

Policy and practice

PERFORMANCE OF THE EUROPEAN REGION INFLUENZA SURVEILLANCE NETWORK: ALIGNMENT WITH GLOBAL STANDARDS

Michala Hegermann-Lindencrone,¹ Diane Gross,¹ Tamara Meerhoff,² Dmitriy Pereyaslov,¹ Pernille Jorgensen,¹ Rene Snacken,³ Eeva Broberg,³ Cornelia Adlhoch,³ Julien Beauté,³ Pasi Penttinen,³ Caroline S. Brown¹

¹ World Health Organization Regional Office for Europe, Copenhagen, Denmark

² Radboud University Medical Centre, Nijmegen, Netherlands

³ European Centre for Disease Prevention and Control, Stockholm, Sweden

Corresponding author: Michala Hegermann-Lindencrone (email: mhl@euro.who.int)

ABSTRACT

Challenges in assessing and monitoring the influenza A(H1N1)pdm09 in 2009 highlighted shortcomings in global influenza surveillance, including the lack of a standardized approach to data collection. The 2013 Global Epidemiological Surveillance Standards for Influenza defined seven principal objectives of influenza surveillance, each of which is key to decision-making. This study assessed quantitative and qualitative information against these seven principal objectives to determine the performance of the European Region influenza surveillance network.

The analysis showed that this network of national influenza experts in 50 countries of the World Health Organization (WHO) European Region, including the 28 European Union countries, contributes substantially to global influenza surveillance and health security. Through close collaboration among experts and standardization of surveillance across countries, the network provides timely information on the timing, spread and severity of seasonal influenza and acts as an early warning system for emerging respiratory viruses. Although substantial achievements have been made since 2008,

some areas of influenza surveillance in Europe need to be further improved. Continued support of the network by participating countries, WHO, the European Centre for Disease Prevention and Control and other partners is an efficient way to build defence against the unpredictable nature of influenza viruses and other emerging respiratory pathogens such as Middle East respiratory syndrome coronavirus (MERS-CoV). Such continued support will also ensure implementation of the core capacities required for surveillance and response under the International Health Regulations.

KEYWORDS: INFLUENZA, SURVEILLANCE STANDARDS, NETWORK, FLU NEWS EUROPE, PREPAREDNESS

BACKGROUND

The overarching goal of influenza surveillance, as defined by the World Health Organization (WHO), is to minimize the impact of the disease by providing useful information to public health authorities so they may better plan appropriate control and intervention measures, allocate health resources and make case-management recommendations. Minimization of the impact of influenza is critical, since seasonal influenza causes an estimated 3 to 5 million cases of severe disease and between 250 000 and 500 000 deaths

globally each year. In Europe, approximately 20% of the population is affected yearly, with mortality occurring particularly in elderly people (1). Influenza viruses are constantly changing due to antigenic drift which may influence the timing and severity of seasonal influenza epidemics and necessitates frequent updates of the vaccine to ensure the best possible match with circulating influenza viruses. Continuous influenza surveillance is fundamental to determining the composition of seasonal influenza vaccine, monitoring the characteristics and severity of circulating viruses and detecting new influenza

viruses with pandemic potential. Influenza pandemics are caused by new influenza A viruses, against which humans have little to no immunity, and they usually result in more severe disease than seasonal influenza and occur at irregular intervals. The influenza pandemic of 1918–1919 caused an estimated 20–40 million deaths worldwide. An estimated 1–4 million deaths have been attributed to each of the pandemics in 1957–1958 and 1968. The first pandemic of the 21st century resulted from the emergence of influenza A(H1N1)pdm09 in 2009, caused an estimated 100 000–400 000 deaths (2). Challenges in assessing and monitoring the 2009 pandemic highlighted shortcomings in global influenza surveillance, including the lack of a standardized approach to data collection. A robust surveillance infrastructure is therefore essential to ensure compliance with international instruments including the International Health Regulations (3), the Pandemic Influenza Preparedness (PIP) Framework (4) and the European Union (EU) decision on serious cross-border threats to health (5).

