WELCOME TO THE GIHSN 10TH ANNUAL MEETING!
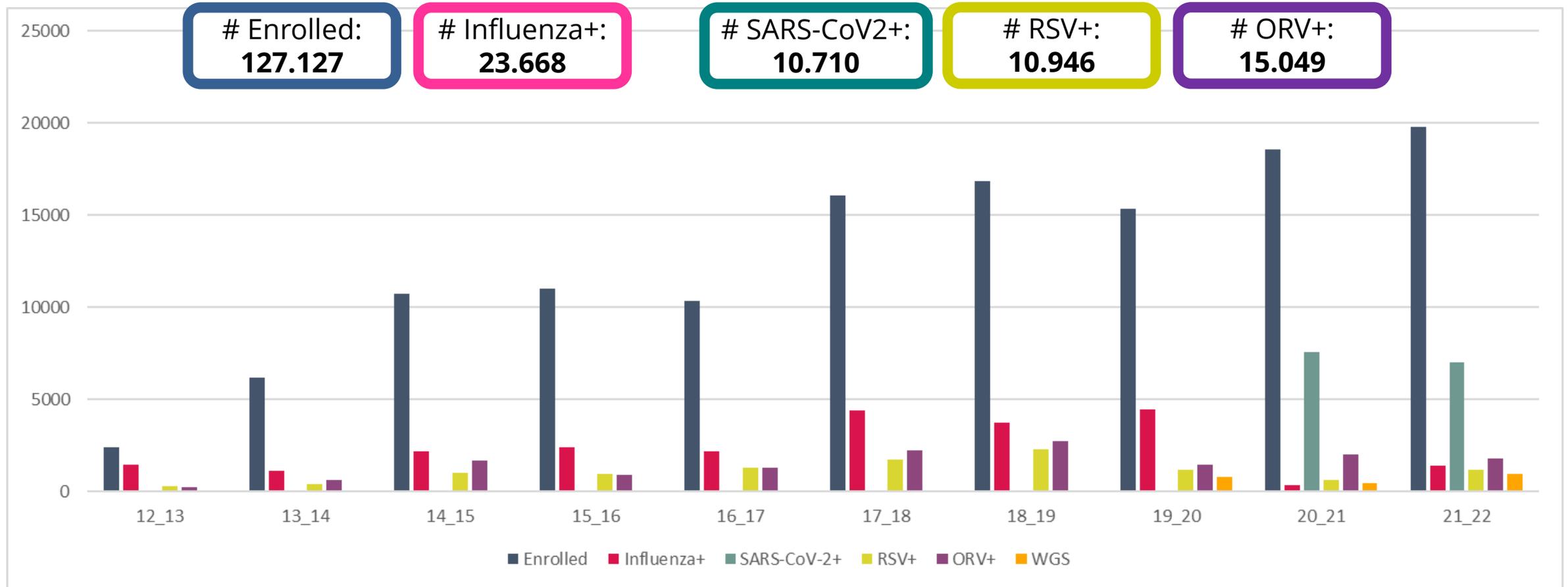
20 SITES WORLDWIDE CONTRIBUTING DATA BASED ON A CORE PROTOCOL AND CONSISTENT CASE DEFINITIONS
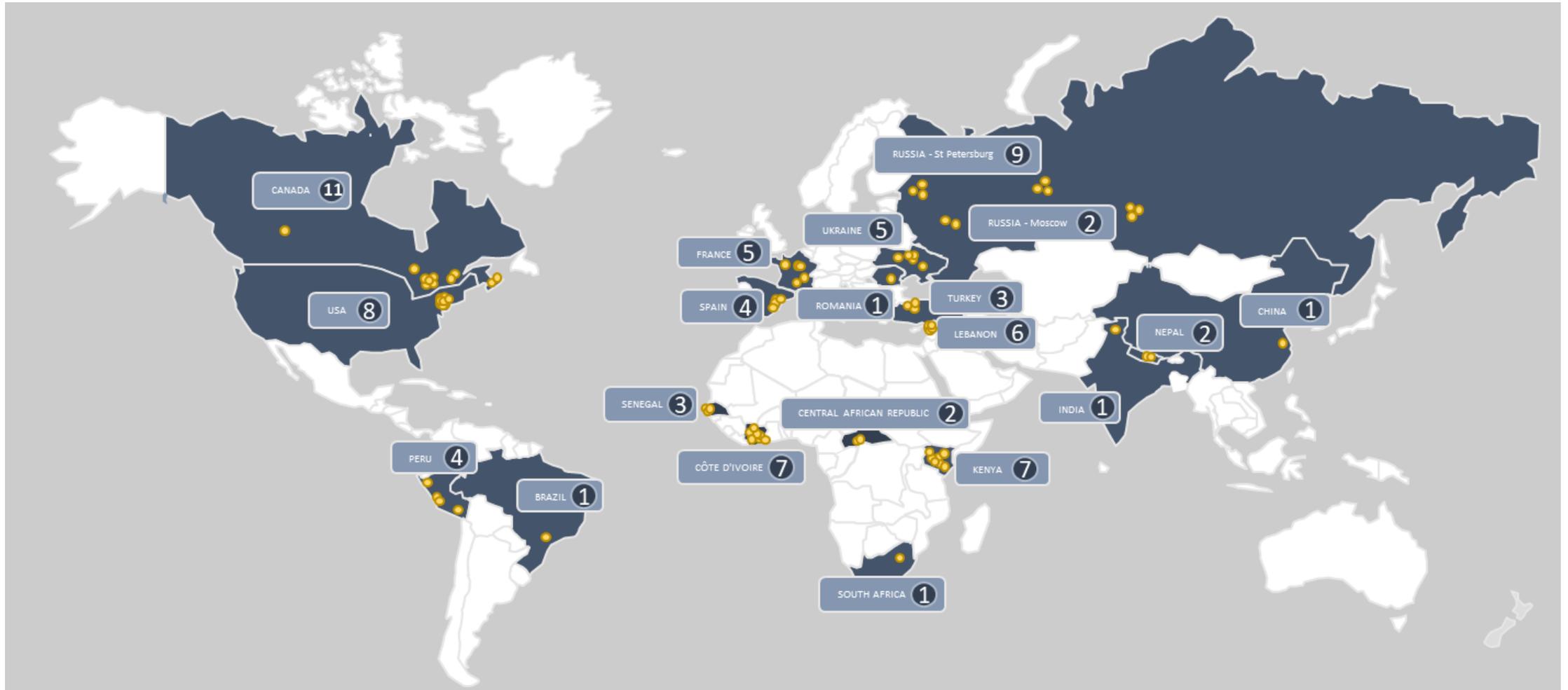
10 YEARS OF GLOBAL, PATIENT-LEVEL DATA ON SEVERE, INFLUENZA-LIKE ILLNESS

| # Enrolled: 127.127 | # Influenza+: 23.668 | # SARS-CoV2+: 10.710 | # RSV+: 10.946 | # ORV+: 15.049 |

Legend: Enrolled, Influenza+, SARS-CoV-2+, RSV+, ORV+, WGS

Years: 12_13, 13_14, 14_15, 15_16, 16_17, 17_18, 18_19, 19_20, 20_21, 21_22
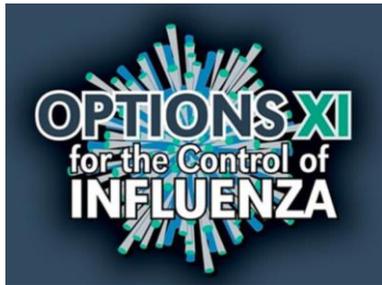
LINKING CLINICAL OUTCOMES & VIRUS GENOME SEQUENCING

| # WGS: 2.210 |

CONTRIBUTING TO A BETTER UNDERSTANDING OF INFLUENZA & ORV CIRCULATION AND IMPACT

AN EMPOWERED SCIENTIFIC COMMUNITY

THANK YOU!

Let's continue together and bring the network to the next level!

18 OCTOBER: REGION SPECIFIC SESSION 2 - AGENDA

<u>TUESDAY 18th OCT</u> 2pm - 5pm CET: REGION SPECIFIC SESSION 2*

Time	Session	Speaker
2:00 - 2:05	**Welcome & Introduction to the Session**	C Commaille-Chapus
2:05 - 2:15	**GIHSN 10th Anniversary: Update & Perspectives**	C Mahe L Torcel-Pagnon
2:15 - 2:25	**GIHSN Seasonal Results 2021_22: Overview**	C Commaille-Chapus B Lina
2:25 - 3:25	**GIHSN Seasonal Surveillance 2021_22 by site** *Presentation by each site and discussion*	Site investigators
3:25 - 3:35	**Coffee break**	
3:35 - 4:35	**GIHSN Seasonal Surveillance 2021_22 by site (cont'd)** *Presentation by each site and discussion*	Site investigators
4:35 - 4:45	**GIHSN 2022_23: Selected Sites & Protocol Highlights** (Year-round surveillance, Case definition, Sampling & testing strategy ...) *Presentation & discussion*	L Torcel Pagnon S Chaves
4:45 - 4:55	**Publication/Congress Update** *Presentation & discussion*	S Chaves
4:55 - 5:00	**Closing**	

SITES SESSION 2

Brazil
Peru
Lebanon
Turkey
Ukraine
Romania
Spain
France
Canada
USA

UPDATES

Global Influenza Hospital
Surveillance Network
10-YEAR ANNIVERSARY

The GIHSN offers a **capable surveillance platform** and an effective **Public-private partnership community**

- Empowered and motivated sites combining existing surveillances with capacity building

- Expanding the severe respiratory diseases surveillance beyond Flu to account for virus circulation interconnexion (SARS-COV2, RSV and ORV)

- Increasing virus genome sequencing capacity and linkage with clinicals outcome

- Leveraging the scientific community and historical dataset (publications/congress, research projects)

- Welcoming more partners to support the Foundation (Abbott)

- Engaging with key stakeholders and networks (WHO, IVI, APDC)

Global Influenza
Hospital Surveillance
Network

SHORT TERM PERSPECTIVES

➢ Ensure network sustainability and lean sites selection process
  - 3 years collaboration offer to relevant sites with annual grants

➢ Support network expansion
  - Develop synergies with other networks to cover the 18 WHO Influenza transmission Zones

➢ Reinforce scientific collaboration and exchanges
  - Monthly communication, sites meeting, face to face annual meeting (Spring-summer 2023)

➢ Increase visibility of the GIHSN and transparency of the foundation activities
  - Annual report presenting scientific activities and financial status (available in January 2023)

Global Influenza Hospital Surveillance Network

OVERVIEW OF THE GIHSN COHORT 2021_22
(PRELIMINARY DATA AS OF 15 OCT 2022)
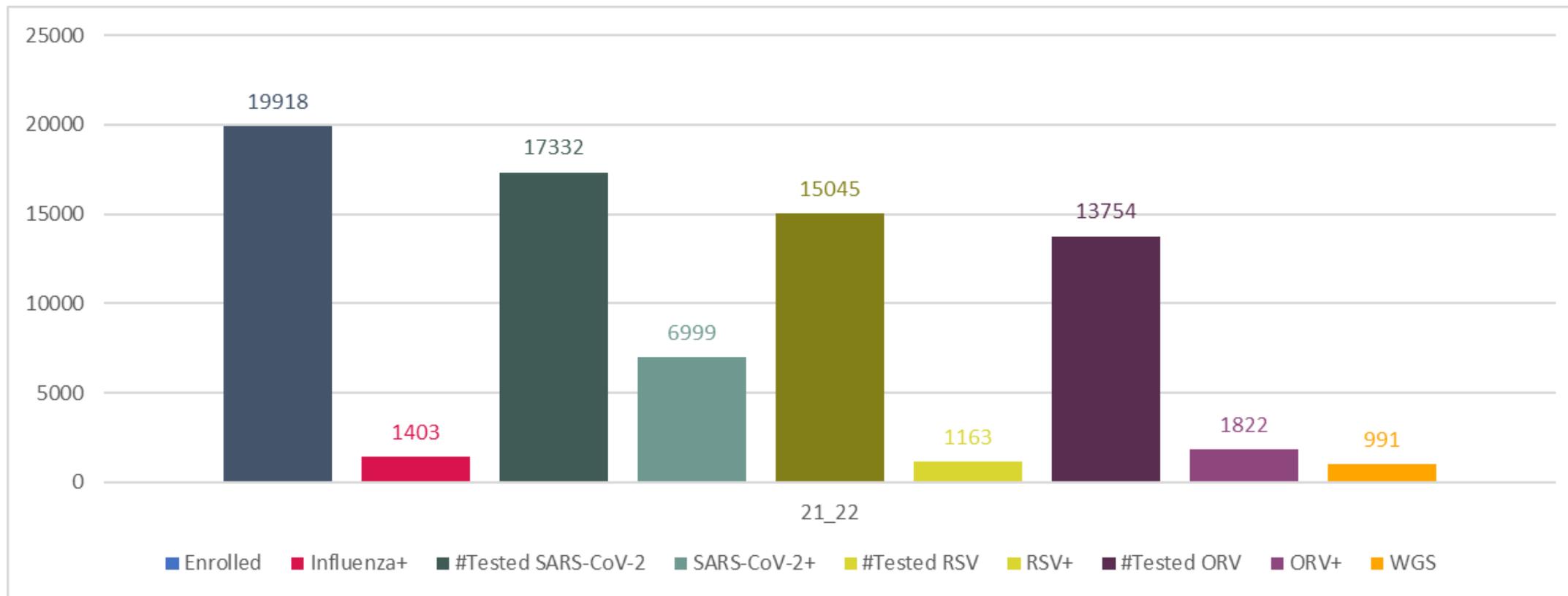
VIRUSES TESTED (2021_22)

Country	Influenza	SARS-CoV2	RSV	HCoV	HMPV	AdV	HBoV	HPIV	RhV	ORV
Africa										
Kenya	■	■								
Côte d'Ivoire	■	■	■	■	■			■		
Senegal	■	■	■	■	■	■	■	■	■	■
Central African Republic										
South Africa	■	■	■		■					
Asia/Pacific										
China										
India	■									
Nepal	■	■								
Middle East										
Turkey	■	■	■	■	■	■	■	■	■	■
Lebanon	■	■	■			■		■		■
Eurasia										
Russia - St Petersburg	■	■	■	■	■	■	■	■	■	
Russia - Moscow	■	■	■	■	■	■	■	■	■	■
Ukraine	■	■	■		■	■		■		
Spain	■	■	■	■	■	■	■	■	■	■
Romania	■	■	■	■	■	■	■	■	■	
France	■	■	■	■	■	■		■	■	■
North America										
Canada	■	■	■	■	■	■		■	■	■
USA	■	■								
South America										
Brazil	■	■	■	■	■	■	■	■	■	■
Peru	■	■	■		■	■				■

Global Influenza Hospital Surveillance Network
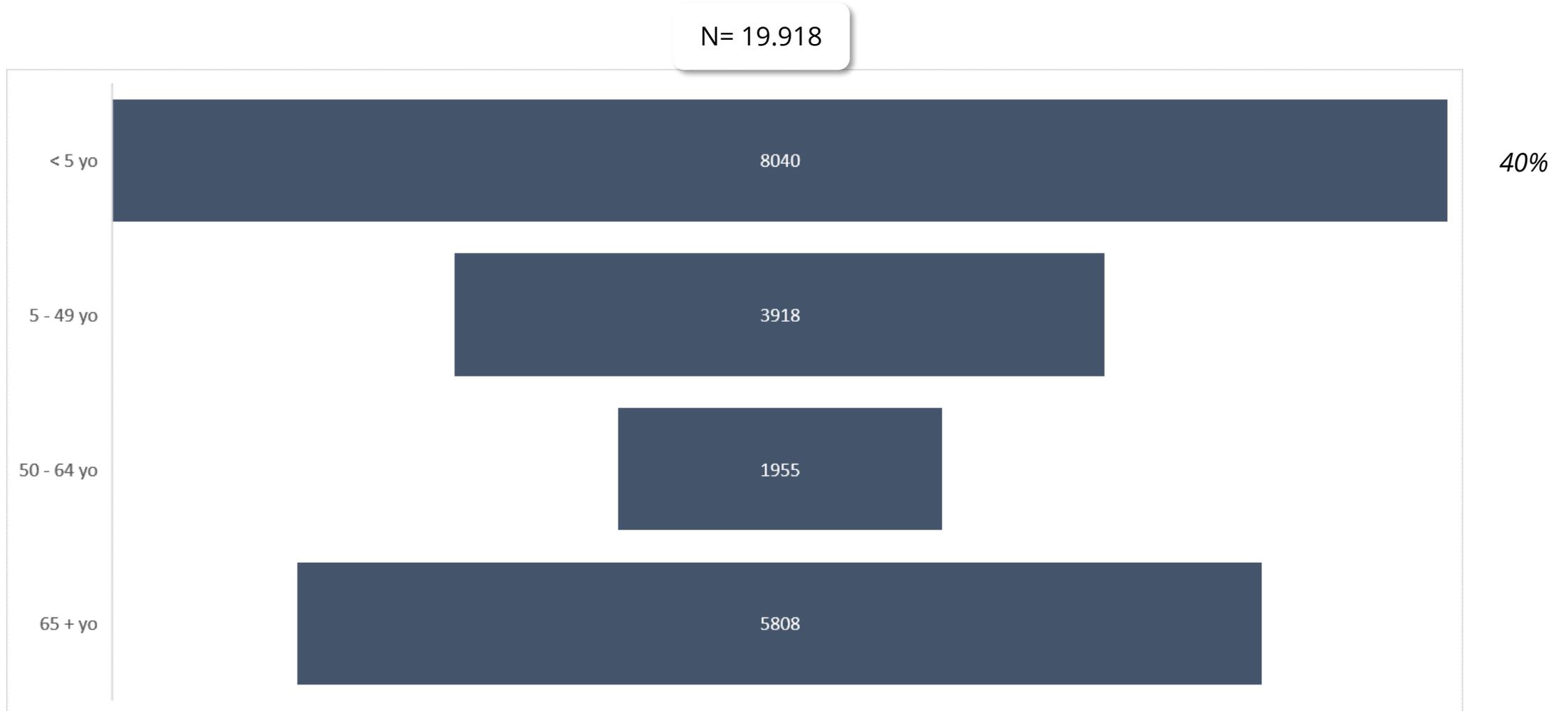
N= 19.918

INFLUENZA+ - STRAIN DISTRIBUTION BY SITE (21_22) (#)
(PRELIMINARY DATA AS OF 15 OCT 2022)

