Conclusion: NAIs were frequently prescribed among cancer patients, but less than a third received treatment within 48 hours of symptom onset. Most were prescribed NAIs only after test results were available, while antibiotics were prescribed empirically. Delayed presentation to care is an obstacle to early NAI use; patient and provider education along with rapid diagnostics are needed to improve early NAI use among cancer patients with influenza.

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1506. Burden of Respiratory Syncytial Virus (RSV) and Other Lower Respiratory Tract Viral Infections During the First Two Years of Life: a Prospective Study

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Session: P-68. Respiratory Infections - Viral

Background. Lower respiratory tract infections (LRTIs) are a leading cause of pediatric morbidity and mortality worldwide, with ~650,000 deaths recorded in < 5-year-olds in 2016. Cross-sectional studies on hospitalized LRTIs are available, but longitudinal studies on the total burden of viral LRTIs are scarce. This study (NCT01995175) prospectively collected incident RSV and other viral LRTIs in a multinational cohort.

Methods. From 2013 to 2017, infants in 8 countries were enrolled at birth and followed for LRTIs up to 2 years of age. Infants with suspected LRTIs were clinically examined and swabbed. Nasal swab samples were tested using quantitative real-time PCR for RSV and multiplex PCR panel for 16 other respiratory viruses/subtypes; bacterial culture was not performed. LRTI and severe LRTI episodes were defined per 2015 WHO LRTI case definitions. Viruses detected from nasal swabs collected from participants with WHO-defined LRTI and severe LRTI episodes are reported.

Results. The 2401 infants followed experienced 1012 LRTI episodes; 259 of these were severe LRTIs. At least 1 virus was detected from 909 (90%) and 235 (91%) LRTI and severe LRTI episodes, respectively. Enteroviruses/Rhinoviruses (EV/RV, 49%) were detected most frequently in samples collected from LRTI episodes, followed by RSV (22%), parainfluenza (PIV, 14%), human metapneumovirus (hMPV, 8%) and seasonal coronavirus (CoV, 6%). RSV was detected in 39% of samples from LRTI episodes in < 3-month-olds and in 18% of 1-year-olds (Table 1). In a similar trend, RSV was detected in 47% of samples from severe LRTI episodes in < 3-month-olds and in 21% of 1-year-olds (Table 2). Co-infection with another virus was common in CoV-positive samples (67%), while most samples positive for RSV (71%), hMPV (70%), EV/RV (67%) and PIV (58%) had no other virus detected.

Table 1. Occurrence of laboratory confirmed respiratory viral infections by viral pathogens identified in nasal swab samples from WHO-defined LRTI episodes

		Age group				
		0–2 months N=111/110	3–5 months N=211/210	6–11 months N=277/276	12–23 months N=418/416	0–23 months N=1017/1012*
Respiratory virus, n (%)						
Enterovirus/Rhinovirus		**47 (42.3)**	**123 (58.3)**	**123 (44.4)**	**204 (48.8)**	**497 (48.9)**
RSV		**43 (38.7)**	**45 (21.3)**	**64 (23.1)**	**74 (17.7)**	**226 (22.2)**
Strain	A	13 (11.7)	11 (5.2)	19 (6.9)	51 (12.2)	94 (9.2)
	B	30 (27.0)	34 (16.1)	45 (16.2)	23 (5.5)	132 (13.0)
Any Parainfluenza		**10 (9.0)**	**39 (18.5)**	**34 (12.3)**	**61 (14.6)**	**144 (14.2)**
Type	1	0 (0.0)	1 (0.5)	6 (2.2)	10 (2.4)	17 (1.7)
	2	0 (0.0)	3 (1.4)	0 (0.0)	3 (0.7)	6 (0.6)
	3	7 (6.3)	26 (12.3)	19 (6.9)	33 (7.9)	85 (8.4)
	4	3 (2.7)	9 (4.3)	9 (3.2)	16 (3.8)	37 (3.6)
Human metapneumovirus		**2 (1.8)**	**10 (4.7)**	**27 (9.7)**	**41 (9.8)**	**80 (7.9)**
Any Coronavirus		**9 (8.1)**	**16 (7.6)**	**18 (6.5)**	**21 (5.0)**	**64 (6.3)**
Strain	229E	4 (3.6)	1 (0.5)	1 (0.4)	3 (0.7)	9 (0.9)
	OC43	4 (3.6)	6 (2.8)	13 (4.7)	11 (2.6)	34 (3.3)
	NL63	1 (0.9)	7 (3.3)	0 (0.0)	4 (1.0)	12 (1.2)
	HKU1	0 (0.0)	2 (0.9)	4 (1.4)	3 (0.7)	9 (0.9)
Adenovirus		**1 (0.9)**	**5 (2.4)**	**14 (5.1)**	**29 (6.9)**	**49 (4.8)**
Any Influenza		**3 (2.7)**	**6 (2.8)**	**12 (4.3)**	**22 (5.3)**	**43 (4.2)**
Type	A	3 (2.7)	4 (1.9)	10 (3.6)	15 (3.6)	32 (3.1)
	B	0 (0.0)	2 (0.9)	2 (0.7)	7 (1.7)	11 (1.1)
Bocavirus		**1 (0.9)**	**7 (3.3)**	**9 (3.2)**	**15 (3.6)**	**32 (3.1)**