The WHO Global Epidemiological Surveillance Standards for Influenza were published in 2013 and resulted from 3 years of worldwide consultation. This guidance proposes surveillance objectives

and describes global standards for a minimal basic respiratory disease surveillance system for the monitoring of influenza. The document defines seven principal objectives of influenza surveillance, each of which is key to decision-making (Table 1). The guidance notes that, “not all of these objectives will be accomplished by every system, particularly when resources are limited” (6). The aim of this analysis was to use seven principal objectives of influenza surveillance as a framework to assess the current (i.e. 2014) performance of the European region influenza surveillance network in order to identify gaps and shape future work within the network.

LOCAL CONTEXT

The current European Region influenza surveillance network has evolved over more than two decades. The first step in the development of this network was a pioneering information-sharing collaboration between five countries performing virological influenza surveillance in the early 1990's (7). The European Influenza Surveillance Scheme (EISS), comprising EU and European Economic Area (EEA) countries, was subsequently established in 1996. In 2008, EISS formally became the European Influenza

TABLE 1. PRINCIPAL OBJECTIVES OF THE WHO GLOBAL EPIDEMIOLOGICAL SURVEILLANCE STANDARDS FOR INFLUENZA

PRINCIPAL OBJECTIVE	USE OF SURVEILLANCE DATA IN DECISION-MAKING
1. Determine when and where influenza activity is occurring, and who is affected	<ul style="list-style-type: none"> Alert providers to anticipate influenza disease in clinics and hospitals Inform and target national prevention and treatment policies such as vaccination timing and the use of pharmaceutical and nonpharmaceutical interventions to control spread
2. Detect changes in the antigenic and genetic characteristics and antiviral sensitivity of influenza viruses	<ul style="list-style-type: none"> Inform local clinician use of antiviral therapies Inform choice of vaccine locally and selection of appropriate viruses globally
3. Determine and monitor underlying risk conditions that are associated with severe disease and use of healthcare resources. Describe the clinical patterns of disease	<ul style="list-style-type: none"> Improve clinical management and prevention of disease in high-risk patients Inform national policies such as priority groups for vaccination and treatment
4. Assess and monitor relative severity of annual epidemics or an outbreak of a novel virus	<ul style="list-style-type: none"> Assist policy-makers in making decisions about public interventions Inform cost-benefit type decisions related to public interventions
5. Estimate contribution of influenza to severe respiratory illness or overall disease burden	<ul style="list-style-type: none"> Allow appropriate allocation of limited health resources among competing disease-related priorities Establish epidemic thresholds for comparison of disease severity between years and localities Contribute to global knowledge base regarding burden of disease attributable to influenza disease
6. Detection of unusual events	<ul style="list-style-type: none"> Rapid detection to alert the International Health Regulation focal points about potential public health events of international concern
7. Measure impact of interventions	<ul style="list-style-type: none"> Inform choice of intervention strategies

Source: WHO Global Epidemiological Surveillance Standards for Influenza, 2013 (6).

Surveillance Network, which was coordinated by the European Centre for Disease Prevention and Control (ECDC), consisting of the then 29 EU and EEA countries. In 2009, the network expanded to include 50 of the 53 countries in the WHO European Region that routinely conduct influenza surveillance (i.e. excluding Andorra, Monaco and San Marino) (8).

These 50 countries have designated national influenza laboratories, the majority of which are recognized by WHO as national influenza centres (NICs) (9). These laboratories participate in the WHO Global Influenza Surveillance and Response System (GISRS) and those of EU/EEA countries form the ECDC-coordinated European Reference Laboratories for Influenza (ERLI-Net) (10). The network also includes one of the six global WHO collaborating centres for reference and research on influenza at the National Institute for Medical Research, London, United Kingdom of Great Britain and Northern Ireland.

