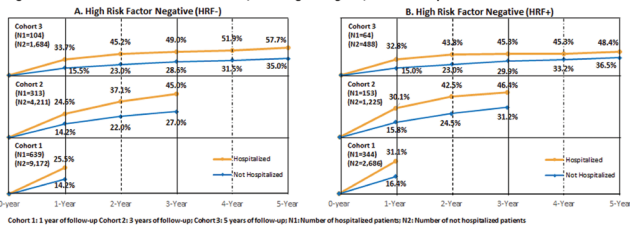


infants or among infants after developing severe RSV-related disease. We describe the cumulative incidence (CI) of AW among hospitalized/ambulatory neonates/infants/toddlers after RSV/bronchiolitis infection diagnosis, in a large clinical database.

Methods. Using deidentified Optum Integrated commercial claims and electronic medical records, we identified patients (0–<3 years old) with a first clinical diagnosis of RSV/bronchiolitis infection from 01 January 2008–31 March 2016. Patients with a diagnosis of asthma/wheezing ≤30 days after first RSV/bronchiolitis diagnosis were excluded. Three cohorts were created with 1/3/5 years of follow-up time required, respectively. Patients were grouped by specific high-risk factors (HRF+/-), including pre-term births and predefined pre-existing disease. Descriptive statistics are reported, with comparisons made by logistic regression analyses.

Results. 9,811/4,524/1,788 patients with RSV/bronchiolitis infection and HRF- were included in the 1/3/5-years follow-up cohorts. 14.9%/28.2%/36.3% had AW events by the end of follow-up in the three cohorts. 6.5%/6.9%/5.8% were hospitalized for RSV/bronchiolitis. 3,030/1,378/552 patients with RSV/bronchiolitis infection and HRF+ were included in the 1/3/5-years follow-up cohorts. 18.1%/32.9%/37.9% had AW events by the end of follow-up in the three cohorts. 11.4%/11.1%/11.6% were hospitalized for RSV/bronchiolitis. The CI rates of AW in the 1/3/5-year HRF+/- cohorts, stratified by hospitalized for RSV/bronchiolitis Y/N, are shown in Figure 1.

Figure 1: Cumulative incidence rates of asthma/wheezing among RSV/bronchiolitis patients.



Logistic regression confirmed that hospitalization for RSV/bronchiolitis was associated with an increased ($P < 0.05$) likelihood of AW, for HRF+ and HRF- patients at each follow-up year.

Conclusion. Thirty-eight percent of RSV/bronchiolitis infants/neonates/toddlers HRF+, and 36% among infants/neonates/toddlers HRF-, developed AW in the 5 years after first RSV/bronchiolitis diagnosis. RSV/bronchiolitis hospitalization was associated with a significantly increased risk of AW development in 1/3/5 years of follow-up; confirming previous observational study results.

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718. Viral Coinfection and Nasal Cytokines in Children with Acute Bacterial Sinusitis (ABS)

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Background. ABS is one of the most common infections in childhood leading to antibiotic prescriptions, but remains a clinical diagnosis. Laboratory testing does not aid diagnosis and there are no predictors to identify those who will respond to therapy or develop complications. Thus, the tools to diagnose and manage ABS remain limited. Initial viral infection predisposes to development of ABS. However, there is poor understanding of the contribution of viral infection to pathogenesis, rate of complications, or the immune response to ABS. The objective of this study was to define bacterial upper airway colonization, viral co-infection and cytokine response in the upper airway during ABS.

Methods. In the context of an ongoing larger prospective clinical study, children were enrolled who were diagnosed with ABS using standardized clinical criteria. Nasopharyngeal (NP) samples were processed for bacterial culture for *S. pneumoniae*, *H. influenzae*, *S. pyogenes* and *M. catarrhalis*; real-time PCR viral testing and cytokine measurement by qPCR. We correlated these findings with clinical symptoms at the time of presentation.

Results. Of 184 enrolled children (median age 4.9 years), 134 (72.8%) had a positive bacterial culture for potentially pathogenic bacteria and 50 (27.2%) had growth of normal flora. A total of 129 (70.4%) subjects tested positive for a virus. The most common virus detected was rhinovirus ($n = 86$) followed by influenza virus ($n = 23$) and adenovirus ($n = 21$). A total of 102 patients (70.4%) had both a positive pathogenic bacterial culture and viral detection. Patients who had a bacterial pathogen plus a viral detection had a significantly higher expression of IL-6, IL-8 and IL-25 ($P < 0.001$). Univariable analysis found no correlation between clinical presentation with viral and/or cytokine expressions.

Conclusion. Children meeting clinical criteria for ABS and a NP swab with a pathogenic bacteria plus viral detection demonstrated higher expression of inflammatory cytokines compared with subjects whose culture had normal respiratory flora.

