on data from the American Medical Association. Counties were classified as urban or rural per the 2013 National Center for Health Statistics classification. National and state-level prescription volume, rates per 1000 population, and average number of prescriptions per provider were calculated for physicians, NPs, and PAs. We assessed the degree to which provider-specific rates explained the variance of the overall rate by state, using the coefficient of determination (r2) from Pearson's correlation. **Results:** Between 2011 and 2022, overall U.S. antibiotic prescribing declined from 877 to 709 per 1000 population, a 19.2% relative reduction. The provider-specific proportion of the overall prescribing rate relatively decreased by 32% for physicians but increased by 157% for APPs (NPs 229%, PAs 86%; Figure 1). State-level antibiotic prescribing rates varied by provider type for both years, shifting towards proportionally greater APP prescribing in 2022 (Figure 2). For 2011 and 2022, physician prescribing rate strongly correlated with the overall state rate (r2 = 0.83 in 2011 versus 0.80 in 2022), whereas the correlation of the NP prescribing rate increased (r2 = 0.20 in 2011 versus 0.76 in 2022). A total of 60,327 (7.2%) physicians practiced in rural settings in contrast to 42,876 (12%) NPs and 14,495 (9.4%) PAs in 2022. Providers in rural counties prescribed more antibiotics per provider on average compared to urban counties; rural physicians prescribed 57% more antibiotics per provider (207 vs 132 antibiotics per provider), rural NPs prescribed 115% more (284 vs 132), and rural PAs prescribed 53% more (289 vs 189). **Conclusions:** The relative contribution of APPs to outpatient antibiotic prescriptions more than doubled over the past decade, accounting for 1 in 3 prescriptions in 2022. This contribution was especially prominent among NPs in rural counties. Further evaluation of antibiotic prescribing appropriateness among APPs and integration of APPs into antibiotic stewardship efforts in various settings.

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A novel risk-adjusted metric to compare hospitals on their antibiotic-prescribing at hospital discharge

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Background: Approximately 40% of all antibiotics related to an acute-care hospital stay are prescribed at the time of hospital discharge. However, there is no metric to compare hospitals on their antibiotic-prescribing at this transition of care. In this study, we sought to build a risk-adjusted metric for comparing hospitals on their overall post-discharge antibiotic use. **Methods:** This was a retrospective study across all acute-care admissions within the Veterans Health Administration during 2018-2021. For patients discharged to home or self-care, data on antibiotics administered while inpatient and those prescribed at discharge were collected. To predict post-discharge antibiotic use (days of therapy, DOT), we built a zero-inflated negative binomial model with a random intercept for each VA medical center. Data were split into training and testing sets to measure model performance and absolute error. Covariates included patient demographics, medical specialty at discharge, comorbidities, discharge diagnoses of infection, and the length of inpatient antibiotic therapy. Outliers, defined as DOT ≥ 30, were excluded, and the predicted random intercept was used to determine hospital performance. To compare hospitals with a positive versus negative random intercept in our model (i.e. higher vs. lower than expected overall post-discharge use, respectively), we calculated mean total antibiotic duration (inpatient + post-discharge) for two uncomplicated infection types: community-acquired pneumonia (CAP) and skin and soft tissue infections (SSTI). **Results:** 1,804,400 patients were discharged to home or self-care across 130 hospitals. The mean age was 67.8 (SD 12.9), and 93.7% were male. Antibiotics were prescribed to 41.5% while hospitalized and 19.5% at discharge. The median number of post-discharge DOT among those prescribed post-discharge antibiotics was 7 (IQR 4-12). The predictive model detected post-discharge antibiotic use with fidelity, including accurate identification of any post-discharge antibiotic exposure (area under the precision-recall curve=0.97) and reliable prediction of the number of post-discharge DOT in those who were exposed (mean absolute error = 1.65; Figure 1). At negative versus positive random intercept hospitals (Figure 2), antibiotic duration for CAP and SSTIs was 7.3 versus 8.1 days ($p < 0$ .001) and 9.4 vs. 10.2 days ($p < 0$ .001), respectively. **Conclusion:** A model using electronically available data was able to accurately predict antibiotic use prescribed at hospital discharge. Hospitals with lower than expected overall post-discharge antibiotic use also prescribed shorter courses of antibiotic therapy for uncomplicated cases of CAP and SSTI, which may reflect more robust processes at these sites to reduce antibiotic overuse at discharge.

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Figure 1. Concordance between observed and predicted post-discharge days of therapy

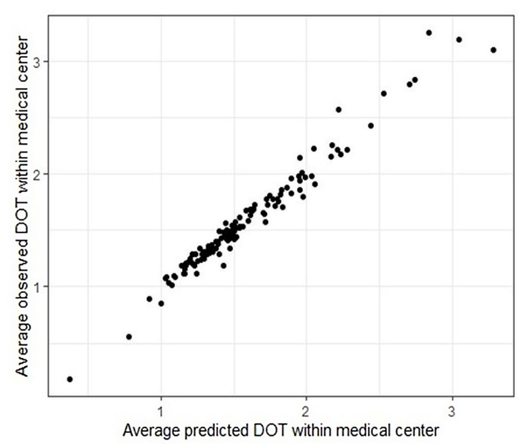

Figure 2. Caterpillar plot of the random intercept for 130 hospitals in a zero-inflated negative binomial model predicting post-discharge antibiotic use