Influenza surveillance in countries of the WHO European Region is conducted routinely in primary care for cases of mild disease and hospitals for cases of severe disease. Some countries also have systems to detect outbreaks of seasonal influenza in institutions such as nursing homes and schools. Outbreaks in humans of avian influenza or other emerging respiratory pathogens are detected as part of early warning systems. During the 2009 pandemic, many countries established national notification of all influenza cases.

Primary-care surveillance is based on nationally organized sentinel networks of primary-care physicians, covering 1–5% of the population in their countries. Each week, these physicians report the number of patients meeting established case definitions of influenza-like illness (ILI), acute respiratory infection (ARI) or both to their national focal point for influenza surveillance. Respiratory samples from a subset of patients are tested for the presence of influenza virus. In this way, countries collect epidemiological and virological data on a weekly basis to inform national surveillance and control policies. Some countries also conduct sentinel surveillance of severe acute respiratory infections (SARI), while others report cases of laboratory-confirmed influenza in hospitals and/or intensive care units. In some countries there are also universal

systems whereby cases of ILI, ARI or laboratory-confirmed influenza in hospitals are reported from all health care facilities. Epidemiological and virological data collected weekly between week 40 of one year and week 20 of the following year (i.e. the winter season) are used to inform national influenza prevention and control programmes.

APPROACH

The performance of the network was aligned against the principal objectives of the WHO Global Epidemiological Surveillance Standards for Influenza (Table 1). Information gathered for the assessment included: data reported to WHO and ECDC; data from a region-wide survey on influenza surveillance systems conducted in 2014; reports from activities conducted by the network, such as annual surveillance meetings, European projects and relevant activities conducted by individual countries. For each principal objective, quantitative (e.g. number of countries performing influenza surveillance in primary care) and qualitative (e.g. examples of projects carried out within the network) data and information were evaluated. Indicators and data from the Flu News Europe (11) platform and the 2014 survey were allocated to each of the principal objective; some indicators were allocated to more than one principal objective. In addition, to demonstrate the recent evolution of influenza surveillance in the WHO European Region, the five indicators whose data best illustrated the expansion of the network through the years 2008, 2011 and 2014 were selected.

RELEVANT CHANGES

Surveillance activities within the network are guided by global and regional (12) standards to enhance comparability of data between countries. Surveillance in the 50 countries is supported by both the WHO Regional Office for Europe and ECDC, which jointly collect and analyse influenza surveillance data from the region and publish a regional influenza bulletin based on these data. Flu News Europe publishes weekly influenza surveillance data reported by 48 European countries in English and Russian throughout the influenza season (11). To inform global surveillance, regional surveillance data are transferred to WHO global virological and

epidemiological platforms, FluNet (13) and FluID (14), which provide the basis for the WHO global biweekly influenza update (15).

In addition to reporting influenza surveillance data, the network participates in initiatives and

projects related to influenza disease burden, severity assessment (seasonal and pandemic influenza) and vaccine effectiveness. Countries share data and best practices during activities conducted within the network. Network performance by principal objectives is described below and quantitative results are shown in Table 2.

