significance (5.3 days vs. 4.1 days; $P = 0.080$) and respiratory-related 30-day readmission rates did not differ (9.4% vs. 10.7%; $P = 0.801$). In addition, treatment failure defined as ICU admission (3.1% vs. 0%; $P = 0.210$), requirement for invasive mechanical ventilation (3.1% vs. 0%; $P = 0.210$), and death (1.6% vs. 0%; $P = 0.460$) did not differ significantly between groups.

Conclusion. Implementation of a PCT-guided protocol for the treatment of COPD exacerbations was associated with a significant reduction in antimicrobial days of therapy. We noted a trend in decreasing LOS and no difference respiratory-related 30-day readmissions, or treatment failure. Our PCT-guided protocol has been demonstrated to safely reduce antibiotic utilization in patients with COPD exacerbations.

1480. Impact of a Guidance Document, Order Set Changes and Physician Education on Antibiotic Prescribing in Acute Exacerbation of COPD

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Background. Current guidelines provide vague recommendations regarding antibiotic choice, duration and patients most likely to benefit from antibiotics during an acute exacerbation of chronic obstructive pulmonary disease (AECOPD). We sought to improve antibiotic prescribing through multidisciplinary creation of a clinical guidance document, order set with imbedded clinical decision support (CDS), and provider education on the management of AECOPD.

Methods. A quasi-experimental study was conducted in adult patients (age >18 years) admitted to Nebraska Medicine for suspected AECOPD before and after clinical decision support was introduced. Patients in the pre-implementation period (10 weeks, April 2015–June 30, 2016, $N = 44$) and a similar post-implementation period (10 weeks, April 2012–June 29, 2017, $N = 51$) were included if COPD was the primary diagnosis code or the COPD exacerbation order set was used at admission. Exclusion criteria included AECOPD admission within the previous 30 days and transfer from an outside hospital. Outcome measures included: percentage of patients receiving antibiotics, median length of therapy, order set usage, antibiotic choices, length of stay (LOS) and oral steroid use.

Results. Post-implementation, the percentage of patients prescribed antibiotics decreased (86.4% vs. 60.8%, $P = 0.006$) as did antibiotics ordered from the order set (29.5% vs. 13.7%). Median length of therapy decreased from 5 days to 1 day pre- vs. post-implementation, respectively. Fluoroquinolone use decreased from 43.2 to 25.5% while azithromycin use remained consistent (18.2% vs. 17.6%). Oral steroid use increased post-implementation (27.3% vs. 41.2%) and average duration of steroid use decreased (11.1 vs. 8.7 days). Average LOS was 3.7 days in both groups and in-hospital mortality was low (2% vs. 0%).

Conclusion. Implementation of an AECOPD guidance document, order set with CDS, and education resulted in significant decreases in antibiotic usage, particularly for fluoroquinolones. Other areas of care also improved using a syndromic stewardship strategy. Our data supports the utilization of this strategy to promote evidence-based antibiotic management in AECOPD.

1481. Clinical Outcomes of *Escherichia coli* Infections in Cystic Fibrosis (CF) Patients

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Background. Despite a growing interest in *emerging* pathogens in CF, research has largely overlooked commonplace organisms. *Escherichia coli* has been reported in up to 50% of CF respiratory samples, yet little is known about its clinical impact. We sought to investigate outcomes of *E. coli* infection in CF.

Methods. We undertook a retrospective cohort study of patients (≥18 years) attending a Canadian CF clinic between 1978 and 2016 with at least one *E. coli* positive sputum culture. Infection was classified as transient (≥1 isolate) or persistent (≥3 isolates over a period ≥6 months). Clinical and demographic data were collected from patient charts 2 years pre- and post-incident infection. For each patient with persistent infection, we collected data on two age (±3 years), sex, and time-matched control patients for comparison. Outcomes sought included risk of pulmonary exacerbation (PEx), lung function decline (FEV$_1$), antibiotic days, and progression to transplant or death. Susceptibility testing was performed as per CLSI standards.

Results. A total of 45 (12.3%) patients (median age 23.5 (IQR 20.0–34.8), 52% male) cultured *E. coli* in their sputum at least once. At incident infection, 24% had PEx but this was not increased relative to prior visits (RR 0.9, $P = 1.00$). Of the cohort, 18 (40%) developed persistent infection. Persistent infection developed in patients with

lower nutritional scores (BMI) (-2.6 kg/m^2, $P < 0.001$) and lung function (FEV$_1$%; 57.2 vs. 74.2, $P = 0.02$). Compared with matched controls, those with persistent infection had no increase in mean annual lung function decline (difference -1.06%/year, $P = 0.24$), odds of PEx (OR 1.4, $P = 0.26$), or mean annual hospital IV days (difference: 0.31 days, 95% CI -4.97 to 5.59 days, $P = 0.91$). Five patients underwent lung transplantation and three died at 5-year follow-up, but this did not differ between transient and persistent infection ($P = 0.63$ and $P = 0.25$, respectively). TMP-SMX resistance ($P = 0.05$), but not ESBL production in incident isolates, was predictive of persistence ($P = 0.56$).

