2790. Respiratory Viral Testing and Antimicrobial De-escalation Among Hospitalized Patients at a Tertiary Care Facility, 2015–2016: A Matched Cohort Study Series

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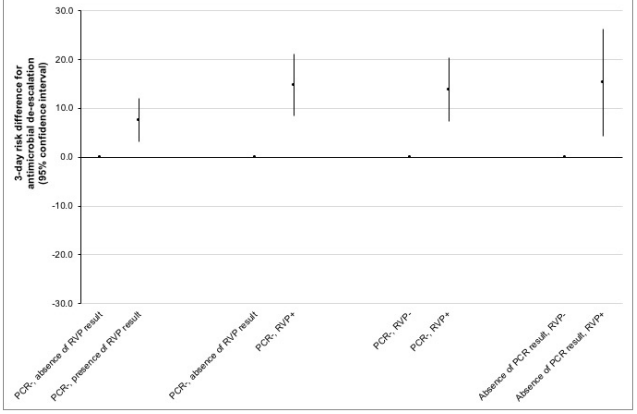
Background: The use of multiplex respiratory viral panels (RVP) is increasing. They have the potential to reduce unnecessary antibiotic use, but data are limited on their clinical effectiveness. Our objective was to estimate risk differences for antimicrobial de-escalation (discontinuation, intravenous to oral, or spectrum narrowing) between different sequences and results of RVP and rapid polymerase chain reaction (PCR) tests for influenza +/– respiratory syncytial virus.

Methods: We conducted a retrospective chart review of adults (age ≥18 years) admitted to a floor or stepdown unit at University of North Carolina Hospitals who had a respiratory viral test (RVT) within 48 hours of admission between September 2015 and April 2016. We estimated 3-day RDs for the relation between RVT and antimicrobial de-escalation. To control confounding and account for the 37-hour mean lag between PCR (faster) and RVP (slower) tests resulting, we leveraged the treatment decision design over a series of 1:1 matched cohort studies. Each targeted a clinically relevant scenario: (1) ordering RVP test (vs no RVP order) after learning PCR status; (2) learning RVP+ result (vs. no RVP result) after knowing PCR status; (3) learning RVP+ result (vs. RVP–) after knowing PCR–status; and (4) learning RVP+ result (vs. RVP–) given no prior PCR. For each subcohort, referent patients were matched to index patients by race, gender, RVT in prior month (y/n), age (±10 years), and season (±1.7 months).

Results: The overall cohort (n = 1,342) was 61% White, 29% African American, and 51% female. Median age was 56 years (IQR 39–69). Across all matched subcohorts (Figure 1), the matching success rate was 79–88% and referent frequency of antimicrobial de-escalation ranged 0.6%–1.9%. In scenario 1, ordering RVP results was associated with higher de-escalation (3-day RD 7.6%; 95% confidence intervals [CI] 3.2%, 12.1%). In scenarios 2–4, learning RVP+ results was associated with more frequent de-escalation (3-day RDs 14.8%, 13.8%, and 15.4%).

Conclusion: RVP testing and positive RVP results were associated with increased antimicrobial de-escalation, although de-escalation was overall infrequent. Future research should assess effect modification across subgroups and evaluate cost-effectiveness.

Figure 1. Three-day risk differences for antimicrobial de-escalation across four matched subcohorts.



