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## Site presentation

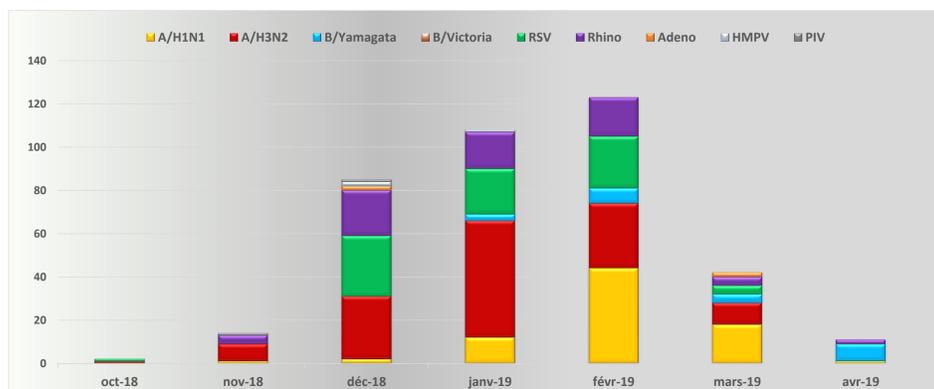
Hospital-based surveillance for severe acute respiratory infection (SARI) cases was established in SKIMS on November 2015. Sheri Kashmir Institute of Medical Sciences is the apex tertiary care center cum referral center in capital Srinagar of the northern most Indian state of Jammu and Kashmir. The institute is an 800 plus bedded facility which is the main referral center and caters to the whole of the Kashmir valley. The Influenza laboratory of SKIMS caters to the hospital needs and apart from surveillance activities also provides outbreak investigation facilities to the state. The SKIMS Influenza lab, employs one scientist (Mr Hyder Mir), two technicians (Ms Masooma Showkat and Mr Mubashir Khan).

## Methods

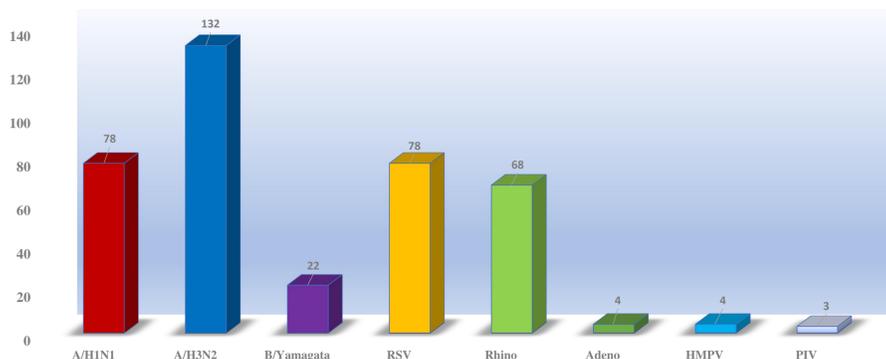
During the study period from October 2018 till April 2019, all inpatients with suspected respiratory infections who were admitted overnight to the study hospitals were screened daily. If a patient met the European Center for Disease Control (ECDC) ILI case definition, a respiratory specimen was tested for influenza and other respiratory pathogens. A case report form captured demographics, history of presenting illness, co-morbidities, disease course and outcome. Nasal and throat swabs were tested on real-time RT PCR to access the prevalence of influenza and other respiratory viruses.

## Results

- From October 2018 to April 2019, a total of 1029 patients with suspected respiratory infections were assessed. Of these, 998 (97%) met the ECDC- ILI case definition and were included in the study.
- Of the 998 recruited cases, 479 (48%) were male. Children aged less than 5 years accounted for 4.4% (n=44) of the eligible patients.
- Of the 998 samples tested, 357 were positive for any virus including 329 single infection and 28 mixed infection.
- Influenza A was the predominant virus detected in 205 (12.6%) [A/H1N1=78; A/H3N2=132] cases followed by RSV (n=78, 7.8%), Rhino virus (n=68, 6.8%), B/Yamagata (n=20, 2%), Adenovirus (n=4, 0.4%), HMPV (n=3, 0.3%) and PIV (n=2, 0.2%).
- Patients without co-morbidities accounted for about 29.2% of the admissions whereas 31% of the patients had ≤ 2 co-morbidities and 34% had > 2 morbidities.
- All influenza positive patients were prescribed antivirals consisting in oseltamivir in all and a combination of oseltamivir and nitazoxanide in 50 cases.
- The vaccination rate among the patients was found to be 0.7%.
- A total of 184 deaths were observed during the study period of whom 57 were among those with positive viral infections that included in patients positive for one or more respiratory pathogen which included A/H1N1 (n=11), A/H3N2 (n=13), influenza B (n=5), RSV (n=14), PIV (n=01), Rhino (n=20) with 9 patients having co-infections. Influenza detection was the commonest among the deceased patients.



**Fig 1. Srinagar-India: Monthly distribution of respiratory pathogens among hospitalized patients**



**Figure 2: Distribution of individual viruses among hospitalized patients**

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**Table.1 Characteristics of study patients vs RT PCR results**

	Virus Positive (n=358)	Virus Negative (n=640)
Males	170 (47.5)	309 (48.3)
Females	188 (52.5)	331 (51.7)
<b>Symptoms</b>		
Fever	357 (99.7)	638 (99.6)
Malaise	323 (90.2)	615 (96.0)
Headache	217 (60.6)	362 (56.5)
Myalgia	227 (63.4)	390 (61.0)
Cough	328 (91.6)	619 (96.7)
Sore throat	256 (71.5)	392 (61.2)
Breathlessness	306 (85.4)	595 (92.9)
<b>Number of underlying co-morbidities</b>		
0	130 (36.3)	162 (25.3)
1-2	91 (25.4)	219 (34.2)
>2	105 (29.3)	235 (36.7)
<b>Underlying Co-morbidities</b>		
Cardiovascular disease	152 (42.4)	344 (53.7)
COPD	62 (17.3)	157 (24.5)
Asthma	3 (0.83)	3 (0.46)
Diabetes	58 (16.2)	117 (18.2)
Chronic renal disease	23 (6.4)	36 (5.6)
Chronic neuromuscular disease	0	8 (1.2)
Chronic liver disease	2 (0.55)	3 (0.46)
Rheumatologic disease	0	3 (0.46)
Immunocompromised	31 (8.6)	72 (11.2)
<b>Hospitalizations in past 12 months</b>		
0	308 (86)	522 (81.5)
1	31 (8.6)	80 (12.5)
≥2	19 (5.3)	38 (5.9)
Anti-virals	57 (15.9)	102 (16)
Influenza vaccination	6 (1.6)	1 (0.15)
<b>Pregnancy status</b>		
Pregnant females	10 (2.7)	1 (0.15)
ICU admissions	36 (10)	97 (15.1)
Mechanical Ventilation	34 (9.4)	68 (10.6)
In-hospital Deaths	57 (16)	127 (19.8)

## Key aspects & challenges

### Keys aspects:

- The SKIMS influenza lab conducts surveillance for influenza and other respiratory viruses and is the sole testing laboratory in the state of Jammu and Kashmir.
- The lab apart from routine surveillance has been catering to the influenza outbreaks in the valley.
- Sequencing performed by Prof. Bruno's lab revealed the phylogenetic relationship of the detected viruses with other GIHSN sites in the network (data available from Prof. Lina Bruno)

### Challenges:

- The funds for the surveillance if possible need to be increased so that we can extend our surveillance of all respiratory viruses.

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