The Global Influenza Hospital Surveillance Network (GIHSN): Data Sharing for Action

Foundation for Influenza Epidemiology

Global Influenza Hospital Surveillance Network
10-YEAR ANNIVERSARY

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Background

The Global Influenza Hospital Surveillance Network (GIHSN) started in 2012 and currently includes more than 100 hospitals in 20 countries, collecting, analyzing, and sharing epidemiologic, clinical and laboratory data on influenza and other respiratory viruses. The network operates under a public-private partnership governance: the Foundation for Influenza Epidemiology (FIE). FIE provides catalytic funding that complements other financial sources (e.g., local ministry of health, WHO, CDC etc.).
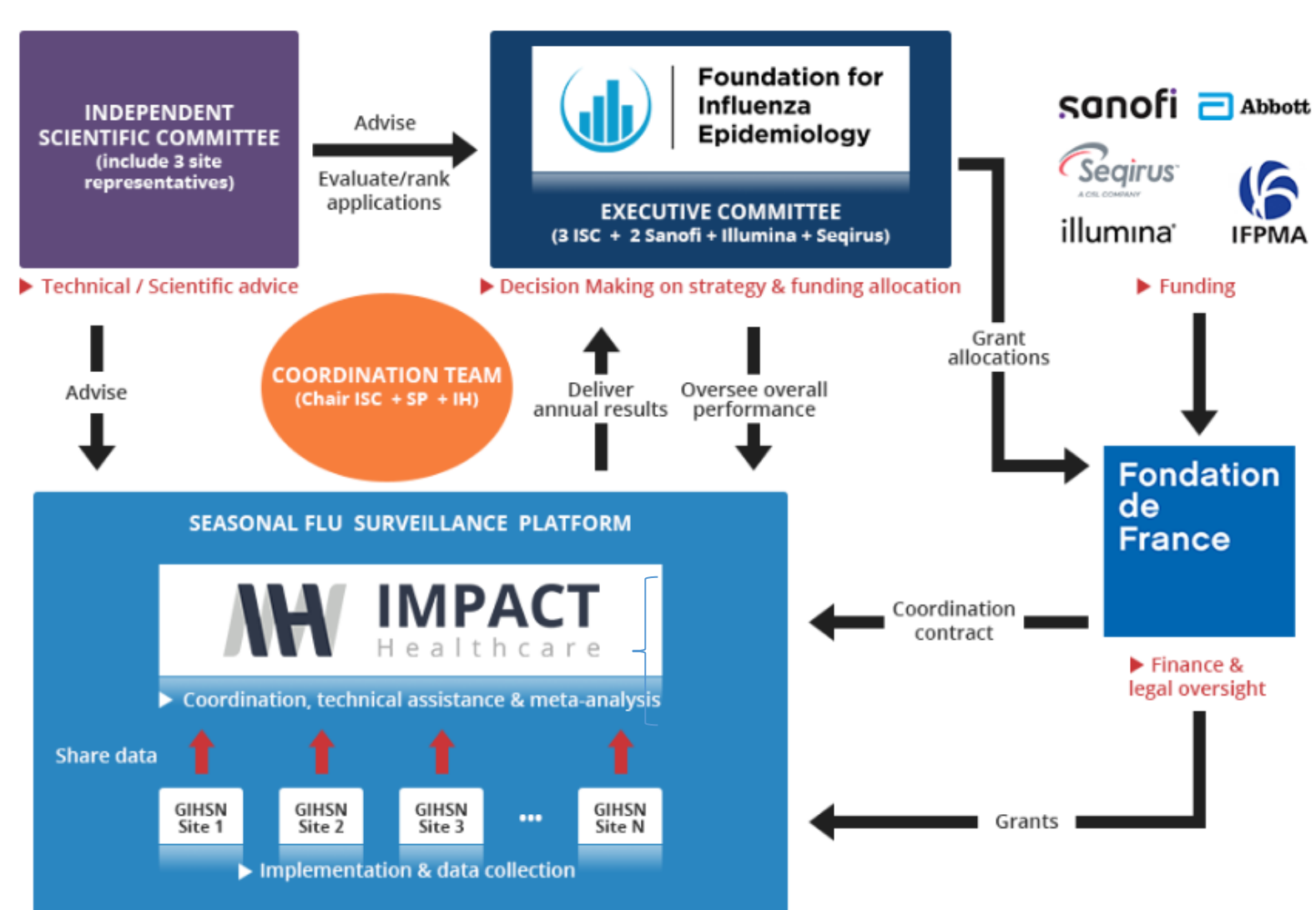
The Executive Committee is the decision maker, in charge of strategic directions related to the project.