Per-protocol set. LRTI, lower respiratory tract infection defined using the 2015 WHO case definition (Modjarrad et al 2016, doi: 10.1016/j.vaccine.2015.05.093); **N**, number of nasal swab samples collected in each age group/number of episodes in each age category; **n (%)**, number (percentage) of nasal swab samples positive for a given viral infection; **RSV**, respiratory syncytial virus. *912 nasal swab samples from 909 episodes had one or more laboratory confirmed viral pathogens. **Note:** data from multiple sites in Argentina, Bangladesh, Canada, Finland, Honduras, South Africa, Thailand and United States.

Table 2. Occurrence of laboratory confirmed respiratory viral infections by viral pathogens identified in nasal swab samples from WHO-defined severe LRTI episodes

		Age group				
		0–2 months N=45/45	3–5 months N=68/67	6–11 months N=62/62	12–23 months N=85/85	0–23 months N=260/259*
Respiratory virus, n (%)						
Enterovirus/Rhinovirus		**19 (42.2)**	**38 (55.9)**	**28 (45.2)**	**42 (49.4)**	**127 (48.8)**
RSV		**21 (46.7)**	**18 (26.5)**	**16 (25.8)**	**18 (21.2)**	**73 (28.1)**
Strain	A	5 (11.1)	4 (5.9)	5 (8.1)	13 (15.3)	27 (10.4)
	B	16 (35.6)	14 (20.6)	11 (17.7)	5 (5.9)	46 (17.7)
Any Parainfluenza		**4 (8.9)**	**15 (22.1)**	**3 (4.8)**	**8 (9.4)**	**30 (11.5)**
Type	1	0 (0.0)	1 (1.5)	1 (1.6)	4 (4.7)	6 (2.3)
	2	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	3	4 (8.9)	12 (17.6)	2 (3.2)	1 (1.2)	19 (7.3)
	4	0 (0.0)	2 (2.9)	0 (0.0)	4 (4.7)	6 (2.3)
Human metapneumovirus		**0 (0.0)**	**2 (2.9)**	**8 (12.9)**	**9 (10.6)**	**19 (7.3)**
Any Coronavirus		**2 (4.4)**	**4 (5.9)**	**5 (8.1)**	**3 (3.5)**	**14 (5.4)**
Strain	229E	1 (2.2)	0 (0.0)	0 (0.0)	1 (1.2)	2 (0.8)
	OC43	0 (0.0)	0 (0.0)	3 (4.8)	2 (2.4)	5 (1.9)
	NL63	1 (2.2)	4 (5.9)	0 (0.0)	0 (0.0)	5 (1.9)
	HKU1	0 (0.0)	0 (0.0)	2 (3.2)	0 (0.0)	2 (0.8)
Adenovirus		**0 (0.0)**	**2 (2.9)**	**4 (6.5)**	**6 (7.1)**	**12 (4.6)**
Bocavirus		**0 (0.0)**	**3 (4.4)**	**4 (6.5)**	**3 (3.5)**	**10 (3.8)**
Any Influenza		**0 (0.0)**	**2 (2.9)**	**2 (3.2)**	**4 (4.7)**	**8 (3.1)**
Type	A	0 (0.0)	1 (1.5)	2 (3.2)	4 (4.7)	7 (2.7)
	B	0 (0.0)	1 (1.5)	0 (0.0)	0 (0.0)	1 (0.4)

Per-protocol set. severe LRTI, severe lower respiratory tract infection defined using the 2015 WHO case definition (Modjarrad et. al. 2016; doi: 10.1016/j.vaccine.2015.05.093); **N**, number of nasal swab samples collected/number of episodes in each age category; **n (%)**, number (percentage) of nasal swab samples positive for a given viral infection; **RSV**, respiratory syncytial virus; *185 nasal swab samples from 185 episodes had one or more laboratory confirmed viral pathogens. **Note:** data from multiple sites in Argentina, Bangladesh, Canada, Finland, Honduras, South Africa, Thailand and United States.