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2791. Burden of Respiratory Infections in Trainees Higher Than Healthcare Records Indicate: Results from an Anonymous Survey

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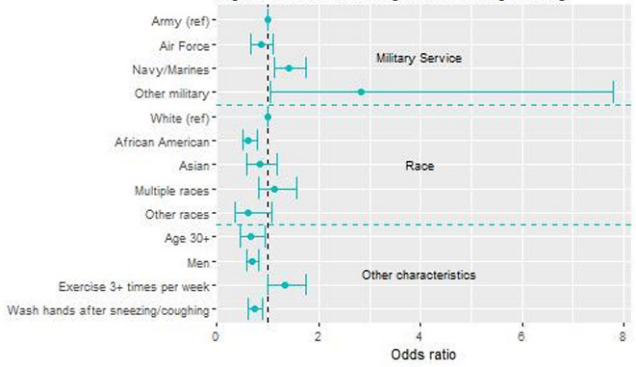
Background: Influenza-like illnesses (ILIs) are common in military populations, particularly among trainees, and can impair mission-readiness. To develop effective preventive measures against ILIs, it is vital to understand the ILI burden in the military population and identify potential risk factors for infection.

Methods: Anonymous ILI surveys were administered from January 2017 to March 2019 to military medical trainees living in a congregated setting on Fort Sam Houston (JBSA-FSH), TX. The surveys included questions about sociodemographic characteristics, weight, height, smoking status, activity level, as well as some basic questions about ILI and potential risk factors. Factors associated with ILI were identified using chi-square, t-tests, and multivariate models.

Results: 2,381 surveys were returned that included age, sex, and ILI information. Respondents were 16–54 years old, 1,301 (55%) were male, 782 (33%) were Air Force, 817 (34%) were Army, and 763 (32%) were Navy/Marines. 39% of those surveyed (929) reported having experienced an ILI during their training with 40% (370) seeking healthcare for those symptoms. The primary reasons for seeking healthcare included the severity of the illness (59%), concern about spreading the illness (50%), and the accessibility of healthcare (41%). 53% of the respondents reported that ILI had an impact on their performance, among whom 77% stated reduced study time, 66% missing physical training, and 53% missed class. The final multivariate model indicates that men and participants 30+ years old were less likely to report ILI (OR 0.69 (0.58, 0.82); OR 0.65, (0.45, 0.94)) (Figure 1). In addition, participants who reported washing their hands after they coughed or sneezed were less likely to report having had an ILI (OR 0.73 (0.61, 0.89)).

Conclusion: Although 39% of respondents reported having an ILI during their training, only 40% sought healthcare, indicating that ILIs are more common during training than healthcare records indicate. More information is needed regarding how training outcomes vary among those with ILI who seek care, those with ILI who do not seek care and those without ILI during training, to allow a better estimate of the impact of ILI and development of ILI mitigation strategies.

Figure 1. Odds of having had ILI during training



Disclaimer
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2792. Association of Body Mass Index with Rates of Hospitalization in Patients with Respiratory Viral Infections—Puerto Rico, 2012–2018

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Background: Obesity is a serious public health problem in Puerto Rico, where 31% of the population is obese. Multiple studies have suggested that adults with influenza who are underweight, overweight, or obese have increased risk of hospitalization compared with those of normal weight. We sought to determine whether risk of hospitalization among patients infected with influenza or other respiratory viruses differs by BMI among patients in Puerto Rico.

Methods: We analyzed data from patients enrolled in the Sentinel Enhanced Dengue Surveillance System (SEDSS), a prospective study of patients with acute febrile illness (AFI), from May 2012 to September 2018. We evaluated those older than 24 months, who had height, weight, and clinical disposition recorded, and tested positive by RT–PCR for infection with influenza A (n = 1253), influenza B (n = 844), adenovirus (n = 435), respiratory syncytial virus (n = 289), parainfluenza virus (n = 361), metapneumovirus (n = 247), or coronavirus (n = 15). BMI categories were determined using standard cutoffs in adults and BMI-for-age percentiles for children and adolescents. Risk of hospitalization by BMI category was calculated using multivariate Poisson regression.