Conclusion. In this Canadian CF cohort, *E. coli* infection was common and occurred more frequently in patients with compromised nutrition and lung function. Persistent infection with *E. coli* did not portend worse clinical outcomes. Multi-centre studies are merited to further understand the epidemiology and clinical impact of *E. coli* infection.

1482. Changing Patterns of HIV-TB Coinfection Among Patients in a Public Health Department Ambulatory Care Setting: A 5-Year Experience from a US Metropolitan Area

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Background. HIV–TB coinfection leads to a complex set of synergistic interactions in the epidemiology, risk of acquisition, pathogenesis and prognosis of both infections. In the United States, the prevalence of HIV-TB coinfection has been around 6% for the past several years. We present here a 5-year experience at a public health department ambulatory care setting in Tampa, Florida, showing potentially changing patterns. Descriptive data and clinical aspect of coinfected patients is presented.

Methods. A retrospective review of tuberculosis cases over the 5-year period ending December 2017 was performed. Those with HIV coinfection were included in the study. Clinical, microbiological and/or PCR based testing methods were used to make the diagnosis. SPSS was used to compile basic descriptive statistics

Results. There were a total of 411 TB patients and 33 had HIV, an 8% prevalence of coinfection. The median age was 45 years (range 18–65). The male to female ratio was 21:12. Twenty-four percent (8/33) were homeless and 24% were foreign born. Only one patient admitted to using injection drugs while 27% (9/33) used non-injection illicit drugs. Forty-five percent (15/33) had TB symptoms such as fever, night sweats, weight loss and cough; the rest had radiographic abnormality which led to the diagnosis. Only 12% (4/33) had CT scan abnormality reported as cavitary or miliary while the rest had nonspecific infiltrates. Eighty-eight percent (29/33) had pulmonary TB while 6% had lymph node and 6% serosal (one pleural and one peritoneal) infections. Seventy-nine percent (29/33) were treated with a combination of daily observed and self-administered therapy. Twelve percent (4/33) did not complete therapy, or were lost to follow-up whereas one person was diagnosed post mortem thus not treated.

Conclusion. The prevalence of HIV-TB coinfection in our cohort is slightly higher than the recent US average of 6% perhaps signifying the setting and demographics of our patient population. Our cohort was relatively older, most of them US born, and had predominantly pulmonary TB contrary to prior reports. These changing patterns may have been influenced by the overall older age of HIV patients in general or they could be indicators of underlying fundamental changes in the HIV-TB coinfection state at large. Additional study is needed to further elucidate this variance.

1483. Pleural Empyema Caused by *Stenotrophomonas maltophilia* in a National Cohort of Hospitalized Veterans

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Background. *S. maltophilia* is an environmental multi-drug-resistant Gram-negative bacteria that is mostly found as a respiratory tract colonizer in patients with cystic fibrosis (CF) and as an opportunist in immunocompromised hosts. To understand the role of this pathogen in non-CF patients, we performed a retrospective analysis of hospitalized patients with *S. maltophilia* empyema in the Veterans Health Administration (VHA).

Methods. Using microbiology results within the VHA Corporate Data Warehouse, we identified pleural fluid cultures that tested positive for *S. maltophilia*

among 1.9 million hospitalized patients between January 1, 2010 and December 31, 2017. We then reviewed the electronic health records for these patients and collected demographics, clinical characteristics, microbiology, antibiotic treatment, and outcome (30-day mortality).

Results. We identified 45 unique patients with *S. maltophilia* in pleural fluid cultures from 21 VHA facilities. Associated conditions included prolonged chest tube presence (*n* = 35), recent hospital admission (*n* = 34), recent antibiotic exposure (*n* = 30), cancer (*n* = 25), recent ICU stay (*n* = 23), and cardiothoracic surgery (*n* = 21). Most cultures were polymicrobial (*n* = 36), with the most commonly isolated organisms being *Enterobacteriaceae* (*n* = 12), *Staphylococcus* spp. (*n* = 11), and *Pseudomonas aeruginosa* (*n* = 9). According to susceptibility testing, trimethoprim-sulfamethoxazole (TMP-SMX) was the most active agent (93% susceptible), followed by levofloxacin (85%). Only 49% of tested isolates were susceptible to ceftazidime. In 27 (60%) of the cases, treatment directed against *S. maltophilia* was administered with TMP-SMX (*n* = 16), levofloxacin (*n* = 7) and minocycline (*n* = 4). In two cases, *S. maltophilia* was considered a contaminant since there was no evidence of pleural infection. In both groups, 30-day mortality was 22% (6/27 treated vs. 4/18 untreated).

