

Supplemental Tables: Induced Sputum and the Diagnosis of Childhood Pneumonia

Supplementary Table 1: Characteristics of cases with and without induced sputum collection

	Cases without IS Collected N=432	Children with IS Collected N=3800	Total N=4232	p-value^a
Characteristic	n (%)	n (%)		
Age				
1-5 months	185 (42.8)	1549 (40.8)	1734 (41.0)	
6-11 months	111 (25.7)	860 (22.6)	971 (22.9)	.17
12-23 months	81 (18.8)	860 (22.6)	941 (22.2)	
24-59 months	55 (12.7)	531 (14.0)	586 (13.8)	
Very severe pneumonia	283 (65.5)	1087 (28.6)	1370 (32.4)	
Female	222 (51.4)	1594 (41.9)	1816 (42.9)	<.001
HIV status				
Positive	46 (10.6)	205 (5.4)	251 (5.9)	
Negative	320 (74.1)	3276 (86.2)	3596 (85.0)	<.001
Unknown	66 (15.3)	319 (8.4)	385 (9.1)	
Received Oxygen				
At admission	213 (49.3)	1201 (31.6)	1414 (33.4)	<.001
Ever*	289 (66.9)	1575 (41.4)	1864 (44.0)	<.001
Died within 30 days of discharge^b	231 (58.5)	142 (4.2)	373 (8.8)	<.001

Abbreviations: IS, induced sputum; HIV, human immunodeficiency virus.

^aP-value obtained from Chi-square test.

^bChildren missing 30-day vital status were assumed to be alive at 30 days.

Supplemental Tables: Induced Sputum and the Diagnosis of Childhood Pneumonia

Supplementary Table 2: Pathogen detection by multiplex PCR of paired nasopharyngeal/oropharyngeal swabs and induced sputum collected from children aged 1-59 months hospitalized cases who did not meet the clinical/laboratory definition for pneumonia^a (N=398)

Pathogen	NP/OP+ and IS+ N (%)	Only NP/OP+ N (%)	Only IS+ N (%)	P-value^b
<i>B. pertussis</i>	2 (0.5)	1 (0.3)	2 (0.5)	>.99
<i>C. pneumoniae</i>	1 (0.3)	3 (0.8)	3 (0.8)	>.99
<i>H. influenzae</i>	137 (35.6)	43 (11.2)	30 (7.8)	.16
<i>H. influenzae</i> type b	3 (0.8)	5 (1.3)	4 (1.0)	>.99
<i>M. catarrhalis</i>	241 (62.6)	48 (12.5)	13 (3.4)	< .001**
<i>M. pneumoniae</i>	1 (0.3)	1 (0.3)	1 (0.3)	>.99
<i>Pneumocystis jirovecii</i>	7 (1.8)	8 (2.1)	11 (2.8)	.65
<i>S. aureus</i>	32 (8.3)	25 (6.5)	14 (3.6)	.11
<i>S. pneumoniae</i>	261 (67.8)	31 (8.1)	14 (3.6)	.02
Salmonella species	0 (0.0)	2 (0.5)	5 (1.3)	.45
Adenovirus	32 (8.3)	14 (3.6)	25 (6.5)	.11
Bocavirus	28 (7.3)	17 (4.4)	33 (8.6)	.03
CMV	158 (40.9)	33 (8.5)	43 (11.1)	.30
Coronavirus 229E	2 (0.5)	1 (0.3)	3 (0.8)	.63
Coronavirus OC43	9 (2.3)	2 (0.5)	3 (0.8)	>.99
Coronavirus NL63	9 (2.3)	1 (0.3)	3 (0.8)	.63
Coronavirus HKU1	4 (1.0)	0 (0.0)	4 (1.0)	.13
HMPV	21 (5.5)	2 (0.5)	20 (5.2)	<.001*
Influenza A	14 (3.6)	2 (0.5)	5 (1.3)	.45
Influenza B	10 (2.6)	1 (0.3)	1 (0.3)	>.99
Influenza C	3 (0.8)	0 (0.0)	1 (0.3)	>.99
Parainfluenza 1	12 (3.1)	2 (0.5)	6 (1.6)	.29
Parainfluenza 2	3 (0.8)	4 (1.0)	1 (0.3)	.38
Parainfluenza 3	15 (3.9)	4 (1.0)	5 (1.3)	>.99
Parainfluenza 4	7 (1.8)	2 (0.5)	3 (0.8)	>.99
PV/EV	25 (6.5)	16 (4.1)	18 (4.7)	.86