TABLE 2. QUANTITATIVE MEASURES OF INFLUENZA SURVEILLANCE BY PRINCIPAL OBJECTIVES AND INDICATORS

PRINCIPAL OBJECTIVE AND INDICATORS	NUMBER OF COUNTRIES (%)
Principal objective 1 indicators	
Performs primary care influenza surveillance	48/50 (96%)
Collects data on qualitative indicators on geographical spread, intensity and trend	46/50 (92%)
Reports having a threshold for influenza surveillance to WHO and ECDC	33/50 (66%)
Performs influenza surveillance in primary care by age group	42/50 (84%)
Principal objective 2 indicators	
Performs virological surveillance of influenza	48/50 (96%)*
Shares influenza viruses with GISRS	44/50 (88%)
National influenza centre is recognized by WHO	41/50 (82%)
Conducts genetic or antigenic virus characterization	24/50 (48%)
Conducts antiviral susceptibility testing	16/50 (32%)
Principal objective 3 indicators	
Performs influenza surveillance in primary care by age group	42/50 (84%)
Collected data on impact on health services during the 2009 pandemic	35/50 (70%)
Performs sentinel SARI or other hospital-based surveillance	22/50 (44%)
Principal objective 4 indicators	
Collected data on impact on health services during the 2009 pandemic	35/50 (70%)
Performs sentinel SARI or other hospital-based surveillance	22/50 (44%)
Participates in European monitoring of excess mortality for public health action (EuroMoMo) project	16/50 (32%)
Principal objective 5 indicators	
Performs sentinel SARI or other hospital-based surveillance	22/50 (44%)
Principal objective 6 indicators	
Performs influenza surveillance in primary care by age group	42/50 (84%)
Performs sentinel SARI or other hospital-based surveillance	22/50 (44%)
Participates in WHO external quality assessment project for the detection of influenza virus type A by PCR	48/50 (96%)
Shares influenza viruses with GISRS	44/50 (88%)
Principal objective 7 indicators	
Participates in the joint VENICE-ECDC-WHO survey on seasonal influenza vaccination policies and coverage in the European Region	47/53 (89%)
Participates in Influenza - Monitoring of Vaccine Effectiveness (I-MOVE) project	19/50 (38%)

WHO: World Health Organization; ECDC: European Centre for Disease Prevention and Control; GISRS: WHO Global Influenza Surveillance and Response System; SARI: severe acute respiratory infections; PCR: polymerase chain reaction; VENICE: Vaccine European New Integrated Collaboration Effort.

* Corrigendum: in an earlier web version this number was reported as 46/50 (92%)

PRINCIPAL OBJECTIVE 1

Principal objective 1 is to determine when and where influenza activity is occurring, and who is affected. Epidemiological and virological data reported by countries from both primary-care and hospital surveillance provide information on when and where influenza activity is occurring as well as who is affected. ILI and ARI surveillance provides incidences by age group (0–4, 5–14, 15–64 and ≥65 years of age) and case-based data from laboratory-confirmed hospitalized cases allows age to be correlated with influenza virus type and subtype. Thirty-three countries have established epidemic thresholds for ILI and/or ARI, which indicate the start and end of the countries' influenza seasons. In 24 of these countries, a standard approach using historical epidemiological data—the moving epidemic method—is used (16). At the regional level, the start of the influenza season is signalled when 10% of all sentinel specimens test positive. Information on the timing and spread of seasonal influenza is also provided by country reports on qualitative indicators of intensity, geographical spread, trends in influenza activity and dominant virus.

PRINCIPAL OBJECTIVE 2

Principal objective 2 is to detect changes in the antigenic and genetic characteristics and antiviral sensitivity of influenza viruses. NICs conduct influenza surveillance by determining the type and subtype of influenza viruses in clinical specimens using molecular detection techniques and by sharing viruses with the WHO collaborating centre. During the four influenza seasons following the 2009 pandemic, an average of 69 332 influenza virus detections per season were reported from European countries. In addition, NICs in 15 countries routinely perform antigenic strain characterization of influenza viruses through use of post-infection ferret antisera and 18 countries routinely characterize viruses genetically, thereby increasing the representativeness of viruses provided for the annual vaccine strain selection process. For example, during the 2014–2015 influenza season, NICs in Europe helped track the emergence of antigenically drifted A(H3N2) viruses by characterizing 734 viruses genetically and 723 antigenically. NICs in 27 countries shared more than 800 influenza viruses with the WHO collaborating centre prior to the WHO consultation on the composition of influenza virus vaccines for the

northern hemisphere 2015–2016, thus contributing to the WHO recommendations (17). Furthermore, 16 countries monitor antiviral susceptibility (18). This activity enabled signalling of the community emergence of oseltamivir-resistant influenza A(H1N1) during the 2007–2008 influenza season (19).