Results: Among the 3,388 patients included, 675 (20%) were overweight, 926 (27%) were obese, 405 (12%) were underweight, and 1382 (41%) were normal weight. Median age was 13.4 (range: 2–100 years), and 50% were male. Risk of hospitalization was not significantly different in children and adult patients infected with a respiratory virus who were overweight relative to those that had normal BMI; however, once hospitalized, obese individuals of any age had a mean length of hospital stay 1.7 days longer than normal weight persons (95% CI: 0.27–3.17 days). Among adult patients, underweight patients were nearly 3 times more likely to be hospitalized compared with normal weight patients (relative risk 2.8, 95% CI: 1.4–5.9). Underweight children were not at increased risk of hospitalization.

Conclusion: Among patients infected with a respiratory virus, risk of hospitalization was higher among underweight adult patients, and obese patients had a longer mean length of stay once hospitalized. Body mass index should be considered when evaluating risk and managing these patients.

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2793. Influenza and Bacterial Pneumonia Coinfection: Rates and Outcomes

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Background: Limited evidence suggests that influenza leads not only to bacterial colonization and greater risk of bacterial pneumonia, but to poor outcomes and increased mortality. We compared bacterial culture results between patients positive (FLU+) and negative (FLU-) for influenza in the setting of community-acquired pneumonia (CAP). Among FLU+ patients we compared bacterial etiology, characteristics, treatment and outcomes between patients with and without bacterial coinfection.

Methods: We included adults admitted with pneumonia 2010–2015 to 179 US hospitals participating in the Premier database. Pneumonia was identified using an ICD-9-CM algorithm. Among patients tested for FLU, we limited the microbiology results to the first 14 hospital days. We assessed inpatient mortality, ICU admission, use of vasopressors, mechanical ventilation (MV), cost, and LOS using mixed multiple logistic regression and gamma generalized linear mixed models.

Results: Among 166,273 patients hospitalized with CAP, 38,665 (23.3%) were tested for influenza and 4,313 (11.15%) were positive. In FLU+ patients the most common bacterial co-infection was *Staphylococcus aureus* (37.6%) followed by *Streptococcus pneumoniae* (25.9%) and *Pseudomonas aeruginosa* (10.9%), varying based on the day of coinfection (days 1–3 vs. days 4–14) (Figure 1). In FLU- patients, *S. pneumoniae* (30.5%) and *S. aureus* (30.3%) were similarly common, followed by *P. aeruginosa* (10.0%). FLU+ patients with bacterial co-infection were younger (66.3 vs. 69.1 years), with more comorbidities (3.2 vs. 2.7) than influenza patients with no bacterial co-infection (all comparisons $P < 0.001$). Bacterial co-infection was also associated with increased odds of in-hospital mortality (OR 1.86, 95% CI,1.31–2.65), ICU admission (OR 3.46, 2.44–4.9), use of vasopressors (OR 3.74, 2.61–5.36), and MV (OR 3.51, 2.49–5.36), increased cost (risk-adjusted ratio of geometric means, 1.6, (1.47–1.73) and LOS (risk-adjusted ratio of geometric means 1.42, (1.33–1.52).

Conclusion: In a large US inpatient sample hospitalized for CAP, 11% of patients with influenza had or acquired a bacterial co-infection. Bacterial co-infection was associated with significantly worse outcomes and higher cost.

Day 1-3 (N = 445)	Day 4-14 (N = 92)
Staphylococcus aureus (34.2%)	*Staphylococcus aureus* (53.3%)
MSSA (29%)	MSSA (35.9%)
MRSA (14.6%)	MRSA (17.4%)
Streptococcus pneumoniae (27.9%)	*Pseudomonas aeruginosa* (8.7%)
Pseudomonas aeruginosa (11.5%)	*Streptococcus pneumoniae* (7.6%)
Hemophilus influenza (8.5%)	*Esherichia coli* (5.4%)

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2794. Testing and Treatment in Patients Hospitalized with Suspected Influenza Pneumonia

