



Study of Influenza Disease Burden among Children in Eastern China

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Site presentation

The study 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. The 5 municipal districts were defined as Suzhou downtown and selected as study districts in this study. 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 there are about 38,000 hospitalizations per year. Since 2011, an enhanced surveillance on severe acute respiratory infection was carried out SCH. These provided a strong support for this GIHSN project.

Methods

Inclusion

Pediatric patients (<14 years old) were included in the study if they with acute process, referred a seven days or less antecedent of a community onset of influenza infection (ICD-10), and were residents in Suzhou or living in Suzhou longer than 6 months.

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 for all enrolled children (less than 14 years old) was obtained if they comply with inclusion criteria and were given informed consent. All samples were kept at -80°C refrigerator until sending to Suzhou CDC's reference laboratory. Real-time RT-PCR was performed on the samples to detect the presence of influenza A(H1N1 and H3N2), influenza B(B/Yamagata, B/Victoria). Respiratory syncytial virus (RSV), Parainfluenza I,II,III, and Adenovirus were detected by direct immunofluorescence assay; Rhinovirus and Bocavirus were detected by PCR in the SCH laboratory.

Data analysis

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

Results

A total of 1264 patients admitted to the respiratory wards in SCH with symptoms of respiratory infection were carefully screened. After opening the case report form, 549 patients were excluded because: 180 patients were not residents in Suzhou, 1 patient was institutionalized, 65 patients had previous admission for same disease within 30 days, 300 patients had initial symptoms before seven days prior to admission, 3 patients' parents refused to participate. And then 30 patients were not sampled. Finally, 685 patients were included into data analysis. (Figure 1)