N= 1.403
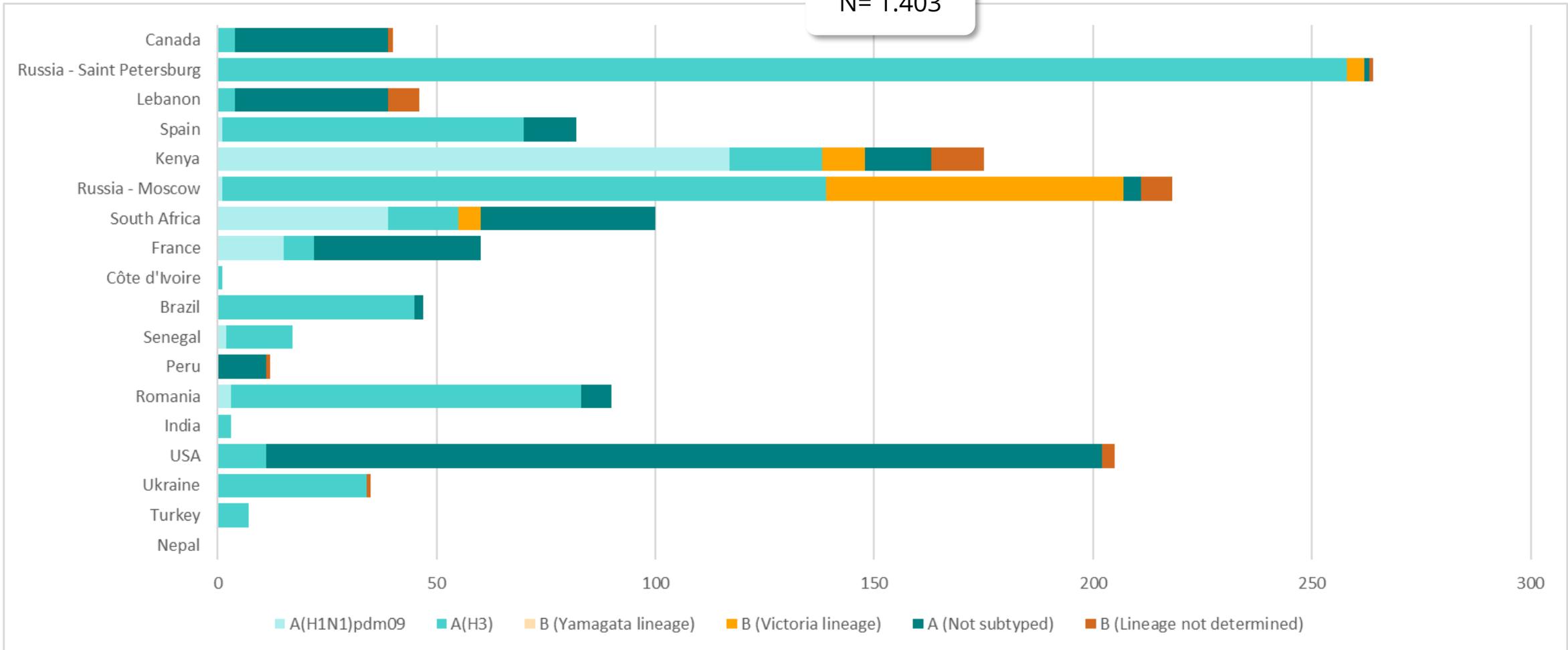
WGS BY SITE (2021_22) (#)
(PRELIMINARY DATA AS OF 15 OCT 2022)
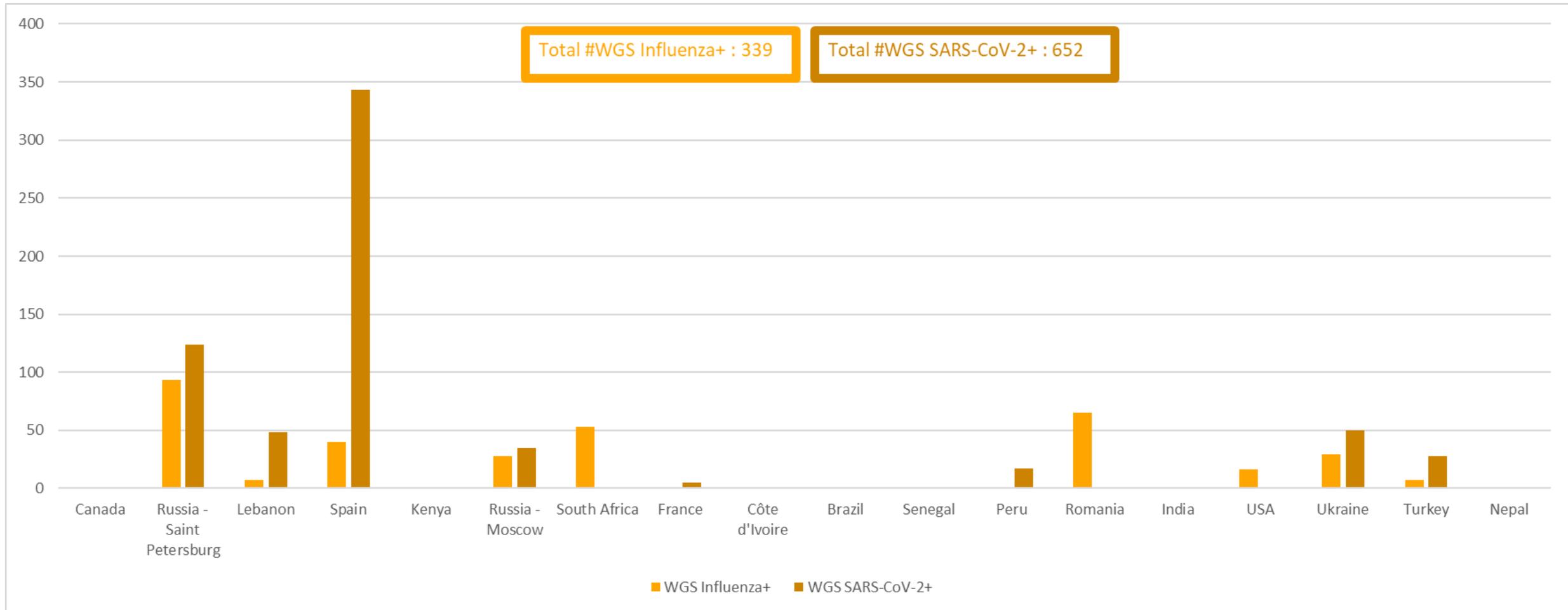
Total #WGS Influenza+ : 339

Total #WGS SARS-CoV-2+ : 652

■ WGS Influenza+   ■ WGS SARS-CoV-2+

SEQUENCING UPDATE

Pays d'origine	date reception	Nombre echantillons recus (ARN)						nombre de sequences validées au CNR					Nombre echantillons non séquencés / échec					GISAID				EN COURS	Nombre echantillons recus (ARN)	nombre de sequences validées au CNR	Nombre echantillons non séquencés / échec	GISAID	EN COURS	total Grippe COVID	observations
		GRIPPE																				COVID						
		H3	H1	A	B	coinf AB	total	H3	H1	A	B	AB	total	H3	H1	A	B	total	H3	H1	B	total	total							
Perou (Po et ARN)	19/10/2021			6			6	2					2			3		3					1	28	21	7			34	
ukraine	11/02/2022	29	0	0			29	21					21			0		0					8	10	9	1			39	8 Grippe encours a voir avec hadrien
			5	0			5	3					3	1				1						48	36	5			53	recu 2 co-infection COVIDGrippe
Liban	12/05/2022																	0					3					7		En cours 2 grippe H3 et 1 coinfection Covid+Grippe B / 6 COVID
Cote d'ivoire (Po)	09/06/2022	1	2				3	1	2				3					0						4	2	2			7	
kenya	11/04/2022	63	1	11	37	7	119						0					0					119						119	15 premieres grippe A seq 12/7
Fluvac Montpellier (Po)	12/05/2022												0					0						6	0	6			6	
Fluvac Rennes (Po)	11/05/2022												0					0						17	1	16			17	COVID 15 inint et 1 quantité insuffisante
Fluvac Paris Bichat (Po)	12/05/2022												0					0						9	8	1			9	
Fluvac Paris Cochin (Po)	15/06/2022												0					0						35	35	0			35	
Bresil	12/10/2022						16																						16	
Liban (TBC)							27																						27	
total échantillons							205																	157					362	
total sequences validés CNR													29												112				141	
total echec CNR																		4								38			42	
total soumis GISAID																											0		0	
total sequences en cours de traitement																							131					7	138	

bilan 17/10/2022

Global Influenza Hospital Surveillance Network

GIHSN 2021-2022 INFLUNZA A(H3N2) (to be completed)
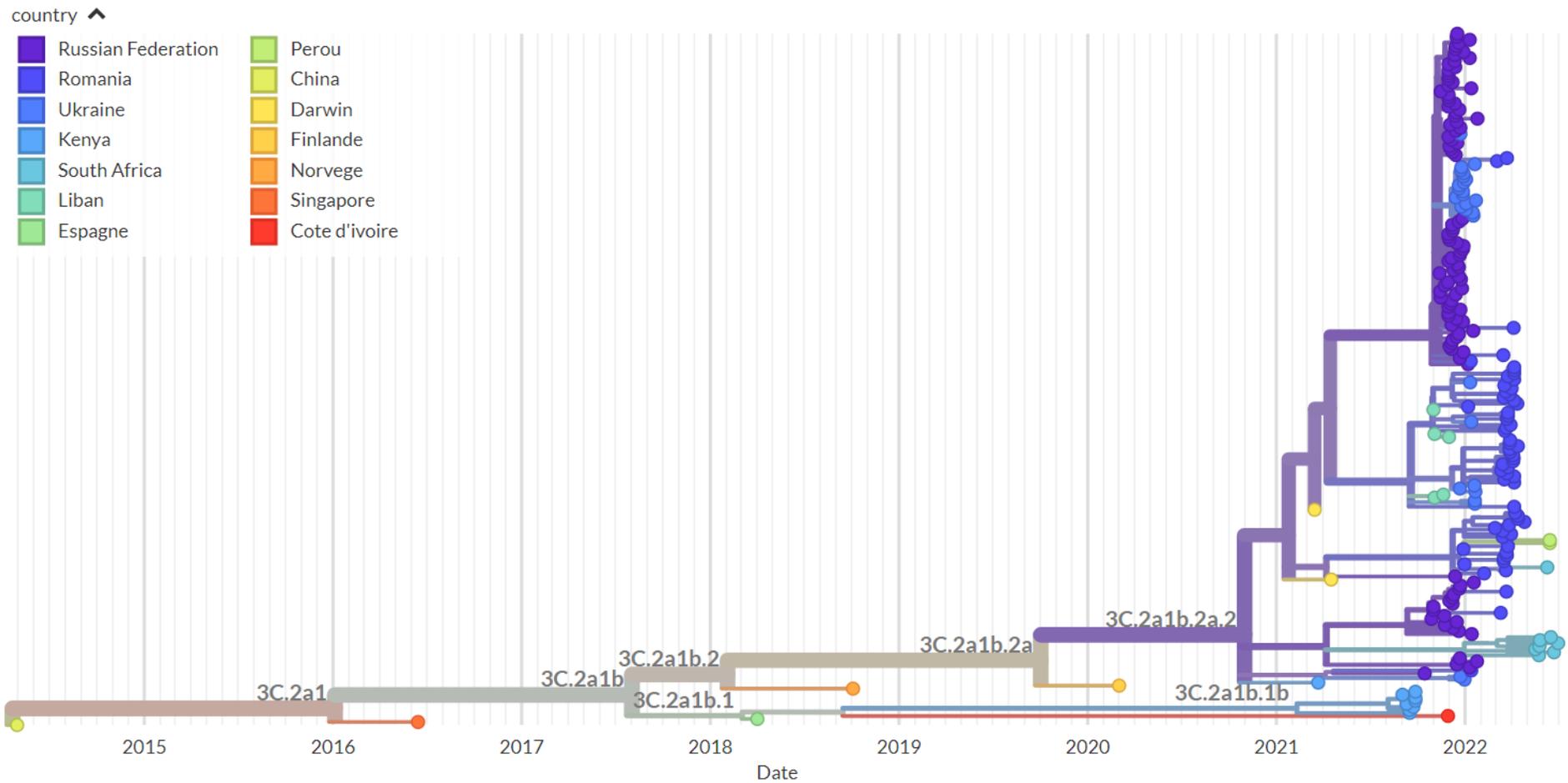
GIHSN 2021-2022 INFUENZA A(H1N1)pdm09 (To be completed)
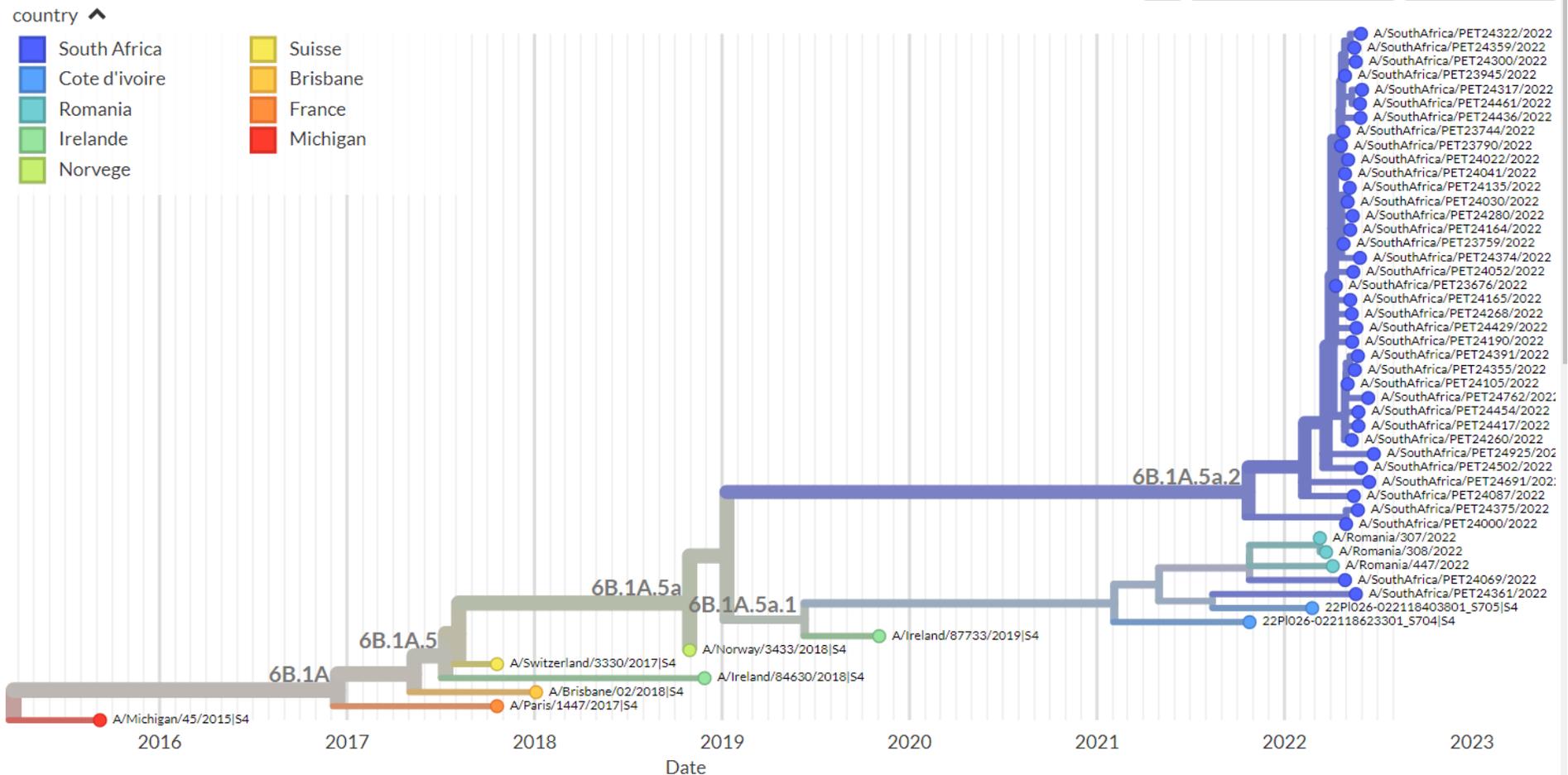
ANNUAL MEETING, 18 OCTOBER 2022

GIHSN 2021_22: RESULTS BY SITE

Site Investigators

ANNUAL MEETING, 18 OCTOBER 2022

SITE: PEQUENO PRINCIPE HOSPITAL, BRAZIL

PI / Speaker: **Sonia Mara Raboni, MD, PhD**

PEQUENO PRINCIPE HOSPITAL, BRAZIL

- Pediatric referral hospital, Curitiba, Southern Brazil
- Sentinel hospital for Severe Acute Respiratory Infection (SARI)

378 Beds

68 ICU Beds

10 HSTC Beds

61% Public Health System

22.000 hospitalizations/year

Season: Dec 2021- Oct/2022

- Climate: Subtropical
  - hot summers and dry winters
- Coldest regions in Brazil.
- Curitiba Metropolitan área: 3.2 million/inhab
- 932 m (3,058 ft) above sea level
- Climate: Temperate
  - Cold winter and humid summer (~25º.C)

AVERAGE AGE OF PEQUENO PRÍNCIPE HOSPITAL PATIENTS

48% of patients have up to 5 years

| AGE (years) | 0 | 1 | 5 | 12 | 15 | 20+ |

14% | 34% | 34% | 10.5% | 7% | 0.5%

Mission: To promote child and adolescent health through teaching and research

Global Influenza Hospital Surveillance Network
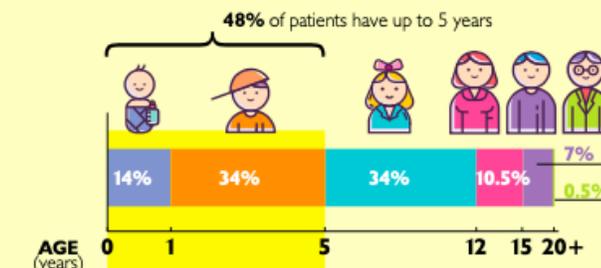
METHODS

Active surveillance for influenza infection in children < 18 y, Dec 1st, 2021, to Oct 10th, 2022

- ➤ Extended SARI

  - ➤ Acute respiratory infection with cough and onset within 10 days that requires hospitalization (no fever)

- ➤ NP swabs obtained from all patients

  - ➤ Extended SARI, bronchiolitis, asthma exacerbation, unexplained sepsis, any respiratory diagnosis or symptoms
  - ➤ Influenza A and B, RSV, AdV, Metapneumovirus, Rhino, PIV 1/2/3, CoV 229E, NL63, OC43, HKU1, Bocavirus, and SARS-CoV-2

- ➤ Other information collected was

  - ➤ IF vaccines and clinical symptoms

- ➤ Days of collection: Twice/week (Mon/Wed) and (~ 08 sp/day)

RESULTS

Indicator	N
Screened	1100
Eligible	892
Included	482
Included with validated sample collection	482
LCI	40
SARS-CoV-2 and SARS-CoV +other RV	34
Other RV	197
Negatives	139
Ongoing	72

Included: 482
Results: **412**

Age

≥ 5 years old: 103
< 5years old: 309

75%

Median Age: 2y

Sex

Female 194
Male 218

52%
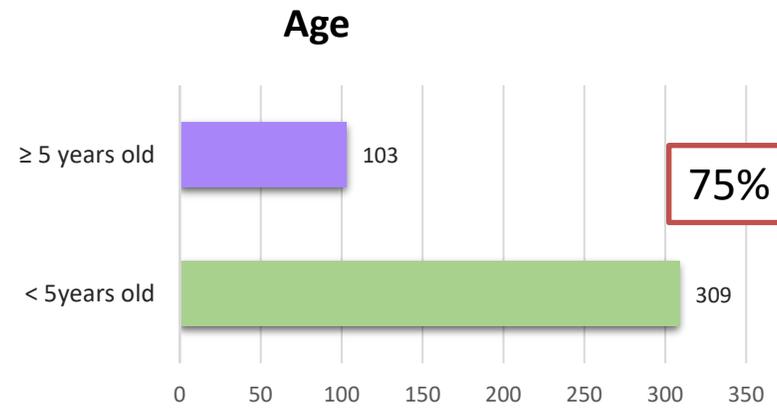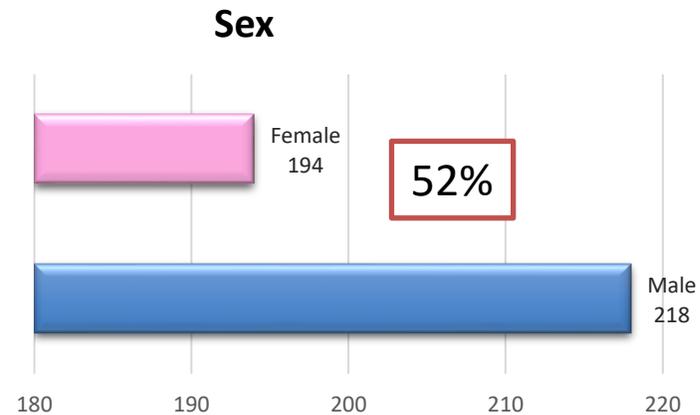
RESULTS

365 virus / 273 pt.
- Positivity rate: 66%;
- Mono: 222 (54%)
- Codetection: 51 (12%)