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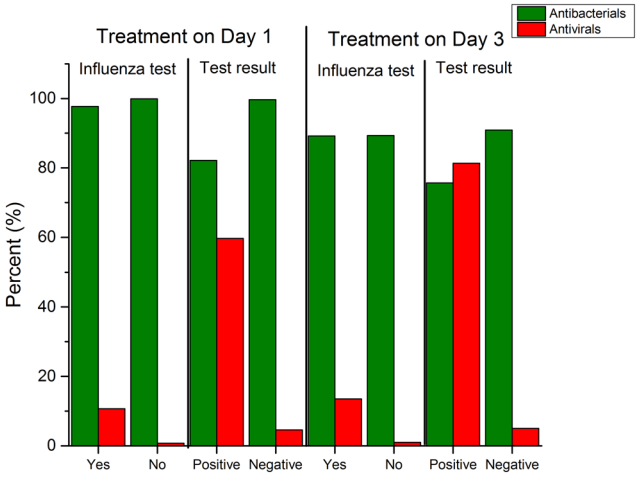
Background: Influenza is a leading cause of community-acquired pneumonia (CAP). Little is known about the effect of influenza testing on antimicrobial treatment among adult patients hospitalized with CAP. We quantified prevalence of testing and impact of positivity on treatment with antibacterials, antivirals, and outcomes.

Methods: We included adults admitted with pneumonia in 2010–2015 to 179 US hospitals contributing to the Premier database. Patients had CAP if radiographic evidence of pneumonia and antimicrobial treatment were present on day 1. We assessed influenza testing and compared antimicrobial utilization and outcomes of patients who tested positive vs negative vs not tested. Using mixed logistic regression and gamma generalized linear mixed models, we assessed the impact of influenza testing on inpatient mortality, length of stay (LOS) and cost.

Results: Among 166,273 patients with CAP, 38,665 (23.2%) were tested for influenza; 11.5% of these tested positive. The influenza testing rate increased from 15.4% in 2010/7–2011/6 to 35.6% in 2014/7–2015/6, ranging from 28.8% during flu season (October–May) to 8.2% in other months. Positive tests were more common during flu season (12.2% vs. 2.8%, $P < 0.001$). Patients tested for influenza were younger (66.6 vs. 70.3 years), less likely admitted from SNF (5.4% vs. 7.9%), with fewer comorbidities (2.9 vs. 3.3). Of patients tested for influenza, positive patients were younger (66.3 vs. 68.8 years), less likely admitted from SNF (5.2% vs. 6.8%), with more comorbidities (2.9 vs. 2.7) (all comparisons $P < 0.001$). Patients testing positive more likely received antivirals, were slightly less likely to receive antibacterials (Figure 1), but received shorter antibacterial courses than negative patients (5.3 vs 6.4 days, $P < 0.001$). Influenza tests were associated with reduced odds of in-hospital mortality compared with no testing (adjusted OR 0.71, 95% CI 0.63–0.81) and positive vs. negative tests with reduced costs (0.95, 0.92–0.99) and LOS (0.97, 0.94–0.99) (Figure 2).

Conclusion: In a large US inpatient sample hospitalized for pneumonia, only 23.2% of the patients were tested for influenza, but testing varied widely by hospital. A positive influenza test was associated with antiviral treatment but had minimal impact on antibiotic prescribing.



Outcome	Contrast	OR/Mean Multipliers (95% CI)
		Adjusted
In hospital mortality	Influenza test vs. no test	0.71 (0.63 - 0.81)
	Positive vs. negative test	0.92 (0.80 - 1.06)
Cost	Influenza test vs. no test	0.99 (0.95 - 1.02)
	Positive vs. negative test	0.95 (0.92 - 0.99)
Length of stay	Influenza test vs. no test	0.98 (0.96 - 1.00)
	Positive vs. negative test	0.97 (0.94 - 0.99)

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2795. Clinical and Economic Impact of a Ribavirin Intervention Program in Hematopoietic Cell and Solid-organ Transplant Recipients with Respiratory Syncytial Virus Infection

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