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719. The Respiratory Pathogen Panel and Antibiotic Utilization in the Emergency Department

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Background. The multiplex polymerase chain reaction respiratory pathogen panel (RPP) is used frequently in emergency departments (EDs) for the rapid identification of viruses and atypical bacteria of the respiratory tract. Its clinical value is unclear, as numerous studies have demonstrated that its use has a limited impact on antibiotic prescribing. We aimed to describe the relationship between RPP results and antibiotic prescribing rates for ED patients in our large academic medical center.

Methods. We retrospectively analyzed the charts of 1,061 patients aged 18–90 who were treated and released from two EDs from January 1, 2015 to January 31, 2018 and underwent RPP testing. Patients with evidence of bacterial infection were excluded based on RPP detection of atypical bacteria and microbiological analysis of blood, urine, wound, and sputum specimens. The results of the RPP and the rates of subsequent respiratory pathogen-directed antibiotic prescribing (including ED and outpatient pharmacy orders) were compared.

Results. Antibiotic prescription rates were 21.5% in patients who tested negative for any respiratory virus, compared with 14.5% in patients who tested positive (OR 0.70, $P < 0.01$). When positive RPPs were subdivided based on virus type (influenza and non-influenza) and compared with negative RPPs, only influenza-detection was associated with a significant reduction in antibiotic prescriptions (Table 1).

Conclusion. In our study population, the presence of a respiratory virus detected by the RPP was correlated with a significant decrease in antibiotic prescribing. This effect was largely driven by influenza detection. This demonstrates that at our institution, the RPP may have a role in reducing unnecessary antibiotic utilization, but providers need further guidance in the interpretation of non-influenza respiratory virus positivity.

Table 1. Antibiotic Prescription Rates by RPP Result, Subdivided by Virus Type

RPP Result	N	No. of Patients Given Antibiotics	Odds Ratio (95% CI)	P-value
Negative	628	135 (21.5%)	Reference	
Positive	433	63 (14.5%)	0.70 (0.56–0.88)	<0.01
Influenza*	169	20 (11.8%)	0.49 (0.30–0.81)	<0.01
Non-influenza virus(es)	264	43 (16.3%)	0.71 (0.49–1.04)	0.08

*Includes RPPs that were positive for multiple viruses if influenza was present.

Disclosures. All authors: No reported disclosures.

720. Respiratory and Nonrespiratory Complications Among Patients Hospitalized with Influenza, FluSurv-NET, 2016–2017

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Background. Influenza is most commonly associated with respiratory complications; however, nonrespiratory complications occur frequently among patients hospitalized with influenza. We used data from the Influenza Hospitalization Surveillance Network (FluSurv-NET) to describe complications recorded on discharge summaries of patients hospitalized with influenza.

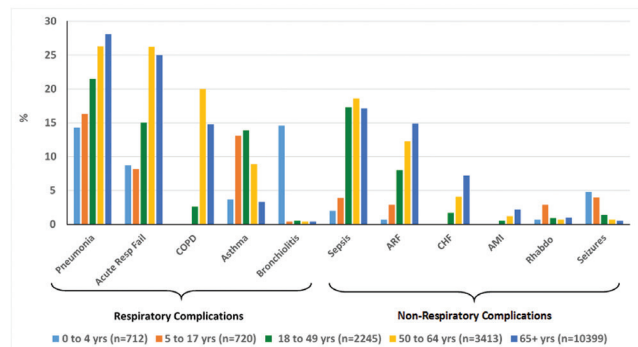
Methods. We included children (0–17 years) and adults (≥18 years), who resided within a FluSurv-NET catchment area and were hospitalized with laboratory-confirmed

influenza during 2016–2017. We abstracted data on underlying conditions and discharge diagnoses from medical charts. We calculated the frequency of respiratory and nonrespiratory complications in all age groups and used univariate and multivariable logistic regression to examine factors associated with select complications among adults.

Results. Among 17,489 patients, the most common respiratory complications were pneumonia (26%) and acute respiratory failure (23%) and the most common nonrespiratory complications were sepsis (16%) and acute renal failure (ARF) (12%). Complications varied by age group (figure). Pneumonia was the most common respiratory complication in all age groups except 0–4 years; among children aged 0–4 years bronchiolitis was most common (104/712; 15%). Among 97 children aged 0–4 years with bronchiolitis who underwent testing for respiratory syncytial virus (RSV), 37% had RSV. The most common nonrespiratory complication was seizures in children aged 0–17 years (17% had a history of prior seizures) and sepsis in adults. Among adults ($n = 16,057$), factors most strongly associated with ARF included chronic renal disease (adjusted odds ratio (AOR) 2.5; 95% confidence interval (95% CI) 2.2–2.8), male sex (AOR 1.5 95% CI 1.4–1.7) and age ≥ 65 years (AOR 1.4 95% CI 1.2–1.7); the factor most strongly associated with sepsis was chronic neuromuscular disease (AOR 1.5 95% CI 1.3–1.8).