RESPIRATORY VIRUSES DETECTION BY AGE GROUP

80% <5y

< 5 y   ≥ 5 y

■ IFA+ ■ H3N2 ■ IFA non subtyped ■ RSV+ ■ HRV+ ■ HMPV+ ■ Boca+ ■ PIV+ ■ ADV+ ■ SARSCoV-2+ ■ HCOV+ ■ Other
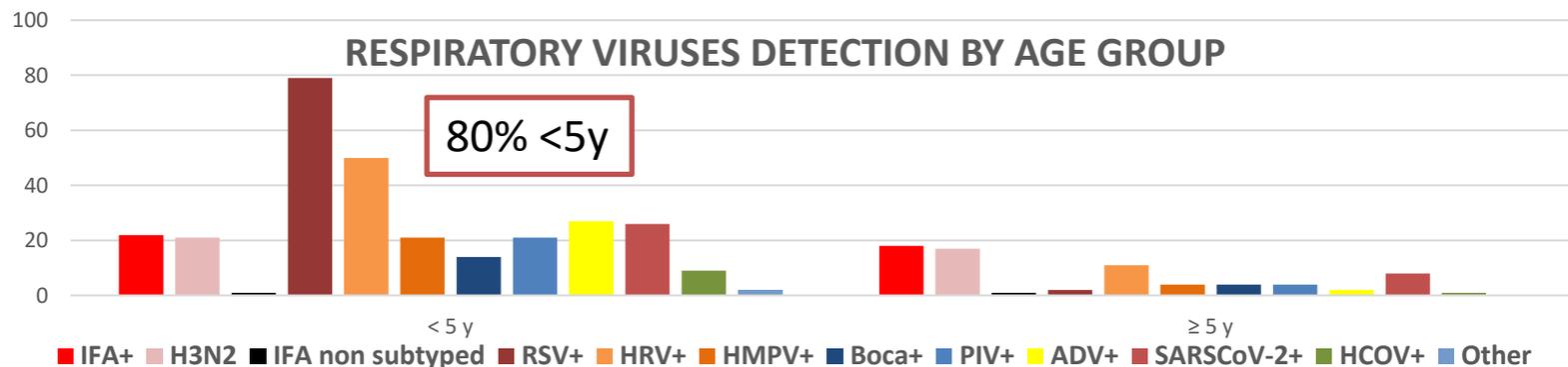
	Included	IFA+	H3N2	IFA non subtyped	RSV+	HRV+	HMPV+	Boca+	PIV+	ADV+	SARSCoV-2+	HCOV+	Other
< 5 year	309	22	21	1	79	50	21	14	21	27	26	9	2
≥ 5 year	103	18	17	1	2	11	4	4	4	2	8	1	0
TOTAL	412	40	38	2	81	61	25	18	25	29	34	10	2

Global Influenza Hospital Surveillance Network

RESULTS

GIHSN 2021/2022
RESPIRATORY VIRUSES DETECTION BY MONTH

Global Influenza
Hospital Surveillance
Network
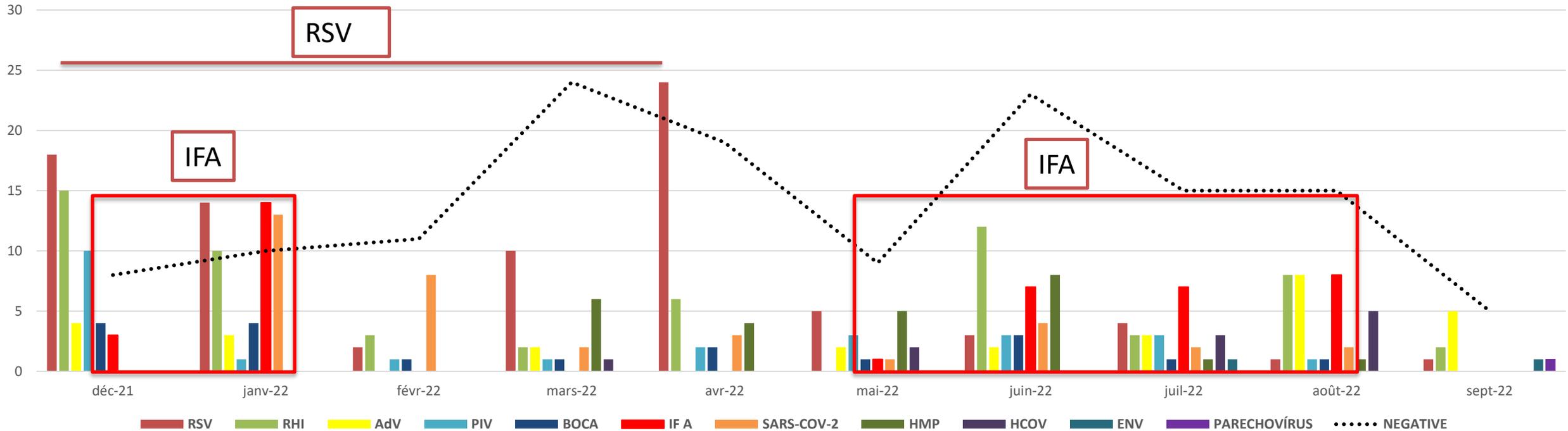
RESULTS

INFLUENZA VACCINATION IN CURRENT SEASON

Vaccination in influenza A+(N=40)		
Yes	12	30%
No	27	68%
Unknown	1	3%

Vaccination in Influenza A - (N=372)		
Yes	156	42%
No	216	58%

p = 0.1772

Vaccinated 14 days before the onset of symptoms		
Yes	10	83%
No	2	17%

No difference between vaccinated and unvaccinated, but data need to be analyzed:
- number of doses applied
- first influenza vaccination under age 9 y (2 doses)

Global Influenza Hospital Surveillance Network

CONCLUSION & CHALLENGES

CONCLUSIONS:

- The collection twice/week allows <u>evaluating of all seasons</u>, reflecting better the RV circulation in the region
- Influenza A was identified in 40/273 + pts (14.6%), all H3N2.
- No detection of influenza B
- Influenza vaccine coverage among negative and positive cases were: 30% and 42%, respectively
- RSV was the most prevalent 81/273 + pts (30%)
- SARS-CoV -2 was detected in 31/273 + pts (12%)
  - Samples were already sequenced and in analysis
- 16 positive influenza samples were sent to Lyon for nucleotide sequencing on October 10, 2022

CHALLENGES:

- Parents' consent in samples collection (~40% refusal rate)
  - Evaluate other samples' types: saliva and gargle (Sars-CoV-2)

Thanks!

ANNUAL MEETING, 18 OCTOBER 2022

SITE: PERU

PI / **Speaker**: V. Alberto Laguna MD / **Ingrid More MD**

PERÚ

Tropical Medicine Institute Universidad Nacional M. de San Marcos (UNMSM) Instituto de Investigación Nutricional (IIN).
Clínica Internacional. Lima

V. Alberto Laguna[1,2]**, Juana del Valle**[.3]**, Ingrid More**[2]**, Marinelly Roca**[2] **Estela Ramírez**[3]**, J. Martins**[3]**, Nora Reyes**[1]

1) Tropical Medicine Institute Universidad Nacional M. de San Marcos (UNMSM) **2)** Clínica Internacional, Lima 3) Instituto de Investigación Nutricional. Lima

Site description

Population: People of all age groups from three Peruvian hospitals: at Lima (main peruvian city), Callao (central region) and Pucallpa (jungle eastern central zone), looking for geographical representativeness of the network for the GIHSN mission. Arequipa and Piura sites were not available this year.

Since April 2020, during coronavirus pandemic, mandatory measures of social isolation were established. Since May 2021, our team was able again to enroll participans but only in Lima, due to travel restrictions.

At the end of December 2021, an outbreak of influenza was reported in the city of Pucallpa in the department of Ucayali. Our team traveled to obtain samples. In adition, during 2022 a MoH children hospital at Callao, Perú was included

Catchment area. Lima it is the main city of the country with 8.5 million people. Our site was located at Private Clinica International and covered the whole city of Lima. Has 203 bed and three ICUs, of those, one pediatric.

Seasonality. In Lima and southern highland sites (Arequipa), influenza cases occur more often in wintertime (April- August).

Lima/ Callao

Pucallpa (Ucayali)

PERÚ

Tropical Medicine Institute Universidad Nacional M. de San Marcos (UNMSM) Instituto de Investigación Nutricional (IIN). Clínica Internacional. Lima

Methods

A site coordinator and a field worker searched records every day to identify eligible impatients. Electronic case reports were not used. Enrollment was based on primary diagnosis at admission. Looking for geographical representativeness,
our network was established in Lima, Callao and Pucallpa.

1. Screening of daily admissions

**Recruitment period
for October 2021- 2022 season:**

As previous years, this season we store all aliquots at -70C

5. Data Analysis

Quality control of each patient file, review of compliance with inclusion criteria according to protocol and observations on the main research. Validation and matching of laboratory results, according to the criterion of positivity / periodic report of patients enrolled to the principal investigator. Consolidation of records, database standardization and analysis

2. Enrollment/data collection

Patients with clinical symptoms of influenza-like illness during the seven days before admission and hospitalized within the previous 24 hours with any of the eligible diagnoses were included.

INFORMED CONSENT

3. Swabbing

Clínica Internacional
Nuestros pacientes primero

4.Sample Processing

Genotyping process: Lyon (France) 50-100 influenza positive samples (annual)

Monthly report to GIHSN

Reporting to INS-MoH

Global Influenza Hospital Surveillance Network

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Results

	#included	#LCI	#tested for RSV	#RSV+	#tested for SARS-CoV2	SARS-CoV2+	#tested for ORV	#ORV+	#WGS LCI	#WGS SARS-Cov2
Patients < 5 yrs	161	1	161	26	161	13	161	16	0	0
Patients 5+ yrs	216	12	216	8	216	38	216	12	0	0
Total	**377**	**13**	**377**	**34**	**377**	**51**	**377**	**28**	**0**	**0**

- During this period, a total of 377 participants were enrolled, of those 217 were male and 161 were under 5 yrs. of age.

- We found positive samples for any respiratory virus in 116 (31%). More prevalent conditions were: asthma (11%) cardiovascular diseases (9%) diabetes (4%) and obesity (4%). Only 8% of the participants got influenza vaccine in the current season and 29% got in the previous one. At least, 31.9% participants have 01 doses of SARSCoV2 vaccine. Co-infections were found in 10 samples. Consent form was not easy to obtain at ICU only 6.7 % participants were hospitalized at intensive care, of those 2.7% needed mechanical ventilation.

- Were found positive samples in SARS-COV2 virus in 51 (14%), RSV in 34 (9%) and Influenza virus in (3 .4%), all samples were also tested for adenovirus, metaneumovirus and bordetella pertussis

Global Influenza Hospital Surveillance Network

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Clínica Internacional

Detailed results

Characteristics of elegible population. October 2021-2022

Variable	Participants	Lima	(%)	Ucayali	(%)
Elegible patients	377	339	89.9	38	10.1
Samples taken	377	339	89.9	38	10.1
Gender					
Male	217	195	89.9	22	10.1
Age Group					
Media	21				
Median (range)	30 [18-45]				
0-5	161	157	49.2	4	10.5
5-18	72	66	20.7	6	15.8
18-45	53	40	12.5	13	34.2
45-65	39	31	9.7	8	21.1
65-80	26	21	6.6	5	13.2
80+	26	24	7.5	2	5.3
Positive result	116	108	31.9	8	21.1
FLUA	12	7	2.1	5	13.2
FLUB	1	1	0.3	0	0.0
SARS COV 2	51	49	14.5	2	5.3
RSV	34	34	10.0	0	0.0
Adenovirus	16	15	4.4	1	2.6
Metapneumovirus	12	12	3.5		0.0
Negative result	256	226	66.7	30	78.9
Coinfeccions	10	10	2.9	0	0.0
SARS COV 2 / Adenovirus	2	2	0.6	0	0.0
SARS COV 2 /RSV	1	1	0.3	0	0.0
SARS COV 2 / Metapneumovirus	2	2	0.6	0	0.0
Metapneumovirus/RSV	1	1	0.3	0	0.0
RSV/Adenovirus	3	3	0.9	0	0.0
RSV/Adenovirus/Metapneumovirus	1	1	0.3	0	0.0

Monthly viral distribution by PCR . October 2021-2022
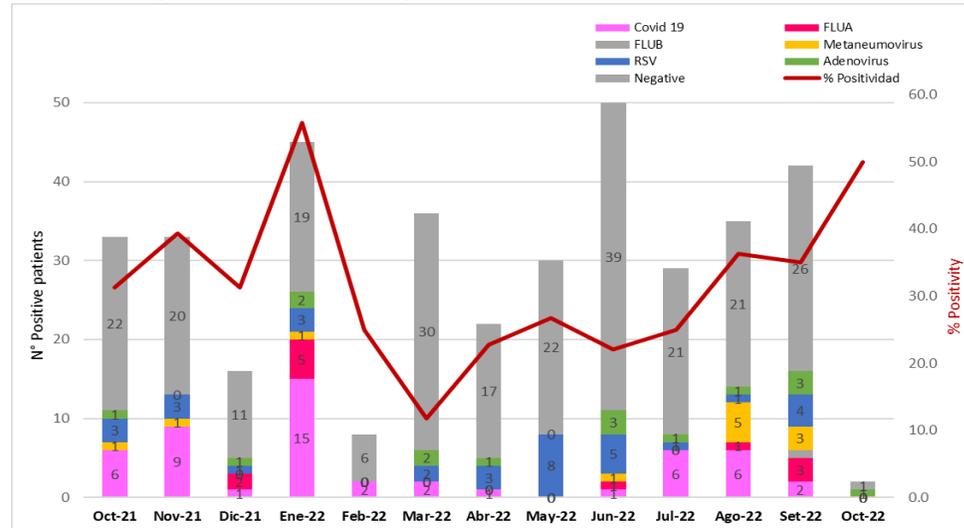
Viral circulation by RT PCR. October 2021-2022
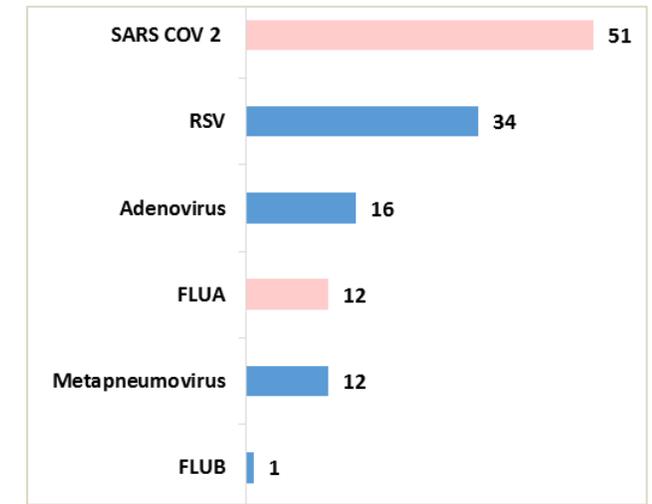
Participant distribution by age and severity, Oct 2021-2022

Network

PERÚ

Tropical Medicine Institute Universidad Nacional M. de San Marcos (UNMSM) Instituto de Investigación Nutricional (IIN).
Clínica Internacional. Lima
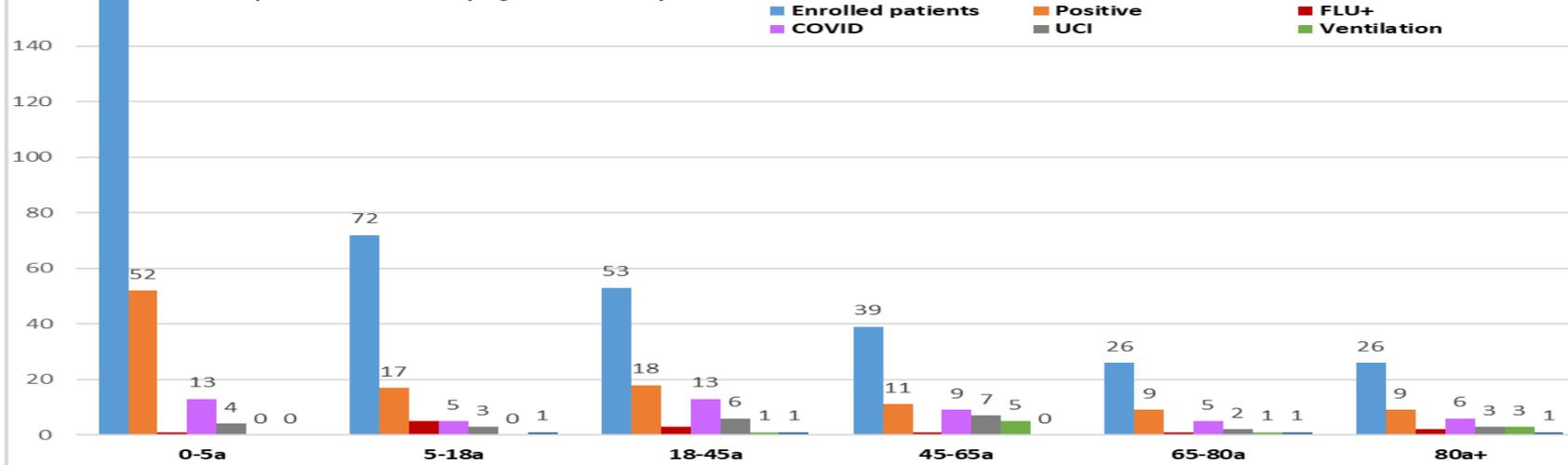
Conclusion & Challenges

Conclusion :

- During the current period, the viral circulation was predominantly of the SARS COV 2 virus, especially in children under 5 years of age and adults from 18 to 45 years of age.
- There are 13 positive samples for influenza (12 for Flu A and 01 for Flu B). In the current season, 51 positive samples were obtained for SARS COV 2.
- Patients with co-morbidities such as asthma, CVs diseases or COPD were positive for at least one virus. A total or 6.7% participants were hospitalized at Intensive Care Unit (ICU) of those, 2.7% needed mechanical ventilation.
- Influenza vaccination rates were extremely low. In Perú, influenza vaccine is available annually in April/May. In addition, there are high rates of rejection.
- Getting sequencing established locally it is expensive for us.

