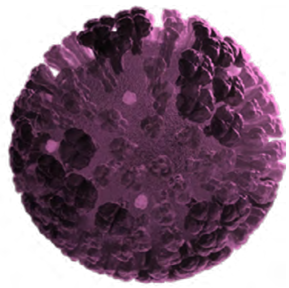
Global **Influenza** Initiative

InFluNews



The monthly newsletter from the Global Influenza Initiative (GII)

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Welcome to the August issue of InFluNews!

The previous issue of InFluNews looked at the approaches taken by key public health agencies to evaluate the performance of seasonal influenza vaccines, their key challenges and future perspectives.

If you have missed any of the past issues of InFluNews or would like to find out more about the GII, please visit the ***GII LinkedIn page.***

Future directions in respiratory virus surveillance

The focus of this month's issue of InFluNews is on respiratory virus surveillance. We describe achievements and challenges in the fields of influenza and SARS-CoV-2 surveillance, highlight key developments in surveillance methodology in recent years and consider the future of influenza surveillance and forecasting.

This month's guest editor, Jan Kynčl, provides expert commentary.

Influenza virus image from CDC/Douglas Jordan.

FOCUS THIS MONTH:

Influenza surveillance today

The World Health Organization (WHO) Global Influenza Surveillance and Response System (GISRS) was established in 1952 when only 25 countries had some influenza surveillance in place.[1] Seventy years later, GISRS includes a network of over 150 laboratories in more than 127 countries, areas or territories, testing millions of specimens every year.[1]

GISRS coordinates global influenza surveillance activities by providing:[2]

- **A mechanism** of surveillance, preparedness and response for seasonal, pandemic and zoonotic influenza
- **A platform** for monitoring influenza epidemiology and disease
- **An alert system** for novel influenza viruses and other respiratory pathogens

Influenza surveillance is an essential component of public health systems because it:[3]

- Tells us when influenza seasons begin and end
- Describes the impact of influenza seasons on health
- Indicates the impact of control and mitigation measures
- Is used for making decisions on vaccine strain selection and monitoring the prevalence of resistance to antiviral drugs

The prediction of future influenza activity (including influenza incidence, timing and peaks of epidemics) known as influenza forecasting, can also be an important tool for health care planning and resource allocation.[3]

Evolution and challenges of influenza virus surveillance

Two main approaches are generally used to conduct influenza surveillance: syndromic (epidemiological - clinical) and laboratory (virological). Syndromic surveillance systems collect information from outpatient clinics and/or hospitals and describe incidence patterns over time. Laboratory surveillance systems test samples collected from influenza patients and provide information on circulating virus strains.[3]

Notably, influenza surveillance is not uniformly distributed globally, and some populations have limited surveillance data.[4] Equally, surveillance practices differ greatly between countries, even those that are resource-rich[5] which makes it hard to evaluate and compare data between countries.

Influenza surveillance continues to evolve, despite the challenges. GISRS has served as a global alert system for novel influenza and other respiratory viruses on several occasions over the years, including the emergence of avian influenza (H5N1), SARS-CoV-1, pandemic influenza (H1N1) and most recently, SARS-CoV-2.[1] The number of specimens tested by GISRS rose from an average of 3.4 million per year in 2014–2019, to 6.7 million per year for influenza plus 44.2 million for SARS-CoV-2 in 2020–2021.[1]

Recently, WHO has developed an integrated influenza and other respiratory viruses surveillance dashboard which displays weekly influenza and SARS-CoV-2 surveillance data provided by GISRS and national epidemiological institutions.[6] Integrating surveillance of influenza with other high-impact respiratory viruses optimises the use of material and human resources, makes sure that other high impact viruses are not left ‘unattended’ during a pandemic, and leads to better preparedness for future pandemics.[7] Therefore, the most efficient and sustainable systems of the future are likely to be those that further integrate surveillance of other respiratory viruses of public health concern.

Digital surveillance techniques are increasingly being explored which use electronic data sources to provide information on circulation of influenza and SARS-CoV-2. Information may be obtained from, for example, internet searches, social media posts and participatory surveillance efforts.[3]

An example is 'Outbreaks near me', a web-based tool which uses crowdsourcing to track outbreaks of flu and COVID-19 in North America.[8] Predictions based on digital surveillance have not always been accurate in the past, however, and might best be used to supplement traditional sources of information with the added benefit of being low in cost.[3]

Measurement of vaccine coverage

The accurate measurement of vaccine coverage is an important contributor to disease control.[9] Data on vaccine coverage is necessary to evaluate and compare the performance of vaccines. It also helps to identify areas and groups of people that remain at risk and can therefore inform local and/or national vaccination strategies.[9] Effective monitoring and control of influenza will therefore require both effective surveillance systems and accurate measurement of influenza vaccine coverage rates. A key challenge to estimating vaccine coverage rates in low- and middle-income countries is the lack of recent, local population estimates. Alternative methods to estimate population size and migration at the local level, such as satellite imagery, geopositioning and mobile phone call records, are being explored but require further research and investment before they can be routinely applied.[9]

Evolution and challenges of influenza forecasting

The research and development (R&D) roadmap for influenza vaccines (2021) described a key strategic goal on the topic of influenza forecasting which was to "enhance the ability to forecast viruses that are likely to circulate in the upcoming season to improve the antigenic match between circulating influenza viruses and viral strains selected for seasonal vaccine production."[4] The roadmap identifies several R&D priorities that are critical to this goal. These include the need for a greater geographic diversity of influenza virus sequence data, a broader application of new tools such as computational approaches and systems biology to facilitate understanding of influenza virus evolution (including the emergence of novel influenza viruses with pandemic potential) and improving antigenic characterisation of influenza A H1N1 and H3N2 viruses.[4]

