



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's Hospital (SCH) in Suzhou, China. Suzhou is a major city located in the southeast of Jiangsu Province in eastern China. It has an area of 8,488 km² and a population of approximately 12 million people. 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.

Methods

Inclusion

Pediatric patients (<14 years old) from respiratory wards with acute respiratory infection were included in the study. We included all the children except they were excluded by the following criteria.

Exclusion criteria

Institutionalized 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. Logistic regression was used to calculate odds ratios, comparing the odds of virus positive between patients with and without certain kind of clinic symptoms, controlling for demographics and timing of sample relative to disease onset.

Results

Of the 1886 patients, 692 children (36.6%) were ≤6 months and 1654 children (87.5%) were ≤5 years old. The average age was 2.10±2.46 years old and 1103 patients were male. There are 111 children (5.9%) with low birth weight and 302(16.0%) patients with previous hospitalization within 3 months. A total of 15 (1.4%) patients were vaccinated during current influenza seasons. (Table 1)

Table 1. The population profile of enrolled children

Characteristic	Total		Male		Female		χ ²	P value
	n	%	n	%	n	%		
Age group								
≤6months	692	36.6	436	37.9	256	34.6	39.90	<0.001
~1 years	261	13.8	176	15.3	85	11.5		
~2 years	260	13.8	183	15.9	77	10.4		
~5 years	441	23.3	243	21.1	198	26.8		
~14 years	236	12.5	112	9.7	124	16.8		
Low birth weight	111	5.9	65	5.7	46	6.2	0.23	0.608
Breast feeding	1126	59.8	700	61.1	426	57.8	4.81	0.090
Hospitalized in pre-12mons	202	10.7	111	9.6	91	12.3	3.30	0.068
Consultation in pre-3mons	302	16.0	200	17.4	102	13.8	4.33	0.037
Influenza vaccine	53	2.8	29	2.5	24	3.2	0.86	0.325
Influenza vaccine in this season	15	0.8	7	0.6	8	1.1	1.28	0.258

Table2. the positive rates of the virus with different characteristic (95%CI)

Characteristic	Influenza		RSV		Parainfluenza		Rhinovirus		Bocavirus	
	COR ^a	AOR ^b	COR ^a	AOR ^b	COR ^a	AOR ^b	COR ^a	AOR ^b	COR ^a	AOR ^b
Age										
≤6months	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
~1 years	2.0(1.4-3.1)	1.5(1.2-2.3)	0.5(0.3-0.7)	0.6(0.4-0.8)	1.0(0.7-1.4)	0.9(0.6-1.3)	1.2(0.7-2.1)	1.4(0.8-2.4)	1.7(0.9-3.4)	1.5(0.7-3.1)
~2 years	2.4(1.6-3.5)	1.6(1.2-2.4)	0.4(0.3-0.6)	0.5(0.4-0.8)	0.9(0.6-1.3)	0.8(0.5-1.1)	1.2(0.7-2.0)	1.4(0.8-2.4)	2.3(1.2-4.3)	2.0(1.0-3.9)
~5 years	1.9(1.4-2.8)	1.2(0.8-1.7)	0.3(0.2-0.5)	0.5(0.3-0.7)	0.8(0.6-1.1)	0.6(0.5-0.9)	1.7(1.1-2.6)	2.1(1.3-3.2)	1.6(0.9-2.9)	1.4(0.8-2.7)
~14 years	1.4(0.9-2.1)	0.6(0.4-1)	0.1(0-0.1)	0.1(0.1-0.2)	1.0(0.7-1.5)	0.7(0.5-1.1)	1.1(0.6-1.9)	1.6(0.9-2.8)	1.1(0.5-2.4)	1.1(0.5-2.5)
Interval(days)										
≤3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
4~7	1.8(1.3-2.5)	1.7(1.2-2.4)	0.7(0.6-1)	0.8(0.6-1.1)	1.8(1.3-2.4)	1.7(1.3-2.4)	0.3(0.1-0.4)	0.3(0.2-0.5)	0.4(0.2-0.8)	0.4(0.2-0.8)
8~10	2.8(1.8-4.2)	2.6(1.7-3.9)	0.5(0.3-0.8)	0.6(0.4-1.0)	2.1(1.4-3.1)	2.0(1.3-2.9)	0.4(0.2-0.8)	0.5(0.2-0.9)	0.9(0.4-1.9)	0.9(0.4-2.0)
11~	1.6(1.1-2.3)	1.6(1.1-2.3)	0.4(0.3-0.6)	0.5(0.3-0.7)	0.9(0.6-1.2)	0.9(0.6-1.3)	1.1(0.8-1.6)	1.1(0.8-1.6)	1.6(1.0-2.7)	1.6(1.0-2.7)
fever	3.8(2.7-5.3)	3.1(2.2-4.4)	0.4(0.3-0.5)	0.6(0.5-0.8)	1.5(1.2-1.9)	1.6(1.2-2.1)	0.6(0.4-0.8)	0.5(0.4-0.8)	1.2(0.8-1.9)	1.2(0.7-1.9)
Rhinorrhoea	0.9(0.7-1.2)	0.9(0.7-1.2)	1.3(1.0-1.7)	1.2(0.9-1.5)	1.0(0.8-1.3)	1.0(0.8-1.4)	1.1(0.8-1.6)	1.1(0.8-1.5)	1.2(0.8-1.9)	1.2(0.8-1.9)
polypnea	0.3(0.1-0.6)	0.5(0.2-1.1)	2.7(1.9-3.9)	1.7(1.2-2.6)	0.5(0.3-0.9)	0.6(0.3-1.0)	2.0(1.2-3.2)	1.6(0.9-2.6)	1.5(0.7-3.0)	1.4(0.6-2.9)
breathless	0.5(0.4-0.7)	0.6(0.5-0.8)	2.7(2.1-3.4)	2.0(1.5-2.6)	0.8(0.6-1.0)	0.9(0.7-1.2)	1.4(1-1.9)	1.1(0.8-1.6)	1.4(0.9-2.2)	1.3(0.8-2.2)