Challenges

- Next period we will focus our resources in re-establish the network in Lima, Arequipa (Andean site) and Piura (northern site) In addition to include one more hospital in Lima /Callao.
- Getting sequencing capacity locally

Global Influenza Hospital Surveillance Network

Multicenter Surveillance Network

6 **hospitals** from different governorates in Lebanon representing ≈1500 patient-beds:

- American University of Beirut Medical Center (AUBMC)
- Rafic Hariri University Hospital (RHUH)
- Keserwan Medical Center (KMC)
- Bekaa Hospital (BH)
- New Mazloum Hospital (NMH)
- Hammoud Hospital University Medical Center (HHUMC)

Population:

- All age groups
- Acute process
- Admission in the previous **24-72** hours
- Admission diagnosis meeting the predefined conditions

Lebanon

Global Influenza Hospital Surveillance Network

Methods

Screening of daily admissions list:
predefined set of conditions (<5 years old VS ≥5 years old)

Handling of samples:
After aliquoting samples, they are stored at -80°C until further processing

Testing strategy:
Real-Time qPCR for:
- ✓ Influenza A, B (their subtypes)
- ✓ RSV
- ✓ SARS-COV-2

Active year-round surveillance

Recruitment of subjects:
Extended SARI case definition

Data collection

Sampling strategy:
- Using remaining PCR sample available upon admission
OR
- Sample collection:
✓<14 years old: nasal sample
✓≥14 years old: NP & P samples

Results

#Screened= **96,719** → #Eligible= **4,804** → #Enrolled = **2,432**

	SARS-CoV-2	Influenza	RSV	ORV*	Mixed viruses**
Tested	2,382	2,141	2,141	38	2,141
Positive result	**359** (14 mixed infections)	**58** (37 A/NT, 11 AH3N2, 10 B/NT) (15 mixed infections)	**83** (11 mixed infections)	**38** (16 mixed infections)	**25** (56 individual viruses)

*ORV: Other respiratory viruses: 13 Rhinovirus (5 Rhino/Enterovirus), 7 Adenovirus, 1 EBV, 1 Parainfluenza virus
**Mixed infections: 5 SARS-COV-2&RSV, 1 SARS-COV-2&RSV&A/NT, 8 SARS-COV-2&A/NT, 1 RSV&A/NT, 1 RSV&AH3N2, 1 RSV&B/NT&A/NT, 1 RSV&B/NT&Adenovirus, 1 RSV&Rhinovirus, 1 A/NT&Adenovirus&Rhinovirus, 1 Rhinovirus&Metapneumovirus, 2 Parainfluenza virus& Adenovirus, 1 Adenovirus&Coronavirus NL63 &Rhinovirus&Parainfluenza, 1 Adenovirus&Coronavirus HKU1, NL36

Global Influenza Hospital Surveillance Network

Isolated viruses by month and age-group

Virus monthly distribution (N=2247)

Virus distribution across age groups (N=2204)
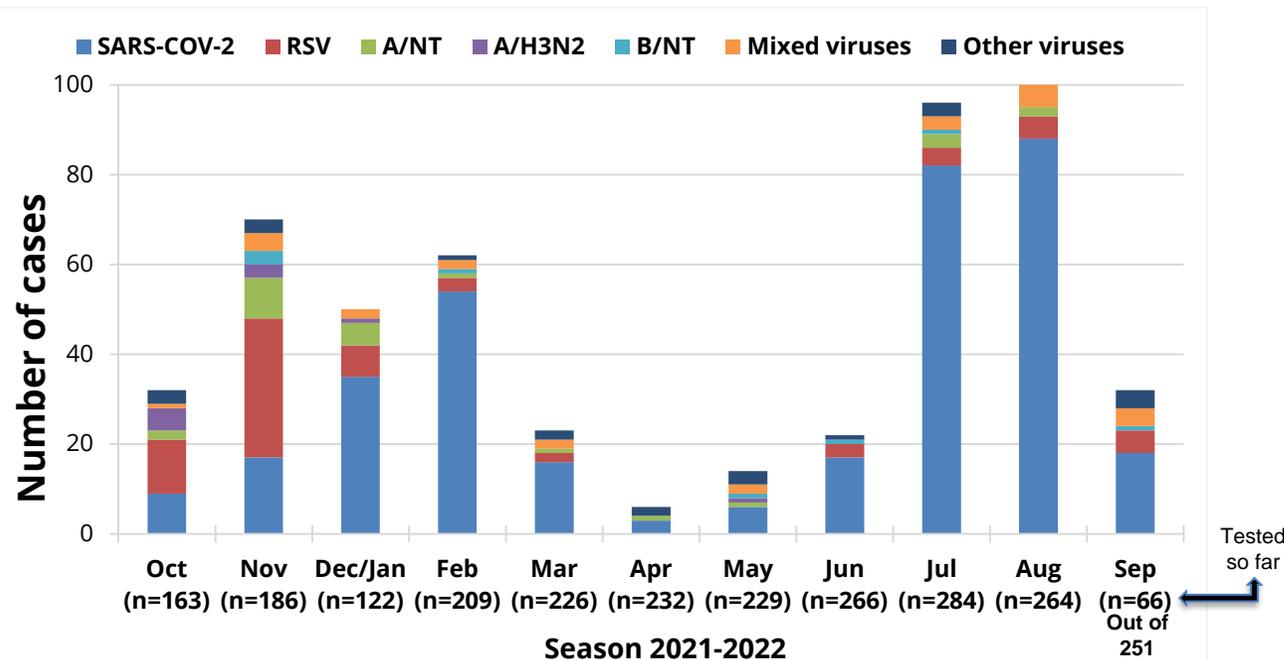
- Approximately, a 30% decrease in the number of positive cases was seen from March to June 2022
- Fourteen RSV cases (2.3%) were identified between July and September 2022
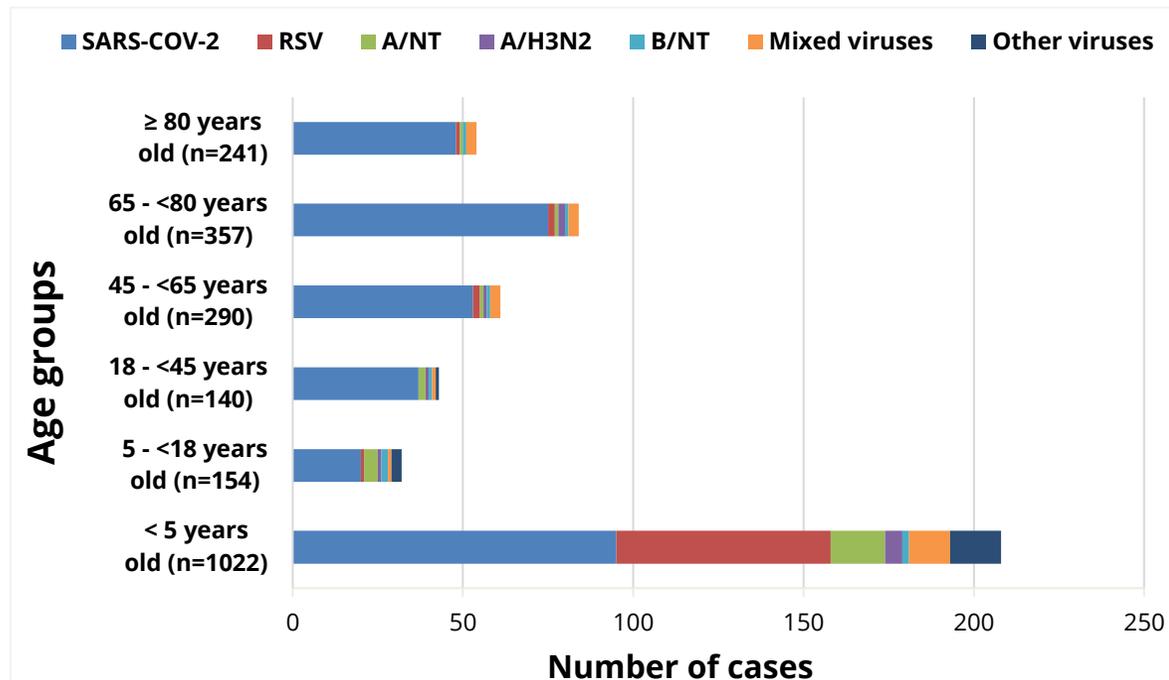
SARS-COV-2 was the most common virus across age groups with the largest case numbers among children < 5 years (9.3%) and elderly aged 65-<80 years (21.1%)

Sequencing of SARS-CoV-2 and Influenza isolates
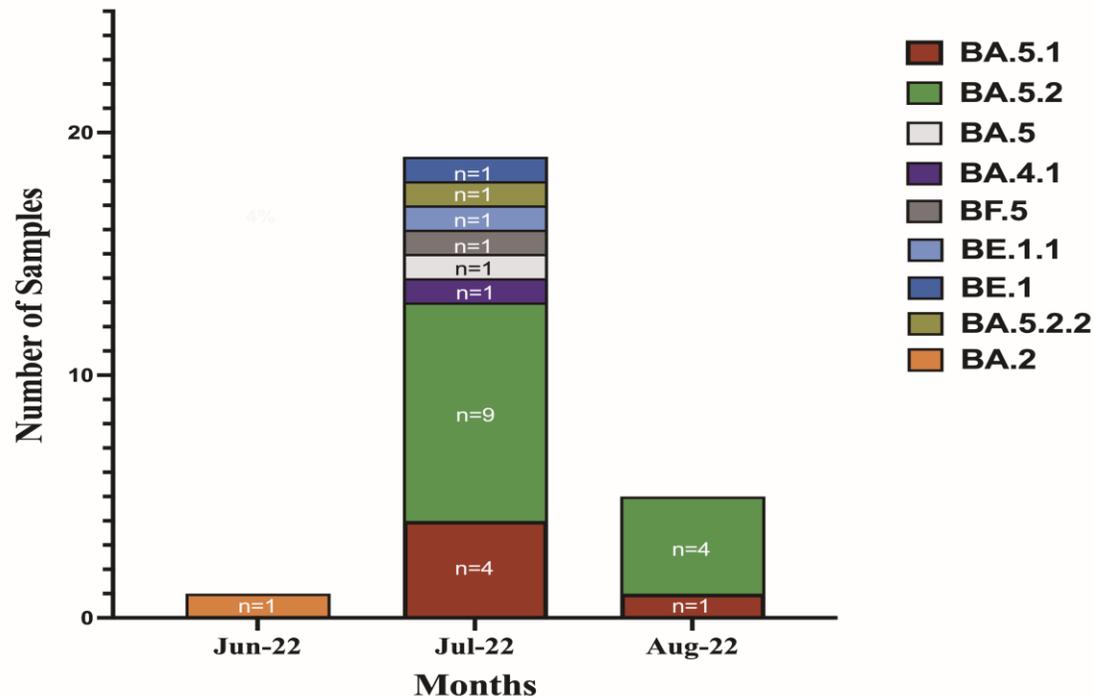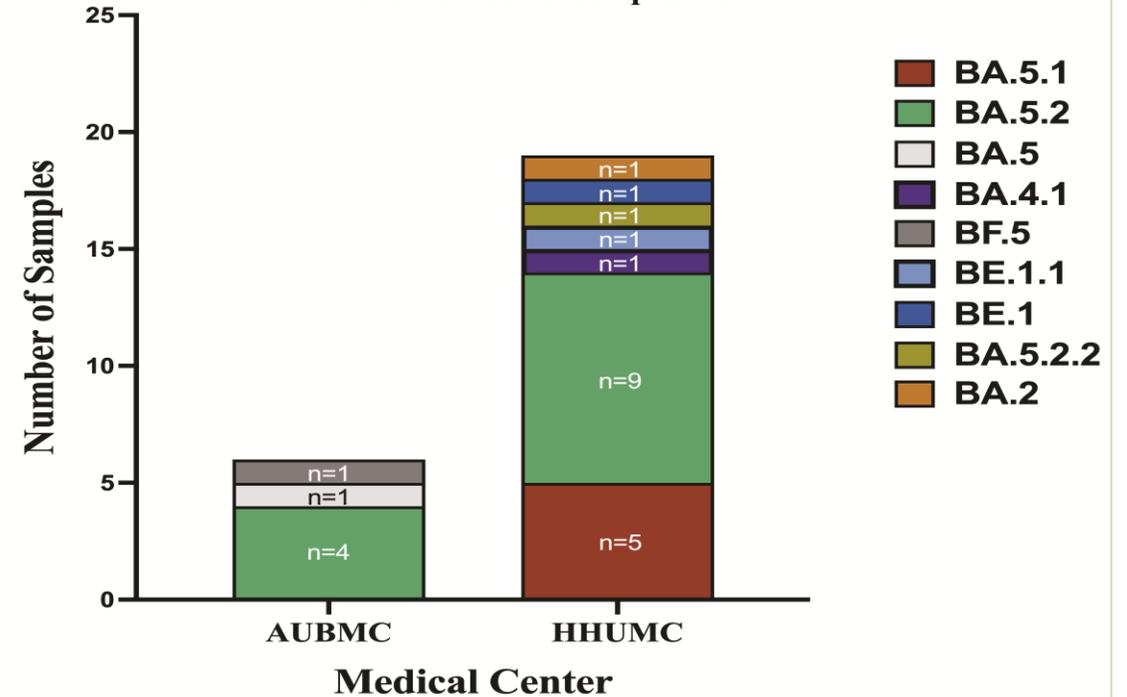
- 25 SARS-COV-2 isolates were locally sequenced using NGS
- 48 SARS-COV-2 isolates, and 5 Influenza isolates (1 A/NT and 4 AH3N2) were sent to Lyon for WGS in April 2022, but the results are not yet available

Pre-existing conditions in hospitalized respiratory viral infections

Percentage of cases with a positive respiratory viral infection with/without pre-existing conditions (N=2198)

	SARS-COV-2 (n=327)	RSV (n=67)	A/NT (n=25)	A/H3N2 (n=10)	B/NT (n=8)	Mixed viruses (n=23)	Other viruses (n=19)
Pre-existing conditions (N=2198)							
No	125 (38.2)	54 (80.6)	16 (64.0)	7 (70.0)	6 (75.0)	13 (56.5)	10 (52.6)
Yes	202 (61.8)	13 (19.4)	9 (36.0)	3 (30.0)	2 (25.0)	10 (43.5)	9 (47.4)
CVD	133 (40.7)	4 (6.0)	5 (20.0)	2 (20.0)	2 (25.0)	7 (30.4)	0 (0.0)
COPD	13 (4.0)	1 (1.5)	0 (0.0)	0 (0.0)	0 (0.0)	2 (25.0)	1 (4.3)
Asthma	13 (4.0)	2 (3.0)	2 (8.0)	1 (10.0)	0 (0.0)	1 (4.3)	1 (5.3)
DM	59 (18.0)	2 (3.0)	2 (8.0)	2 (20.0)	0 (0.0)	3 (13.0)	0 (0.0)
Immunodeficiency disease	9 (2.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Kidney disease	27 (8.3)	0 (0.0)	0 (0.0)	2 (20.0)	0 (0.0)	0 (0.0)	1 (5.3)
Neurological disease	23 (7.0)	3 (4.5)	2 (8.0)	0 (0.0)	0 (0.0)	2 (8.7)	1 (5.3)
Malignancy	34 (10.4)	1 (1.5)	2 (8.0)	0 (0.0)	0 (0.0)	2 (8.7)	2 (10.5)
Prematurity (children<5years)	3/94 (3.2)	4/61 (6.6)	0/16 (0.0)	0/5 (0.0)	0/2 (0.0)	0/12 (0.0)	3/15 (20.0)

Subjects with positive SARS-CoV-2 were more likely to have CVD as a pre-existing condition (40.7%), followed by DM (18%), malignancy (10.4%), and kidney disease (8.3%)

Global Influenza Hospital Surveillance Network

Severity of viral respiratory infections in young and old age-groups

Severity during admission and death among subjects, (A) under 5 years (N=1013), (B) ≥60 years old (N=726), with a positive respiratory viral infection
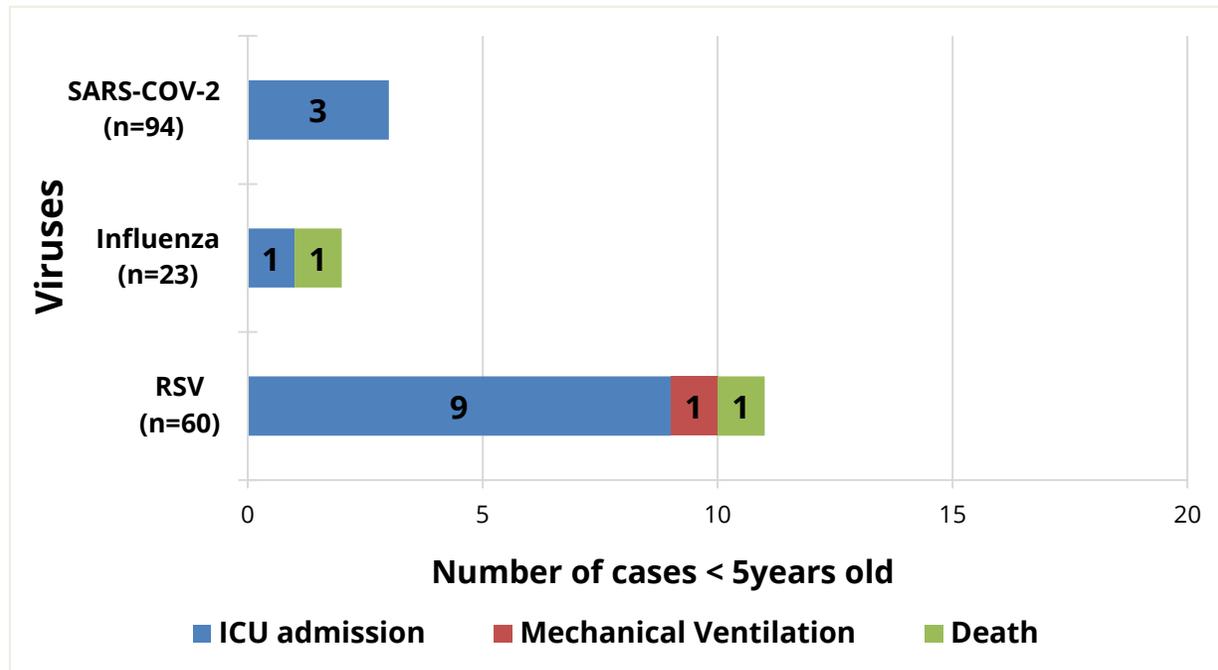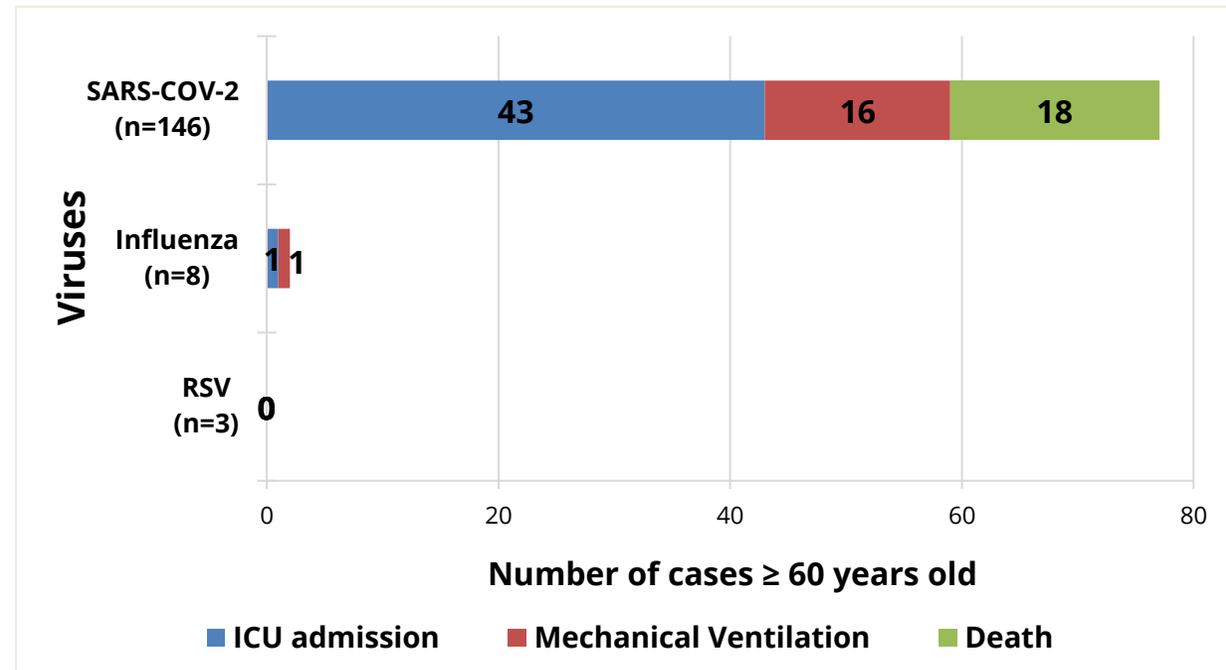
- Among 60 subjects with positive RSV aged <5 years old, 9 subjects were admitted to ICU (15%).
- SARS-COV-2 was associated with high severity among subjects ≥60 years old (29.5% and 11% required ICU admission and MV, respectively; and 12.4% died).