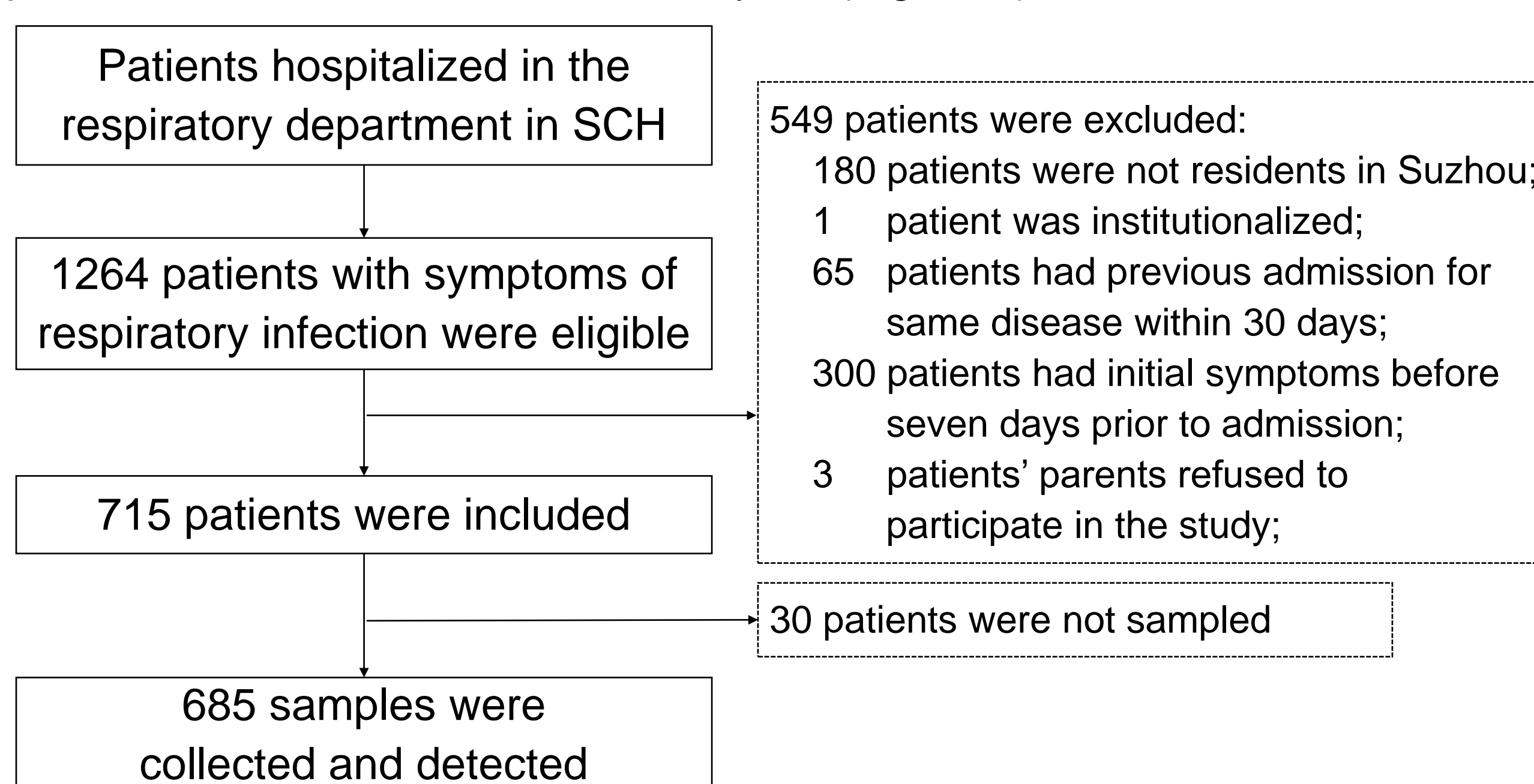


Figure 1. Screening, eligibility and enrollment of study subjects

Table 1. The population profile of enrolled children

	Total (N=685)		Male (N=419)		Female (N=267)		χ^2	P
	n	%	n	%	n	%		
Age group							10.171	0.038
≤6months	283	41.3	169	40.4	114	42.7		
~1 years	91	13.3	62	14.8	29	10.9		
~2 years	93	13.6	66	16.0	26	9.7		
~5 years	146	21.3	80	19.1	66	24.7		
~14 years	72	10.5	40	9.6	32	12.0		
Low birth weight	62	9.1	32	7.7	30	11.2	2.537	0.111
Breast feeding	380	55.5	223	53.3	157	58.8	1.961	0.161
Hospitalized in 12mons	187	27.3	118	28.2	69	25.8	0.468	0.538
Consultation in 3mons	620	90.5	379	90.7	241	90.3	0.032	0.859

Of the 685 patients, 283 children (41.3%) were ≤6 months and 613 children (89.5%) were ≤5 years old. The average age was 1.88±2.44 years old and 419 patients were male. There are 62 children (9.1%) with low birth weight and 187 patients with previous hospitalization within 3 months. (Table 1)