Objectives

To describe the epidemiology of viral-associated hospitalizations and to better understand viral circulation, related severity, and risk factors.

Methods

- An independent multidisciplinary scientific committee manages the scientific direction of the network, but sites remain owner of their data.
- Using standard protocols, the sites collect demographic and clinical information from patients admitted with respiratory illnesses, including clinical outcomes at discharge from hospital.
- Respiratory specimens are collected and tested for influenza and other respiratory virus by RT-PCR.
- The network has evolved over time to focus on linking epidemiologic and clinical data with whole genome sequencing (WGS) information to explore the association of viral genotypes and severity or vaccine-breakthrough cases and support vaccine strain selection.
- The GIHSN promotes sharing of surveillance data with local health authorities, WHO and the scientific community at large.
- Despite the pandemic, the network has been able to pursue its activities with limited disruption and it is currently active year-round.
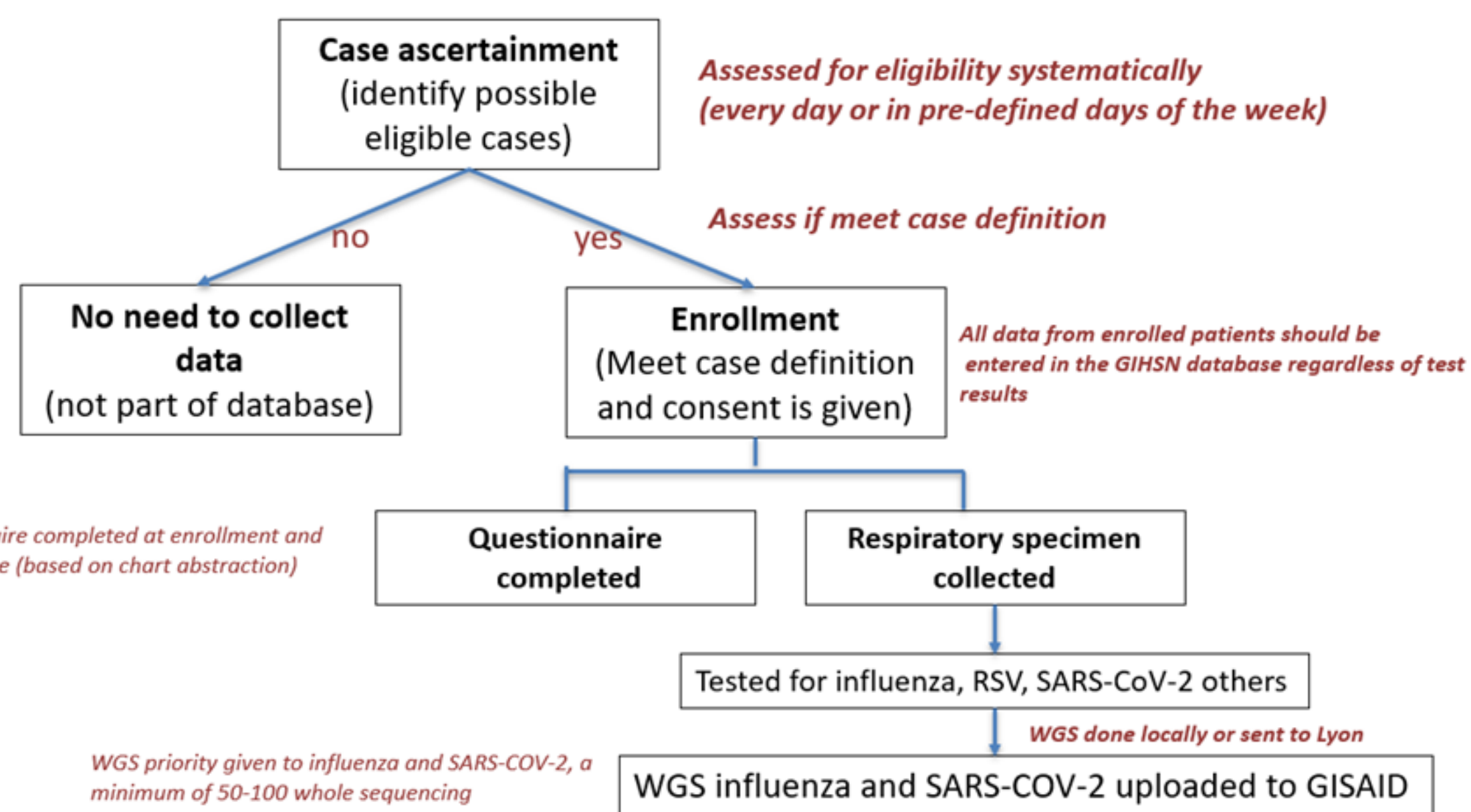