Conclusion & Challenges

Conclusion

- Overall, SARS-CoV-2 remained the predominant respiratory virus causing hospitalization across all age groups. Influenza and RSV are picking up compared to the previous two seasons as non-pharmaceutical interventions are being lifted

- We observed a change in the seasonality of RSV circulation with significant activity during the summer months

- In children < 5 years, influenza came third in frequency following SARS-CoV-2 and RSV

- In children < 5 years, more were severely ill from RSV infection than SARS-CoV-2 and influenza combined

- Out of 316 subjects with SARS-COV-2 infection, 187 (59.2%) were unvaccinated, 129 (40.8%) were vaccinated of whom 6 received one dose, 58 received 2 doses versus 65 received ≥3 doses

- Among adults, subjects who are 65 to less than 85 years old showed the highest proportion of COVID-19 cases

Challenges

- Due to the sampling inconvenience, more potential subjects refused participation compared to previous seasons
- A low number of hospital admissions due to the economic crisis in Lebanon was noticed

Global Influenza Hospital Surveillance Network

Site description

- Study was conducted in Ankara, capital city of Turkey with which hosts 5.5 million people (6.7% of the country population)
- 3 hospitals participated, all tertiary care, containing 1200 adult and 280 pediatric beds
- Emergency room, infectious diseases wards screened

Methods

- **Year-round surveillance:** December 26th, 2021---- ongoing (until Nov 30th, 2022)

  - Screening Monday, Wednesday and Fridays of the week (total number of eligible patients not captured)

  - Sampling working hours (08-18) during these three days

- **Sampling strategy:** Expanded list of acute process used to identify eligible patients. Cases who have been:

  - Admitted through emergency doors or screened wards for an acute condition, in the previous 72 hours and

    has stayed in hospital for at least 1 night

  - Experiencing symptoms in the last 7 days prior to admission and consented for swabbing

- **Testing strategy:** Tested for 13 different viruses for 41 different strains on Illumina Respiratory Virus Oligo Panel V2

  - All samples kept at -70°C over the two seasons (the remaining aliquots may not be adequate for future testing)

- **Sequence data:** Submitted according to the GISAID protocol

**Global Influenza
Hospital Surveillance
Network**

Results (Data cut off date: October 1st, 2022)

	#included	#LCI	#tested for RSV	#RSV+	#tested for SARS-CoV-2	#SARS-CoV-2+	#tested for ORV	#ORV+	#WGS LCI	#WGS SARS-Cov2
Patients < 5 yrs	36	3	36	5	36	0	36	10	3	0
Patients 5+ yrs	131	4	131	0	131	30	131	1 (Rhinov)	4	28
Total	167	7	167	5	167	30	167	11	7	28

Key messages

Patients ≥5 years:
The mean age was 64.8±1.8 years
90.1% had at least one comorbidity
Patients under 5 years:
The mean age was 19.4±2.8 months
5.6% had at least one comorbidity

Of the positive samples (31.7%):
SARS-CoV-2 **18.0**%; ORV **6.6%**; inf A H3N2 **4.2%**; RSV **3%**

ORV+RSV include 17 viruses in 16 patients:
Respiratory syncytial virus (type A)
Respiratory syncytial virus 9320 (type B)
Metapneumovirus (CAN97-83)
Adenovirus C2
WU Polyomavirus
Rhinovirus A89
Rhinovirus C (strain 024)

Detailed results
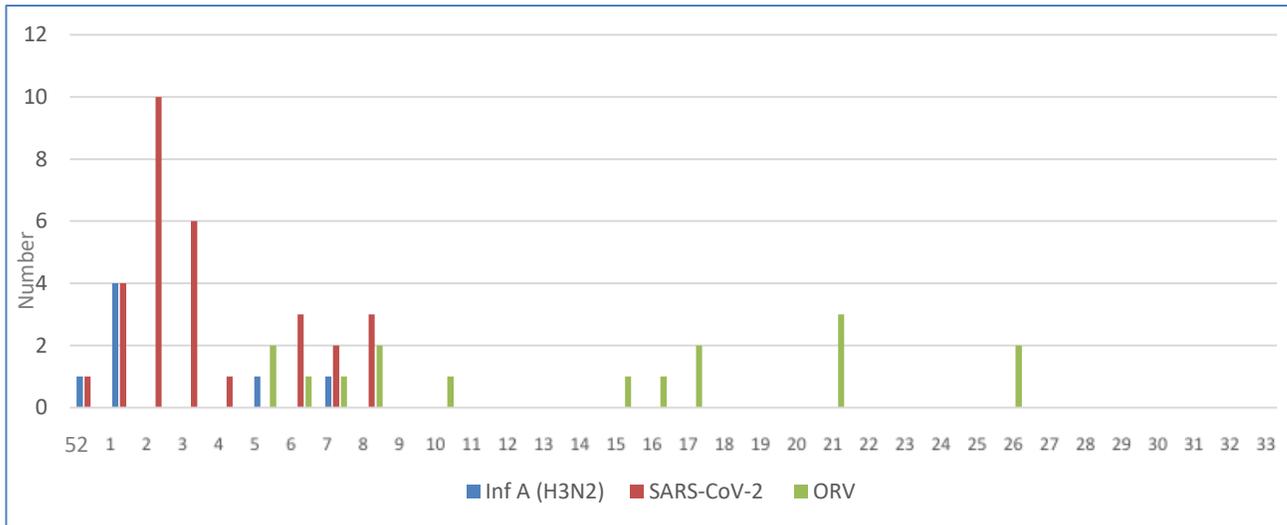
Figure. Weekly distribution of number of influenza, SARS-CO-V2 and ORV infected cases during the study period (2021, 51st week- 2022, 39th week)
ORV, Other respiratory viruses

Table. Disease course and outcome of patients with regards to SARS-CoV-2 positivity

	Number of patients (%)		
	SARS-CoV-2 positive (n=30)	SARS-CoV-2 negative (n=137)	All (n=167)
Supplemental oxygen without MV	8 (26.7)	76 (55.5)	84 (50.3)
MV	3 (10.0)	14 (10.2)	17 (10.2)
Vasopressor support	-	3 (2.2)	3 (1.7)
Admission the intensive care unit	4 (13.3)	38* (27.7)	42 (25.1)
Death	2 (6.7)	8** (5.8)	10 (5.9)

ICU, intensive care unit; MV, mechanical ventilation

Cases requiring MV&vasopressor support and deaths were in the 5+ yrs group

*p:0.74
**p:0.56

Conclusion & Challenges

CONCLUSIONS:

- The 2021-22 season, although dominated by SARS-CoV-2, has experienced the re-emergence of influenza and ORV

  - The influenza season was quite short and low, ORVs mainly affected children, especially less than 5 years

- SARS-CoV-2 cases dropped abruptly, probably owing to milder disease severity in vaccinated population

- Clinical outcomes of patients without SARS-CoV-2 were not better when compared to those with SARS-CoV-2

- The testing platform helped to preserve the quality of the genetic material and helped to tackle ORV emergence

CHALLENGES:

- The organizational structure of the hospitals and the patient flow could vary during the study period

- Interruptions during long holidays and leave offs

- Analysis/Interpretation of the genetic data are challenging

UKRAINE

The Study is conducted in 5 hospitals in 3 cities of Ukraine.

- Kyiv – 3 hospitals (1 adult and 2 pediatric)
- Dnipro – 1 hospital
- Khmelnytsky – 1 hospital

975 adult and pediatrics in-patient beds

Population enrolled is approximately 35% older adults >=65 years of age, admitted to hospitals with an acute respiratory illness

Global Influenza Hospital Surveillance Network

UKRAINE

Methods

Surveillance for influenza and COVID-19 infections in adults and children has been conducting during all round the year (since 40th week 2021 till 39th week 2022)

➢ NP swabs were obtained from all patients who meets the case definition SARI. Our physicians use the SARI case definition recommended by WHO in 2011.

➢ All NP swabs were at first tested for SARS-CoV-2 and all negative samples were tested for influenza A & B by PCR method. Sometimes (depends on our capacity) we tested negative samples for influenza and SARS-CoV-2 for other respiratory viruses.

➢ All samples (negative and positive) are stored at -70°C during 1 year or more

Global Influenza Hospital Surveillance Network

UKRAINE

Results *(data shared in the GIHSN)*

	#included	#LCI	#tested for RSV	#RSV+	#tested for SARS-CoV2	SARS-CoV2+	#tested for ORV	#ORV+	#WGS LCI	#WGS SARS-CoV2
Patients < 5 yrs	18	4	1	0	18	14	1	0	4	7
Patients 5+ yrs	180	30	23	1	180	94	23	1	25	44
Total	198	34	24	1	198	108	24	1	29	51

Key messages

- Characteristics of enrolled patients: 9% - age <5 yrs, 32% - age 65+. The most frequent co-morbidity was cardiovascular diseases – 35%. The other co-morbidity conditions were: diabetes (9%), obesity (7%), COPD (5%), asthma (1,5%), renal impairment (1,5%), rheumatologic diseases (1,5%), liver diseases, neoplasm and HIV infection. Some part of adults received 2 doses of COVID-19 vaccine. Only 1 adult was vaccinated against influenza.

- There were 7 lethal cases from all patients. All of them were in age group 65-91 years. The cause of death among 4 lethal cases was SARS-CoV-2 virus, 1 – influenza B virus (patient 87 years old) and 2 – were negative for SARS-CoV-2 and influenza.

UKRAINE

Detailed results

Name of the virus	Mutations in HA	Description of meaning of the mutation
A/Kyiv/424/2021	I156K, S172H	**Mutation in 156** position of HA is associated with antigenic drift ; **Mutation in 172** position of HA is associated with antigenic drift and virulence
A/Kyiv/28/2022	S140N	Mutation HA **S140N** removes a potential N-glycosylation site at position 138 which may also affect antigenic and other properties of this strain.

All other sequenced influenza viruses have mutation HA **N202D** which is associated with antigenic drift and the major part of viruses have mutation HA **S161N** which is related to virulence, antigenic drift.
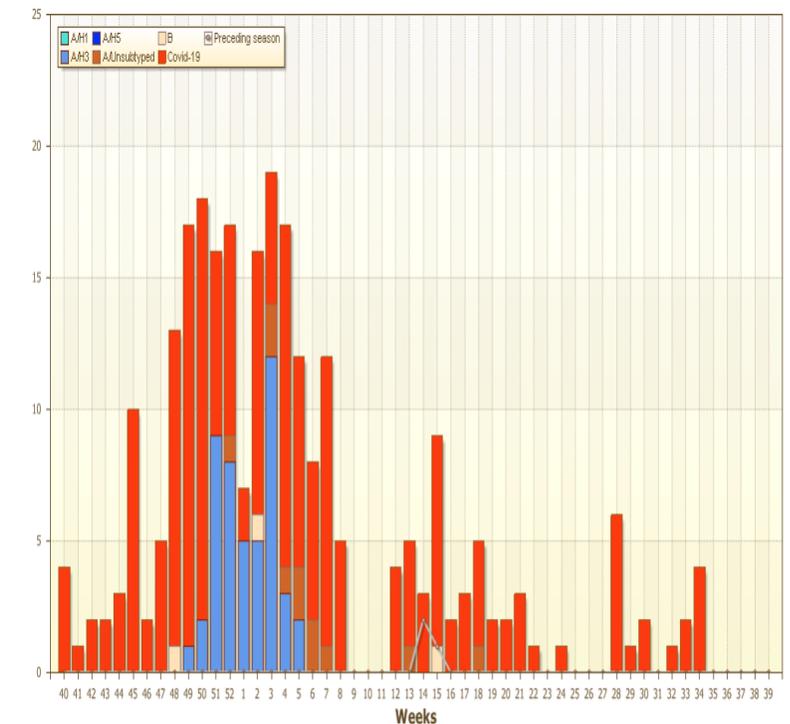
Conclusion & Challenges

CONCLUSIONS:

- There was co-circulation of influenza viruses and SARS-CoV-2 in 2021/22 season in Ukraine. There was the absolute dominance of A(H3N2) subtype among all influenza viruses.

CHALLENGES:

- In contradistinction to other European countries Ukraine didn't have the second influenza wave because of beginning of the war and huge migration process out of the country, especially the children population.
- Despite that we ourselves were able to perform the WGS of some part of SARS-CoV-2 viruses on Illumina platform, the access to reagents is still difficult due to their high cost.

COFFEE BREAK

ANNUAL MEETING, 18 OCTOBER 2022

SITE: NIID ROMANIA

PI/Speaker: PI: Anca Drăgănescu / Speaker: Oana Săndulescu

ROMANIA

NATIONAL INSTITUTE OF INFECTIOUS DISEASES "Prof. Dr. MATEI BALŞ"

Site description

- Tertiary care infectious diseases hospital (273 beds)

- Wide patient addressability
  - catchment area 5937382 people, from:
    - Bucharest
    - South Eastern Romania

- On-site molecular genetics with sequencing capacity

- Reporting of laboratory-confirmed influenza and SARS-CoV-2 cases to the national ILI/SARI surveillance

ROMANIA

National Institute for Infectious Diseases "Prof. Dr. Matei Balș" Bucharest, Romania

NATIONAL INSTITUTE OF INFECTIOUS DISEASES "Prof. Dr. MATEI BALŞ"
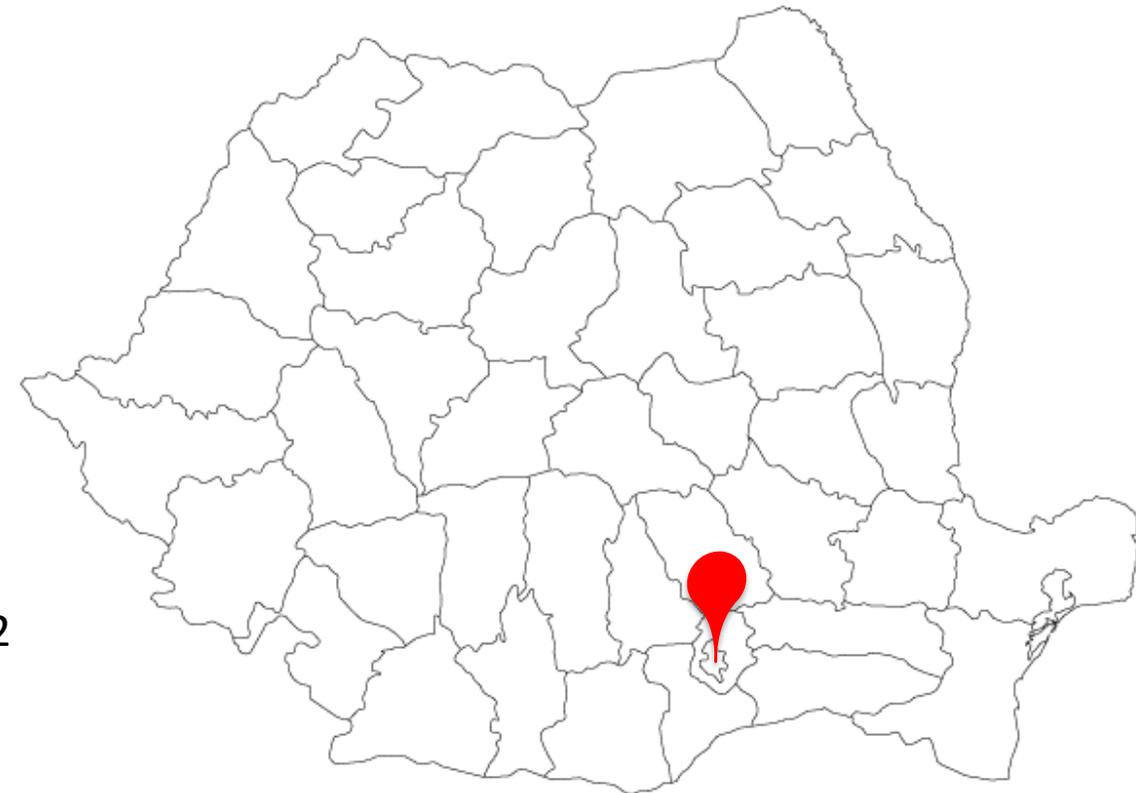
Methods

- Prospective epidemiological active surveillance study.

- Year-round surveillance (Nov 2021-Oct 2022)

- Case definition and inclusion/exclusion criteria according to the GIHSN study protocol.

- Study procedures: informed consent, eligibility, medical questionnaire, nasopharyngeal + pharyngeal swab for adults (≥14 years), nasopharyngeal + nasal swab for children (<14 years)

- Laboratory procedures:
  - RT-PCR for influenza A/B/RSV (all viable samples) plus SARS-CoV-2 (most samples)
  - Optional add-on: multiplex PCR respiratory panel
  - Subtyping/lineage determination for influenza A/B
  - Whole genome sequencing for influenza and SARS-CoV-2

ROMANIA

National Institute for Infectious Diseases "Prof. Dr. Matei Balș" Bucharest, Romania

Results

	#included	#LCI	#tested for RSV	#RSV+	#tested for SARS-CoV2	SARS-CoV2+	#tested for ORV	#ORV+	#WGS LCI	#WGS SARS-Cov2
Patients < 5 yrs	79 (22.9%)	3 (3.8%)	72 (91.1%)	4 (5.6%)*	75 (94.9%)	44 (58.7%)§	37 (46.8%)	12 (32.4%)¶	-	-
Patients 5+ yrs	266 (77.1%)	84 (31.6%)	264 (99.2%)	8 (3.0%)*	263 (98.9%)	99 (37.6%)§	133 (50.0%)	50 (50.4%)¶	-	-
Total	**345 (100%)**	**87 (25.2%)**	**336 (97.4%)**	**12 (3.6%)***	**338 (98.0%)**	**143 (42.3%)§**	**170 (49.3%)**	**62 (36.5%)¶**	**63 (72.4%)&**	**-**

*percentage calculated from the total number of patients tested for RSV

§ percentage calculated from the total number of patients tested for SARS-CoV-2

¶ percentage calculated from the total number of patients tested for ORV

& percentage calculated from the total number of patients tested for influenza

Key messages

- Characteristics of enrolled patients:
    - 51.6% female and 48.4% male
    - Mean age: 26.8 years (min – 1 months, max – 90 years)
    - 23.8% had at least one chronic condition
    - only 7.8% of patients were vaccinated for influenza
- 3 deaths in patients with SARS-CoV-2 infection
- Viable samples (historically, +, since last season, + and -) are stored (-70°C), dating back approximately 12 months – storage space limitations for samples older than >1y

ROMANIA

National Institute for Infectious Diseases "Prof. Dr. Matei Balș" Bucharest, Romania

NATIONAL INSTITUTE OF INFECTIOUS DISEASES "Prof. Dr. MATEI BALȘ"