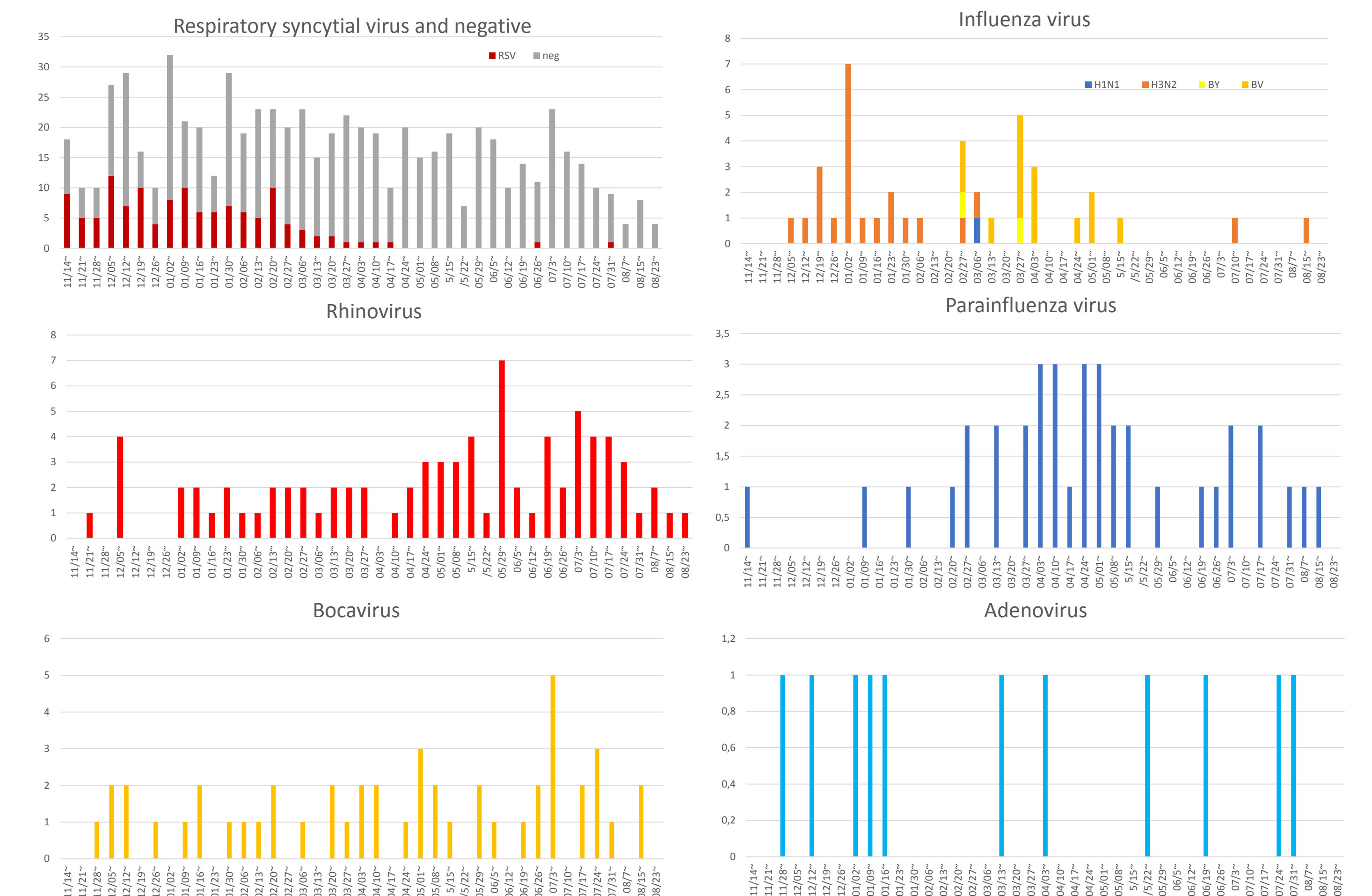


Figure 2 Respiratory Virus positive rate of acute respiratory infection cases in SCH

Since November 2016 to August 2017, the influenza virus positive rate peaked in January. The most prevalent influenza virus was A/H3N2 and B/Victoria. No specimen was collected during the week of 30th January because of the Spring Festival holiday.

For other respiratory virus, RSV was the most prevalent virus (positive rate:18.7%), which peaked since November to March. The positive rate of Rhinovirus was 11.8% and prevalent during the whole surveillance period. While parainfluenza virus was prevalent at April 2017. Bocavirus had no seasonality trend at the study period. Only 12 cases infected with Adenovirus were detected. (Figure 2)

Table 2. The characteristic of influenza positive and negative children

	Influenza virus		
	Positive (N=40)	Negative (N=645)	P
Gender : Male	20(50.0)	398(61.7)	0.141
Female	20(50.0)	247(38.3)	
Age group: ≤6 months	6(15.0)	282(43.7)	0.002
~1 year	10(25.0)	81(12.6)	
~2 years	4(10.0)	88(13.6)	
~5 years	13(32.5)	131(20.3)	
~14 years	7(17.5)	63(9.8)	
low birth weight	2(5.0)	60(9.3)	0.126
Breast-feeding	27(67.5)	352(54.6)	0.111
Polypnea	3(7.5)	109(16.9)	0.118

When comparing the characteristics of influenza positive and negative cases, there were significant differences across age groups (p=0.002). As for the gender distribution, breast-feeding, low birth weight and polypnea, the differences were not statistically significant among influenza positive and negative patients (P>0.05). (Table 2)

Key aspects & challenges

- For the 2016-2017 influenza season, the influenza virus was epidemic year-around with peak in January and March in Suzhou, China. The dominant prevalent virus was A/H3N2 and B/Victoria. While the positive rate of influenza virus was only 5.8% of the study period, even at the prevalent period, the positive rate was only 8.6%. These were lower than our expectation. Thus the vaccine effectiveness estimation can't be completed because the small sample size.
- The RSV was the most common detected respiratory virus in Suzhou, and with a single peak in winter and early spring.

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