Surveillance and outbreak reports

THE INTRODUCTION OF THE SENTINEL INFLUENZA SURVEILLANCE SYSTEM IN POLAND - EXPERIENCES AND LESSONS LEARNED FROM THE FIRST THREE EPIDEMIC SEASONS

M Romanowska (nic@pzh.gov.pl)¹, I Nowak¹, K Rybicka², L B Brydak^{1,2}

1. National Institute of Public Health – National Institute of Hygiene, National Influenza Centre, Warsaw, Poland

2. Chair and Department of Family Medicine, Medical University of Warsaw, Warsaw, Poland

Influenza surveillance provides information on virus activity and is necessary for the selection of vaccine strains and early warning in the case of the threat of an epidemic or pandemic. To improve this surveillance in Poland, a sentinel surveillance system was introduced in 2004-5 ("SENTINEL"). This paper presents results from SENTINEL during three seasons of its existence. Voivodship Sanitary-Epidemiological Stations (VSEs), physicians and the National Influenza Center (NIC) participate in SENTINEL. Laboratory course was performed by the NIC for VSEs. Stations were provided with procedures, report forms, etc. Physicians register number of influenza-like illnesses (ILI) and collect swabs. VSEs perform diagnostic tests. On the basis of information from VSEs, the NIC prepares weekly reports for the entire country. In 2004-5 epidemiological reports were received from 50% of VSEs, while in 2005-6 and 2006-7 from all VSEs. Virological reports were obtained from 37.5% of VSEs (2004-5), 75% (2005-6) and 94% (2006-7). Weekly number of reporting physicians ranged in three consecutive seasons from 165 to 219, 98 to 949 and 696 to 1,054. A total of 399 specimens were tested during the 2004-5 winter; 63 (16%) were positive for influenza and 21 (5%) for other respiratory viruses. In 2005-6, 949 specimens were tested. Influenza infections were confirmed in 47 cases (5%) and infections with other respiratory viruses in 36 cases (4%). A total of 1,195 specimens were tested during the 2006-7 winter; 37 (3%) were positive for influenza and 26 (2%) for other respiratory viruses. SENTINEL provided improvement of influenza surveillance when compared with seasons before 2004. Nevertheless, due to decreasing rate of positive specimens, virological surveillance is the most important part to improve in the next years.

Introduction

Influenza surveillance provides useful information on current influenza activity, including two types of data, i.e. epidemiological information, such as influenza incidence, mortality rates, hospitalization rates and virological information as types/subtypes of circulating influenza viruses and their antigenic and/or genetic characteristics. The above knowledge is necessary for the appropriate selection of vaccine strains, the development of new effective antivirals and new diagnostic reagents as well as for early warning in the case of epidemic, pandemic or avian flu in a human population, including the introduction of appropriate measures to reduce the number of influenza illnesses, complications and deaths, and consequently to reduce the high social and economic costs of influenza [1-3].

At the European level, virological and epidemiological information on influenza has been collected and analyzed by the European Influenza Surveillance Scheme (EISS), since 1996 [4]. The general aim of EISS is to contribute to a reduction in influenza morbidity and mortality, and the main objectives are: the collection and exchange of timely information on influenza activity in Europe; the aggregation, interpretation and making available of epidemiological and virological data regarding influenza in Europe; the strengthening and harmonizing of the methods used for the assessment of influenza activity; the contribution to the selection of influenza vaccine strains; the monitoring of influenza prevention and control policies in Europe; the contribution to pandemic preparedness planning; the promotion of research; and the operation of a Community Network of National Reference Laboratories for Human Influenza in Europe [4].