Fig 1: Case ascertainment and enrolment procedures for patients hospitalized with respiratory illness
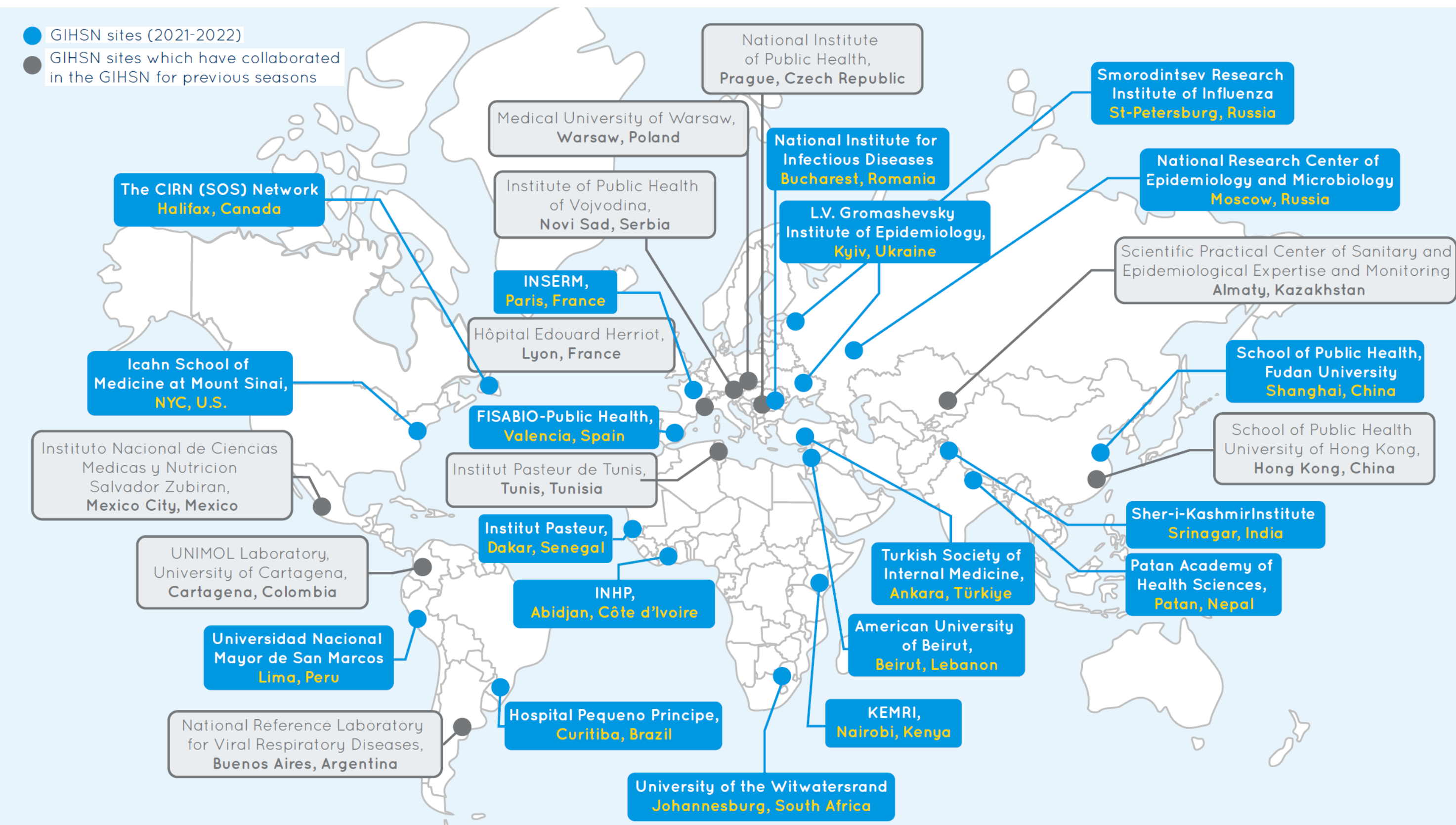

