Table 1. Predictive performance of pneumonia and sepsis scores for severity and mortality in Influenza

Severity Score	Sensitivity	Specificity	PPV	NPV	Accuracy	AUC	p value	CI 95%
FluMex	40.4 (25.6-56.7)	86.7 (77.5-93.1)	60.7 (44.3-74.9)	74.2 (68.8-78.9)	71.2 (62.4-78.9)	0.63	0.01	0.52-0.74
CURB-65	11.9 (3.9-25.6)	97.5 (91.5-99.7)	71.4 (33.6-92.5)	68.6 (66.0-71.0)	68.8 (59.9-76.7)	0.55	0.38	0.43-0.66
PSI	9.5 (2.6-22.6)	100 (95.6-100)	100	68.6 (66.4-70.6)	69.6 (60.7-77.5)	0.45	0.38	0.34-0.56
CROMI	46.3 (30.6-62.5)	51.2 (39.9-62.4)	32.2 (24.2-41.4)	65.6 (57.2-73.1)	49.5 (40.4-58.7)	0.49	0.83	0.38-0.60
SIRS	71.4 (55.4-84.2)	39.5 (28.8-50.9)	37.9 (32.0-44.2)	72.7 (60.6-82.2)	50.4 (41.2-59.5)	0.55	0.39	0.44-0.65
qSOFA	14.2 (5.4-28.5)	91.5 (83.3-96.5)	46.1 (23.5-70.5)	67.8 (64.7-70.8)	65.6 (56.5-73.8)	0.53	0.60	0.42-0.64
SOFA	43.9 (28.4-60.2)	57.8 (46.4-68.6)	33.9 (25.1-44.1)	67.6 (60.0-74.3)	53.2 (44.0-62.2)	0.51	0.81	0.40-0.62
ILI	18.9 (10.7-29.7)	55.1 (40.2-69.3)	38.8 (26.5-52.8)	31.0 (25.4-37.2)	33.3 (25.0-42.4)	0.53	0.57	0.42-0.64
Mortality Score	**Sensitivity**	**Specificity**	**PPV**	**NPV**	**Accuracy**	**AUC**	**p value**	**CI 95%**
FluMex	100 (39.7-100)	80.1 (71.9-96.9)	14.2 (10.4-19.2)	100	80.8 (72.7-87.2)	0.90	0.006	0.83-0.97
CURB-65	75 (19.4-99.3)	96.6 (91.7-99.1)	42.8 (19.7-69.6)	99.1 (95.5-99.8)	96 (90.9-98.6)	0.86	0.01	0.60-1.00
PSI	50 (6.7-93.2)	98.3 (94.1-99.8)	50 (15.6-84.4)	98.3 (95.7-99.3)	96.8 (92-99.1)	0.30	0.10	0.00-0.56
CROMI	50 (6.7-93.2)	52.1 (42.7-61.3)	3.3 (1.2-8.6)	96.8 (91.9-98.8)	52.0 (42.8-61.1)	0.51	0.94	0.22-0.80
SIRS	100 (39.7-100)	36.9 (28.3-46.3)	5.0 (4.4-5.7)	100	39.0 (30.3-48.2)	0.68	0.21	0.49-0.87
qSOFA	50 (6.7-93.2)	90.9 (84.3-95.3)	15.3 (5.5-36.0)	98.2 (95.3-99.3)	89.6 (82.8-94.3)	0.70	0.17	0.39-1.00
SOFA	0 (0-60.2)	55.8 (46.4-64.8)	0	94.3 (93.4-95.1)	54.0 (44.8-63.0)	0.28	0.14	0.10-0.45
ILI	50 (6.7-93.2)	71.4 (62.4-79.3)	5.5 (2.0-14.0)	97.7 (94.0-99.1)	70.7 (61.8-78.5)	0.62	0.40	0.35-0.90

AUC: area under the curve; CURB-65: Confusion, Urea, Respiratory rate, Blood pressure, age > 65 years; PSI: pneumonia severity index; CROMI: C: Comorbidities, Respiratory rate, Oxygen saturation, Mental status change, Infiltrates at chest radiograph; CI: confidence interval; ILI: Influenza-Like Illness; NPV: negative predictive value; PPV: positive predictive value; SIRS: Systemic Inflammatory Response Syndrome; qSOFA: quick Sequential Organ Failure Assessment score; SOFA: Sequential Organ Failure Assessment score.

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

2322. Etiology, Severity of Illness, and Risk Factors for Patients Hospitalized with Acute Gastroenteritis from Multi-Site Veteran's Affairs (VA) Surveillance, 2016–2018: Results from SUPERNOVA

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Background. The severity of acute gastroenteritis (AGE) in adult populations and the relative contribution of specific pathogens is not well characterized. In 2016, we implemented a multisite AGE surveillance platform in 4 VA hospitals (Atlanta, Bronx, Houston and Los Angeles), collectively serving > 320,000 patients annually.

Methods. Inpatient AGE cases and age- and time-matched non-AGE controls were identified through prospective screening of admissions using standardized case definitions. Stool samples were tested for 22 pathogens using the FilmArray® Gastrointestinal Panel. Medical conditions were analyzed as risk factors for AGE by multivariate logistic regression.