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Rhinovirus	67 (17.4)	24 (6.3)	25 (6.5)	>.99
RSV	52 (13.5)	6 (1.6)	7 (1.8)	>.99
Any bacteria	348 (89.5)	20 (5.1)	9 (2.3)	.06
Any virus	325 (83.5)	16 (4.1)	27 (6.9)	.13
Any pathogen	375 (96.4)	7 (1.8)	3 (0.8)	.34

Abbreviations: NP/OP, nasopharyngeal/oropharyngeal; IS, induced sputum; PV/EV, parechovirus/enterovirus; RSV, respiratory syncytial virus; CMV, cytomegalovirus; HMPV, human metapneumovirus A/B.

^a Non-pneumonia (Non-Pn) case defined as a case with a normal CXR, blood culture pathogen negative, and normal respiratory rate or non-hypoxic in the absence of crackles, or normal respiratory rate and non-hypoxic in the presence of crackles.

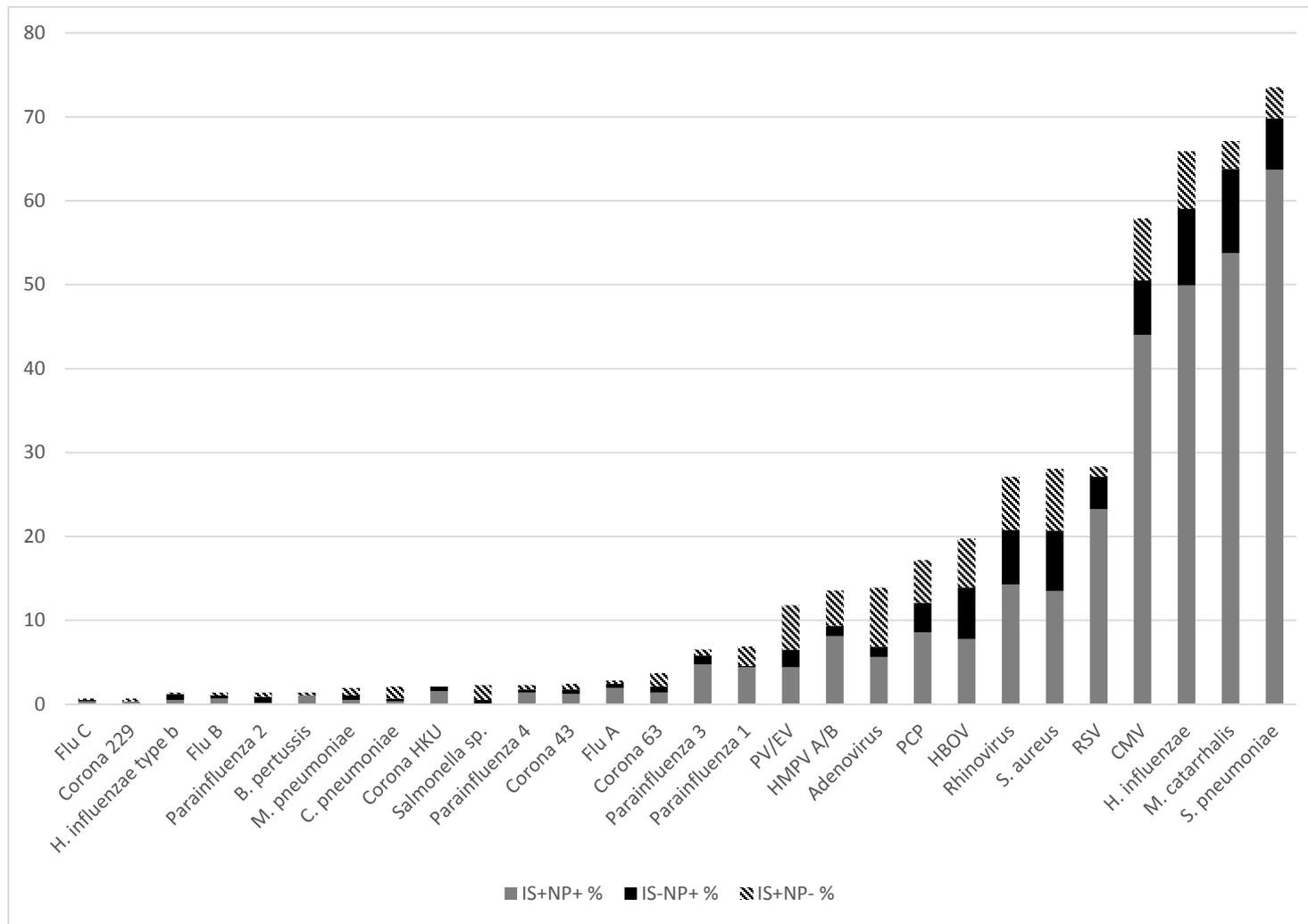
^b P-value obtained by McNemar's Chi-square test.