Conclusion. *S. maltophilia* is infrequently isolated from pleural fluid among patients in the VHA system and is commonly a polymicrobial infection following instrumentation or surgery. In this cohort, we observed a high mortality independent of treatment, likely reflecting host co-morbidities or ineffective treatments.

Disclosures. **All authors:** No reported disclosures.

1484. Impact of Combination Vs. Monotherapy on Clinical Outcomes Associated with *Stenotrophomonas maltophilia* Pneumonia

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Background. *Stenotrophomonas maltophilia* is an emerging nosocomial pathogen with intrinsic resistance to several antibiotics, making it potentially challenging to treat. Studies have demonstrated treatment failures and resistance development with monotherapy (MT); however, limited clinical data have demonstrated improved outcomes with combination therapy (CT). The aim of this study was to compare clinical outcomes with CT vs. MT for *S. maltophilia* pneumonia.

Methods. This was a retrospective cohort study of patients admitted to OSUWMC between November 2011 and October 2017 with *S. maltophilia* pneumonia who received at least 48 hours of effective therapy. Data collected included baseline characteristics, APACHE II, immune status, and therapy received. The primary outcome was clinical response after seven days of effective therapy with CT vs. MT (i.e., improvement in signs and symptoms of infection, absence of fever for 24 hours, WBC normalization if immunocompetent, and negative blood cultures if concurrently bacteremic). Secondary outcomes included development of a nonsusceptible isolate; adverse drug events (ADEs); and 30-day microbiological cure, infection recurrence, and all-cause mortality. The Wilcoxon Rank-sum test, Pearson chi-squared test, and Fisher's exact test were utilized as appropriate. A multivariable logistic regression model was used to assess clinical response while adjusting for confounding variables.

Results. There were 252 patients with *S. maltophilia* pneumonia who met inclusion criteria, of which 38 received CT and 214 received MT. There was no difference in clinical response with CT vs. MT (47.4% vs. 39.7%, *P* = 0.38), even after controlling for immune status, APACHE II, and polymicrobial pulmonary infection (adjusted OR 1.49, 95% CI 0.62–3.60). Thirty-day microbiological cure (*P* = 0.44), recurrence (*P* = 0.53), all-cause mortality (*P* = 0.07), and isolation of a nonsusceptible isolate during (*P* = 0.96) or after (*P* = 0.85) therapy were also similar when comparing CT vs. MT. The most commonly reported ADEs were hyperkalemia and GI intolerance with trimethoprim/sulfamethoxazole and fluoroquinolones, respectively.

Conclusion. CT had similar efficacy and development of nonsusceptibility compared with MT for *S. maltophilia* pneumonia.

Disclosures. **All authors:** No reported disclosures.

1485. Antimicrobial Activity of Ceftolozane-Tazobactam Tested Against Contemporary (2015–2017) Gram-Negative Isolates from Patients with Pneumonia in US Medical Centers

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Background. Ceftolozane-tazobactam (C-T) is a combination antipseudomonal cephalosporin and β-lactamase inhibitor. C-T has been approved in >50 countries for treating adults with complicated urinary tract infections, acute pyelonephritis, and complicated intra-abdominal infections in combination with metronidazole. The Program to Assess Ceftolozane-Tazobactam Susceptibility (PACTS) monitors C-T resistance among Gram-negative (GN) isolates worldwide. In the current study,

isolates were collected from US patients hospitalized with pneumonia (PIHP) from 2015–2017.

Methods. A total of 4,337 GN isolates, including 2,102 *Enterobacteriaceae* (ENT) and 1,528 *Pseudomonas aeruginosa* (PSA) isolates, were collected in 2015–2017 from 30 US hospitals and tested for C-T susceptibility (S) by CLSI broth microdilution at JMI Laboratories. Only 1 isolate per patient per infection episode was included. Other antibiotics tested were amikacin (AMK), cefepime (FEP), ceftazidime (CAZ), colistin (COL), levofloxacin (LVX), meropenem (MEM), and piperacillin–tazobactam (TZP).-resistant (R) phenotypes analyzed were ENT R to doripenem, imipenem, or meropenem (CRE) and extended-spectrum β-lactamase (ESBL, non-CRE). Multidrug-resistant (MDR) isolates were identified as nonsusceptible (NS) to 3 or more antimicrobial classes. PSA phenotypes analyzed were CAZ-NS, MEM-NS, and TZP-NS.

