Antimicrobial Stewardship News

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Opportunities Abound for Optimizing Antimicrobial Use in US Hospitals

A recent report from the CDC suggests that there is significant room for improving appropriateness of inpatient antimicrobial use for common conditions and frequently prescribed antibiotics.[1]

Trained personnel from the Emerging Infection Program gathered data from inpatient admissions in 192 hospitals in ten states on a specific date between May 1 and September 30, 2015. Data were collected from inpatient admissions for four common scenarios and assessed for quality of antimicrobial prescribing:

1) Community acquired pneumonia ((CAP), excluding health-care or hospital onset-infections) in patients $\geq$ 18 years of age meeting radiologic and clinical criteria as well as receipt of at least 3 days of antibiotics for pneumonia, with no other infection
2) Urinary tract infection (UTI) present on admission in non-pregnant, non-neutropenic, non-transplant patients $\geq$ 1 year of age, with receipt of at least one day of antibiotics, with no other infection
3) Receipt of $\geq$ 1 day of fluroquinolone (FQ) therapy for one infection and $\geq$ 18 years of age
4) Receipt of $\geq$ 3 days of intravenous vancomycin for one infection and $\geq$ 1 year of age

Quality of antimicrobial prescribing in each admission was evaluated using standardized criteria developed by CDC with input from an antimicrobial stewardship expert panel convened by the Pew Charitable Trusts (including DASON's Libby Dodds Ashley, PharmD, MHS).

Antimicrobial prescribing for each event was determined to be "supported" or "unsupported" by evidence in the patient's medical record including (a) clinical indication for antibiotic therapy based on the patient's infection diagnosis (b) selection of an antimicrobial agent that was consistent with guideline recommendations or culture data, when available and (c) duration of antibiotic therapy consistent with guidelines.

In total, there were 12,299 patients identified in these hospitals during the study time frame, of whom 49.5% received antibiotics on the study date or previous day. 2,680 patients had one of the four targeted scenarios and of those, 1,566 met strict study criteria for additional analysis of antimicrobial prescribing quality. The most common scenarios were fluoroquinolone use (492) and UTI (452) followed by vancomycin (345) and CAP (219). 58 (3.7%) patients were included in both the vancomycin and FQ quality assessments because they met criteria for both, but by definition no patients could be in both the CAP and UTI assessments.

Patients in the quality analysis had a median age of 67 years (interquartile range 53-79 years), with a majority of admissions from a private residence to non-critical care wards. 55% were female. More than 80% of patients were admitted to hospitals with less than 400 beds, so community hospitals were well-represented in this study.

Overall, 55.9% (95% CI 53.5%-58.4%) of antibiotic courses for these scenarios were found to be not supported by evidence in the medical record. Figure 1 shows the breakdown of unsupported antibiotic courses for each scenario.

Figure 1. Antibiotic Courses "Not Supported" By Medical Record Evidence
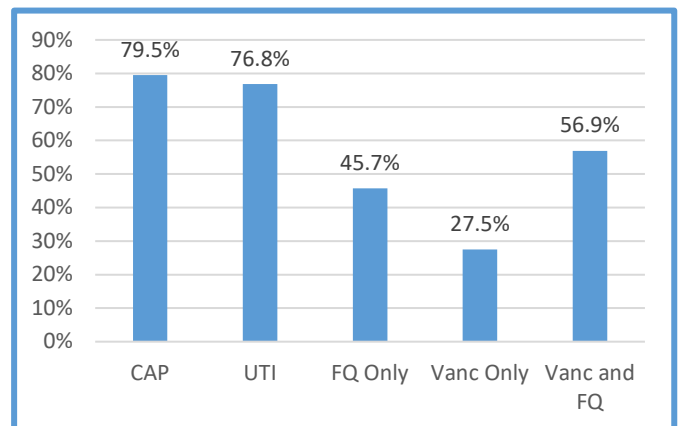
Unsupported antibiotic courses were highest for CAP (79.5%), followed by UTIs (76.8%), vancomycin and FQ (56.9%), FQ (46.5%), and IV vancomycin (27.3%).

The investigators captured data from both the inpatient admission as well as duration of antimicrobial prescribing on hospital discharge. Antibiotics were prescribed on discharge for approximately 60% of patients with CAP, 57% of patients with UTIs, 47% of FQ recipients, and 12% of vancomycin recipients (**Table 1**). Median durations of antibiotic treatment and hospital length of stay for patients in the quality assessments are also shown in **Table 1**.