* Presence in IS alone is significantly greater than NP/OP alone (<.002).

** Presence in NP/OP alone is significantly greater than IS alone (<.002).

Supplemental Tables: Induced Sputum and the Diagnosis of Childhood Pneumonia

Supplementary Figure 1: Pathogen detection by multiplex PCR of paired nasopharyngeal/oropharyngeal swabs and induced sputum collected from children aged 1-59 months hospitalized with CXR+ pneumonia in whom a low quality induced sputum specimens was available



Abbreviations: CXR+, chest x-ray positive; NP, nasopharyngeal/oropharyngeal; IS, induced sputum

Restricted to CXR+ cases with paired NP/OP swabs and low quality IS specimens (≥ 10 squamous epithelial cells per low power field; N=578); some cases missing data for certain pathogens (≤ 20 cases per pathogen). Chest x-ray positive defined as radiographic evidence of pneumonia (consolidation and/or other infiltrates).

Supplemental Tables: Induced Sputum and the Diagnosis of Childhood Pneumonia

Supplementary Table 3: Comparison of pathogen density in induced sputum vs. nasopharyngeal/oropharyngeal specimens among children aged 1-59 months hospitalized with CXR+ pneumonia in whom a high quality induced sputum specimens was available

Pathogen	N	IS greater than NP/OP by 1log (copies/ml) N (%)	NP/OP greater than IS by 1log (copies/ml) N (%)	P-value ^a
<i>B. pertussis</i>	1100	4 (0.4)	5 (0.5)	>.99
<i>C. pneumoniae</i>	1105	7 (0.6)	9 (0.8)	.80
<i>H. influenzae</i>	1105	116 (10.5)	271 (24.5)	<.001
<i>H. influenzae</i> type b	1097	7 (0.6)	17 (1.5)	.06
<i>M. catarrhalis</i>	1105	111 (10)	298 (27)	<.001
<i>M. pneumoniae</i>	1094	15 (1.4)	5 (0.5)	.04
<i>Pneumocystis jirovecii</i>	1108	34 (3.1)	40 (3.6)	.56
<i>S. aureus</i>	1105	53 (4.8)	85 (7.7)	.008
<i>S. pneumoniae</i>	1105	96 (8.7)	333 (30.1)	<.001
<i>Salmonella</i> species	1108	10 (0.9)	9 (0.8)	>.99
Adenovirus	1097	70 (6.4)	38 (3.5)	.003
Bocavirus	1094	103 (9.4)	79 (7.2)	.09
CMV	1097	127 (11.6)	180 (16.4)	.003
Coronavirus 229E	1094	7 (0.6)	7 (0.6)	>.99
Coronavirus OC43	1094	18 (1.6)	6 (0.5)	.002
Coronavirus NL63	1094	6 (0.5)	6 (0.5)	>.99
Coronavirus HKU1	1094	8 (0.7)	12 (1.1)	.50
HMPV	1094	47 (4.3)	39 (3.6)	.45
Influenza A	1094	10 (0.9)	11 (1)	>.99
Influenza B	1094	6 (0.5)	1 (0.1)	.13
Influenza C	1105	1 (0.1)	4 (0.4)	.38
Parainfluenza 1	1094	42 (3.8)	13 (1.2)	<.001
Parainfluenza 2	1096	12 (1.1)	7 (0.6)	.36
Parainfluenza 3	1096	23 (2.1)	23 (2.1)	>.99
Parainfluenza 4	1096	13 (1.2)	14 (1.3)	>.99
PV/EV	1097	64 (5.8)	41 (3.7)	.03
Rhinovirus	1094	99 (9)	92 (8.4)	.66

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RSV	1097	57 (5.2)	84 (7.7)	.03
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Abbreviation: CXR+. Chest x-ray positive; IS, induced sputum; NP/OP, nasopharyngeal/oropharyngeal; PV/EV, parechovirus/enterovirus; RSV, respiratory syncytial virus; CMV, cytomegalovirus; HMPV, human metapneumovirus A/B.