Results. Of the 4,337 GN isolates, 3,820 (88.1%) had a C-T MIC ≤8 mg/L. The three most prevalent GN species isolated from PIHP were PSA (*n* = 1,528; 35.2%), *Klebsiella pneumoniae* (KPN, *n* = 562; 13.0%), and *Escherichia coli* (EC, *n* = 434; 10.0%). The %S of C-T and comparators for the top 3 pathogens are shown in the table. C-T showed activity against these isolates with %S of 96.5, 88.6, and 97.5% against EC, KPN, and PSA, respectively.

Conclusion. C-T demonstrated activity against the most prevalent contemporary GN isolates from PIHP in the US. C-T was the only β-lactam that had >88%S against all 3 species: EC, KPN, and PSA. C-T and COL were the only agents tested that had >95%S for EC and PSA pathogens in PIHP. For PSA, C-T maintained activity against isolates resistant to CAZ, TZP, and MEM. These data suggest that C-T may be a useful treatment for GN infections causing PIHP.

| | n | % susceptible[a] | | | | | | | |
		C-T	FEP	CAZ	MEM	TZP	LVX	AMK	COL
EC	434	96.5	74.2	76.5	99.3	90.5	55.4	99.1	99.5
MDR	60	76.7	10.0	11.7	95.0	61.0	3.3	95.0	98.3
ESBL, non-CRE	134	91.0	18.7	26.1	100.0	85.0	16.4	97.8	99.3
KPN	562	88.6	80.1	77.6	91.8	83.6	85.6	96.4	97.7
MDR	97	38.1	6.2	4.1	52.6	26.8	26.8	79.4	89.7
ESBL, non-CRE	104	79.8	32.7	20.2	95.2	60.6	62.5	96.2	97.1
PSA	1,528	97.5	83.6	82.6	76.0	77.7	71.7	93.8	99.9
CAZ-NS	266	85.7	30.8	-	39.1	6.4	42.1	81.2	99.6
TZP-NS	341	89.1	40.9	27.0	40.2	-	42.2	85.9	99.4
MEM-NS	366	90.7	55.5	55.7	-	44.3	30.6	85.8	99.7

[a] CLSI (2018), EUCAST for EC and KPN vs. COL

1486. Missed and Delayed Diagnosis of *Pneumocystis* Pneumonia in HIV and Non-HIV-Infected Individuals

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Background. *Pneumocystis* pneumonia (PcP) is a life-threatening condition for patients with HIV and other immunocompromised patients. Effective treatment requires timely diagnosis, but little is known about the frequency of diagnostic delays.

Methods. We conducted a retrospective cohort study using the Truven Health Analytics Commercial Claims and Encounters Database from 2011 to 2016. We identified index case visits for PcP as the point at which a patient was first diagnosed with PcP. We analyzed visits prior to the index diagnosis for symptoms related to PcP; these symptoms included cough, fever, dyspnea, pneumonia or other respiratory infections. We performed a change-point analysis to identify the time window before the index PcP diagnosis where diagnostic opportunities began to appear. We used a simulation model to estimate the likelihood of potential delays representing actual diagnostic opportunities.

Results. In our cohort, we identified 7,656 case patients with PcP, 5,187 in patients with HIV and 2,469 in patients without HIV. We observed a dramatic spike in hospitalizations, ED visits and outpatient visits for symptoms associated with PcP in the period just before the index PcP Diagnosis (see figure). In the time prior to the index PcP diagnosis, we identified 15,963 visits, and 4,674 patients, with at least one symptom of PcP. Of these potential opportunities, we estimated that 5,396 visits (CI 5,256–5,542), in 2,868 patients (CI 2,813–2,925), represented likely diagnostic delays. Around 56% of diagnostic opportunities occurred within 14 days of the PcP diagnosis, and 72% occurred within 3 weeks. Diagnostic delays were most likely to occur in outpatient settings: 4,429 outpatient opportunities (CI 4,546–4,679) compared with 674 (CI 706–738) inpatient or ED opportunities. Patients without HIV were more likely to experience a diagnostic delay: 77.4% (CI 74.7–80.2) of non-HIV patients, compared with 18.5% (CI 17.7–19.2) of HIV patients, experienced a delay. Diagnostic delays tended to be longer in patients without HIV, 16.1 days (15.7–16.4), compared with patients with HIV, 14.9 days (CI 14.8–15.1).