Table 1. Characteristics By Study Scenario

CAP N=219	UTI N=452	FQ N=550	Vanc N=403
Antibiotic(s) prescribed at hospital discharge			
60.3%	56.9%	46.9%	11.7%
Duration of antimicrobial treatment, median (IQR), days			
10 (8-13)	8 (5-11)	7 (4-11)	7 (5-11)
Hospital length of stay, median (IQR), days			
6 (4-11)	4 (3-7)	6 (3-9)	9 (5-15)

For CAP encounters, the most common reason for unsupported (potentially inappropriate) antimicrobial prescribing was treatment duration $\geq$ 8 days (103 of 219 (47%) CAP patients). 31.1% (68/219) patients with CAP did not receive antibiotics that were guideline-concordant on day 3 of inpatient treatment.

For patients with UTIs, 38.5% (174/452) of admissions involved antimicrobial prescribing when there were no signs or symptoms of UTI documented within the first two days of hospitalization and no pathogen identified in urine or blood cultures. Treatment continued longer than the guideline-recommended duration in an additional 37.3% of patients (169/452) with UTIs.

When FQ prescriptions were evaluated in 550 patients, 230 (41.8%) were found to have excessive durations of therapy. This was most commonly due to use of FQ for 8 or more days to treat lower respiratory tract, abdominal or gastrointestinal infections without sepsis, which occurred in 29.2% of FQ recipients overall (161/550).

Unsupported intravenous vancomycin prescriptions were most frequently attributed to continued therapy without appropriate evidence of a susceptible pathogen from culture or pathogens susceptible to other antibiotics without evidence of a severe/unspecific penicillin allergy. This occurred in 56 of 403 (14%) patients receiving vancomycin overall.

What does this study tell us?

This was a carefully conducted and thorough analysis of common clinical scenarios encountered in our community hospitals, specifically focusing on antimicrobial prescriptions related to CAP, UTIs, FQs and intravenous vancomycin. Although it focused on hospital admissions from 2015, we see similar challenges with prolonged durations of antimicrobial therapy in many of our DASON hospitals.

This study focused their efforts to evaluate prescribing in a very specific group of patients who would meet definitive criteria for antibiotic therapy, and still found that ~56% of antibiotic use was unsupported by evidence apparent in the medical record. There were *many* more patients in these hospitals who received antibiotics that did not even meet criteria for evaluation in this study- such as those receiving prophylaxis, empirical therapy, or those without radiographic evidence of pneumonia who still receive antibiotics on admission. Thus, the findings in this study are potentially only the tip of the iceberg for the population eligible for optimization of antimicrobial use.

Current guidelines[2] suggest 5 days of antibiotics may be appropriate for many patients with CAP (and even as few as 3 days in some cases[3]), and up to 7 days for CAP caused by *S. aureus* or *P. aeruginosa*. Yet in this study, almost 73% of CAP patients had treatment for 8 or more days. Likewise, durations of antimicrobial therapy for UTIs, FQ and vancomycin were unnecessarily long in many cases.

Although there are some limitations to this study based on the methods used (for example, lack of consideration for clinical judgement, limited to 10 states and data from a specific time frame of 2015 which was prior to implementation of The Joint Commission Antimicrobial Stewardship standards for acute care hospitals in 2017), these data indicate continued efforts are needed to

optimize and streamline antimicrobial use in US hospitals.

Key Points:

- This study found that in certain patients initiated on antibiotics at hospital admission for CAP and UTI, more than 75% lacked evidence to support antimicrobial therapy selection or duration.
- Many patients received antibiotics for UTIs when there was lack of evidence for signs/symptoms of infection and/or no pathogen identified on cultures.
- FQ and vancomycin (IV) were often continued for longer than necessary durations, without apparent supporting evidence.
- These cross-sectional data from 2015 suggest there is much room for improvement in antimicrobial prescribing for commonly encountered scenarios in US Hospitals.
- Antimicrobial therapy is known to be associated with certain harms such as adverse effects, *C. difficile* infection, and antimicrobial resistance. Therefore, continued efforts to optimize antibiotics are warranted.

References:

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