Restricted to Chest x-ray positive cases with paired NP/OP swabs and high quality IS specimens (< 10 squamous epithelial cells per low power field; N=1114); some cases missing data for certain pathogens (≤ 20 cases per pathogen). Chest x-ray positive defined as radiographic evidence of pneumonia (consolidation and/or other infiltrates).

Bold indicates significant difference in proportion of children with IS density greater than or less than 1 log more than NP/OP density ($p < 0.002$).

^a P-value obtained by two-sided sign test.

Supplemental Tables: Induced Sputum and the Diagnosis of Childhood Pneumonia

Supplementary Table 4a. Pathogens detected by PCR in Induced Sputum (IS) among Chest X-Ray Positive Pneumonia Cases and Non-Pneumonia Cases with a high quality IS specimen, Stratified by age

Pathogen	Age < 6 months				Age > 6 months			
	CXR+ (N=418) n (%)	Non- Pneumonia cases (N=145) n (%)	aOR (95% CI)	aOR (also adjusted for NP/OP) (95% CI)	CXR+ (N=700) n (%)	Non- Pneumonia cases (N=243) (%)	aOR (95% CI)	aOR (also adjusted for NP/OP) (95% CI)
<i>B. pertussis</i>	8 (1.9)	3 (2.1)	0.84 (0.21, 3.33)	1.2 (0.16, 9.09)	2 (0.3)	1 (0.4)	0.28 (0.02, 3.43)	0.16 (0.01, 2.88)
<i>C. pneumoniae</i>	4 (1)	2 (1.4)	0.57 (0.1, 3.29)	0.55 (0.06, 4.83)	8 (1.1) 387	2 (0.8)	0.92 (0.18, 4.76)	0.83 (0.15, 4.62)
<i>H. influenzae</i>	213 (50.7)	65 (44.5)	1.3 (0.86, 1.96)	1.06 (0.58, 1.92)	(55.1)	103 (42.4)	1.32 (0.95, 1.83)	1.06 (0.71, 1.57)
<i>H. influenzae</i> type b	10 (2.4)	3 (2.1)	1.16 (0.3, 4.48)	1.82 (0.27, 12.41)	12 (1.7) 443	5 (2.1)	0.68 (0.22, 2.13)	0.7 (0.18, 2.65)
<i>M. catarrhalis</i>	229 (54.5)	94 (64.4)	0.74 (0.49, 1.13)	0.93 (0.53, 1.62)	(63.1)	164 (67.5)	0.85 (0.6, 1.19)	0.86 (0.55, 1.34)
<i>M. pneumoniae</i>	5 (1.2)	0 (0)	--	--	21 (3)	2 (0.8)	4.9 (1.11, 21.75)*	4.77 (0.78, 28.98)
<i>Pneumocystis</i> <i>jirovecii</i>	70 (16.7)	19 (13)	1.15 (0.64, 2.04)	0.75 (0.37, 1.52)	24 (3.4)	1 (0.4)	5.5 (0.71, 42.84)	--
<i>S. aureus</i>	77 (18.3)	32 (21.9)	0.63 (0.38, 1.04)	0.71 (0.38, 1.32)	63 (9) 518	14 (5.8)	1.03 (0.53, 1.99)	1.19 (0.56, 2.51)
<i>S. pneumoniae</i>	277 (66)	97 (66.4)	0.99 (0.65, 1.51)	0.99 (0.52, 1.87)	(73.8)	182 (74.9)	0.93 (0.64, 1.34)	0.99 (0.61, 1.63)
Salmonella species	5 (1.2)	1 (0.7)	1.46 (0.16, 13.52)	1.02 (0.08, 13.14)	7 (1) 130	4 (1.6)	0.46 (0.11, 1.82)	0.46 (0.12, 1.85)
Adenovirus	19 (4.5)	8 (5.5)	0.62 (0.25, 1.53)	0.67 (0.22, 2.06)	(18.5) 138	50 (20.4)	0.68 (0.46, 1.02)	0.68 (0.41, 1.13)
Bocavirus	22 (5.2)	16 (11)	0.45 (0.22, 0.92)*	0.34 (0.14, 0.79)*	(19.7) 400	47 (19.3)	0.98 (0.66, 1.45)	1 (0.64, 1.54)
CMV	172 (40.9)	57 (39)	0.97 (0.64, 1.47)	0.83 (0.43, 1.6)	(56.8)	147 (60)	0.71 (0.51, 0.99)*	0.65 (0.44, 0.95)*
Coronavirus 229E	7 (1.7)	1 (0.7)	2.54 (0.3, 21.65)	2.2 (0.17, 28.78)	7 (1)	4 (1.7)	0.61 (0.16, 2.25)	0.35 (0.06, 2.09)
Coronavirus OC43	13 (3.1)	3 (2.1)	1.29 (0.35, 4.84)	--	19 (2.7)	10 (4.1)	0.64 (0.28, 1.49)	0.97 (0.3, 3.18)
Coronavirus NL63	6 (1.4)	4 (2.7)	0.32 (0.08, 1.29)	--	12 (1.7)	8 (3.3)	0.38 (0.13, 1.14)	0.33 (0.07, 1.55)
Coronavirus HKU1	11 (2.6)	3 (2.1)	1.03 (0.27, 4)	0.52 (0.1, 2.72)	12 (1.7)	5 (2.1)	0.68 (0.22, 2.15)	0.37 (0.06, 2.12)