Fig 2: Geographic distribution of GIHSN sites over the seasons. The GIHSN progressively expanded since 2012 to include sites from both hemispheres and inter-tropical areas

Results

- A total of 143,200 patients hospitalized with respiratory illness have been enrolled so far, including laboratory-confirmation of 24,488 Influenza cases and 42,342 patients with other respiratory viruses.
- The annual positivity rate for influenza has ranged from 29% in 2018-19 to 2% in 2020-21 (COVID-19 pandemic period).
- The network has contributed to more than 20 published manuscripts and numerous local and international meetings and conferences since its initiation.
- The Foundation for Influenza Epidemiology is also supporting research activities that leverage the data and/or samples gathered through the GIHSN leading to expanding collaborations to better understand the burden of influenza. GIHSN data are shared with WHO to support vaccine strain selection.
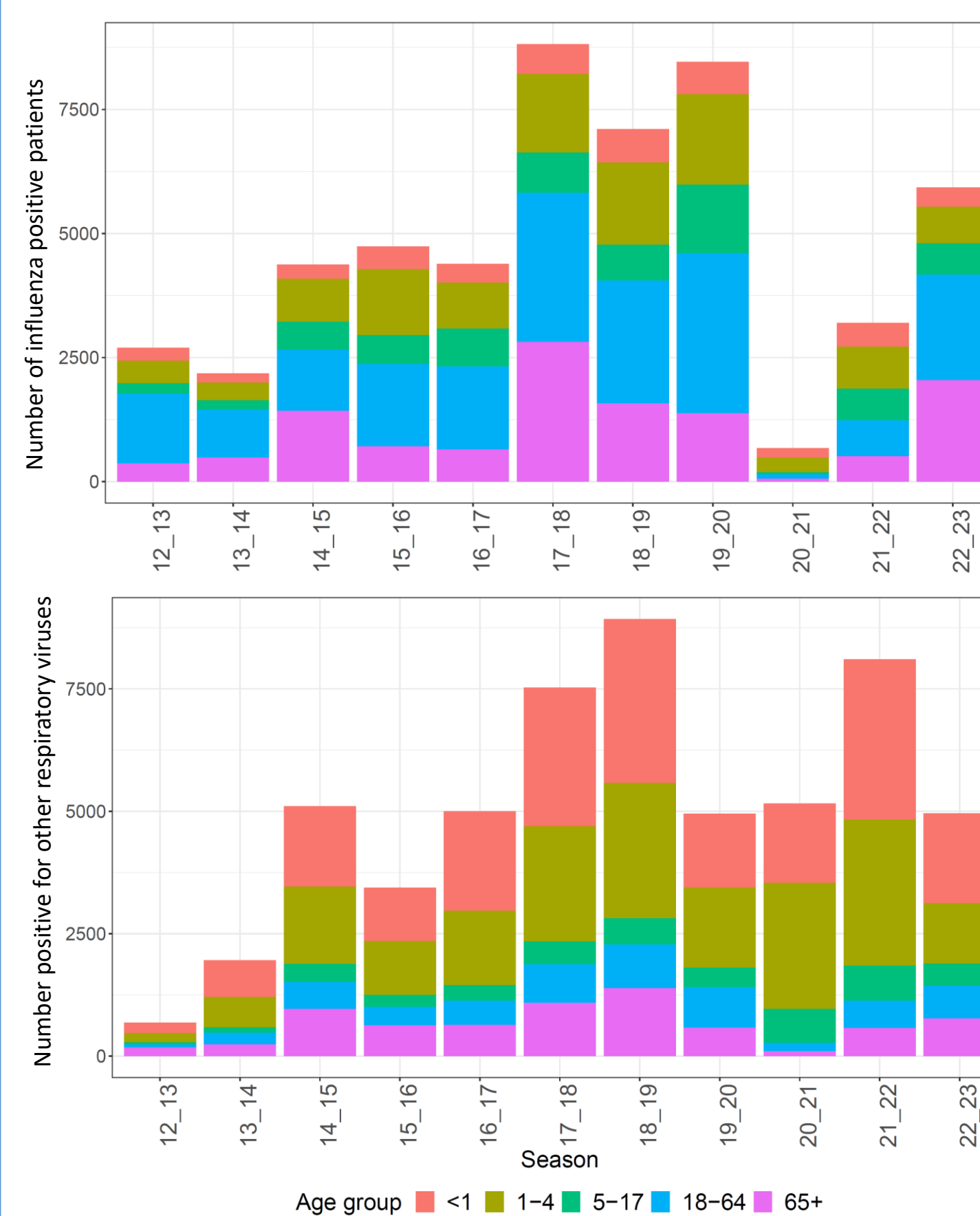