Key aspects & challenges

- In 2018-2019 influenza season, the average positive rate of influenza virus was 14.% in Suzhou, China. In this season, the dominant prevalent virus was influenza A/H1N1.
- The major challenge is the vaccination rate of influenza vaccine, it's hard to estimate the VE because the number of cases is too small.

Since October 2018 to April 2019, the influenza virus epidemic since January, and positive rate peaked in January to March. The most prevalent influenza virus was A/H1N1 before March and the prevalent strains became B/Yamagata in March. No specimen was collected from February 4 to February 10 because of the Spring Festival holiday. (Figure1)

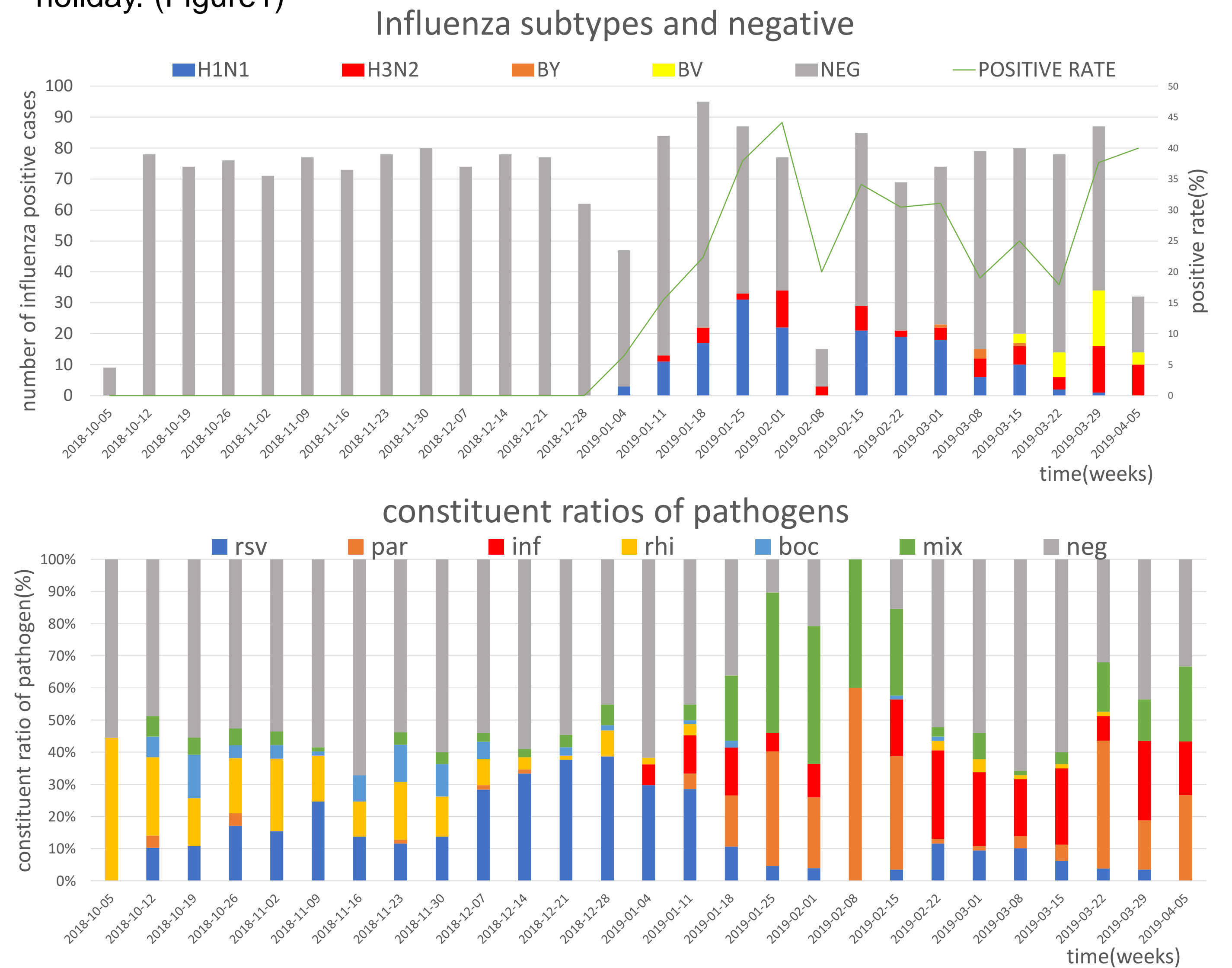


Figure 1 Respiratory Virus positive rate of included cases in SCH

The positive rates of influenza and RSV differed by age and timing of sample relative to disease onset. Younger patients were more likely to be infected with RSV and children from 1 to 2 years old had the highest positive rate of influenza (20.4%,95%CI:17.9-22.9). Compared with patients without fever, fever cases had higher positive rate of influenza but lower of RSV. The adjusted odds ratio comparing the odds of influenza among those febrile patients with those patients without fever was 3.8(95%CI:2.7-5.3). While children with polypnea and breathless had a higher rate of RSV but lower rate of influenza (table2,3).