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HMPV	37 (8.8)	19 (13)	0.75 (0.41, 1.39)	0.31 (0.12, 0.77)*	96 (13.7)	22 (9.1)	1.64 (0.97, 2.79)	1.13 (0.58, 2.21)
Influenza A	12 (2.9)	3 (2.1)	1.51 (0.41, 5.51)	0.67 (0.13, 3.53)	27 (3.9)	16 (6.6)	0.5 (0.25, 1.01)	0.32 (0.08, 1.34)
Influenza B	5 (1.2)	4 (2.7)	0.5 (0.13, 1.95)	--	10 (1.4)	7 (2.9)	0.65 (0.23, 1.83)	1.7 (0.14, 20.96)
Influenza C	4 (1)	1 (0.7)	0.8 (0.08, 7.84)	--	1 (0.1)	3 (1.2)	0.07 (0.01, 0.7)*	0.05 (0, 1.02)
Parainfluenza 1	35 (8.3)	9 (6.2)	1.92 (0.81, 4.56)	2.31 (0.73, 7.29)	49 (7)	9 (3.7)	2.31 (1.07, 4*.99)	2.3 (0.71, 7.43)
Parainfluenza 2	5 (1.2)	1 (0.7)	2.03 (0.23, 18.03)	4.76 (0.4, 56.62)	14 (2)	3 (1.2)	1.71 (0.47, 6.24)	1.54 (0.33, 7.19)
Parainfluenza 3	26 (6.2)	6 (4.1)	1.38 (0.54, 3.51)	1.07 (0.29, 4)	49 (7)	15 (6.1)	1.09 (0.57, 2.06)	1.34 (0.48, 3.7)
Parainfluenza 4	8 (1.9)	5 (3.4)	0.55 (0.17, 1.8)	--	19 (2.7)	5 (2)	1.14 (0.39, 3.37)	0.68 (0.19, 2.43)
PV/EV	25 (5.9)	16 (11)	0.47 (0.24, 0.95)*	0.58 (0.24, 1.4)	84 (11.9)	27 (11)	1.22 (0.75, 1.99)	1.35 (0.76, 2.39)
Rhinovirus	89 (21.1)	21 (14.4)	1.46 (0.86, 2.5)	1.32 (0.69, 2.51)	154 (22)	71 (29.2)	0.54 (0.38, 0.78)*	0.56 (0.35, 0.88)*
RSV	141 (33.5)	45 (30.8)	1.32 (0.86, 2.04)	0.88 (0.39, 1.97)	138 (19.6)	15 (6.1)	4.39 (2.47, 7.8)*	1.52 (0.65, 3.58)

Abbreviations: aOR, adjusted odds ratio; CXR+, chest x-ray positive; PV/EV, parechovirus/enterovirus; RSV, respiratory syncytial virus; CMV, cytomegalovirus; HMPV, human metapneumovirus A/B.