PRINCIPAL OBJECTIVE 3

Principal objective 3 is to (i) determine and monitor underlying risk conditions that are associated with severe disease and use of health care resources, and (ii) describe the clinical patterns of disease. Countries report the number of hospitalized laboratory-confirmed cases and provide information on ages, intensive care unit admissions, outcomes and influenza (sub)types (20). Such data can help inform policies such as priority groups for vaccination. For example, routine collection of these data enabled an exploratory analysis of pooled data from influenza-positive SARI cases in three countries, which showed that being older than 15 years; having lung, heart, kidney or liver disease; and being pregnant were independently associated with a fatal outcome (21). During the 2009 pandemic and then in subsequent influenza seasons, European countries collected and shared data on the impact on health services. Sharing of such information is valuable for clinicians treating influenza patients as well as for policy-makers targeting and prioritizing vulnerable populations for vaccination or antiviral treatment.

PRINCIPAL OBJECTIVE 4

Principal objective 4 is to assess and monitor relative severity of annual epidemics or an outbreak of a novel virus. This principal objective is addressed through some of the same essential mechanisms described under principal objectives 1 and 3; i.e surveillance in primary care by age group; an epidemic threshold; and SARI or hospital-based surveillance. Data describing the intensity or level of influenza activity in outpatients based on ILI and ARI cases allows comparison of severity across seasons. In addition, ECDC conducts an early-season risk assessment each year describing the severity and other characteristics of the season Flu News Europe data and a survey of first-affected countries (22).

The European monitoring of excess mortality for public health action (EuroMoMo) project,

a collaboration on mortality monitoring between 16 countries, publishes weekly data on all-cause mortality (23). These data enable the identification of excess all-cause mortality correlated with the influenza season and are included in Flu News Europe. During the 2014–2015 influenza season, higher excess all-cause mortality among elderly people compared with the previous four seasons was identified. This excess mortality coincided with the circulation of influenza A(H3N2) viruses, the majority of which exhibited antigenic drift compared with the vaccine virus strain, and with medium-to-high influenza intensity in most European countries compared with the previous two seasons.

PRINCIPAL OBJECTIVE 5

Principal objective 5 is to estimate contribution of influenza to severe respiratory illness or overall disease burden. The calculation of the burden of disease attributable to influenza is an important component to assist in resource allocation and policy decisions. More than 45 papers have been published in the past 10 years that include information on the burden of influenza in countries of the European Region. For example, comparison of influenza surveillance data reported by 28 European countries during the 2009 pandemic with previous influenza seasons showed the 2009 pandemic started earlier and was associated with a significant increase in paediatric outpatient consultations in most countries (24). However, the majority of the studies conducted in the region target only specific groups and many do not represent country-level data. Little information is also available on the burden of influenza or the cost-effectiveness of influenza vaccination in eastern Europe.

PRINCIPAL OBJECTIVE 6

Principal objective 6 is the detection of unusual events. The close contact between members of the network that has developed over the past 10 years facilitates rapid communication and sharing of information. Country networks of clinicians and microbiologists conducting surveillance in primary-care and hospital settings ensure communication to and from the local level, essential for early warning systems. A mechanism is also in place to facilitate the rapid shipment of viruses in the event of the detection

of an unusual virus as well as the rapid dissemination of protocols for molecular detection of a human infection with a novel influenza virus. Any influenza A virus that cannot be subtyped by national influenza laboratories and all influenza viruses with pandemic potential are immediately shipped to a WHO collaborating centre.

In the event of an outbreak of a novel virus, early detection is essential. During the 2009 pandemic, NICs were rapidly provided with kits to detect the A(H1N1)pdm09 virus and within 4 months of the start of the pandemic, 40 out of 50 countries had reported laboratory-confirmed cases. Countries of the WHO European Region have demonstrated their ability to detect novel viruses on several occasions. For example, in the case of Middle East respiratory syndrome coronavirus (MERS-CoV), most countries in the WHO European Region (29/50) had developed laboratory capabilities to detect and confirm MERS-CoV cases within 10 months after sequence information for the first reported MERS-CoV case was made available (25). Furthermore, in a 2013 survey of EU and EEA countries, 28 of 31 laboratories in 27 countries reported an ability to subtype influenza A(H7) viruses (26).