Detailed results

A/H3: *n*=80 (92.0%)
A/H1: *n*=3 (3.4%)
A/ns: *n*=4 (4.6%)
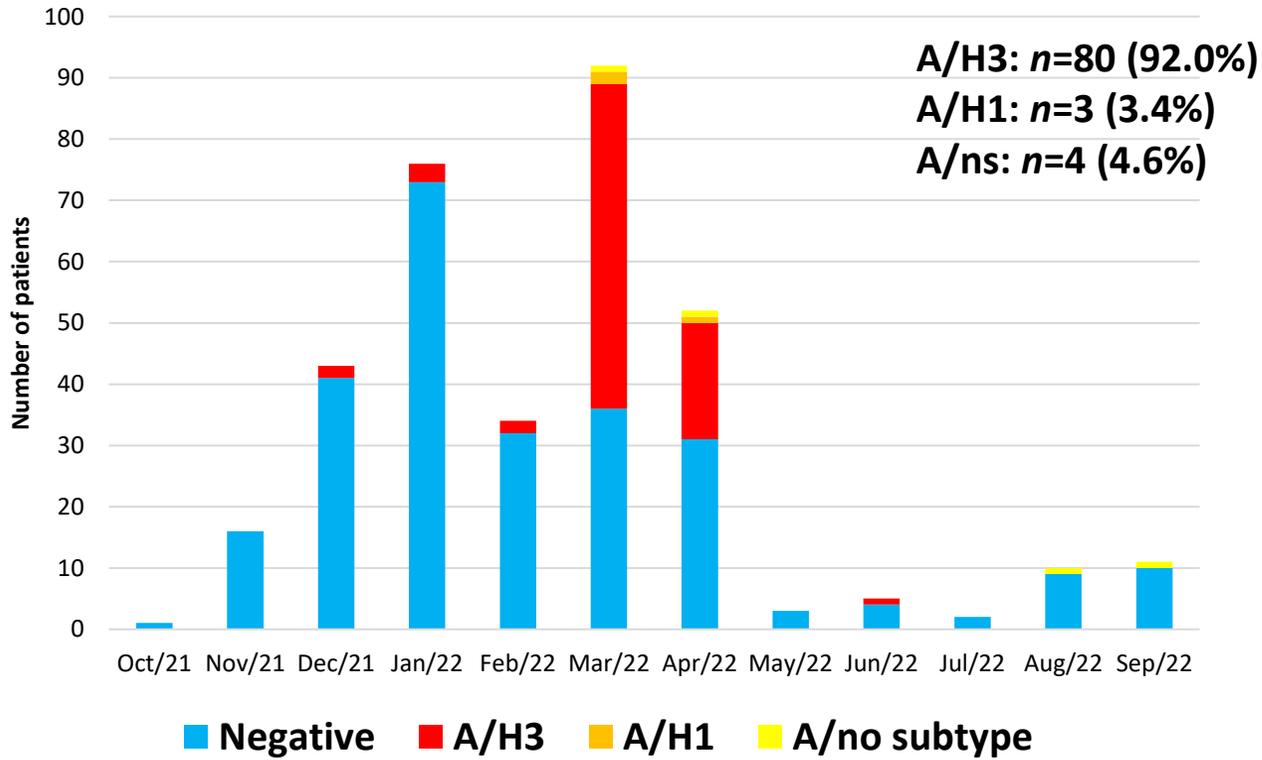
Rhinovirus	30
Adenovirus	7
Metapneumovirus	8
RSV	11
Parainfluenza virus	2
Human coronavirus	6
Rhinovirus + Metapneumovirus	3
Rhinovirus + Adenovirus	1
Rhinovirus + Human coronavirus	1
Rhinovirus + Parainfluenza	1
Rhinovirus + RSV	1
Adenovirus + Parainfleunzae	1
Metapneumovirus + Human coronavirus	1

Legend: ■ Negative ■ A/H3 ■ A/H1 ■ A/no subtype

17 cases of influenza and co-infections:
- 10 cases with SARS-CoV-2
- 7 cases with ORV: 3 rhino, 1 adeno, 1 corona, 1 RSV

ROMANIA

National Institute for Infectious Diseases "Prof. Dr. Matei Balș" Bucharest, Romania

NATIONAL INSTITUTE OF INFECTIOUS DISEASES "Prof. Dr. MATEI BALȘ"

Conclusions & Challenges

CONCLUSIONS:

- Influenza comeback after the first pandemic season
- Lower and later circulation compared to pre-pandemic years (historically Jan-Feb)
- Intense influenza wave during March-April 2022
- Sporadic cases during the summer
- On-site sequencing:
  - routinely done for SARS-CoV-2
  - done for influenza as part of GIHSN

CHALLENGES:

- Addressability of patients with ILI during off-season intervals
- To do: feasibility study for expansion of sample storage facility

Global Influenza Hospital Surveillance Network

SPAIN

Site description

HOSPITALS	CATCHMENT POPULATION	NUMBER OF BEDS
General Universitario de Castellón	282,000	509
Universitario y Politécnico La Fe	287,000	975
Universitario Doctor Peset	279,000	539
La Marina Baixa	170,000	270
TOTAL	**1,018,000**	**2,293**

Methods

Daily active surveillance for respiratory viruses in patients of all ages has been conducted from November 2nd, 2021 to September 19th, 2022 (last data update, the study is ongoing):

- **All patients hospitalized for a respiratory reason** are screened.
- Information on **clinical and sociodemographic characteristics** is obtained by interviewing patients/legal tutors and by consulting medical records.
- **NP and N/P swabs** are obtained **from all patients** meeting the **ILI** case definition.
- All swabs are tested for influenza, SARS-CoV-2, RSV and other respiratory viruses by **real-time RT-PCR**.
- Viral detections and influenza and SARS-CoV-2 whole-genome sequencing are performed at Fisabio's Genomics and Health laboratory. **WGS** is attempted **in all positive samples with Ct values<32**.
- All samples are stored at -70°C (for all seasons).

SPAIN

Results

	#included	#LCI	#tested for RSV	#RSV+	#tested for SARS-CoV-2	SARS-CoV-2+	#tested for ORV	#ORV+	#WGS LCI	#WGS SARS-CoV-2
Patients < 5 yrs	59 (100%)	0 (0%)	59 (100%)	19 (32%)	59 (100%)	9 (15%)	59 (100%)	12 (20%)	0 (0%)	6 (10%)
Patients 5+ yrs	1570 (100%)	82 (5%)	1570 (100%)	56 (4%)	1570 (100%)	536 (34%)	1570 (100%)	187 (12%)	40 (2%)	337 (21%)
Total	1629* (100%)	82 (5%)	1629* (100%)	75 (5%)	1629* (100%)	545 (33%)	1629* (100%)	199 (12%)	40** (2%)	343** (21%)

*Patients included between 02/11/2021 – 19/09/2022; 2 damaged samples and 11 pending laboratory results. **Pending results.

Key messages

No influenza cases were detected **in <5**

Almost all influenza cases were **A(H3N2)**

34% of hospitalizations in **5+** had **SARS-CoV-2** infection vs. **5% flu**

65% of **65+** were **vaccinated against flu** vs. 72% and 59% in the past two seasons

SPAIN

Reasons for admission
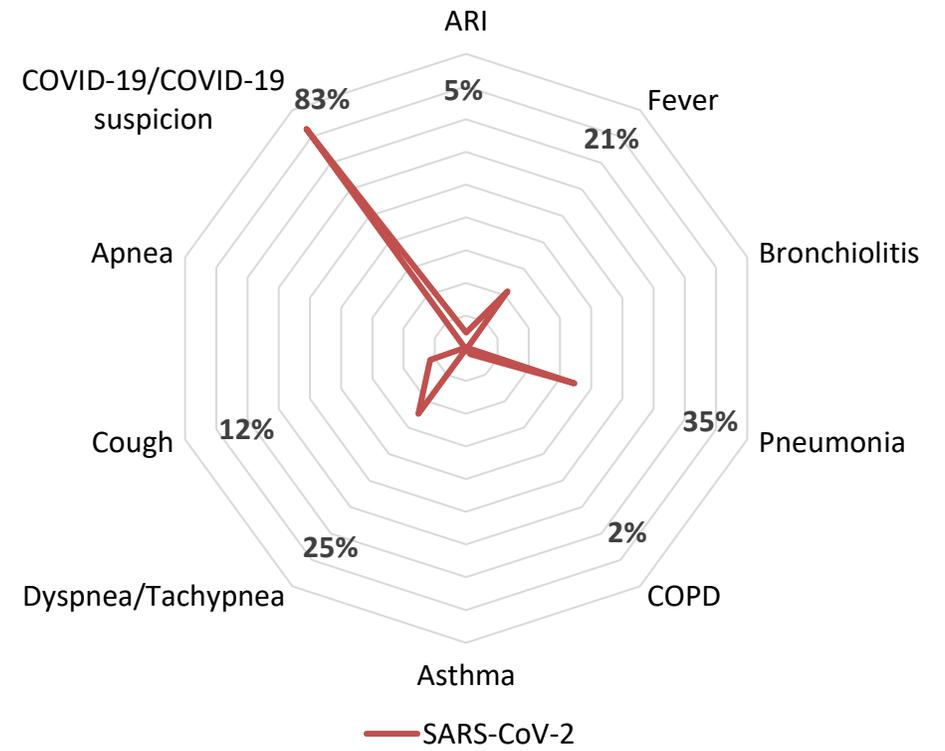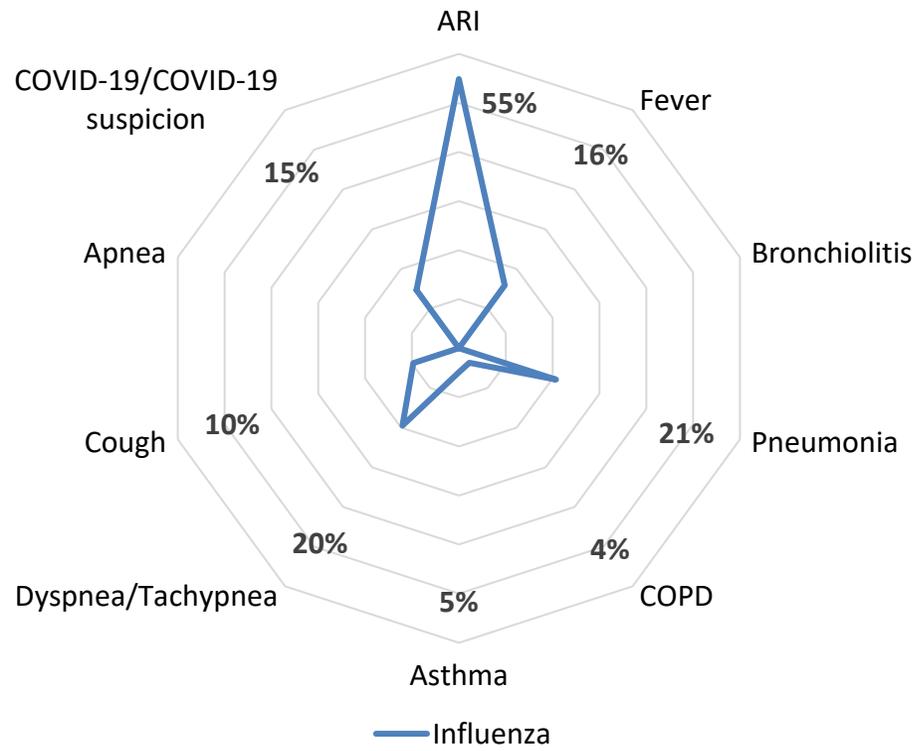
Influenza

- ARI 55%
- Fever 16%
- Bronchiolitis
- Pneumonia 21%
- COPD 4%
- Asthma 5%
- Dyspnea/Tachypnea 20%
- Cough 10%
- Apnea
- COVID-19/COVID-19 suspicion 15%

SARS-CoV-2

- ARI 5%
- Fever 21%
- Bronchiolitis
- Pneumonia 35%
- COPD 2%
- Asthma
- Dyspnea/Tachypnea 25%
- Cough 12%
- Apnea
- COVID-19/COVID-19 suspicion 83%

Symptoms
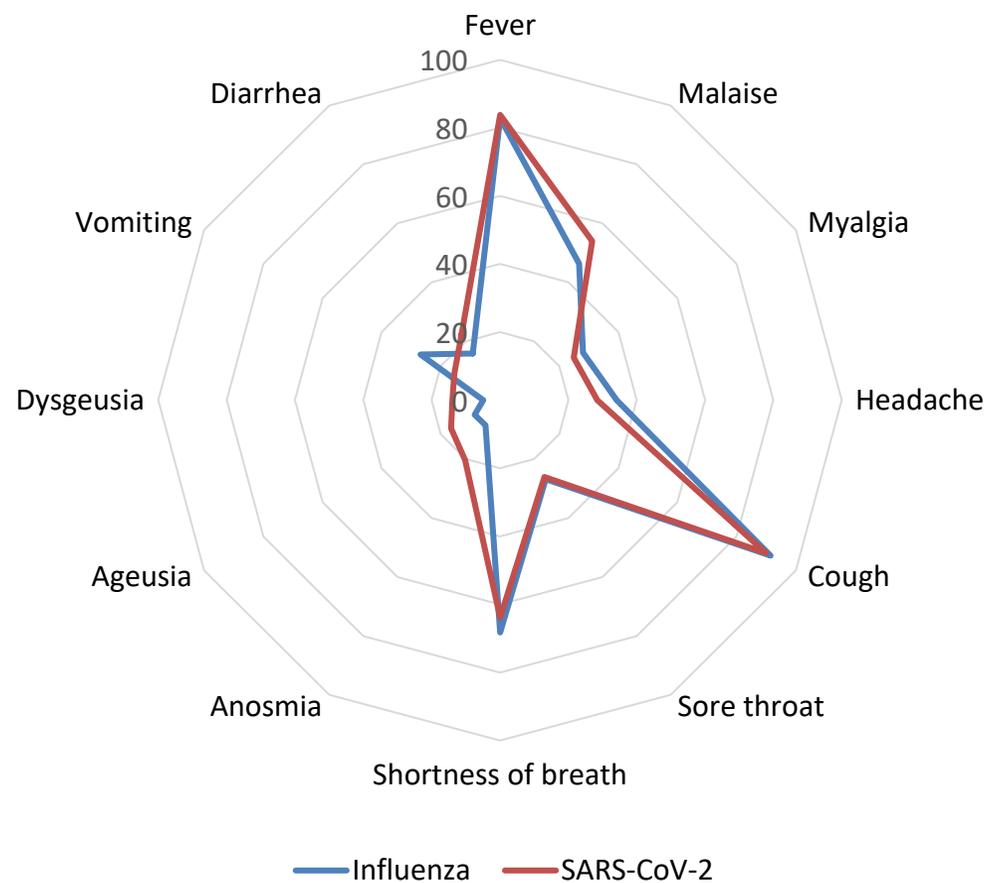
SPAIN

Laboratory results (RT-PCR)

- SARS-CoV-2 — 58%
- Rhinovirus/EV — 11%
- Influenza — 9%
- RSV — 8%
- HMPV — 6%
- AdV — 3%
- CoV — 3%
- PIV — 1%
- BoV — 1%

Influenza positives (N=82)

- A(H1N1)pdm09 — 1%
- A(H3N2) — 84%
- A not subtyped — 15%

SARS-CoV-2 variants

- Delta — 29%
- Omicron — 71%
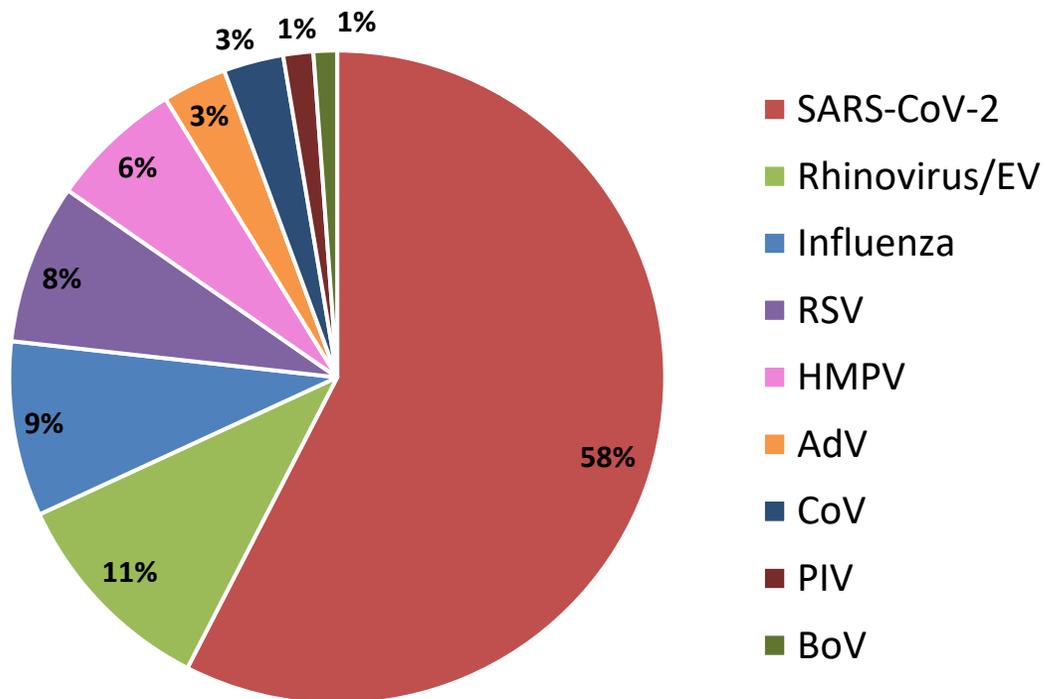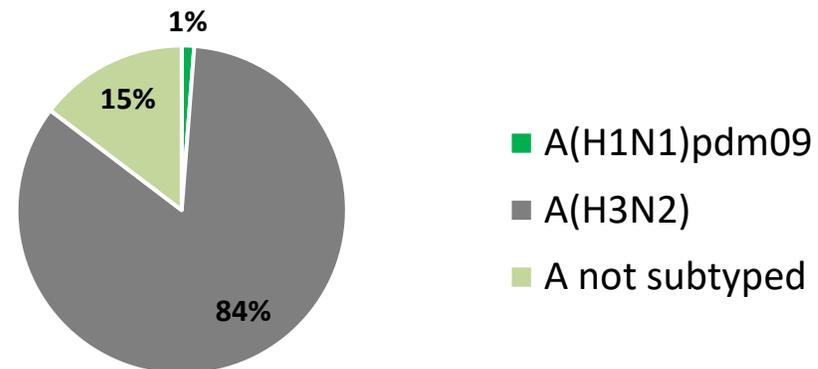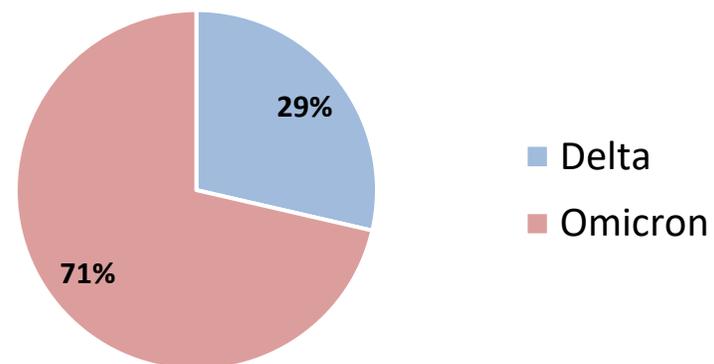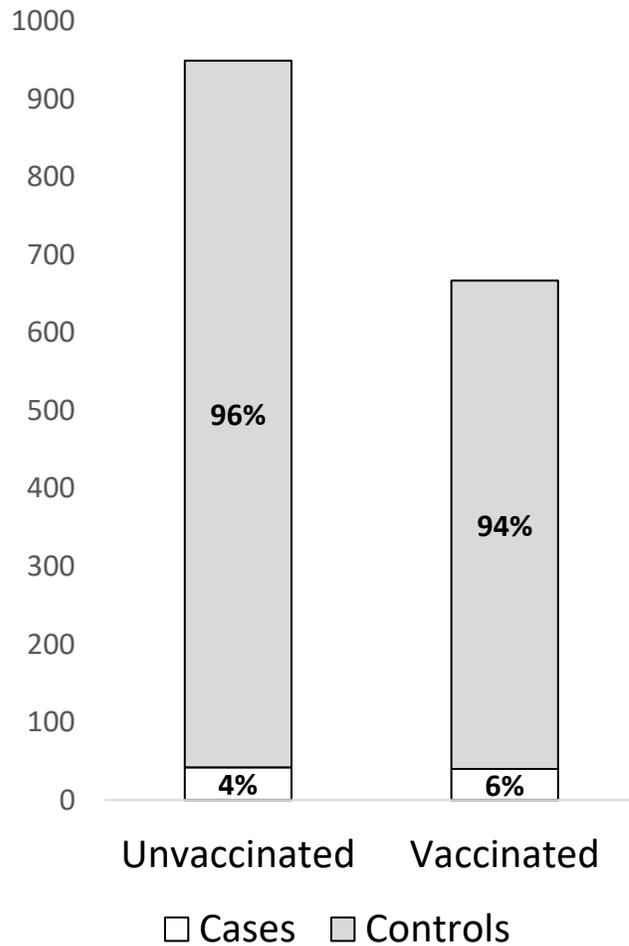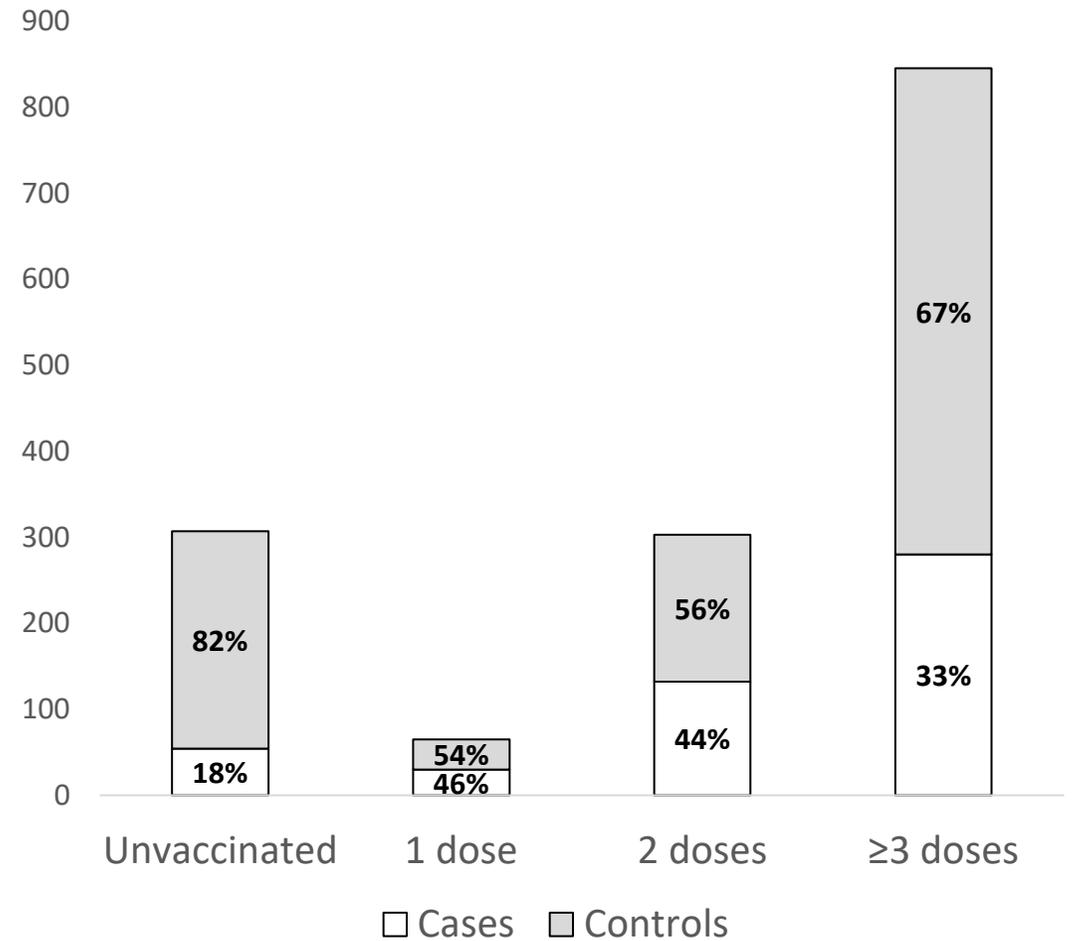
Conclusion & Challenges