Fig 3: Number of influenza positive patients (top) and of patients positive for other respiratory viruses (bottom) by year of surveillance
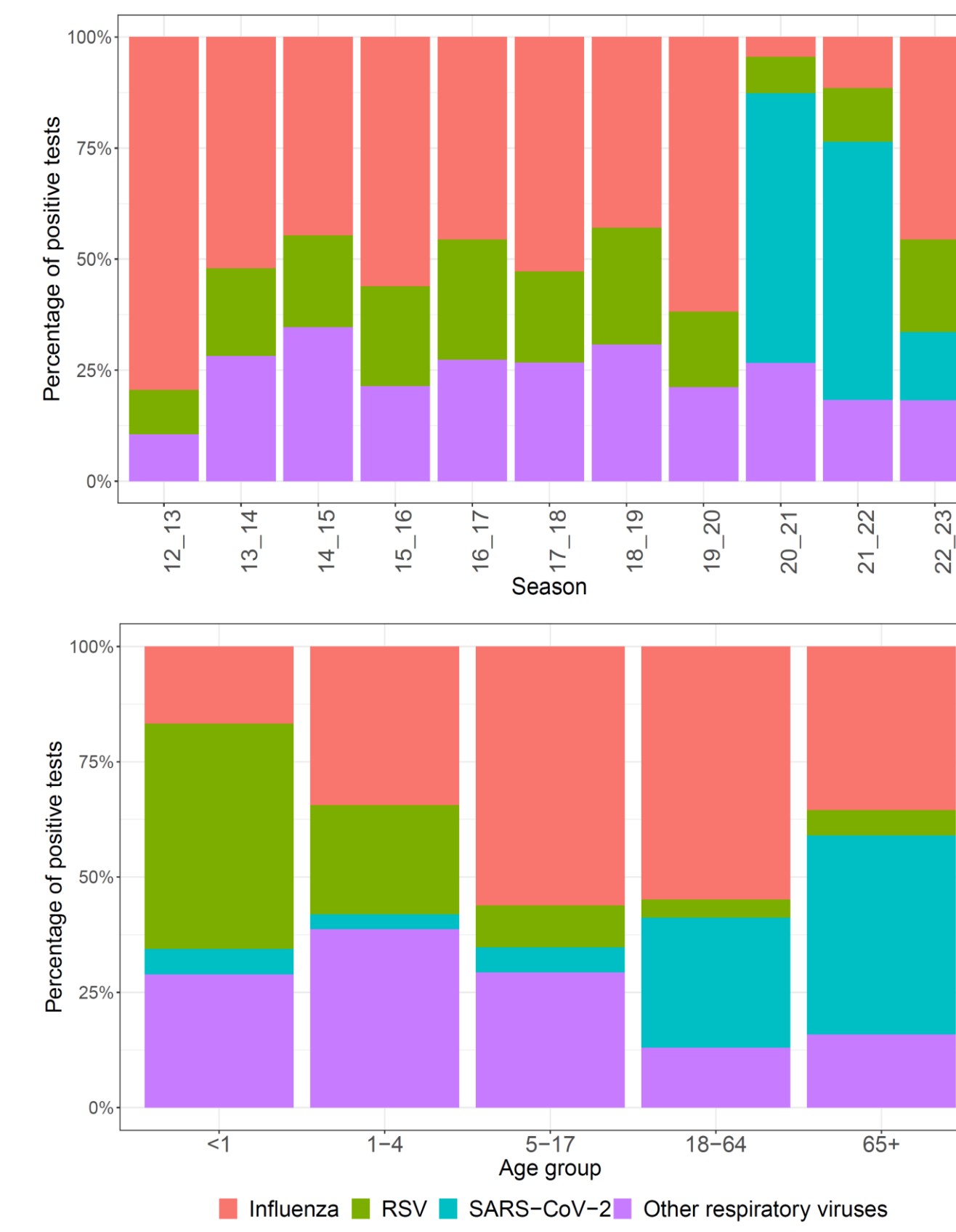