Conclusion: Respiratory viruses are detected in the majority of LRTIs during the first 2 years of life. RSV likely accounts for much of this overall LRTI burden. Our results suggest that RSV most strongly impacted the very young; it was the most commonly detected virus in severe LRTIs in infants aged < 3 months. RSV was also persistently detected at high levels in samples from LRTIs (22%) and severe LRTIs (28%) in children up to 2 years old.

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1507. Clinical Characteristics of Common Respiratory Viruses Detected in Infants Across Different Clinical Settings

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Session: P-68. Respiratory Infections - Viral

Background. Viral acute respiratory infections (ARI) continues to be a significant cause of healthcare visits in young children. We evaluated the clinical presentation and disease severity of common respiratory viruses associated with medically attended ARI in infants.

Methods. We conducted a prospective viral surveillance study in Davidson County, TN. Infants under one year with fever and/or respiratory symptoms were enrolled from the outpatient (OP), emergency department (ED), or inpatient (IP) settings from 12/16/2019 through 4/30/2020. Nasal swabs were collected and tested for common viral pathogens using Luminex® NxTAG Respiratory Pathogen Panel. Demographic and clinical characteristics were collected through parent/guardian interviews and medical chart abstractions.

Results. In total, 364 participants were enrolled, and 361 (99%) had nasal swabs collected and tested. Overall, mean age was 6±3.3 months, 50% were female, 45% White, and 27% Hispanic. Of the 295 (82%) virus-positive specimens; the three most

common viruses were rhinovirus/enterovirus (RV/EV), respiratory syncytial virus (RSV), and influenza (flu) [124, 101, and 44, respectively]. Compared to virus-negative infants, virus-positive infants were more likely to have more severe ARI symptoms and to be admitted to the intensive care unit **(Table 1).** Compared to other virus-positive infants: RV/EV-positive infants were more likely to be White, attend daycare, but less likely to present with respiratory distress, or require oxygen or admission; flu-positive infants were older and more likely to have systemic symptoms rather than ARI symptoms, and RSV-positive infants were more likely to present with respiratory distress, receive oxygen and be hospitalized **(Table 1).**

Table 1. Demographic and Clinical Characteristics of Study Subjects

Table 1. Demographic and Clinical Characteristics of Study Subjects.