To become a full member of EISS requires the following criteria to be met: (1) The network is nationally or regionally representative; (2) The authority of the network is recognised by the national or regional health authority; (3) Epidemiological surveillance and virological surveillance are integrated in the same population; (4) The network has functioned successfully for at least two years; and (5) The network can deliver data on the weekly basis [4]. At present, EISS is a network of reference laboratories located in all European Union Member States, and also in Norway, Serbia, Switzerland and Ukraine. Poland, represented by the National Influenza Center (NIC) at the National Institute of Public Health – National Institute of Hygiene (NIPH-NIH), became an associate member of EISS in 2001 [5]. There were three reasons that made Poland impossible to be a full member of EISS: virological surveillance was not nationally/regionally representative (EISS membership criterion no. 1); epidemiological surveillance was not integrated with virological surveillance (criterion no. 3); and data were not delivered on a weekly basis (criterion no. 5) [4].

Until the epidemic season 2004-05, epidemiological and virological influenza surveillance were two separate systems in Poland [6]. Epidemiological surveillance was nationally and regionally representative, but virological surveillance was not. Laboratories of 16 Voivodship Sanitary-Epidemiological Stations (VSEs) in 16 administrative regions (voivodships) very sporadically participated in virological surveillance. Influenza isolates and other laboratory confirmations were obtained almost exclusively from Warsaw and

the NIC. Epidemiological influenza surveillance was nationally and regionally representative, because it was and still is a part of the national surveillance of infectious diseases, which includes influenza. Nevertheless, the significance of epidemiological data was limited due to the lack of appropriate laboratory confirmations and integration with virological influenza surveillance.

Another difficulty concerned entering epidemiological information into the EISS database, which requires weekly data according to the calendar numbering of weeks and separate data for age groups: 0-4, 5-14, 15-64 and ≥ 65 years [7,8]. At that time, epidemiological data were obtained from the national surveillance existing for a wide range of different diseases. According to this surveillance, all physicians should collect data on the number of ILI and send to the local stations, including VSEs. Then, VSEs forward data to the Department of Epidemiology at the NIPH-NIH, which prepares reports for periods: 1st-7th, 8th-15th, 16th-22nd and 23rd-30th/31st day of a month. This means that the reporting periods do not always agree with the calendar weeks. The last problem was data collection for the specific four age groups. In Poland, epidemiological data were collected in two age groups: under 14 years and ≥ 15 years.

As a result of the above, the NIC, together with the Chief Sanitary Inspectorate, took action to establish a sentinel system that integrated virological and epidemiological influenza surveillance (called SENTINEL), similar to other countries and consistent with EISS requirements [7,9-11]. A sentinel system enables active surveillance to be performed by the collection of data from the selected active sentinel sites, such as outpatient clinics, health centres, hospitals or from individual participants, such as family physicians [12]. In this way, information received from the selected sentinel sites that cover only certain parts of the population is used to assess the situation in the entire population [12,13]. In Poland, the idea was to create the conditions to enable the inclusion of VSEs and a representative number of family physicians in the system, with the NIC as coordinator. This paper describes how this sentinel influenza surveillance system was developed in Poland in order to fulfill EISS requirements and presents how it has operated during the first three influenza epidemic seasons.

Methods

To establish SENTINEL, the NIC developed guidelines for participants to have system collecting on time-credible information of a high enough quality to become an integral part of the European data on influenza activity in different periods of the epidemic season.

In 2003, the Chief Sanitary Inspector and the NIC prepared a set of documents to provide VSEs with information on SENTINEL, including its general principles and information on the tasks of VSEs and physicians. The Chief Sanitary Inspectorate played a significant role in including VSEs into SENTINEL, as the NIC has no appropriate entitlements with reference to VSEs.

VSEs received guidelines regarding reporting epidemiological and virological data as well as swabbing instructions, specimen forms and reporting forms. These forms were updated in 2005 and 2006 to make them optimal for collecting valuable information in the easiest way.

Between November 2003 and April 2004, the NIC ran a practical laboratory course for VSEs on virus isolation (cell line, chicken embryos), the detection of virus antigens by immunofluorescence (IF), virus titration by hemagglutination test and serology by hemagglutination inhibition test. VSEs received laboratory procedures with the list of reagents and equipment to make their start in SENTINEL easier. In the case of technical problems, the NIC advised VSEs by telephone or e-mail. The Chief Sanitary Inspectorate financially assisted VSEs to equip and obliged them to join SENTINEL, establish cooperation with physicians and coordinate surveillance on the voivodship level.