Conclusion. Influenza hospitalizations are associated with a broad spectrum of complications including pneumonia, respiratory failure, sepsis, ARF and seizures. During the influenza season, astute clinicians should keep influenza in the differential diagnosis for patients with a wide range of presentations.

Figure. Respiratory and Non-Respiratory Complications by Age Group, FluSurv-Net, 2016–17



*Acute Resp Fail = Acute Respiratory Failure; COPD = Exacerbation of Chronic Obstructive Pulmonary Disease; ARF= Acute Renal Failure; CHF= Exacerbation of Congestive Heart Failure; AMI= Acute Myocardial Infarction; Rhinobdo= Rhabdomyolysis

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721. Clinical Respiratory Syndromes and Association with Influenza Clinical Diagnostic Testing and Antiviral Treatment among Children Hospitalized with Acute Respiratory Illness, 2015–2016

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Background. We investigated clinical influenza testing and treatment in children hospitalized with acute respiratory illness (ARI) who had distinct respiratory syndromes.

Methods. Children <18 years old with ARI were enrolled at seven hospitals in the New Vaccine Surveillance Network (NVSN) between November 1, 2015–June 30, 2016. ICD10 admission diagnosis codes were grouped to define syndromes of bronchiolitis, asthma, pneumonia, and croup. At clinician discretion, influenza testing with a rapid influenza diagnostic test or molecular assay was performed on respiratory

samples. As part of the study, each site performed influenza testing using molecular assays on mid-turbinate nasal and throat swabs from all enrolled children. Analysis was restricted to influenza season; children who received antivirals before hospitalization were excluded.

Results. Among 2,134 children with available ICD10 codes, on preliminary analysis 1,119 (52%) had influenza testing ordered by a clinician: 111 (10%) were positive, and 57 (51%) of 111 received antiviral treatment. Of the 2,134, 858 (40%) had one of the four mutually exclusive syndromes (table). Hospital clinical testing per clinician discretion was influenza positive in 16 of the 858 children (percent positivity per syndrome ranged from <1% to 38%; table). Research study testing of children not undergoing clinical influenza testing identified 11 additional positives. Antiviral treatment was highest for pneumonia patients.

Conclusion. Understanding testing and treatment practices by clinical syndrome may help to identify missed opportunities for influenza diagnosis and treatment.

Table:

	Bronchiolitis		Asthma		Pneumonia		Croup
	n = 392		n = 320		n = 117		n = 29
	n	%	n	%	n	%	n %
Age <5 years	391	>99	156	49	76	65	23 79
<2 days from illness onset to admission	87	22	171	54	28	24	15 52
>1 known underlying condition	84	21	277	87	62	53	6 21
Hospital clinical testing performed	209	53	90	28	68	58	8 28
Positive influenza	1	<1	4	4	8	12	3 38
Antiviral treatment	0		1		6		0
Research study result in children without hospital clinical testing							
Additional positive influenza	1		3		5		2
Antiviral treatment	0		0		3		0

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722. Normal Clinical Signs and Duration of Antibiotics in Hospitalized Patients with Pneumonia

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Background. The most common reason for antibiotic prescribing in hospitalized patients is suspected respiratory tract infection. In many cases, however, antibiotics may be started when the diagnosis is unclear and continued for a fixed course regardless of patients' clinical trajectories. We sought to characterize the distribution of clinical signs in patients started on antibiotics for possible pneumonia, number of days to normalization of clinical signs, and duration of antibiotics beyond when signs normalized.

Methods. We performed a retrospective analysis on 43,820 consecutive adults admitted to Brigham and Women's Hospital from May 2017 to January 2018. We identified all nonventilated patients started on antibiotics for pneumonia using clinicians' stated indications in their medication orders. We analyzed the distribution of clinical signs indicative of pneumonia (maximum temperature, maximum white blood cell count, median respiratory rate, and supplemental oxygen need) on the first day of antibiotics. We then calculated median days to normalization for each sign, total days of antibiotics for pneumonia, and duration of antibiotics beyond when all signs normalized.

Results. We identified 2,754 nonventilated patients started on antibiotics for pneumonia. On the first day of antibiotics, 38% had oxygen saturations $\geq 95\%$ without supplemental oxygen, 78% had normal temperatures, 63% had normal white blood cell counts, and 79% had median respiratory rates <22 breaths/minute. All signs were normal in 25% of patients. Amongst those with at least one abnormal clinical sign on the first day of antibiotics, all signs returned to normal within a median of 3 days (IQR 2–7 days). Antibiotics were nonetheless continued for ≥ 3 more days in 33% of these patients.

Conclusion. Pneumonia is a major driver of antibiotic utilization in hospitalized patients but we found 25% of cases lacked the cardinal clinical signs of pneumonia and antibiotics were continued for ≥ 3 days after all clinical signs normalized in a third of the 75% of patients who did have signs of pneumonia. These findings suggest substantial opportunities to improve antibiotic prescribing for suspected respiratory tract infections in hospitalized patients.

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