CONCLUSIONS:

- **Influenza and RSV were back** in circulation.
- **All influenza** cases were **type A**, being **A(H3N2)** the **predominant** strain. **No** influenza **cases** were detected **in <5**.
- **Symptoms** were **very similar for influenza and SARS-CoV-2** cases.
- **58%** of positive samples were **SARS-CoV-2**, **11% RhV/EV**, **9% influenza** and **8% RSV** cases.
- **Most SARS-CoV-2** cases belonged to the **Omicron** variant.
- Among all hospitalizations, **80% were vaccinated with at least one dose against COVID-19** and **56% with 3 or more** doses. **Influenza vaccine coverage** in **65+** was **65%**.

MAIN CHALLENGE:

Most patients had prior knowledge about nasopharyngeal swab collection, and some were reluctant to repeat the procedure for the study. In those cases, we used the nasopharyngeal sample taken at hospital and analyzed it at Fisabio.

ANNUAL MEETING, 18 OCTOBER 2022

SITE: FRANCE

Speaker: Louise LEFRANÇOIS

FRANCE

Site description *(participating centers in the GIHSN)*

- Data from the FLUVAC Study : an observational, prospective, multicentric study to test vaccine effectiveness of Influenza vaccine against hospitalization, using Test Negative Design

- 5 academic hospitals:
    - 2 Paris (Cochin & Bichat), Lyon, Montpellier and Rennes

- Study Population: adults ≥ 18 years, admitted to hospitals with an Influenza like illness

- Influenza season in France starts around November to end of April the following year (according to SPF). Data collection started in October.

Methods

Active surveillance from **November 1st, 2021 to June 30th, 2022**

Daily Screening	Inclusion	Virologic detection	Analysis

Daily Screening

- Emergency department + patients directly admitted to participating departments

- Hospitalisation ≥ 24h

- Symptoms started < 7 days before swabbing for Flu and 14 days for COVID-19

Inclusion

- Inclusion & exclusion criteria*

- Non opposition consent signed

- Respiratory swabbing /reliquat within 24 hours

- Data collected (socio-demographic, clinic and epidemiologic)

Virologic detection

- RT-PCR (lab hospital)

- Stored at -80°C

- Sequencing (CNR of Lyon/Institut Pasteur)

Analysis

- Data management and statistical analysis (SC-10 Inserm)

- Data sharing with GIHSN

* At least one systemic symptom or sign: fever or feverishness, malaise, headache or myalgia **or** deterioration of general condition (asthenia or loss of weight or anorexia or confusion or dizziness) **AND** at least one respiratory symptom or sign (cough, sore throat or shortness of breath) at admission or within 48 hours after admission.

FRANCE

Results (data shared in the GIHSN)

	#included	#LCI	#tested for RSV	#RSV+	#tested for SARS-CoV2	#SARS-CoV2+	#tested for ORV	#ORV+	#WGS LCI	#WGS SARS-Cov2
Patients ≥ 18 yrs	**725**	**64**	**253**	**5**	**725**	**359**	**947**	**25**	**-**	**71**

Description of ORV

	#tested	#positive
Adenovirus	189	0
Bocavirus	189	0
Metapneumovirus	193	10
Parainfluenzavirus	185	2
Picorvirus	191	13
Co-infection Influenza / SARS-Cov2	**534**	**3**

Vaccination status

	Overall n= 725	<65 years n= 215	≥65 years n= 510
Influenza vaccination* (%)	251/701 (35%)	38/209 (17%)	213/492 (44%)
COVID vaccination complete (%)	162/705 (23%)	62/209 (31%)	100/496 (21%)
COVID vaccination boost (1 ou 2) (%)	345/705 (49%)	61 /209 (30%)	284/496 (57%)

* Vaccinated 14 days before symptoms apparitions. 24 patients with no date for Flu vaccination

FRANCE

F-CRIN Network

i-reivac

Innovative clinical research network in vaccinology

Inserm

La science pour la santé
From science to health

Results *(data shared in the GIHSN)*

Description	Flu vacination n= 251	Flu unvaccination n= 450
Sex /female (%)	111 (44%)	190 (42%)
Age (median)	79 [70;88]	70[55;82]
PCR positive (%)	29 (12%)	34 (8%)
Comorbidities (%)		
Respiratory diseases	104 (41%)	151 (34%)
Cardiac diseases	112 (45%)	142 (32%)
Diabetes	66 (26%)	113 (25%)
Obesity	43 (17%)	128 (28%)
Cancer	51 (20%)	65 (14%)
Renal	45 (18%)	58 (13%)
Rheumatologic	46 (18%)	48 (11%)

Outcomes	Influenza positive n= 64	
	Vaccination n= 29	Unvaccination n= 34
Admitted in ICU (%)	3 (10%)	5 (15%)
Mechanical ventilation invasive (%)	2 (7%)	3 (9%)
Death (%)	1 (3%)	0 (0%)
Full COVID vaccination (%) Primo and/or boosted	28/29 (97%)	20/34 (59%)

FRANCE

Conclusions & Challenges

CONCLUSIONS:

- In France, less patients during the season 2021-22 than 2020-21 (1071 vs. 725)- control measures ?
- No all WGS available for this study (to be collected), but context of omicron VOC circulation
- 63 cases of Flu – more than in 2020-21

- Season 2022-2023 might be important - no control measures – people reluctant to another boost – COVID-19 variant => risk of overload hospital

CHALLENGES: New study!

- Human Resource Intensive (shortage of personnel) – Omicron wave – January 2021

- Implementation of new study – RESPIVAC => more centers, funding, multiple vaccine schedule
- Surveillance of Influenza and SARS-CoV2 <u>and</u> others respiratory viruses

Site description *(hospitals participating in the GIHSN)*

- 11 adult academic and community hospital sites in 5 Canadian Provinces (Nova Scotia, Ontario, Quebec, Alberta) representing ~6000 acute care beds
- Population enrolled is approximately 2/3 older adults >=65 years of age, admitted to hospitals with an acute respiratory illness
- Influenza seasons in Canada typically begin with early influenza A activity, followed by a later influenza B peak; COVID has come in waves

2021/22 Sites

Methods

- Active surveillance for COVID-19 and influenza infection in adults (≥16 years of age) now conducted year round.
  - ➤ NP swab obtained from all patients with an admitting diagnosis of CAP, exacerbation of COPD/asthma, unexplained sepsis, any respiratory diagnosis or symptom as part of standard clinical care
  - ➤ NP swabs tested for COVID-19, influenza A & B by PCR
  - ➤ Influenza typing and B lineage characterization performed locally or at Canadian Immunization Research Network's (CIRN) SOS Network Central Laboratory at the Canadian Center for Vaccinology in Halifax, NS
  - ➤ Other clinical and demographic information was also collected, including information about vaccination status, comorbidities, medications, and frailty
  - ➤ Weekly reporting to Public Health Agency of Canada to inform national COVID-19 and influenza surveillance and management efforts

- Influenza positive cases matched to influenza-test negative controls on Admission date (within 14d of DOA of case), age stratum (≥ 65y or <65y) and site of enrolment to calculate influenza vaccine effectiveness (VE) using multivariable logistic regression.

  VE = 1-OR x 100%, with 95% CI (Confidence Intervals)

CANADA

Results *(data shared in the GIHSN)*

Variable	N (%)
Age	Mean 63.9 (SD 23.1) Median 67 [IQR 58-83] Range 16-101
Sex: % Female	29 (70.7%)
Frailty: Non-frail (CFS 1-3)	17 (41.5%)
Pre-frail (CFS=4)	6 (14.6%)
Mildly frail (CFS=5)	3 (7.3%)
Mod-Severe (CFS 6-9)	12 (29.3%)
Influenza vaccinated	17 (41.5%) **13 (31.7% missing)
ICU admission	5 (12.2%)
Died	4 (9.8%)

	#included	#LCI	#RSV+	SARS-CoV2+	#ORV+	#WGS LCI	#WGS SARS-Cov2
Patients 16+ yrs	3909	41	0	3781	49	* pending	* pending

Since this data transfer we have received additional data from sites, mostly on test negative patients, which will be transferred to GIHSN soon

Influenza key messages

- Very few influenza cases
- Influenza type/strain: 1 B no lineage, 4 H3N2, rest A not subtyped
- Median age 67 – younger than usual seasons
- Full spectrum of age and frailty represented
- Death and ICU remain high (approx. 10% and 12%)
- Too few cases to estimate Vaccine Effectiveness

Summary of demographic and clinical characteristics Omicron wave (Admission after Dec 1, 2021)

SOS network COVID-19 hospitalizations by province
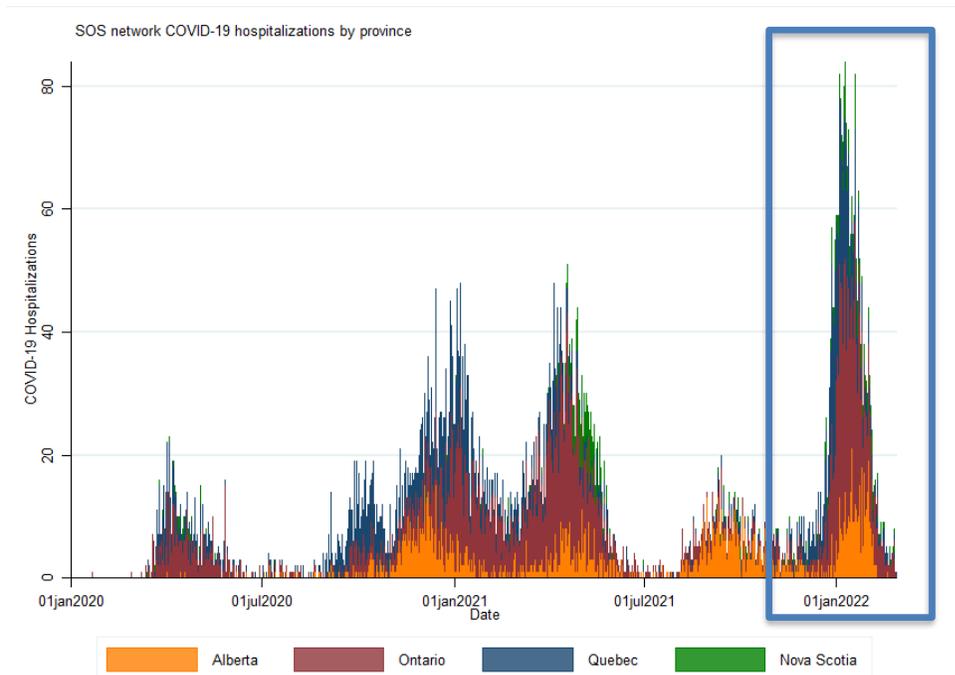
	Cases (n=2991)	Controls (n=1313)	p value
Age mean (SD) Range	68.8 (18.5) 16-104	72.8 (24.9) 18-105	<0.001
<55	587 (19.6%)	144 (11%)	
55-64	406 (13.6%)	208 (15.8%)	
65-75	747 (25.0%)	334 (25.4%)	
75+	1251 (41.8%)	627 (46.4%)	
Female	1377 (46.0%)	636 (48.4%)	0.15
Fully vaccinated (2+ doses)	2101/2317 (64.1%)	1166/1305 (89.3%)	<0.001
Frailty: Non	567 (23.9%)	314 (23.9%)	<0.001
Pre-frail	687 (23.0%)	271 (20.6%)	
Mild	431 (14.4%)	264 (20.1%)	
Moderate +	655 (21.9%)	440 (33.5%)	
Missing	651 (21.8%)	24 (1.8%)	

Older adults were more likely to be vaccinated, less likely to go to ICU, and more likely to die (Omicron)

	Age <65 Cases N = 993	Age <65 Controls N = 352	p	Age >= 65 Cases N = 1998	Age >=65 Controls N = 961	p
% vaccinated	381 (38.4%)	282 (80.1%)	<0.001	1106 (55.4%)	885 (92.1%)	<0.001
ICU	202 (20.3%) M = 309 (31.1%)	44 (12.5%) M = 63 (17.9%)	<0.001	210 (10.5%) M = 558 (27.9%)	87 (9.1%) M – 193 (20.1%)	0.036
Mechanical Ventilation	130 (13.1%) M = 309 (31.1%)	16 (4.5%) M = 63 (17.9%)	<0.001	103 (5.2%) M = 558 (27.9%)	30 (3.1%) M = 195 (21.0%)	0.003
Death	53 (5.3%) M = 318 (32.0%)	7 (2.0%) M = 80 (22.7%)	0.002	328 (16.4%) M = 574 (28.7%)	79 (8.2%) M = 246 (25.6%)	<0.001

Global Influenza Hospital Surveillance Network

VE of >=2 doses against hospital admission

Method: Test negative case control; Omicron

	Adjusted for age and sex (95% CI) Cases/Controls	Adjusted model (95% CI) Cases/Controls
Overall	87.3 (84.7-89.5) 2990/1313	79.6 (75.1-83.3)* 2340/1289
Age < 65y	83.4 (77.7-87.6) 993/352	74.6 (65.4-81.3)# 734/344
Age ≥ 65y	89.4 (86.3-91.7) 1997/961	82.8 (77.6-86.8)+ 1606/945

Variables included in modeling: age, sex, frailty. Logistic regression, Listwise deletion.
* Model includes age, sex and frailty
# model include age, sex and frailty
+ model includes age, sex, and frailty

CIHR IRSC
Canadian Institutes of Health Research   Instituts de recherche en santé du Canada

COVID-19 IMMUNITY TASK FORCE

Global Influenza Hospital Surveillance Network

Conclusion & Challenges

CONCLUSIONS:
- Age and frailty were associated with high risk of adverse outcomes, but poor outcomes were experienced across the range of age and frailty
- Very little influenza was circulating last season in Canada; burden of COVID-19 was high, especially in the large Omicron wave
- VE during Omicron wave was 79.6% overall and appeared to be similar for older vs. younger adults

CHALLENGES:
- WGS: COVID test samples are done by public health rather than the site labs so we don't have access to all samples. Some are done by our National Microbiology Lab and we can get access to them, though with delays.
- Very high case numbers overwhelmed human resources (>10,000 cases in 2 years vs ~12,000 influenza cases since 2009 (12Y)
- Moving forward limit enrollment to enable timely data entry and focus on rolling VE estimates
- Research staff sometimes redeployed or restricted by pandemic precautions
- Despite widespread vaccine registries, unable to link to vaccine registry data (yet?)

Site description

8 Hospitals
- ~ 42,000 employees
- 3,815 beds
- 400+ ambulatory sites

Each Year
- 4,000,000 patient visits
- 150,000 inpatient admissions
- 16,000 births

Season	# Influenza NAAT	# Influenza cases	Influenza WGS
2019-20	14203	1783	192
2020-21	23882	7	7
2021-22	77858	1629	259

Season	# SARS-CoV-2 NAAT	# SARS-CoV-2 cases	SARS-CoV-2 WGS
2019-20	73790	13333	2500
2020-21	559088	25361	1754
2021-22	1064935	84376	3309

Surveillance setting: Mount Sinai Pathogen Surveillance Program
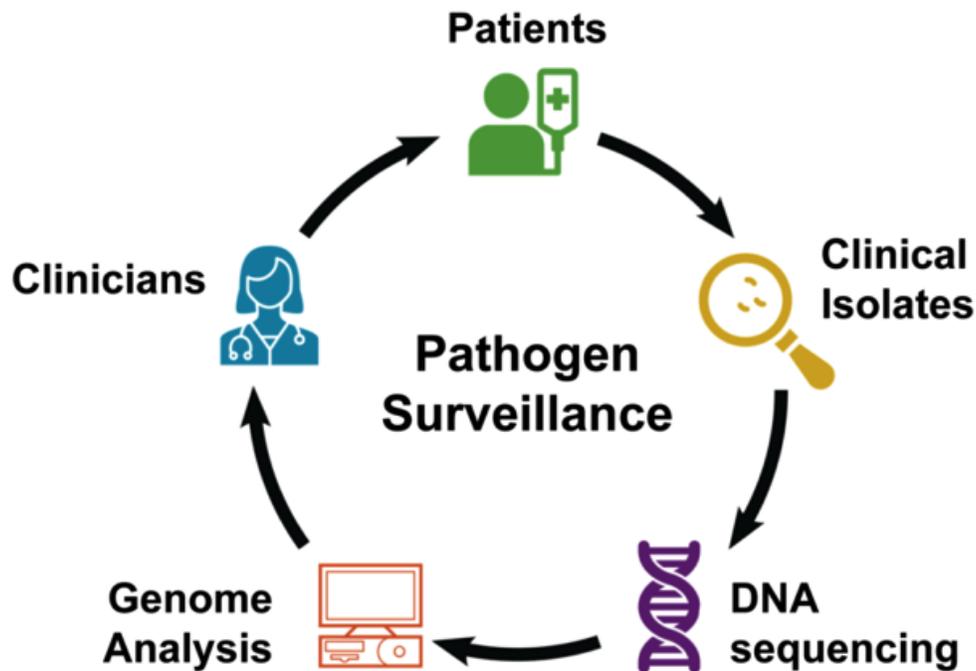
- >200,000 biospecimens from 8 hospitals
  - >65,000 residual nasopharyngeal/ante nares swabs positive for viral pathogen
  - >80,000 serum/plasma samples

- Daily reports from Electronic Medical Records
  - Clinical Microbiology Laboratory
  - Demographics, visits, caregivers, medications, outcomes, vaccination etc.