Table3. the positive rates of the virus with different characteristic(95%CI)

Characteristic	Influenza	RSV	Parainfluenza	rhinovirus	Bocavirus
Age					
≤6months	9.7(8.6-10.8)	30.6(28.9-32.4)	18.2(16.7-19.7)	7.2(6.2-8.2)	3.2(2.5-3.8)
~1 years	18(15.6-20.4)	17.6(15.3-20)	18.0(15.6-20.4)	8.8(7.1-10.6)	5.4(4.0-6.8)
~2 years	20.4(17.9-22.9)	16.5(14.2-18.8)	16.9(14.6-19.3)	8.5(6.7-10.2)	6.9(5.3-8.5)
~5 years	17.2(15.4-19)	13.2(11.5-14.8)	14.7(13.0-16.4)	11.8(10.3-13.3)	5.0(4.0-6.0)
~14 years	12.7(10.5-14.9)	3.0(1.9-4.1)	18.2(15.7-20.7)	8.1(6.3-9.8)	3.4(2.2-4.6)
Interval(days)					
≤3	9.9(8.7-11)	25.3(23.6-26.9)	13.9(12.6-15.2)	11.7(10.4-12.9)	4.7(3.9-5.5)
4~7	16.4(14.8-17.9)	19.8(18.1-21.4)	22.4(20.7-24.2)	3.2(2.5-3.9)	1.8(1.2-2.3)
8~10	23.5(20.4-26.5)	14.3(11.8-16.8)	25.0(21.9-28.1)	5.1(3.5-6.7)	4.1(2.7-5.5)
11~	14.9(13.2-16.6)	12.3(10.7-13.8)	12.3(10.7-13.8)	12.9(11.4-14.5)	7.5(6.2-8.7)
fever	20.1(18.9-21.3)	13.0(12.0-14.0)	19.4(18.2-20.6)	6.9(6.1-7.6)	4.7(4.1-5.4)
Rhinorrhoea	13.5(12.1-14.8)	22.2(20.5-23.8)	17.4(15.9-18.9)	9.5(8.3-10.6)	5.0(4.2-5.9)
polypnea	4.8(3.0-6.6)	37.0(33.0-41.0)	9.6(7.1-12.0)	15.1(12.1-18)	6.2(4.2-8.2)
breathless	9.6(8.5-10.7)	28.8(27.2-30.5)	15.3(14.0-16.6)	10.4(9.3-11.5)	5.4(4.6-6.2)

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Funding: This study was supported by FISABIO, SINO-US collaborative program on Emerging and Re-emerging Infectious Diseases [5U2GGH000018].