Improved computational resources are allowing more advanced modelling techniques that incorporate multiple sources of data with complex algorithms to be used for influenza forecasting. A significant increase in studies of this type was seen after the 2009 influenza pandemic.[3]

The way that public health agencies conduct influenza forecasting is also evolving. The Centers for Disease Control and Prevention (CDC) launched a competition to forecast the upcoming US flu season in 2013: Predict the Influenza Season Challenge. Since then the CDC has collaborated with external researchers to forecast influenza, providing the forecasting teams' data as well as forecast accuracy metrics. The CDC note that, while significant progress has been made since the launch of the competition, influenza forecasting remains challenging.[10]

How are influenza forecasts used?

- To prepare for an increased healthcare burden[10]
- To plan the public health response[10]
- To provide well-matched vaccines[4]
- To help prevent illness, hospitalisation and death[10]
- To help reduce the economic burden[10]
- To inform communication to healthcare providers[10]

Evaluation of influenza surveillance systems in five European countries reveals great heterogeneity and a need for improvement

As previously mentioned, there is a wide variation in influenza surveillance systems between countries. There is therefore a need to improve and standardise these systems in order to better characterise the burden of influenza globally and invest adequate resources in prevention and healthcare.

De Fougerolles et al. developed a standardised framework to evaluate and compare influenza surveillance systems in countries of Europe. The framework allowed comparison across five criteria: granularity, timing, representativeness, sampling strategy, and communication, providing a means to evaluate adherence to WHO standards and allowing the identification of areas of possible improvement.[5]

Some of the key findings of the study were that France and the UK showed the widest range of surveillance sub-systems, particularly for hospital surveillance, followed by Germany, Spain, and Italy. While virological, primary care and hospital surveillance were well developed in all five countries, non-medically attended events, influenza cases in the community, outbreaks in closed settings and mortality estimates were not consistently reported or published. A breakdown of data per risk condition was available in France and Spain, but not in the UK, Germany or Italy. Communication of surveillance data was inconsistent, and data were not always provided in a timely manner or in an accessible format.[5]

The future of influenza surveillance and forecasting

There is a need to build and standardise influenza surveillance capabilities within countries as this is key to the robustness and reliability of the data gathered by WHO GISRS. WHO already provides guidance for the required standards of a basic influenza surveillance system,[11] but additional resources, support and guidance made be needed to lift the surveillance systems of countries across the globe to a minimum acceptable standard.

In the future, low-cost digital surveillance options could be added to traditional methods to help ease the cost burden in resource-constrained countries, while further integration of the surveillance of other respiratory viruses should maximise the use of resources and ultimately lead to further health and cost benefits. WHO is already engaged in efforts to develop a framework for integrated surveillance of high-impact respiratory viruses in their regional offices.[7]

With increasing computational power and sophistication of digital technologies, digital surveillance and multi-stream data assimilation are expected to play an increasing role in public health surveillance.[3]

Guest editor Jan Kynčl comments:

This year, we are celebrating 70 years since the establishment of the GISRS. This influenza surveillance system is one of the oldest global networks operated by WHO that was established to protect people from the threat of influenza.

In the European Union, about 20 years ago, there was a discussion as to whether surveillance should be based on acute respiratory infections (ARIs) or influenza-like illness (ILI), and ILI was selected as the main indicator. Nevertheless, the COVID-19 pandemic clearly showed that there is an urgent need to develop and sustain resilient population-based integrated systems for influenza, COVID-19 and other respiratory virus infections.

Therefore, we should reopen the discussion about ARIs and/or ILI reporting. ILI reporting provides more detailed information concerning the occurrence of influenza and influenza-related illnesses, but its impact is limited. ARI reporting provides complex information on the occurrence of acute respiratory infections including influenza but sensitivity with regards to influenza detection is lower. From this perspective, combining both ARI and ILI surveillance seems to be an ideal solution.

GII summary statement

Significant progress has been made in the field of influenza surveillance in recent decades – but great heterogeneity still exists in the levels of surveillance operating in countries across the globe and in the systems they use. There is work to be done to lift influenza surveillance systems of all countries to an acceptable minimum standard.

The COVID-19 crisis highlighted the need for effective surveillance of other respiratory viruses in a pandemic situation and led to established influenza surveillance systems being used for both influenza and COVID-19. The COVID-19 pandemic also illustrated the importance of measuring vaccine coverage rates allowing us to assess vaccine performance and identify groups with low vaccine coverage.

In the future, the continued integration of surveillance for influenza and other respiratory viruses of public health concern could lead to more efficient and cost-effective respiratory virus surveillance systems, while digital tools could be used to provide a lower cost option to boost the surveillance and vaccine coverage monitoring capabilities of countries with limited resources.

About the GII

The GII is a global expert scientific forum that includes international scientists, researchers and clinicians with expertise in epidemiology, virology, infectious diseases, immunology, health economics, public health, primary care and geriatrics.

The GII receives financial support from Sanofi which covers the involvement of Ogilvy Health, a medical communications agency which acts as the secretariat for the GII as well as coordinating logistics for the annual meeting, managing other GII projects and offering strategic counsel.

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