	Virus-Positive n=295	Virus-Negative n=66	RV/EV** n=124	RSV** n=101	Influenza** n=44
Age, months, mean ± SD	6.1±3.3	6.2±3.4	6.4±3.2	**4.9±3.2**↑↓	**7.8±2.9**↑
Age, months, median [IQR]	6.1 [3.4-8.8]	7 [3.2-8.9]	6.7 [3.9-9]	4.5 [2.3-7.6]	8.8 [5.4-10.1]
Male	142 (48%)	39 (59%)	60 (48.4%)	**57 (56%)**↑	**14 (32%)**↓
White	137 (46%)	27 (42%)	**68 (55%)**↑	44 (44%)	20 (45%)
Black	94 (32%)	27 (41%)	**36 (29%)**↑↓	29 (29%)	18 (41%)
Other/Unknown/Mixed	64 (22%)	12 (18%)	**20 (16%)**↓	28 (28%)	6 (14%)
Hispanic or Latino	83 (28%)	14 (21%)	26 (21%)	31 (31%)	14 (32%)
Breastfeeding	245/294 (83%)	55 (83%)	100 (81%)	84 (83%)	35 (80%)
Smoke exposure	41 (14%)	13 (20%)	14 (11%)	14 (15%)	8 (18%)
Daycare	**97 (33%)**	**8 (12%)***	**54 (44%)**↑	29 (29%)	13 (30%)
UMCs	**59 (20%)**	**22 (33%)***	25 (20%)	15 (15%)	13 (20%)
Signs and Symptoms					
Illness Duration, days	3.6±2.5	3.5±2.9	3.8±2.7	3.9±2.2	3±2.3
Documented Fever	167/293 (57%)	43 (65%)	**60 (48%)**↑↓	56/100 (56%)	**36 (82%)**↑
Chills	32/249 (13%)	6/59 (10%)	**6 (5%)**↓	13 (13%)	**12 (27%)**↑
Cough	**262 (89%)**	**43 (65%)***	**104 (84%)**↑↓	**101 (100%)**↑	41 (93%)
Nasal Congestion	**276 (94%)**	**48 (73%)***	117 (94%)	95 (94%)	40 (91%)
Runny Nose	**262 (89%)**	**38 (58%)***	114 (92%)	87 (86%)	38 (86%)
GI symptoms	121/292 (41%)	31 (47%)	**42/123 (34%)**↓	42/100 (42%)	21/43 (49%)
Lethargy	118/258 (46%)	30/61 (49%)	42 (34%)	45 (45%)	**26 (59%)**↑
Irritability	**254 (86%)**	**52/65 (80%)***	104 (84%)	87 (86%)	41 (93%)
Decreased Appetite	162 (55%)	28 (42%)	60 (48%)	**69 (68%)**↑	25 (57%)
SOB	133/291 (46%)	28 (42%)	**43 (35%)**↓	**68 (67%)**↑	20 (45%)
Wheezing	**34 (12%)**	**2 (3%)***	**8 (6%)**↓	**23 (23%)**↑	2 (5%)
Crackles/Rales/Ronchi	**68 (23%)**	**6 (9%)***	**14 (11%)**↓	**50 (50%)**↑	**5 (11%)**↓
Accessory Muscle Use	10 (3%)	0	2 (2%)	**7 (7%)**↑	0
Apnea	13/283 (5%)	2/65 (3%)	5 (4%)	7 (7%)	**0**↓
Maximum RR	**44.8±13.8**	**38.4±9.5***	**40.9±12**↓	**51.1±14.5**↑	**39.5±7.6**↓
Minimum O2 Saturation	**95.8±5.2**	**97.2±3.6***	**97±5.3**↑	**94.4±5.7**↓	96.2±4.1
Viral testing					
Viral Codetection	52 (17%)	NA	40 (32.3%)	12 (11.9%)	13 (29.5%)
RV/EV-Codetection	NA	NA	NA	9 (8.9%)	6 (13.6%)
RSV-Codetection	NA	NA	9 (7.3%)	NA	0
Influenza-Codetection	NA	NA	6 (4.8%)	0	NA
Setting					
OP	187 (63%)	42 (64%)	**101 (81%)**↑	**46 (45%)**↓	27 (61%)
ED	49 (17%)	10 (15%)	**10 (8%)**↓	**18 (18%)**↑	11 (25%)
IP	59 (20%)	14 (21%)	**13 (10%)**↓	**37 (37%)**↑	6 (14%)
O2 Use	32/59 (54.2%)	4/14 (28.6%)	7/13 (53.9%)	**24/37 (65%)**↑	1/6 (17%)
ICU admission	**16/59 (27%)**	**0/14***	3/13 (23%)	9/37 (24%)	1/6 (17%)
Mechanical Ventilation	1/59 (1.7%)	1 (7.1%)	0	0	0

n=number; UMCs= Underlying medical conditions; IQR= Interquartile range; RR= respiratory rate; ICU= Intensive care unit; SOB: shortness of breath; GI: gastrointestinal; OP: outpatient; ED: emergency department; IP: inpatients; NA= not available. Categorial Data are in n (%), Continuous Data are in Mean ± SD, Median [IQR]. **: comparison between each virus and all other viruses, §Pearson's Chi-Squared, † T-test, * P<0.05, ↑: higher, ↓: lower

Conclusion: The majority of ARI in infants are due to respiratory viruses, with RSV, RV/EV, and flu accounting for over three-quarters of these viruses. The clinical presentations and disease severity differed across the clinical settings and the three main viruses, with RSV being most severe. To decrease the burden of medically attended viral ARI, preventive measures (i.e., developing new vaccines and antivirals), refining current vaccination strategies, and infection control measures are needed.