Physicians participating in SENTINEL are family doctors as well as pediatricians and internists with or without specialization in family medicine, working in public or private outpatient health care units. They practice in 16 administrative regions (voivodships) and were recruited by VSEs. None are paid for SENTINEL activities, due to a lack of funds for such aim. Therefore, the only criteria for selecting sentinel physicians were: to obtain their interest to participate in SENTINEL on the voluntary basis according to principles established by the NIC. Physicians in SENTINEL register number of ILI cases on the weekly basis and collect swabs from patients with influenza symptoms according to the instructions prepared by the NIC. These instructions describe the aim of specimen collection; the conditions of storage and transport of the specimens; include guidelines on who should be swabbed and when, as well as including technical instructions on how to collect throat and nasal swabs. Clinical criteria presenting a basis for physicians to collect specimens are the following: symptoms of influenza/ILI, i.e. at least one respiratory tract symptom (e.g. cough, sore throat, rhinitis) and at least one systemic symptom (e.g. sudden onset of disease, fever $>38^{\circ}\text{C}$, perspiration, chills, muscular/joint pain, headache, malaise/fatigue, nausea). Epidemiological data and swabs are sent with the specimen form to an appropriate VSE.

In the first version of the specimen form used in the first season, 2004-5, physicians listed individual symptoms in a given patient. Nevertheless, the NIC decided to simplify this form and deleted the clinical picture of disease. In the 2005-6 season, the following information were to be provided by sentinel physicians in the specimen form: age of the patient, sex, date onset of illness, date of specimen collection, date of sending of the specimen to laboratory, information on whether the patient had been vaccinated against influenza in a given epidemic season, information on whether the patient had been exposed to the specific antivirals and physician's contact details. In the specimen form used in the 2006-7 season, the date of sending of the specimen to laboratory was changed to the date of the receipt of the specimen by the laboratory and an additional space was given for the results of diagnostic tests performed by laboratories. VSEs perform tests to confirm or exclude influenza infection. Depending on the capacity, they isolate virus and/or perform IF assay for influenza and sometimes, but not routinely, for other viruses (RSV, adenovirus, parainfluenza) [14,15]. The results are forwarded to the physician who collected the specimen. Weekly epidemiological and virological reports are then prepared and sent by VSEs to the NIC.

In the epidemiological reports, the following information is included: the calendar week number; the number of ILI cases registered in the specific age groups (0-4, 5-14, 15-64, ≥ 65 , unknown age) in each week; the number of all patients in the specific age groups attributed to the healthcare units in which

sentinel physicians work; and the number of reporting sentinel physicians in a given week. In the case of virological reports, data collected in the season 2004-5 included: the calendar week number; the number of specimens received and tested by a given method in each week; the number of positive specimens and the results of testing; the number of negative specimens; and the number of specimens/isolates sent to the NIC for confirmation. In the 2005-6 season, the latter was deleted, but two other items were added: the number of specimens during laboratory testing (when the result is not available within the same reporting period as in the case of virus isolation) and a table for overdue results of tests performed with specimens collected in the previous weeks. Influenza isolates are sent to the NIC, where antigenic characteristics is made. VSEs are informed of the results of such analysis. The NIC then sends isolates to the World Health Organization (WHO) Collaborating Centre in London, the United Kingdom, for detailed analysis. After verification of information received from VSEs, the NIC prepares weekly epidemiological and virological reports and sends the data to EISS and the WHO (FluNet).

Results presented in this paper for each epidemic season include periods between week no. 36 of a given year and week no. 16 of the next year, inclusive.

Results

Characteristics of data reporting by VSEs and information on the number of physicians in SENTINEL are presented in Table 1.