The denominator was the number of children with available IS results for each pathogen. Some cases missing data for certain pathogens (<20 cases per pathogen).

CXR+ defined as radiographic evidence of pneumonia (consolidation and/or other infiltrates).

Non-pneumonia (Non-Pn) case defined as a case with a normal CXR, blood culture pathogen negative, and normal respiratory rate or non-hypoxic in the absence of crackles, or normal respiratory rate and non-hypoxic in the presence of crackles.

OR adjusted for age, sex, site and HIV status.

*p<.05 and **p<.002.

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Supplementary Table 4b. Pathogens detected by PCR in Induced Sputum (IS) among Chest X-Ray Positive Pneumonia Cases and Non-Pneumonia Cases with a high quality IS specimen, Stratified by severity

Pathogen	Severe				Very Severe			
	CXR+ (N=829) n (%)	Non- Pneumonia cases (N=236) n (%)	aOR (95% CI)	aOR (also adjusted for NP/OP) (95% CI)	CXR+ (N=289) n (%)	Non- Pneumonia cases (N=152) n (%)	aOR (95% CI)	aOR (also adjusted for NP/OP) (95% CI)
<i>B. pertussis</i>	6 (0.7)	3 (1.3)	0.52 (0.12, 2.24)	0.51 (0.08, 3.16)	4 (1.4)	1 (0.7)	0.69 (0.07, 7)	--
<i>C. pneumoniae</i>	9 (1.1)	3 (1.3)	0.68 (0.17, 2.74)	0.57 (0.12, 2.79)	3 (1)	1 (0.7)	1.05 (0.08, 13.25)	1.05 (0.08, 14.7)
<i>H. influenzae</i>	455 (54.6)	102 (43.4)	1.59 (1.15, 2.19)*	1.38 (0.91, 2.09)	145 (50.3)	66 (42.9)	0.91 (0.57, 1.46)	0.6 (0.33, 1.08)
<i>H. influenzae type b</i>	13 (1.6)	3 (1.3)	1.16 (0.31, 4.31)	1.54 (0.37, 6.51)	9 (3.1)	5 (3.3)	0.73 (0.19, 2.75)	--
<i>M. catarrhalis</i>	507 (60.8)	156 (66.4)	0.83 (0.59, 1.15)	0.75 (0.48, 1.18)	0 (0)	1 (0.8)	0.75 (0.46, 1.2)	1.06 (0.58, 1.92)
<i>M. pneumoniae</i>	23 (2.8)	0 (0)	--	--	165 (57.3)	102 (66.2)	1.03 (0.15, 6.97)	0.96 (0.11, 8.52)
<i>Pneumocystis jirovecii</i>	66 (7.9)	16 (6.8)	1.22 (0.66, 2.25)	1.04 (0.5, 2.17)	5 (1.7)	3 (2)	1.62 (0.49, 5.32)	1.33 (0.28, 6.39)
<i>S. aureus</i>	103 (12.4)	38 (16.2)	0.63 (0.4, 0.99)*	0.81 (0.48, 1.4)	2 (0.7)	2 (1.3)	1.58 (0.61, 4.08)	1.73 (0.57, 5.2)
<i>S. pneumoniae</i>	591 (70.9)	166 (70.6)	1.01 (0.72, 1.42)	1.01 (0.61, 1.66)	28 (9.7)	4 (2.6)	0.94 (0.56, 1.57)	0.89 (0.45, 1.78)
<i>Salmonella species</i>	10 (1.2)	3 (1.3)	0.68 (0.16, 2.8)	0.64 (0.15, 2.66)	70 (24.3)	13 (8.4)	0.38 (0.04, 3.54)	0.19 (0.01, 3.01)
<i>Adenovirus</i>	113 (13.5)	34 (14.3)	0.68 (0.43, 1.06)	0.68 (0.38, 1.21)	36 (12.5)	24 (15.6)	0.72 (0.37, 1.41)	0.94 (0.41, 2.13)
<i>Bocavirus</i>	132 (15.8)	40 (17)	0.77 (0.5, 1.17)	0.79 (0.49, 1.27)	28 (9.7)	23 (14.9)	0.74 (0.37, 1.48)	0.69 (0.32, 1.45)
<i>CMV</i>	433 (51.7)	114 (48.1)	0.96 (0.7, 1.32)	0.88 (0.58, 1.33)	139 (48.3)	90 (58.4)	0.54 (0.33, 0.87)*	0.49 (0.27, 0.86)*
<i>Coronavirus 229E</i>	10 (1.2)	4 (1.7)	0.71 (0.21, 2.41)	0.39 (0.08, 1.89)	4 (1.4)	1 (0.7)	1.67 (0.17, 16.1)	1.93 (0.12, 31.88)
<i>Coronavirus OC43</i>	24 (2.9)	6 (2.6)	1.05 (0.41, 2.69)	1.47 (0.38, 5.63)	8 (2.8)	7 (4.6)	0.55 (0.17, 1.77)	1.98 (0.16, 24.45)
<i>Coronavirus NL63</i>	15 (1.8)	5 (2.1)	0.48 (0.15, 1.49)	0.38 (0.06, 2.19)	3 (1)	7 (4.6)	0.34 (0.08, 1.49)	0.34 (0.03, 4.53)
<i>Coronavirus HKU1</i>	18 (2.2)	4 (1.7)	1.13 (0.36, 3.53)	0.48 (0.11, 2.05)	5 (1.7)	4 (2.6)	0.49 (0.11, 2.16)	0.37 (0.05, 2.85)
<i>HMPV</i>	107 (12.8)	32 (13.6)	1.03 (0.66, 1.63)	0.65 (0.36, 1.19)	26 (9)	9 (5.8)	1.72 (0.72, 4.13)	0.89 (0.26, 3.04)
<i>Influenza A</i>	28 (3.4)	7 (3)	1.07 (0.45, 2.55)	0.86 (0.18, 4.22)	11 (3.8)	12 (7.8)	0.47 (0.17, 1.29)	0.32 (0.07, 1.48)
<i>Influenza B</i>	11 (1.3)	4 (1.7)	0.84 (0.25, 2.79)	--	4 (1.4)	7 (4.6)	0.52 (0.13, 1.97)	1.34 (0.11, 15.77)
<i>Influenza C</i>	3 (0.4)	2 (0.9)	0.31 (0.05, 2.11)	--	2 (0.7)	2 (1.3)	0.11 (0.01, 1.08)	0.12 (0.01, 2.99)
<i>Parainfluenza 1</i>	72 (8.6)	16 (6.8)	1.89 (1.01, 3.54)*	2.22 (0.94, 5.2)	3 (1)	2 (1.3)	4.6 (0.91, 23.34)	2.56 (0.11, 57.84)
<i>Parainfluenza 2</i>	14 (1.7)	2 (0.8)	2.25 (0.5, 10.11)	3.8 (0.65, 22.33)	12 (4.2)	2 (1.3)	0.87 (0.14, 5.38)	1.99 (0.2, 19.89)
<i>Parainfluenza 3</i>	60 (7.2)	15 (6.3)	1.01 (0.55, 1.85)	1.04 (0.4, 2.71)	5 (1.7)	2 (1.3)	1.45 (0.48, 4.32)	1.34 (0.3, 6.01)