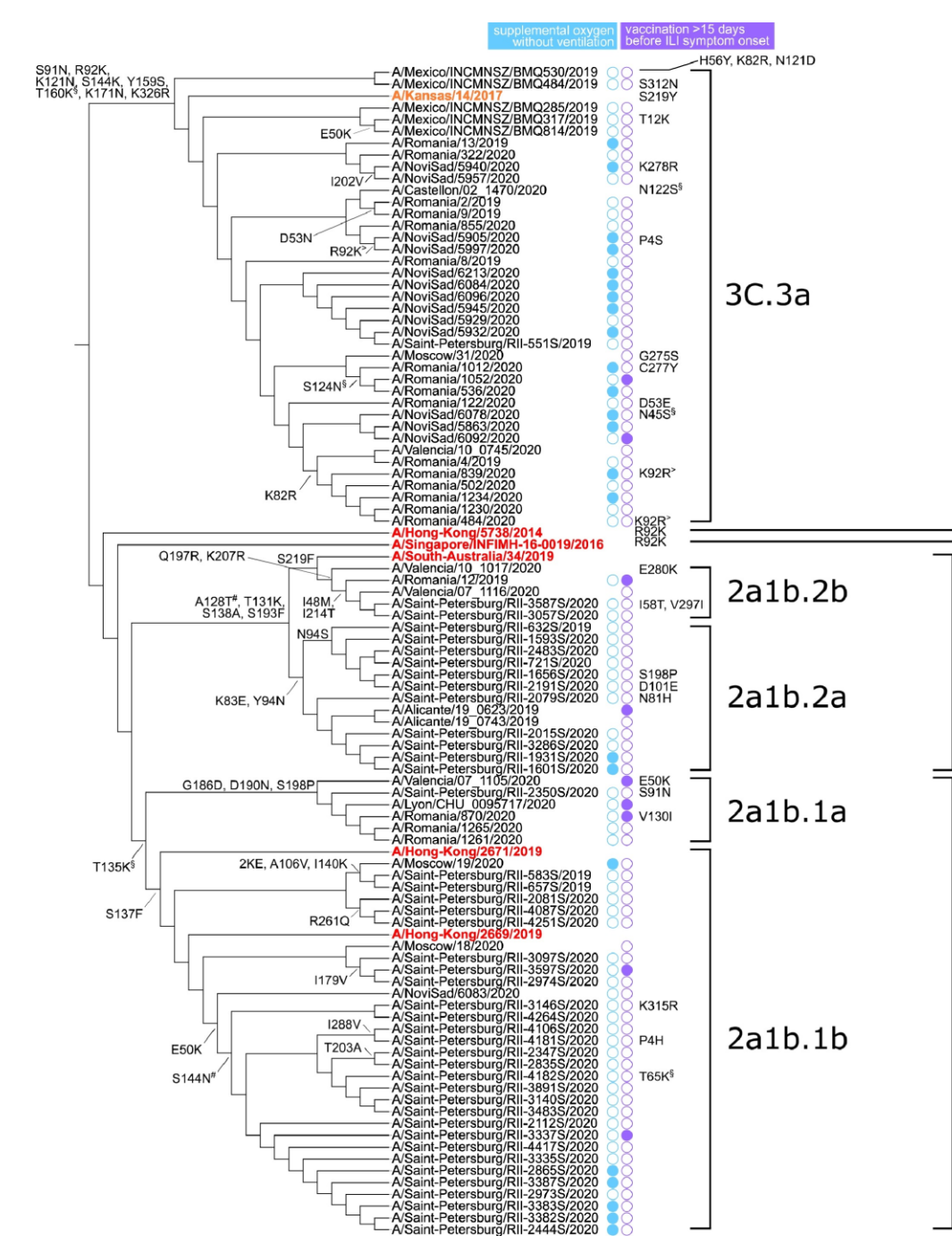
Fig 4: Distribution of respiratory viruses detected among hospitalized patients by year of surveillance (top) and by age group (bottom)