SENTINEL covered 1.3%, 4.7% and 5.0% of the total population of Poland in the 2004-5, 2005-6 and 2006-7 seasons, respectively. The population covered by SENTINEL in each of 16 voivodships ranged from 0.4% to 9.4% (season 2004-5), from 0.8% to 14.4% (season 2005-6) and from 1.3% to 16.9% (season 2006-7) of the total population of a given voivodship. Representativeness of the specific age groups covered by SENTINEL differed between voivodships. In 2004-5, SENTINEL covered, depending on the voivodship, between 0.2% and 9.1% of the population aged 0-4; 0.2% to 8.6% of the population aged 5-14; 0.2% to 9.2% of the population aged 15-64 and 0.2% to 10.6% of the population aged ≥65. In 2005-6 these parameters were between 0.8% and 12.7% (0-4 years), 0.7% and 14.4% (5-14 years), 0.7% and 14.5%

(15-64 years), 1.4% and 14.7% (≥65 years). In 2006-7 these values ranged from 1.3% to 15.4% (0-4 years), 1.1% to 17.1% (5-14 years), 1.3% to 16.1% (15-64 years) and from 1.7% to 22.2% (≥65 years). In contrast to the above data, there were no significant differences in the representativeness of different age groups in SENTINEL within individual voivodships.

In 2004-5, the total number of SENTINEL swabs amounted to 399 and this is 91.1% of the total number of specimens in this season (remaining 8.9% were received from non-sentinel system as hospitals). Percentage of specimens positive for respiratory viruses (influenza, RSV, parainfluenza or adenovirus) amounted to 21.1%, while positive only for influenza - 15.8%. Weekly percentage of specimens positive for influenza ranged from 0% to 31.8% (Table 2).

Among influenza infections 52.4% were caused by type A (13 cases of influenza A not subtyped, one case of influenza A subtype H1, 19 cases of influenza A subtype H3) and 47.6% by type B (30 cases). The total number of influenza isolates amounted to 48, including 41 strains obtained within SENTINEL (85.4%). Twenty three of 41 isolates were identified as type B (56.1%), 17 strains as subtype A/H3N2 (41.5%) and one strain as subtype A/H1N1 (2.4%). The highest influenza activity was observed between week 8/2005 and 11/2005 with the highest weekly incidence of 641.7/100,000 (Figure 1).

In the 2005-6 season, 949 SENTINEL specimens were tested (98.1% of the total number of samples). Infections with respiratory viruses including influenza were confirmed in 83 cases (8.7%), while infections with influenza in 47 cases (5%). Weekly rate of influenza-positive specimens was between 0% and 26.3% (Table 2). Among influenza infections 25.5% were caused by type A (six cases of influenza A not subtyped, four cases of influenza A subtype A/H1, two cases of influenza A subtype H3) and 74.5% by type B (35 cases). Thirty-five influenza strains were isolated and all of them were obtained within SENTINEL. There were 27 strains of influenza B (77.1%), six strains of A/H1N1 (17.1%) and two strains of A/H3N2 (5.7%). The highest influenza activity was between week 10/2006 and 13/2006 with the highest weekly incidence of 229.7/100,000 (Figure 2).

TABLE 1

Weekly reporting of epidemiological and virological data by the voivodship Sanitary-Epidemiological Stations (VSEs) to the National Influenza Center (NIC) and the number of physicians in the influenza sentinel surveillance system (SENTINEL) in Poland, epidemic seasons 2004-5 to 2006-7

	epidemic season ^a		
	2004-5	2005-6	2006-7
number of VSEs sending epidemiological reports	6 (38%) – 10 (63%) (median: 8)	8 (50%) – 16 (100%) ^b (median: 16)	8 (50%) – 16 (100%) ^d (median: 16)
number of VSEs sending virological reports	1 (6%) – 9 (56%) (median: 6)	6 (38%) – 15 (94%) ^c (median: 12)	10 (63%) – 16 (100%) ^e (median: 15)
number of physicians in SENTINEL	165 – 219	98 – 949 (median: 868)	696 – 1054 (median: 1,017)

