



Study of Influenza Disease Burden among Children in Suzhou, China

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Site presentation

The study was carried out in Suzhou University Affiliated Children Hospital (SCH) in Suzhou, China. Suzhou is a major city located in the southeast of Jiangsu Province in eastern China. It is one of the key cities in the Yangtze Delta, having an area of 8,488 km² and a population of approximately 12 million people. Suzhou consists of 5 municipal districts and 5 county-level cities. SCH is a comprehensive tertiary hospital for children, has a capacity of about 1000 beds. Annually, there are 560,000 outpatient visits including emergency visits and about 38,000 hospitalizations per year.

Since 2011, an enhanced surveillance on severe acute respiratory infection was carried out at SCH. These provided a strong support for this GIHSN project.

Methods

Inclusion

Pediatric patients (<14 years old) from respiratory wards with acute respiratory infection were included in the study, if they were residents in Suzhou or living in Suzhou longer than 6 months. In order to compare the differences between children in compliance with ILI definition (An acute respiratory infection with: measured fever of ≥ 38 C ; cough or sore throat ; with onset within the last 7 days) or not, we included all the children except they were excluded by the following criteria.

Exclusion criteria

- Institutionalized
- Non-resident or not belonging to the predefined population in Suzhou
- Hospitalized in the previous 30 days

Sample collection, management and laboratory procedures

A nasopharyngeal swab or aspirate was obtained from all enrolled children after obtaining informed consent.

All samples were aliquot in the SCH laboratory. Respiratory syncytial virus (RSV), Parainfluenza I,II,III, and Adenovirus were detected by direct immunofluorescence assay; Rhinovirus and Bocavirus were detected by PCR in SCH. Another aliquot was sending to Suzhou CDC's reference laboratory with cold chain within 6 hours, to detect influenza virus A(H1N1 and H3N2), and B(Yamagata, Victoria) by Real-time RT-PCR.

Data analysis

A descriptive analysis of the frequency of laboratory results by epidemiological week, age group, and comorbidities was conducted.

Results

A total of 1459 patients admitted to the respiratory wards in SCH with symptoms of respiratory infection were carefully screened. After opening the case report form, 193 patients were excluded because 120 patients were not residents in Suzhou, 3 patient was institutionalized, 70 patients were admitted to hospital for the same disease within 30 days, Finally, 1266 patients were included into data analysis. (Figure 1)

