

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Background: Inappropriate antibiotic prescription leads to increased *Clostridiodes difficile* infections, adverse effects including organ toxicity, and generation of antibiotic-resistant bacteria. Despite efforts to improve antibiotic use in acute-care settings, unnecessary and inappropriate prescription still occur in 30%–50% of patients. **Objectives:** We assessed factors associated with inappropriate antibiotic prescription at 2 time points: (1) initial, empiric therapy and (2) 3–5 days after therapy initiation. **Methods:** As part of a multicenter study investigating strategies to reduce antibiotic therapy after 3–5 days of use, antibiotic prescription data were collected from 11 adult and pediatric intensive care and general medical units at 6 hospitals in Maryland in 2014 and 2015. We performed a retrospective cohort study of all hospitalized patients who received any of 23 common antibiotics for at least 3 days. Each medical record was reviewed for demographics, admission and discharge dates, patient comorbidities, and antibiotic regimen by at least 1 infectious disease physician or pharmacist. Classification of antibiotic inappropriateness was based on each institution's guidelines and standards. Bivariate analyses were performed using logistic regression for both initial therapy and therapy at days 3–5. Multivariable logistic regression was performed using covariates meeting the significance level of $P < .05$. Results: In total, 3,436 antibiotic courses were assessed at time of initial therapy, and 1541 regimens were continued and reviewed again at days 3–5 of therapy. For the initial therapy, 1,255 regimens (37%) were inappropriate; 45% of these were considered unnecessary and 41% were too broad in spectrum. In the multivariable regression, older age and antibiotic prescription during the summer were associated with the receipt of inappropriate antibiotics (Table 1). Having end-stage renal disease as a comorbid condition was protective against inappropriate use. At days 3–5 of therapy, 688 (45%) of the antibiotic courses were inappropriate. Reasons regimens were considered inappropriate included unnecessary antibiotic prescriptions (49%) and antibiotics being too broad (38%). Older age and receiving cefepime or piperacillin-tazobactam on day 3 of therapy were factors associated with inappropriate use (Table 2). Having undergone a transplant or a surgical procedure was protective of inappropriate antimicrobial use at days 3–5 of therapy. **Conclusions:** Older patients are more likely to receive inappropriate antibiotics at both initial regimen and 3–5 days later. Patients receiving cefepime or piperacillin-tazobactam are at greater risk of receiving inappropriate antibiotics at days 3–5 due to failure to de-escalate. Antibiotic stewardship strategies targeting these patient populations may limit inappropriate use.

Table 1. Multivariable logistic regression analysis for factors associated with inappropriate initial antibiotic regimen.

Characteristic	Odds Ratio	Confidence Interval	p value
Age (per decade)	1.1911	(1.1592, 1.2238)	<.0001
Summer	1.3487	(1.1737, 1.5497)	<.0001
End Stage Renal Disease	0.6868	(0.4733, 0.9966)	0.0479

Table 2. Multivariable logistic regression for factors associated with inappropriate antibiotic prescription 3-5 days after therapy initiation.

Characteristic	Odds Ratio	Confidence Interval	p value
Age (per decade)	1.1803	(1.1327, 1.2299)	<.0001
Transplant	0.2094	(0.0586, 0.7484)	0.0161
Surgical Procedure	0.5878	(0.4201, 0.8225)	0.0019
Cefepime	1.8347	(1.3056, 2.5783)	0.0005
Piperacillin-Tazobactam	1.383	(1.1152, 1.7152)	0.0032

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Feasibility of Developing Traditional Facility-Specific Nursing Home Antibiograms

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Background: An antibiogram is a tool for tracking and reporting antimicrobial resistance; the CDC has endorsed as part of a comprehensive antimicrobial stewardship program in nursing homes. We have previously shown that antibiogram utilization has increased in nursing homes, but most facilities employ tools that are not based on facility-specific data. In this study, we investigate the feasibility to develop antibiograms using facility-specific data and compare these results with antibiograms developed using data from multiple facilities that share the same lab and geographic region. **Methods:** Raw, de-identified culture results from January 1 through December 31st, 2018 were collected from participating nursing homes and their consulting microbiology laboratories under an IRB-exempt protocol. Culture results were entered and stored in REDCap. Number of isolates per species was examined based on nursing home, nursing home laboratory network, and region. Percentage sensitivities of the most frequently isolated species to commonly used antibiotics were calculated at the nursing home and regional level and compared. *T* tests of the absolute difference between nursing home- and regional level percentage sensitivities were performed. All data analyses were performed in R software. **Results:** The mean annual cultures per nursing home was 23.5 (SE, ±3.29). Grouping cultures by lab and region increased the mean culture count 6-fold and 12-fold, respectively. The most commonly isolated species were *Escherichia coli* (29.7%), *Enterococcus* spp (11.6%), *Proteus* spp (10%), *Klebsiella* spp (8.5%). None of the nursing homes had >30 isolates of a single species (Fig. 1). *Escherichia coli* was the only species that exceeded the 30-isolate threshold when aggregated at the laboratory network level (Fig. 2). Grouping nursing home cultures by region provided the greatest average isolate count across the most common species. The greatest differences in percentage sensitivity between nursing homes and their region were noted for *Escherichia coli* and *Proteus* spp to fluoroquinolones (>20% difference; $P < .01$). The difference in sensitivity was <5% for *Escherichia coli* to nitrofurantoin. **Conclusions:** Nursing homes do not generate enough annual isolates to create antibiograms compliant with Clinical Laboratory Standard Institute guidelines. Grouping isolates from multiple nursing homes at the regional level does reliably exceed the 30-isolate threshold for multiple bacterial species but leads to susceptibility estimates that may vary substantially from those observed at the facility level. Alternative tools for tracking antibiotic resistance and guiding antibiotic prescribing decisions at the local level are needed.

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Financial and Labor Benefits of the Individual TB Risk Assessment Model for Annual TB Screening

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Background: Since 1991, US tuberculosis (TB) rates have declined, including among health care personnel (HCP). Non–US born persons accounted for approximately two-thirds of cases. Serial TB testing has limitations in populations at low risk; it is expensive and labor intensive. **Method:** We moved a large hospital system from facility-level risk stratification to an individual risk model to guide TB screening based on "Tuberculosis Screening, Testing, and Treatment of US Health Care Personnel: Recommendations from the National Tuberculosis Controllers Association and CDC, 2019." This process included individual TB risk assessment, symptom evaluation, TB testing for *M. tuberculosis* infection (by either IGRA or TST) for HCP without documented evidence of prior LTBI or TB disease, with an additional workup for TB disease for HCP with positive test results or symptoms compatible with TB disease. In addition, employees with specific job codes deemed high risk were required to undergo TB screening. **Result:** In 2018, this hospital system of ~10,000 employees screened 7,556 HCP for TB at a cost of $348,625. In 2019, the cost of the T Spot test increased from $45 to $100 and the cost of screening 5,754 HCP through October 31, 2019, was $543,057. In 2020, it is anticipated that 755 HCP will be screened, saving the hospital an estimated minimum of $467,557. The labor burden associated with employee health personnel will fall from ~629.66 hours to 62.91 hours. The labor burden associated with pulling HCPs from the bedside to be screened will be reduced from 629.66 hours to 62.91 hours as well. **Conclusion:** Adoption of the individual risk assessment model for TB screening based on "Tuberculosis Screening, Testing, and Treatment of US Health Care Personnel: Recommendations from the National Tuberculosis Controllers Association and CDC, 2019" will greatly reduce financial and labor burdens in healthcare settings when implemented.

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