^a periods between week 36 of a given year and week 16 of the following year, inclusive, according to the calendar numbering of weeks

^b since week 45/2005 reports received from all 16 VSEs

^c one VSE did not send reports due to laboratory conversion

^d between week 41/2006 and week 15/2007 reports received from all 16 VSEs

^e one VSE did not send reports until week 13/2007 due to laboratory conversion

In the 2006-7 season, 1,195 specimens (97.5% of the total number of swabs) were tested. Percentage of specimens positive for respiratory viruses including influenza amounted to 5.3%, while positive only for influenza - 3.1%. Weekly percentage of specimens positive for influenza ranged from 0% to 11.1% (Table 2). Among influenza infections 94.6% were caused by type A (25 cases of

TABLE 2

Weekly percentage of influenza-positive specimens collected and tested within the influenza sentinel surveillance system (SENTINEL) in Poland, epidemic seasons 2004-5 to 2006-7

week number (according to calendar)	epidemic season		
	2004-5	2005-6	2006-7
36	*	*	*
37	*	*	0.0
38	*	0.0	0.0
39	*	0.0	0.0
40	*	0.0	0.0
41	*	0.0	4.0
42	0.0	14.3	0.0
43	0.0	0.0	0.0
44	*	*	0.0
45	0.0	0.0	0.0
46	0.0	0.0	0.0
47	*	0.0	2.9
48	0.0	5.9	0.0
49	0.0	0.0	0.0
50	0.0	0.0	0.0
51	0.0	11.1	0.0
52	*	0.0	0.0
53	0.0	n.a.	n.a.
01	0.0	0.0	10.0
02	*	0.0	0.0
03	0.0	0.0	3.6
04	31.8	0.0	1.9
05	21.7	2.6	6.3
06	17.6	0.0	4.8
07	22.0	12.7	4.5
08	19.6	8.6	2.1
09	13.0	10.6	7.8
10	24.5	5.6	5.3
11	15.1	5.5	0.0
12	3.3	3.8	2.3
13	0.0	4.2	0.0
14	20.0	26.3	0.0
15	0.0	4.5	0.0
16	0.0	0.0	11.1

* no specimens collected in the given week
n.a. - not applicable

FIGURE 1

Influenza-like illness (ILI)* incidence and number of laboratory-confirmed influenza cases in the epidemic season 2004-5 according to the influenza sentinel surveillance system (SENTINEL) in Poland

FIGURE 2

Influenza-like illness (ILI)* incidence and number of laboratory-confirmed influenza cases in the epidemic season 2005-6 according to the influenza sentinel surveillance system (SENTINEL) in Poland

FIGURE 3

Influenza-like illness (ILI)* incidence and number of laboratory-confirmed influenza cases in the epidemic season 2006-7 according to the influenza surveillance system (SENTINEL) in Poland

influenza A not subtyped, five cases of influenza A subtype H1, five cases of influenza A subtype H3) and 5.4% by type B (two cases). Seventeen influenza strains were isolated, including 10 strains (five A/H1N1 and five A/H3N2) obtained within SENTINEL and seven strains (A/H1N1) isolated from hospital specimens. The highest influenza activity was between week 08/2007 and 11/2007 with the highest weekly incidence of 265.8/100,000 (Figure 3).

In all epidemic seasons, the highest ILI incidence was observed in children under 14 years (Table 3). Other indicators of influenza activity summarizing data for three epidemic seasons are presented in Table 3.