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Parainfluenza 4	22 (2.6)	7 (3)	0.86 (0.35, 2.13)	0.48 (0.13, 1.76)	15 (5.2)	6 (3.9)	0.8 (0.15, 4.29)	0.23 (0.02, 2.6)
PV/EV	76 (9.1)	29 (12.2)	0.67 (0.41, 1.07)	0.71 (0.41, 1.24)	204 (70.8)	113 (73.4)	1.71 (0.83, 3.53)	3.25 (1.24, 8.49)*
Rhinovirus	172 (20.6)	55 (23.4)	0.74 (0.51, 1.06)	0.86 (0.54, 1.37)	33 (11.5)	14 (9.1)	0.9 (0.53, 1.52)	0.65 (0.33, 1.27)
RSV	209 (25)	47 (19.8)	1.82 (1.23, 2.67)*	0.81 (0.42, 1.53)	71 (24.7)	37 (24)	2.6 (1.31, 5.18)*	1.44 (0.4, 5.25)

Abbreviations: aOR, adjusted odds ratio; CXR+, chest x-ray positive; PV/EV, parechovirus/enterovirus; RSV, respiratory syncytial virus; CMV, cytomegalovirus; HMPV, human metapneumovirus.

The denominator was the number of children with available IS results for each pathogen. Some cases missing data for certain pathogens (<20 cases per pathogen).

CXR+ defined as radiographic evidence of pneumonia (consolidation and/or other infiltrates).