PRINCIPAL OBJECTIVE 7

Principal objective 7 is the measurement of the impact of interventions. Although not a focus of the network, a number of activities are conducted in this area. With regard to vaccination programmes, a regular survey by the WHO European Region, the Vaccine European New Integrated Collaboration Effort (VENICE) and ECDC evaluates the seasonal influenza vaccination policies and outcomes in the WHO European Region (27). Findings from this survey indicate that uptake is low in most high-risk groups except elderly people in the majority of network countries (28). The WHO European Region guide to tailoring immunization programmes (29) and the yearly influenza awareness campaign provide support to countries to improve this situation. Another initiative is the Influenza – Monitoring of Vaccine Effectiveness (I-MOVE) project which currently involves sentinel surveillance in 19 European countries and provides mid-season and annual estimates of seasonal vaccine effectiveness (30). During the 2009 pandemic, the impact of mitigation

interventions was evaluated by some countries but this information was not collected by WHO and most initiatives to measure impact of interventions were discontinued after the pandemic (31).

EVOLUTION OF THE EUROPEAN REGION INFLUENZA SURVEILLANCE NETWORK

The number of countries in the region performing influenza surveillance and sharing viruses with GISRS increased between 2008 and 2014 for each of the five indicators (Table 3). The evolution observed between 2008 and 2014 reflects both the expansion of the network as well as improvements across national influenza surveillance systems.

TABLE 3. EVOLUTION OF INFLUENZA SURVEILLANCE IN THE WHO EUROPEAN REGION

INDICATOR	NUMBER OF COUNTRIES BY YEAR		
	2008	2011	2014
Performs influenza surveillance in primary care by age group	26	39	42
Reports having a threshold for influenza surveillance to WHO and ECDC	0	15	33
Performs virological surveillance of influenza*	29	45	48
National influenza centre is recognized by WHO	38	40	41
Shares influenza viruses with GISRS	36	39	44

WHO: World Health Organization; ECDC: European Centre for Disease Prevention and Control; GISRS: WHO Global Influenza Surveillance and Response System.

LESSONS LEARNED

The networks' compliance with the seven global principal objectives for influenza surveillance defined by WHO is substantial, considering not all national surveillance systems are expected to accomplish all principal objectives. Thus, the performance of the network makes it a unique public health resource. The network has been a frontrunner in establishing sentinel systems; combining epidemiological and virological data; and applying agreed standards (i.e. case definitions) and indicators resulting in better interpretation of influenza surveillance data between countries.

The network is the main contributor of epidemiological and virological data to WHO's global influenza surveillance: data from 49 European countries are transferred weekly to the global WHO platforms FluNet and FluID.

Performance on the indicators for principal objective 1 is very good, with more than 90% of European countries collecting data on the spread and timing of influenza through qualitative and quantitative indicators. In addition to this, and going beyond the fundamental purpose of this objective, more than 60% of countries have established thresholds for influenza surveillance that signal the start and end of the influenza season. To enhance the performance of the network in this area, efforts are being made by WHO and ECDC to standardize further and automate reporting on intensity and other qualitative indicators.

The network is also performing well on principal objective 2 indicators, with 88% of countries sharing influenza viruses with GISRS, 82% of countries having a WHO-recognized NIC and 48% conducting genetic or antigenic characterization data on a weekly basis. These characterization data generated by NICs in almost half of the countries in the region are performed in addition to the terms of reference for WHO-recognized NICs and complement and inform analyses performed by the WHO collaborating centres. The WHO European Region is the only WHO region that collects and presents virus characterization data on a weekly basis. A gap related to principal objective 2 is that national influenza laboratories in nine countries are not yet formally recognized by WHO as NICs. WHO is working closely with these countries to enhance laboratory capacities to enable them to meet the requirements of the terms of reference for a WHO-recognized NIC. In addition, efforts are made, in particular through the implementation of the PIP Framework partnership contribution, to increase the number of countries that share influenza viruses through GISRS.