Discussion

Epidemiological influenza surveillance is performed in Poland since 1936, and virological surveillance since 1953 [18-20]. Although this surveillance has a long history, its effectiveness was various. The major problem regarded virological part and a small number of specimens collected for laboratory processing. As it is indicated in the Introduction section, epidemiological data on ILI cases without simultaneous laboratory confirmations is not sufficient to have credible information on influenza activity. The reason is that symptoms similar to influenza illness may be caused by influenza virus as well as many other pathogens [20]. Therefore, improvement of virological surveillance through the establishment of SENTINEL influenza surveillance system within which sentinel physicians collect swabs from patients with ILI symptoms was necessary to validate clinical reports on ILI as well as to obtain community-based respiratory specimens for virological testing. Limited and not nationally representative virological information became especially

disturbing since when one of the most important global priorities is influenza pandemic preparedness and surveillance is one of the fundamental components of preparedness plans [3,20,21]. Therefore, the NIC and the Chief Sanitary Inspectorate decided to improve surveillance by creating SENTINEL to provide nationally representative, integrated virological and epidemiological influenza surveillance and to have uniform system with other European countries according to EISS recommendations [4,5,7].

The first seasons of SENTINEL in Poland showed that the system works well, although is not perfect as yet. There was a major improvement, especially in the virological surveillance, in comparison with the previous seasons. There was observed a significant increase in the number of specimens: almost three-fold in 2004-5, over six-fold in 2005-6 and almost eight-fold increase in 2006-7 when compared with 2003-4. Moreover, the specimens were obtained from different regions of the country.

Nevertheless, there were still some difficulties. One of the most important issues is to maintain the integration of epidemiological surveillance with virological surveillance [7,10]. The number of physicians increased, even up to over 1,000 in one week. Nevertheless, this increase was not always connected with participation of physicians in virological surveillance, and consequently with the increased number of specimens. Every week the number of specimens was below 1.0 per physician. The question, therefore, is how to encourage physicians to contribute to SENTINEL and to ensure an appropriate and sustained quality of their work in this surveillance. The number of physicians significantly varied between seasons as well as during individual seasons. These

TABLE 3

Summary of data on influenza activity in Poland in the epidemic seasons from 2004-5 to 2006-7 according to the influenza sentinel surveillance system (SENTINEL)

indicators of influenza activity	epidemic season ^a		
	2004-5	2005-6	2006-7
weeks of peak ILI* incidence	08/2005 – 11/2005	10/2006 – 13/2006	08/2007 – 11/2007
most affected age groups according to ILI* incidence	0-4 5-14	0-4 5-14	0-4 5-14
peak level of intensity ^b	high	medium	medium
peak level of geographical spread ^c	regional	sporadic	sporadic
week of peak laboratory confirmations of influenza infection	10/2005	07/2006	09/2007
week of peak percentage of influenza-positive specimens	04/2005	14/2006	16/2007
predominant ^d type/subtype of influenza virus	co-circulation of influenza A (mainly subtype H3) and B	B	influenza A (subtype H1 and H3, but most cases not subtyped)

* ILI = influenza-like illness

^a periods between week 36 of a given year and week 16 of the following year, inclusive, according to the calendar numbering of weeks

^b according to European Influenza Surveillance Scheme (EISS): low = no influenza activity or influenza activity at baseline level; medium = level of influenza activity usually seen when virus is circulating in the country based on historical data; high = higher than usual influenza activity compared to historical data; very high = particularly severe influenza activity compared to historical data [7, 16, 17]

^c according to EISS: no activity = clinical activity at baseline levels and infections are not laboratory confirmed; sporadic = isolated cases of laboratory-confirmed influenza in a region, or an outbreak in a single institution with clinical activity remaining at or below baseline levels; local outbreak = increased ILI* activity in local areas within a region, or outbreaks in two or more institutions within a region, with laboratory-confirmed cases, levels of activity in the rest of the region and other regions remain at or below baseline levels; regional activity = ILI* activity above baseline levels in one or more regions with a population comprising less than 50% of the country's total population, with laboratory confirmed infections in the affected region(s), levels of activity in other regions remain at or below baseline levels; widespread activity = ILI* activity above baseline levels in one or more regions with a population comprising 50% or more of the country's population, with laboratory confirmed influenza infections [7, 16, 17]

^d all laboratory confirmations were taken into account (virus isolations, detections by IF and RT-PCR)

differences were probably due to not all of the sentinel physicians performing their work in accordance with the principles established by the NIC and VSEs. On the one hand, some of them did not send reports to VSEs every reporting week while on the other hand other “new” physicians became interested in SENTINEL and decided to participate in this system. The problem is that sentinel physicians work as volunteers. Sometimes a feedback information on the result of testing is a sufficient incentive for them. Cooperation with possibly the same physicians season by season would also be a favorable situation to ensure better and better experienced participants.