Notes:
- *During May-November 2020, number of samples tested were limited*
- *2022-23 data are preliminary*

Phylogenetic tree of the influenza hemagglutinin gene for a subset of GIHSN patients infected by A(H3N2) viruses. Grouped amino acid substitutions in the HA1 are indicated on the left of the sequence names, while individual substitutions are indicated on the right. The use of supplemental oxygen without ventilation is indicated by a filled blue circle and the complete vaccination status for the current influenza season is indicated by a filled purple circle. The selected vaccine strain for the current season of the Northern hemisphere is labelled in orange, and non-vaccine reference strains are labelled red. Symbols: § = loss of glycosylation site; # = gain of glycosylation site; > = amino acid reversion. *Clinical and phylogenetic influenza dynamics for the 2019-20 season in the global influenza hospital surveillance network (GIHSN) – Pilot study. Journal of Clinical Virology, Vol 152, 2022*

Severity among patients hospitalized with laboratory-confirmed influenza, by age group, influenza type and country income level. Using multivariable logistic regression, the GIHSN data from 2012 through 2019 was analysed to assess the risk of intensive care unit (ICU) admission, mechanical ventilation, and in-hospital death among hospitalized patients with influenza and explored the role of patient-level covariates and country income. In total, 2.8% of patients <5 years were admitted to the ICU and 0.27% died in-hospital. Among patients 5-64 years, 5.2% were admitted to the ICU and 2.1% died in hospital. While 7.5% of patients ≥65 years were admitted to the ICU and 6.6% died in-hospital. *Predictors of Severity of Influenza-Related Hospitalizations: Results From the Global Influenza Hospital Surveillance Network (GIHSN). The Journal of Infectious Diseases, 2023*

Fig 5: Examples of two scientific peer-reviewed papers using data collected through GIHSN

Conclusion

- The COVID-19 pandemic has highlighted the need for resilient and ready surveillance systems, targeted genetic sequencing scale up and a multi-stakeholder approach.
- The pandemic has also shown the critical importance of understanding the circulation and burden of respiratory viruses to guide public health decision making and research and development initiatives.
- Emerging infectious diseases represent an ongoing threat and GIHSN illustrates the feasibility and pertinence of public and private sector coming together to optimize global efforts under economy of scale approach.
- GIHSN is a community of local researchers sharing their expertise and data, and contributing to the global public health arena.