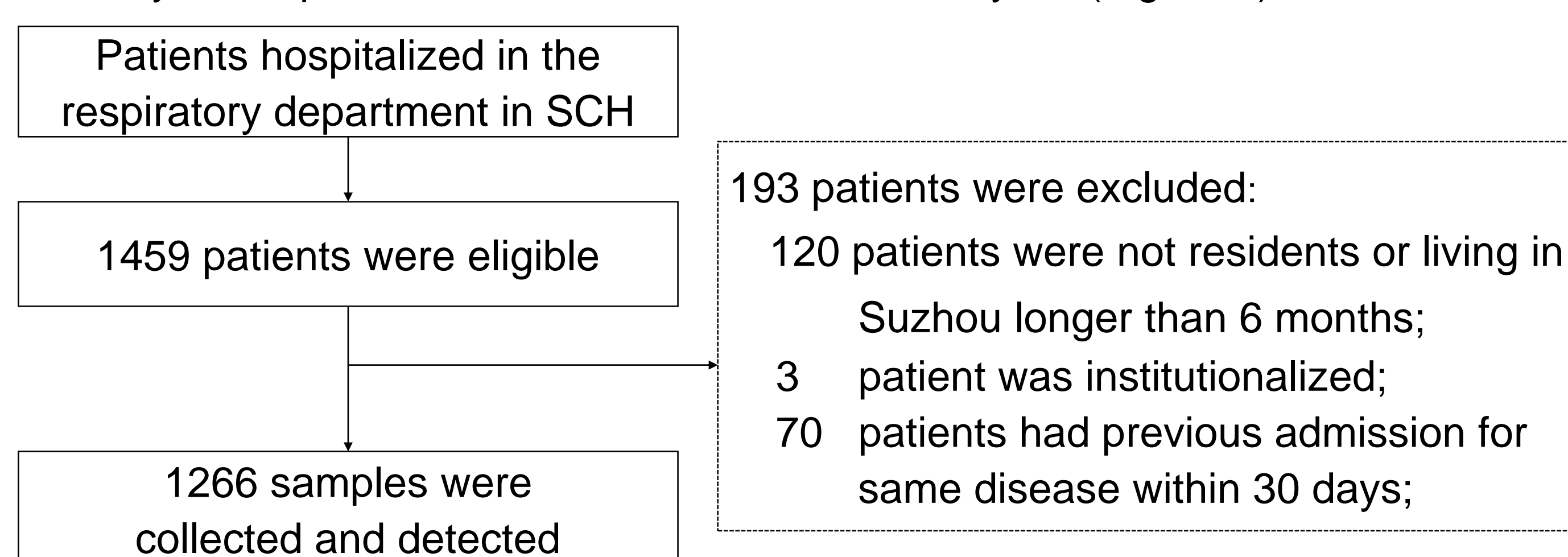


Figure 1. Screening, eligibility and enrollment of study subjects

Table 1. The population profile of enrolled children

	Total (N=1266)		Male (N=811)		Female (N=455)		χ^2	P value
	n	%	n	%	n	%		
Age group							13.33	0.001
≤6months	529	41.7	348	42.8	181	39.8		
~1 years	168	15.1	122	15.1	46	10.1		
~2 years	204	15.7	27	15.7	77	16.9		
~5 years	255	17.7	143	17.7	112	24.6		
~14 years	110	8.8	71	8.8	39	8.6		
Low birth weight	109	8.5	69	8.5	40	8.8	0.03	0.863
Breast feeding	706	55.6	458	56.5	353	54.5	0.46	0.499
Hospitalized in pre-12mons	218	17.2	153	18.9	65	14.3	4.29	0.038
Consultation in pre-3mons	415	32.8	262	32.3	153	33.6	0.23	0.631

Of the 1266 patients, 529 children (41.7%) were ≤6 months and 1156 children (91.2%) were ≤5 years old. The average age was 1.74 ± 2.18 years old and 811 patients were male. There are 109 children (8.5%) with low birth weight and 415 (32.8%) patients with previous hospitalization within 3 months. (Table 1)