Non-pneumonia (Non-Pn) case defined as a case with a normal CXR, blood culture pathogen negative, and normal respiratory rate or non-hypoxic in the absence of crackles, or normal respiratory rate and non-hypoxic in the presence of crackles.

OR adjusted for age, sex, site and HIV status.

*p<.05 and **p<.002.

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Supplementary Table 5. Pathogens detected by PCR in nasopharyngeal/oropharyngeal specimens from non-pneumonia cases and controls

Pathogen	Non-Pn Cases N=573	Controls N=5325	Non-Pn Cases vs. Controls	
	n (%)	n (%)	aOR (95% CI)	P-Value
<i>B. pertussis</i>	3 (0.5)	11 (0.2)	3.04 (0.79, 11.69)	.11
<i>C. pneumoniae</i>	5 (0.9)	66 (1.3)	0.64 (0.25, 1.63)	.35
<i>H. influenzae</i>	277 (48.9)	2653 (51.2)	0.96 (0.80, 1.16)	.67
<i>H. influenzae</i> type b	12 (2.1)	89 (1.7)	1.37 (0.73, 2.58)	.33
<i>M. catarrhalis</i>	407 (71.9)	3812 (73.5)	0.63 (0.51, 0.78)	<.001**
<i>M. pneumoniae</i>	4 (0.7)	71 (1.4)	0.58 (0.21, 1.63)	.30
<i>Pneumocystis jirovecii</i>	24 (4.2)	395 (7.6)	0.45 (0.29, 0.70)	<.001**
<i>S. aureus</i>	87 (15.4)	711 (13.7)	1.43 (1.11, 1.85)	.006
<i>S. pneumoniae</i>	421 (74.4)	3973 (76.6)	0.76 (0.62, 0.94)	.01
<i>Salmonella</i> species	2 (0.4)	27 (0.5)	0.52 (0.12, 2.22)	.38
Adenovirus	65 (11.5)	609 (11.7)	1.32 (0.99, 1.76)	.06
Bocavirus	61 (10.8)	684 (13.2)	0.87 (0.65, 1.15)	.33
CMV	273 (48.3)	2787 (53.7)	0.90 (0.75, 1.08)	.27
Coronavirus 229E	5 (0.9)	55 (1.1)	0.79 (0.31, 2.03)	.63
Coronavirus OC43	13 (2.3)	204 (3.9)	0.57 (0.32, 1.02)	.06
Coronavirus NL63	16 (2.8)	161 (3.1)	0.89 (0.52, 1.51)	.66
Coronavirus HKU1	7 (1.2)	117 (2.3)	0.54 (0.25, 1.17)	.12
HMPV	41 (7.3)	212 (4.1)	1.63 (1.13, 2.35)	.01
Influenza A	20 (3.5)	59 (1.1)	3.32 (1.93, 5.69)	<.001*
Influenza B	16 (2.8)	31 (0.6)	4.07 (2.14, 7.72)	<.001*
Influenza C	3 (0.5)	31 (0.6)	0.79 (0.23, 2.66)	.70

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Parainfluenza 1	28 (5.0)	52 (1.0)	4.66 (2.83, 7.68)	<.001*
Parainfluenza 2	11 (2.0)	56 (1.1)	1.85 (0.94, 3.67)	.08
Parainfluenza 3	29 (5.1)	148 (2.9)	1.86 (1.22, 2.85)	.004
Parainfluenza 4	13 (2.3)	88 (1.7)	1.45 (0.79, 2.67)	.23
PV/EV	54 (9.6)	436 (8.4)	1.16 (0.85, 1.58)	.35
Rhinovirus	136 (24.1)	1088 (21.0)	1.17 (0.95, 1.45)	.14
RSV	78 (13.8)	145 (2.8)	5.94 (4.34, 8.12)	<.001*

Abbreviation: aOR, adjusted odds ratio; CI, confidence interval.

OR adjusted for age, sex, site and HIV status.

Non-pneumonia (Non-Pn) case defined as a case with a normal CXR, blood culture pathogen negative, and normal respiratory rate or non-hypoxemic in the absence of crackles, or normal respiratory rate and non-hypoxemic in the presence of crackles.

* Presence in Non-Pn cases is significantly greater than in controls (<.002).

** Presence in controls is significantly greater than in Non-Pn cases (<.002).

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