The same requirement applies to VSEs to ensure the highest and sustained quality of specimen processing. The percentage of influenza-positive specimens consistently decreased since 2004-5 (15.8%) through 2005-6 (8.7%) until 2006-7 (3.1%). Moreover, there were significant differences in the percentages of influenza-positive specimens week by week within the same epidemic season (sudden increases and decreases). There are two possible explanations: negative results were in fact negative, or the conditions essential for proper specimen collection and processing were not fulfilled. Therefore, the awareness of laboratory staff and physicians of factors affecting a result of testing (specimen collection, storage, transport) should be increased [15]. Each epidemic season, the NIC provides VSEs with the updated reporting forms, but also with detailed instructions for physicians how to collect different types of specimens, who can be swabbed and when, how to store and transport the specimens, etc. Nevertheless, the results presented in this paper show that practical courses for the sentinel physicians would be organized and swabbing instructions should be supplemented with the specific requirements regarding minimal number of swabs to collect each week by every sentinel physician taking into account laboratory capacity of individual VSEs. Besides, it is important to ensure access to rapid, sensitive (e.g. RT-PCR) and new laboratory techniques (real-time RT-PCR). It should also be worth assessing the quality of laboratory work in VSEs.

Another important aspect is the communication between VSEs, physicians and the NIC. Channels of rapid communication should include sending reports and results of laboratory tests on time, transport of specimens and isolates and exchange of any other information regarding surveillance. Differences between the number of epidemiological reports and number of virological reports were probably caused by lack of effective communication and exchange of clear information between individual participants of SENTINEL. For example, some VSEs were not aware of the necessity to send epidemiological and virological reports to the NIC even if no ILI cases were registered or no specimens were collected in a given week. Considering the above aspects, special questionnaires will be sent to VSEs and physicians to identify any problems, suggestions, strong and weak elements of SENTINEL.

At present, influenza surveillance is performed during the epidemic season. Nevertheless, VSEs and physicians should be prepared for all-year-round surveillance, according to EISS' plans. The NIC would also like to use influenza SENTINEL to perform virological surveillance for other respiratory infections as RSV [22-24]. Another objective will be for the NIC to prepare national reports similar to EISS annual reports [4,5,7].

The first seasons of SENTINEL were a success. Poland has been a full member of EISS since May 2006 and participates effectively

in Europe's influenza surveillance. Nevertheless, SENTINEL should be continuously improved in coming years, especially in the area of specimen collection by physicians, laboratory testing and its quality. Before new tasks will be introduced (such as the introduction of new laboratory techniques, and all-year-round surveillance), a more important goal is to maintain the correct and reliable completion of basic principles of SENTINEL. Further improvement of SENTINEL should lead to:

- sustained integration of epidemiological and virological surveillance;
- effective encouragement of physicians to participate in SENTINEL despite the system's volunteer basis;
- possible cooperation with the same family physicians from season to season;
- assurance of appropriate and sustained quality of physicians' work in SENTINEL during the entire epidemic season, even under the risk of decrease of the number of sentinel physicians;
- increased number of specimens collected by individual physicians every week;
- improved quality of the collection, storage and transport of the specimen;
- improved quality of laboratory processing of the collected specimens;
- better qualified and experienced laboratory staff to ensure the highest quality of laboratory processing;
- decreased discrepancies between voivodships in the population size covered by SENTINEL, including population size of the specific age groups;
- better control and coordination of the surveillance in the individual regions (voivodships);
- improved communication between all participants of SENTINEL to ensure the effective exchange of any information and to guarantee that all principles of this system is clear for all participants;
- year-round influenza surveillance according to the EISS plans;
- introduction of respiratory viruses other than influenza and causing ILI into SENTINEL;
- publishing detailed national reports similar to EISS' annual reports on influenza activity in a given epidemic season.