Through routine surveillance activities conducted in the European Region, principal objective 3 is addressed and well achieved: 84% of countries perform influenza surveillance in primary care by age group. Furthermore, 44% of countries (22/50) perform SARI or hospital-based surveillance and thereby contribute

* Corrigendum: in an earlier web version these numbers were reported as 34, 46, 46 for 2008, 2011 and 2014 respectively.

to determining and monitoring underlying risk conditions that are associated with severe disease. WHO and ECDC are supporting countries to improve the quality of hospital-based data in order to repeat and expand the study on underlying risk factors for severe disease.

Various initiatives in Europe are ongoing to assess and monitor the relative severity of seasonal influenza, thereby contributing to principal objective 4. In addition, European countries are participating in the global piloting by WHO of a tool to measure the severity of a future pandemic (32). Future work in this area will be to establish epidemic thresholds for countries reporting SARI and to standardize and automate the calculations of intensity levels for ARI/ILI.

Activities that relate to principal objective 5, i.e. understanding the burden of disease caused by influenza, are important to inform national influenza surveillance and response programmes. SARI or other hospital-based surveillance is performed in 44% of countries in Europe but more work is needed to understand better the national burden of influenza disease. Work is ongoing through intercountry activities and bilaterally with countries in the region to enable national surveillance experts to better estimate national disease burden associated with seasonal influenza and thereby inform decision-making on issues, such as influenza vaccination.

Principal objective 6 is well achieved, with good national capacities to detect unusual events or adapt quickly to detect emerging influenza viruses. Influenza surveillance by age group in primary-care settings (84% of countries) and performing SARI or other hospital-based surveillance (44% of countries) increase the likelihood of detecting unusual events. WHO and ECDC are working to enhance SARI and other hospital-based surveillance in those countries where these activities currently do not occur. The high numbers of European countries participating in the WHO external quality assessment project (96%) and sharing influenza viruses with GISRS (88%) further strengthens the ability to detect novel viruses.

Activities relating to principal objective 7 are mainly oriented at evaluating influenza vaccination uptake and estimating vaccine effectiveness. Nearly 90% of countries within the network participated in the

VENICE survey on seasonal influenza vaccination policies and coverage. Close to 40% of countries participate in the I-MOVE project and thereby contribute to determining the effectiveness of the seasonal influenza vaccine. While these are essential areas of work, a need remains to expand initiatives to measure impact of other interventions against seasonal and pandemic influenza.

Although much has been achieved and the evolution of the network is evident, there are still gaps to be addressed as described above. To address these shortcomings, the WHO European Region—supported by the Centers for Disease Control and Prevention of the United States of America (33) and the PIP Framework partnership contribution (34)—and ECDC are continuing to support activities at country and regional level to strengthen further laboratory and surveillance capacities in the region, in particular in the areas of SARI, burden of disease and WHO-recognition of NICs. Estimating the economic burden of influenza in Europe and measuring the impact of interventions related to influenza are also necessary to inform and drive efficient and cost-effective public health measures, such as adequate vaccination programmes and antiviral use policies.

Since infectious diseases such as influenza do not respect borders, international collaboration on influenza surveillance is essential. Strong and well-established national surveillance systems are essential and a regional surveillance network is valuable not only to inform influenza policies but also to enhance preparedness and response to other respiratory pathogens such as MERS-CoV. Such a network thereby provides an important foundation for implementation of the International Health Regulations (3), the PIP Framework (4) and the EU decision on serious cross-border threats to health (5).

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List of National Influenza Centres in the WHO European Region: http://www.who.int/influenza/gisrs_laboratory/national_influenza_centres/list/en/index3.html

Participants at the Fourth Joint WHO Regional Office for Europe/ECDC Meeting on Influenza Surveillance (2014): http://www.euro.who.int/__data/assets/pdf_file/0009/266247/Report-of-the-Fourth-Joint-WHO-Regional-Office-for-Europe-ECDC-Meeting-on-Influenza-Surveillance.pdf?ua=1

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