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1508. Hospitalizations and Emergency Department Visits for Respiratory Syncytial Virus Among Infants Aged < 1 year in the United States: An Analysis of Nationwide Inpatient and Emergency Room Data

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Session: P-68. Respiratory Infections - Viral

Background. Respiratory syncytial virus (RSV) is a common cause of illness and hospitalization for infants and children globally. The objective of this study was to characterize the burden of RSV and all-cause bronchiolitis (ACB) inpatient hospitalizations and emergency room department (ED) visits in U.S. infants aged < 1 year with the most recent years of data available.

Figure 1. RSV and ACB hospitalizations among US infants <1 year old (NIS 2016)

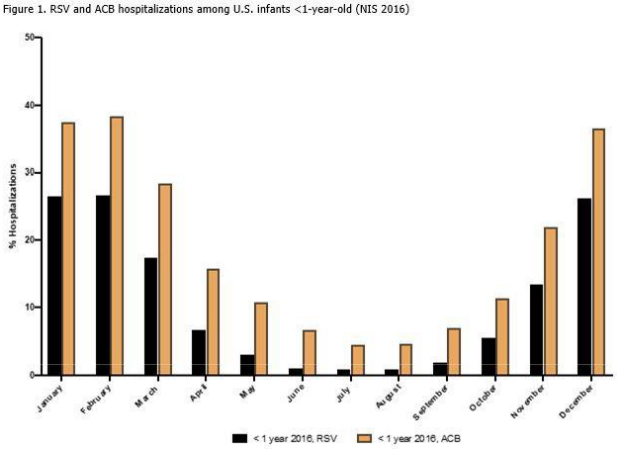
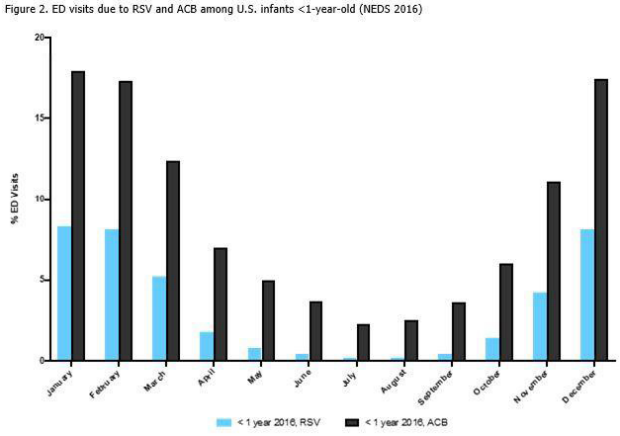


Figure 2. ED visits due to RSV and ACB among US infants < 1 year old (NEDS 2016)



Methods: The National (Nationwide) Inpatient Sample (NIS) and the Nationwide Emergency Department Sample (NEDS), which are large national publicly available all-payer databases in the U.S., were used to estimate the burden of RSV in 2016 based on ICD-9 and 10 codes. The proportions of hospitalizations or ED visits due to RSV in infants aged < 1 year were quantified. Due to the potential of missing RSV encounters based on coding practices, ACB was also evaluated. Based on availability of variables and data recency, 2011 NIS data were used to describe RSV burden by age in months. Sensitivity analyses were conducted with NIS and NEDS data from other years (2011-2015).

Results. A clear seasonal pattern was observed for RSV hospitalizations and RSV ED visits with a peak in December-February and a trough in June-August in 2016. During the RSV season and peak months, RSV was a leading cause of hospitalization (12065/45490=27% in Jan and 12050/45080=27% in Feb) and ED visits (26423/316709=8% in Jan and 24721/306397=8% in Feb)) among U.S. infants under 1 year of age. Similar patterns were seen for ACB in 2016 (38% hospitalization and 17-18% ED visits in Jan and Feb) and for RSV and ACB in the other years. For the inpatient setting in 2011, RSV hospitalizations were the highest among the youngest patients (except those aged <1 month) and decreased with age during the RSV season and peak months.

Conclusion. These results show that during the RSV season, RSV and ACB were a leading cause of hospitalization and ED visit among US infants under 1 year of age. Current policy does not support routine RSV testing of clinical lower respiratory tract infections (LRTIs) among infants. In that context, as an approximation of RSV LRTI visits in each setting, ACB can be considered an upper bound and RSV can be considered a lower bound of the true proportion of hospital encounters associated with RSV in these settings..

Disclosures. Mina Suh, MPH, International Health, EpidStrategies (Employee) Xiaohui Jiang, MS, EpidStrategies (Employee)