- >20,000 pathogen genomes sequenced & assembled to date

- Selected patients are invited to enroll in our observational longitudinal studies

MS-PSP: All influenza virus infections (Oct 2021 to Oct 2022)
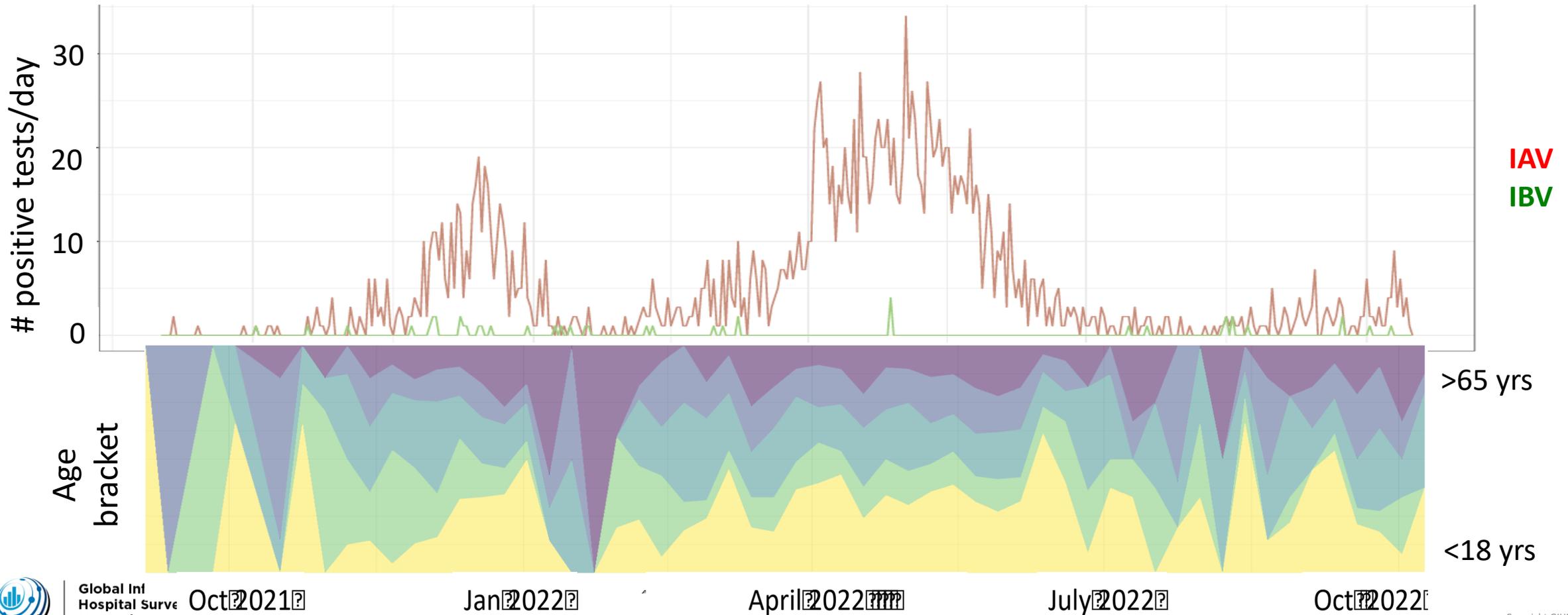
Results: Characteristics of patients hospitalized with influenza virus infections (GIHSN, 2021-2022)

	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Total
# hosp. patients	2	5	29	16	6	28	51	56	10	2	0	205
days of admisssion (median, d)	3.5	3	3	2	3.5	3.5	4	3	5	4		3.5
days of admisssion (range, d)	3-4	0-14	0-26	0-70	1-9	0-23	0-95	0-58	1-51	1-7		--
# fatal outcome (while hospitalized)	0	0	2	2	0	2	3	1	1	0		11
Influenza A	2	5	29	14	6	27	51	56	10	2		202
Influenza B	0	0	0	2	0	1	0	0	0	0		3
SARS-CoV-2 Co-Infection	0	1	2	7	0	1	0	3	2	2		18
Female	2	2	18	7	4	14	30	28	4	1		110
Male	0	3	11	7	2	14	21	27	3	0		88
Missing Sex	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*1*	*3*	*1*		*7*
$\geq$ 65	0	1	18	8	3	16	24	33	6	0		109
5-64	2	4	11	6	3	12	26	21	1	1		87
< 5	0	0	0	0	0	0	1	1	0	0		2
Missing Age	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*1*	*3*	*1*		*7*

Results: Phylogenetic relationships of IAV H3N2
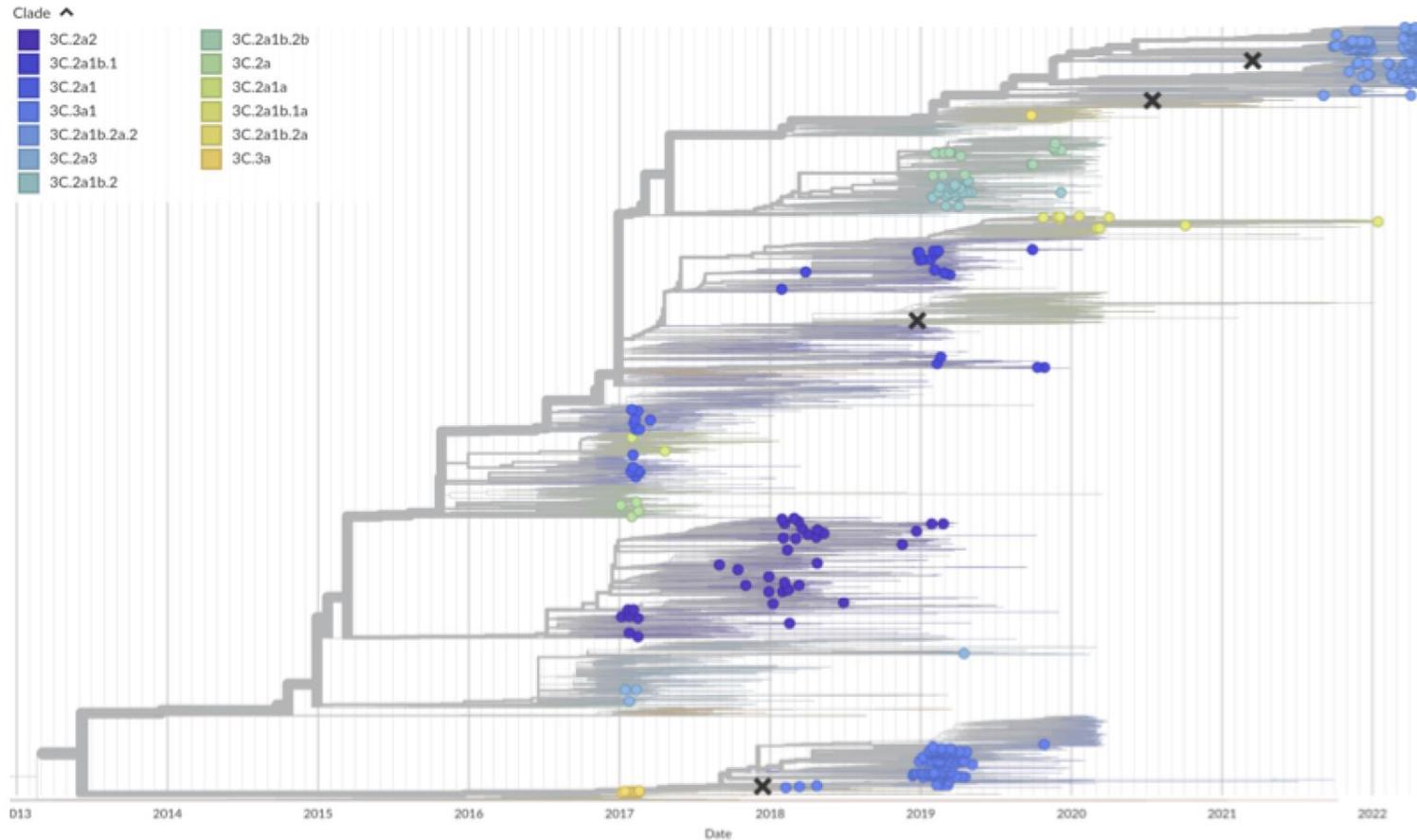
>40 viral genomes from hospitalized patients

Conclusions, challenges and opportunities

CONCLUSIONS:
- The 2021/22 Influenza season was characterized almost exclusively by IAV-H3N2 circulation with two peaks resulting in overall case numbers that are comparable to pre-pandemic levels
- Most people with Influenza virus infection experienced mild symptoms which did not require hospitalization
- Most hospitalizations due to Influenza virus infections were short (median: 3 days)

CHALLENGES and OPPORTUNITIES:
- The initial data sharing agreement and MTA took longer than anticipated
- Sequencing relies on the availability of residual diagnostic specimen
- We have banked residual nasopharyngeal diagnostic specimen which have tested positive for a respiratory virus going back to 2018
- We have banked around 70% of the nasopharyngeal swabs testing positive for respiratory viruses from the past season – linked metadata data is available for each specimen

**Global Influenza
Hospital Surveillance
Network**

ANNUAL MEETING, 18 OCTOBER 2022

GIHSN 2022_23: PARTICIPATING SITES & PROTOCOL HIGHLIGHTS

Laurence TORCEL-PAGNON & Sandra CHAVES, Foundation for Influenza Epidemiology

Foundation for
Influenza
Epidemiology

Sous l'égide de
Fondation
de
France

22 SITE APPLICATIONS FOR THE 2022/23 SEASON
17 SELECTED, 4 IN DISCUSSION

North America
Canada
USA-NYC*
USA-Marshfield*

South America
Brazil-Curitiba
Peru-Lima

W Europe
France
Spain

East. Europe
Romania
Russia-Moscow
Russia-St Petersburg
Ukraine
Poland

Africa
Kenya
South Africa
Côte d'Ivoire*
Senegal-Dakar

Middle East
Lebanon
Turkey

Asia/Pacific
China-Fudan*
India-Srinagar
Pakistan

■ 2021-2022　■ New sites　**Pending*

Grant proposals sent to selected sites end of September

Same protocol as last year!

- Screening and inclusion of hospitalized patients with respiratory illness meeting protocol case definition <u>year-round</u> (**November 2022 to October 2023**)

- Collection of epidemiologic and clinical data for all participating patients (i.e., those who meet case definition and consent to participate), with a standardized questionnaire administered at enrolment and a chart abstraction at patient discharge/death

- Enrolled patients would have respiratory specimen collected shortly after hospital admission (<u>within first 72 hours</u>) and sent for testing at the local and/or reference laboratory or National Influenza Centre

Laboratory

- PCR test for influenza and SARS-CoV2 (priority) and for other respiratory viruses (when possible, e.g., available multiplex)

- Storage (-20C or -70C) of respiratory samples (swabs) from **all swabbed patients for a minimum of one year**. This can facilitate retrospective investigations on pathogen discovery, or evaluation of new diagnostic tools

- WGS for a minimum of **50 to 100 influenza viruses** will be expected. **If number of influenza positive cases are low, site is encouraged to complete WGS of SARS-COV-2**

  - WGS for influenza is a priority. If WGS data available for other respiratory viruses (e.g., SARS-Cov2, RSV) it would be beneficial to share in GISAID with the link to clinical data

  - WGS data uploaded to GISAID by site in a reasonable timeframe, so results are available for the WHO Vaccine Composition Meeting

  - Link between WGS data uploaded in GISAID and clinical data in GIHSN required

Year-round case ascertainment
(identify possible eligible cases)

Assess if meet case definition

no

yes

No need to collect data
(not part of database)

Enrollment
(Meet case definition and consent given)

All data from enrolled patients should be entered in the GIHSN database regardless of test results

Questionnaires at enrollment and at discharge
(based on chart abstraction)

Questionnaire completed

Respiratory specimen collected

Tested for influenza, RSV, SARS-CoV-2 others

WGS done locally or sent to Lyon

WGS from influenza viruses uploaded to GISAID
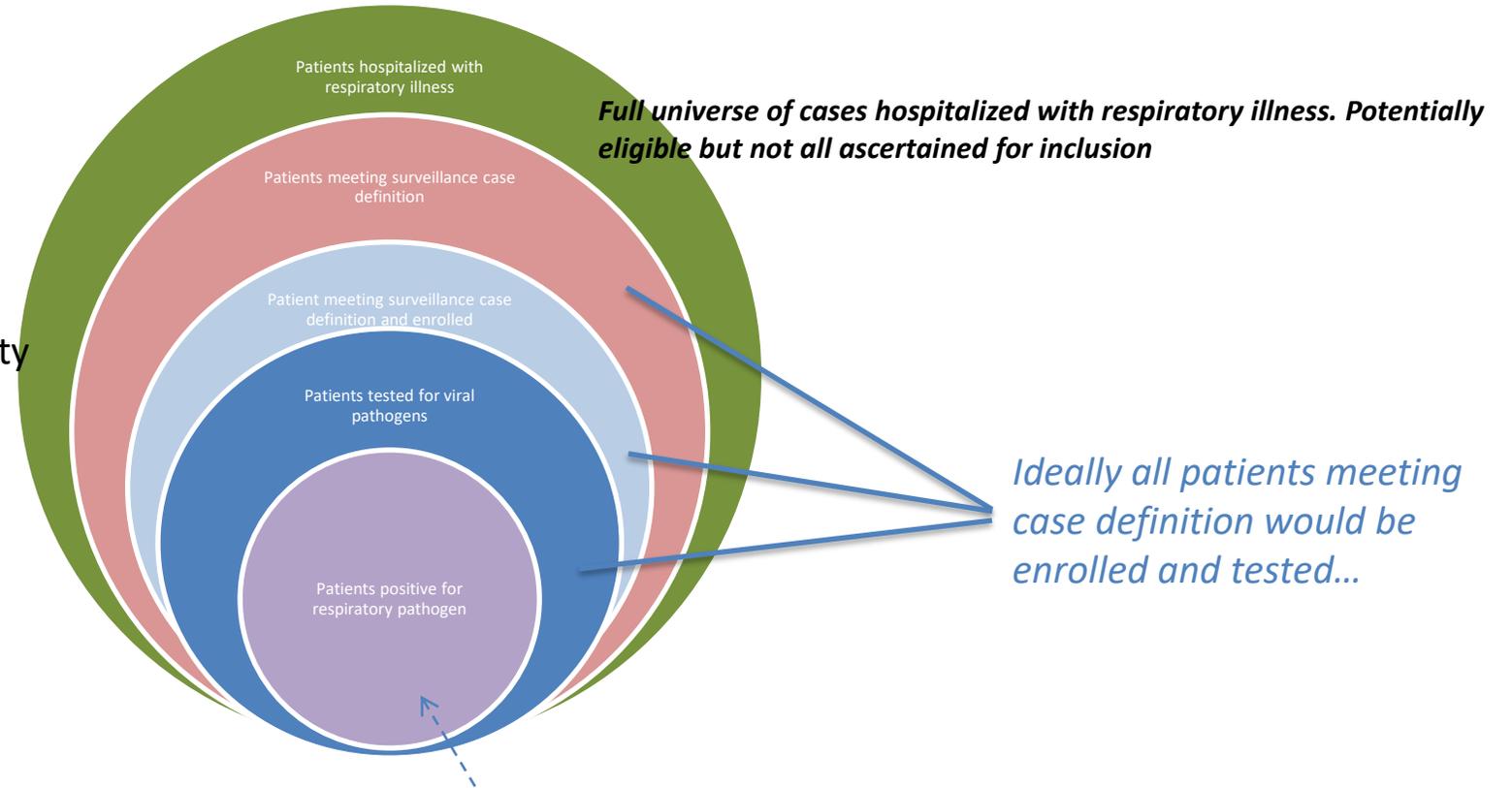
Global Influenza Hospital Surveillance Network

SAMPLING STRATEGY

Enrollment strategy:
1st option: Weeklong case finding, enrollment and sample collection
2nd option: Defined days/week for case finding, enrollment and sample collection
   e.g., 3 days/week all patients meeting eligibility would be approached for enrollment and specimen collected for testing

Patients hospitalized with respiratory illness

Patients meeting surveillance case definition

Patient meeting surveillance case definition and enrolled

Patients tested for viral pathogens

Patients positive for respiratory pathogen

Full universe of cases hospitalized with respiratory illness. Potentially eligible but not all ascertained for inclusion

Ideally all patients meeting case definition would be enrolled and tested...

These patients would not tell us a complete story...Understanding percentage positive for the various pathogens would be important to help us understand virus circulation In different settings

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Pyramid levels (top to bottom):
- Positive results
- Enrolled & Tested
- Meet case definition for ARI
- All hospitalizations for ARI
- Population that seek care at surveillance hospital (**Catchment Population**)

No. Positive results/ No. Tested = Percentage positive by country or region for various pathogens

If we know how many hospitalized cases met case definition, **we could apply positivity rate to that universe of patients to estimate the impact of a certain pathogen** in a population hospitalized with ARI

If we know the catchment area of surveillance hospitals, we can estimate incidence of hospitalizations by country or region for various pathogens

Global Influenza Hospital Surveillance Network

SCIENTIFIC PAPERS - UPDATE

Scientific papers

Title	1st author	Journal	Status
Clinical and phylogenetic influenza dynamics for the 2019-20 season in the global influenza hospital surveillance network (GIHSN) - Pilot study	B Lina	Journal of Clinical Virology	Published May 2022
Age differences in comorbidities, presenting symptoms and outcomes of influenza illness requiring hospitalization: a global perspective from the GIHSN 2018-19	M K Andrew	Journal of Infectious Diseases	To be submitted
Increased severity of influenza-related hospitalizations in resource-limited settings: Results from the Global Influenza Hospital Surveillance Network (GIHSN)	C Viboud S Chaves	Lancet Global Health (target)	To be submitted

To be discussed with ISC: who will lead the 2020-21 & 2021-22 2-year analysis?

ORAL PRESENTATIONS & POSTERS - UPDATE

Options XI for the control of influenza, 26-29 September 2022, Belfast, UK

Title	Presenting author	Poster/Oral presentation
Ten-year anniversary of the Global Influenza Hospital Surveillance Network (GIHSN)	S Chaves	Poster
Age differences in comorbidities, presenting symptoms and outcomes of influenza illness requiring hospitalization: a global perspective from the Global Influenza Hospital Surveillance Network	M K Andrew	Poster
Increased severity of influenza-related hospitalizations in resource-limited settings: results from the Global Influenza Hospital Surveillance Network (GIHSN)	C Viboud/S Chaves	Oral presentation

20th European Congress of Internal Medicine, 9-11 June 2022, Malaga, Spain

Title	Presenting author	Poster/Oral presentation
Global Influenza Hospital Surveillance Network (GIHSN) 2020-21 season project in Turkey: Utilization of influenza surveillance for tackling SARS-CoV2	S Unal / M Durusu Tanriover	Poster

RESEARCH PROJECTS - UPDATE

Research projects validated by the EC of March 24th, 2022

Title	Leading author	Status
Experience of older adults hospitalized with influenza and acute respiratory illness in relation to function in Activities of Daily Living: a report from the GIHSN	M K Andrew	Ready to start, pending some internal confirmation
GIHSN Severity Scale (GIHSN SevScale), aims to develop a scientifically-developed severity scale for influenza cases reported to GIHSN	J Paget	Researcher hired, work should start soon

- Kick-off meetings 2022_23 (new & recent sites) – *In the coming weeks*

- Lab webinar / WGS protocol (all sites) – *In the coming weeks*

- Face-to-face Annual Meeting (to be confirmed) – *Spring-summer 2023*

THANK YOU!

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