Results. From July 2016 to June 2018, 731 cases and 399 controls were enrolled. Risk factors for AGE cases included HIV-positive status (adjusted odds ratio [aOR] 4.6; 95% confidence interval [CI] 1.6–12.9; $P < 0.01$), severe kidney disease (aOR 4.5; 95% CI 2.0–9.8; $P < 0.01$), and immunosuppressive therapy (aOR 4.0; 95% CI 1.2–13.3]; $P = 0.02$). *Clostridioides difficile* and norovirus were the most commonly detected pathogens in cases (18% and 5%, respectively); detection of these pathogens in cases was significantly higher than detection in controls (8% and 2%, respectively; $P < 0.01$ for both). The median duration of hospital stay was longer for *C. difficile* compared with norovirus cases (5 vs. 3 days; $P < 0.01$), and cases with both pathogens had intensive care unit (ICU) stays (*C. difficile*: 18%; norovirus: 8%; $P = 0.2$). Fourteen deaths occurred among AGE cases; 2 were associated with *C. difficile* and 1 with norovirus; the remainder did not have a clear etiology or pathogen detected. *C. difficile* and norovirus were detected year-round with a fall and winter predominance; *C. difficile* prevalence was highest in October, while norovirus prevalence was six times higher in December than in summer months.

Conclusion. This surveillance platform captured cases of severe AGE, including ICU stays and deaths, among hospitalized US Veterans. *C. difficile* and norovirus were leading pathogens in AGE cases. These findings can help guide appropriate clinical management of AGE patients and inform public health efforts to quantify and address the associated burden of disease through targeted interventions.

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

2323. Clinical Characteristics and Disease Burden of Epstein–Barr Virus and Four β-Herpes Viruses Infections in Children Visiting Emergency Room

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Background. It is well known that most of infants and young children with primary EBV and CMV infection are inapparent, and primary HHV-6B and HHV-7 infection cause exanthema subitum (ES). However, the precise incidence of apparent infection of these viruses remains unclear. Therefore, we sought to elucidate clinical features and disease burdens of these viral infections in febrile children visiting emergency room (ER).

Methods. Between June 2015 and December 2017, febrile children under 5 years old, who visited ER and received hematological examination, were enrolled in this study. Detection of serum viral DNAs using real-time PCR and measurement of antibody titers in acute-phase serum were carried out. Clinical information was collected from the medical records.

Results. In total of the 905 cases, EBV, CMV, HHV-6B and HHV-7 were detected in 18 cases (2%), 12 cases (1.3%), 104 cases (11.5%) and 23 cases (2.5%), respectively. No HHV-6A DNA was detected. Primary infection rates among EBV, CMV, HHV-6B and HHV-7-infected patients accounted for 44%, 25%, 91% and 57%, respectively. Admission rates of the primary-infected patients were 88% of EBV, 68% of CMV, 66% of HHV-6B and 42% of HHV-7, respectively. Five of the 8 cases (62.5%) of primary EBV-infected patients demonstrated typical clinical course of infectious mononucleosis (IM); however, no IM patient was seen in 9 patients with viral reactivation. No IM case was observed in CMV-infected patients, regardless of primary infection or reactivation. Clinical characteristics were compared between patients with primary HHV-6B and HHV-7 infections because of similarity of clinical features. Average age (1.5 vs. 2.8 years old; $P < 0.001$), duration of fever (4.5 vs. 2.9 days; $P < 0.001$), the highest body temperature (40.2 vs. 39.6°C; $P < 0.001$), and the frequency of typical skin rash (ES) (87% vs. 54%; $P < 0.001$) were statistically different between the two viral infections. The main reason for admission due to primary HHV-6B and HHV-7 infection was complex-type febrile seizure (58.7 vs. 66.7%; $P = 0.705$).

Conclusion. The clinical features and disease burden of the 5 human herpesviruses infections were elucidated in the febrile children visiting ER.

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

2324. Respiratory Viral Coinfection in a Birth Cohort of Infants in Rural Nepal

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Background. Acute respiratory illnesses are a leading cause of global morbidity and mortality in children. Coinfection with multiple respiratory viruses is common. Although the effects of each virus have been studied individually, the effects of coinfection on disease severity or healthcare seeking are less well-understood.

Methods. A secondary analysis was performed of a maternal influenza vaccine trial conducted between 2011 and 2014 in rural southern Nepal. Prospective weekly active household-based surveillance of infants was conducted from birth to 180 days of age. Mid-nasal swabs were collected and tested for respiratory syncytial virus (RSV), rhinovirus, influenza, human metapneumovirus (HMPV), coronavirus, parainfluenza (HPIV), and bocavirus by RT–PCR. Coinfection was defined as the presence of two or more respiratory viruses simultaneously detected as part of the same illness episode. Maternal vaccination status, infant age, prematurity, and number of children under 5 in the household were adjusted for with multivariate logistic regression.

Results. Of 1,730 infants with a respiratory illness, 327 (19%) had at least two respiratory viruses detected on their primary illness episode. Coinfection status did not differ by maternal vaccination status, infant age, premature birth, and number of children under 5 in the household. Of 113 infants with influenza, 23 (20%) had coinfection. Of 214 infants with RSV, 87 (41%) had coinfection. Overall, infants with coinfection had increased occurrence of fever lasting 4 or more days overall (OR 1.4, 95% CI: 1.1, 2.0), and in the subset of infants with influenza (OR 5.8, 95% CI: 1.8, 18.7). Coinfection was not associated with seeking further care (OR 1.1, 95% CI: 0.8, 1.5) or pneumonia (OR 1.2, 95% CI: 1.0, 1.6).

Conclusion. A high proportion of infants experiencing their first respiratory illness had multiple viruses detected. Coinfection with influenza was associated with longer duration of fever compared with children with influenza alone, but was not associated with increased illness severity by other measures.

Figure 1. Frequency of monoinfections and coinfections by viral type among infants who tested positive for a respiratory virus (n=1730). RSV=Respiratory Syncytial Virus, HMPV=Human Metapneumovirus, HPIV=Human Parainfluenza Virus.