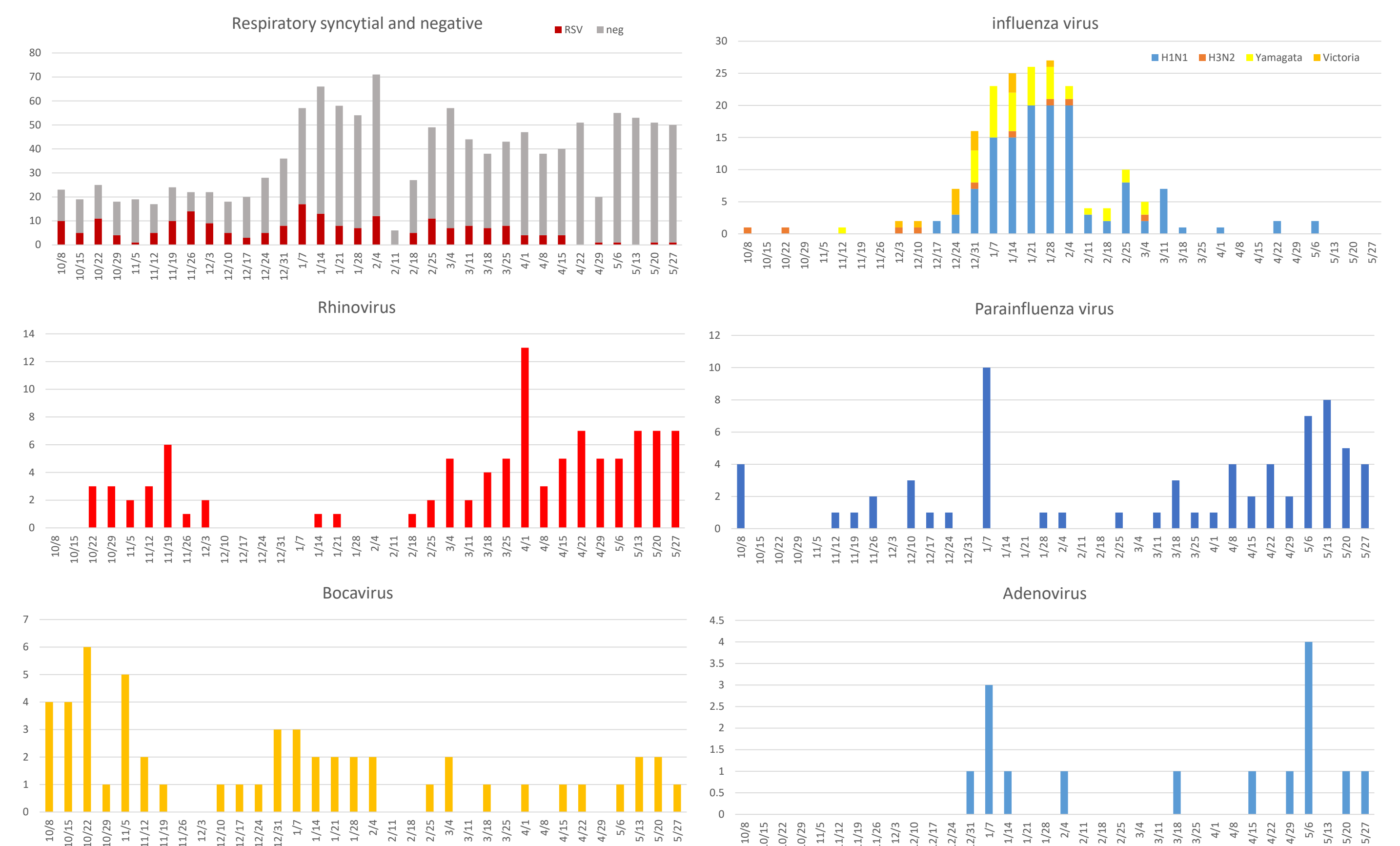


Figure 2 Respiratory Virus positive rate of included cases in SCH

Since October 2017 to May 2018, the influenza virus positive rate peaked in January. The most prevalent influenza virus was A/H1N1. No specimen was collected from February 12 to February 20 because of the Spring Festival holiday.

For other respiratory virus, RSV was the most prevalent virus (positive rate:16.5%), which peaked since October to March. The positive rate of Rhinovirus was 7.9% and the detection rate was relatively low between December and February. Parainfluenza virus had no seasonality trend at the study period. Peak incidence of HBoV infection alone appeared in October. Only 15 cases infected with Adenovirus were detected. (Figure 2)

Table 2. comparing the virus positive rates among children with ILI or not

	ILI (N=478)	NON-ILI (N=788)	P value
Influenza :			
A/H1N1	62(13.0)	68(8.6)	0.013
A/H3N2	6(1.3)	3(0.4)	0.073
B/Yamagata	24(5.0)	16(2.0)	0.003
B/Victoria	9(1.9)	4(0.5)	0.019
Respiratory syncytial virus	52(10.9)	157(19.9)	<0.001
Rhinovirus	38(7.9)	62(7.8)	0.958
Parainfluenza virus	20(4.2)	48(6.1)	0.145
Bocavirus	26(5.4)	27(3.4)	0.083
Adenovirus	5(1.1)	10(1.3)	0.126

When comparing the positive rates among children with ILI or not, there were significant differences across influenza and RSV ($p<0.001$). As for the rhinovirus, parainfluenza virus, bocavirus and adenovirus, the differences were not statistically significant among children that were admitted more or less than seven days from the onset ($P>0.05$). (Table 2)

Table 3. The positive rate of children that were admitted more or less than seven days from the onset

	The interval from onset to admission		
	0~7days (N=853)	8days~ (N=413)	P value
Influenza :			
A/H1N1	64(7.5)	66(16.0)	<0.001
A/H3N2	7(0.8)	2(0.5)	0.504
B/Yamagata	25(3.0)	15(3.6)	0.504
B/Victoria	10(1.2)	3(0.7)	0.461
Respiratory syncytial virus	186(21.9)	22(5.3)	<0.001
Rhinovirus	68(8.0)	32(7.8)	0.890
Parainfluenza virus	34(4.0)	34(8.2)	0.002
Bocavirus	40(4.7)	13(3.2)	0.199
Adenovirus	7(0.8)	8(1.9)	0.085

The positive rate of influenza and RSV ($p<0.001$) among children admitted more or less than 7 days from the onset were significant different. (Table 3)

Key aspects & challenges

- In 2017-2018 influenza season, the average positive rate of influenza virus was 12.5% in Suzhou, China. In this season, the dominant prevalent virus was influenza A/H1N1, which peaked in January.
- The vaccination rate of influenza vaccine is low, it's hard to estimate the VE because the number of cases is too small.
- To identify more influenza infective cases, we improved our surveillance system and the workload increased. In addition, it took us more than one month to complete the case report form, which leads to delay in uploading data online.

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