Acknowledgements

The authors are grateful to all VSEs and physicians who actively participated in the SENTINEL influenza surveillance system in the 2004-5 and 2006-7 seasons.

References

1. World Health Organization, Dept. of Communicable Disease Surveillance and Response. Terms of Reference for National Influenza Centres. Available from: <http://www.who.int/csr/disease/influenza/en/TORNICs.pdf>
2. World Health Organization: The role of National Influenza Centres (NICs) during inter-pandemic, pandemic alert and pandemic periods. 2007 May:1-13. Available from: http://www.who.int/csr/disease/avian_influenza/guidelines/RoleNICsMayf.pdf
3. World Health Organization, Department of Communicable Disease Surveillance and Response. WHO global influenza preparedness plan. The role of WHO and recommendations for national measures before and during pandemics. WHO/CDS/CSR/GIP/2005.5, Global Influenza Programme, WHO, Geneva, Switzerland, 2005:1-50. Available from: http://www.who.int/csr/resources/publications/influenza/GIP_2005_5Web.pdf

4. European Influenza Surveillance Scheme. Annual Report 2005-2006 influenza season. Utrecht, the Netherlands, NIVEL, 2007:1-38. Available from: http://www.eiss.org/documents/eiss_annual_report_2005-2006.pdf
5. European Influenza Surveillance Scheme. Annual Report 2001-2002 influenza season. Utrecht, the Netherlands, NIVEL, 2002:1-34. Available from: http://www.eiss.org/documents/eiss_annual_report_01-02.pdf
6. Brydak LB, Machala MK. Role of a family physician in the European integrated influenza surveillance SENTINEL. *Family Medicine & Primary Care Review* 2006;8(3):848-853 [in Polish].
7. European Influenza Surveillance Scheme. Annual Report 2004-2005 influenza season. Utrecht, the Netherlands, NIVEL, 2006:1-60. Available from: http://www.eiss.org/documents/eiss_annual_report_2004-2005_+_cover.pdf
8. EISS Weekly Electronic Bulletin. Available from: http://www.eiss.org/cgi-files/bulletin_v2.cgi
9. Turner J, Kelly H. A medical locum service as a site for sentinel influenza surveillance. *Euro Surveill* 2005;10(4):96-8. Available from: <http://www.eurosurveillance.org/em/v10n04/1004-222.asp>
10. Fleming DM, van der Velden J, Paget WJ. The evolution of influenza surveillance in Europe and prospects for the next 10 years. *Vaccine*. 2003;21(16):1749-53.
11. Centers for Disease Control and Prevention. Weekly report: influenza summary update. Available from: <http://www.cdc.gov/ncidod/diseases/flu/weekly.htm>
12. Losos JZ. Routine and sentinel surveillance methods. *East Mediterr Health J*. 1996;2(1):46-50.
13. Deckers JGM, Paget WJ, Schellevis FG, Fleming DG. European primary care surveillance networks: their structure and operation. *Fam Pract*. 2006;23(2):151-158.
14. Centers for Disease Control and Prevention. WHO Collaborating Center for the Surveillance, Epidemiology and Control of Influenza. Concepts and procedures for laboratory-based influenza surveillance. U.S. Department of Health and Human Services, Public Health Service, July 1982.
15. Manuguerra J-C, Hannoun C. Influenza and other viral respiratory diseases. Surveillance and laboratory diagnosis. Paris: Institut Pasteur; 1999.
16. European Influenza Surveillance Scheme. Indicators of influenza activity: 2005-2006 influenza season. Available from: http://www.eiss.org/cgi-files/bulletin_v2.cgi?season=2005
17. European Influenza Surveillance Scheme. Indicators of influenza activity: 2006-2007 influenza season. Available from: http://www.eiss.org/cgi-files/bulletin_v2.cgi?season=2006
18. Brydak LB, Kuszewski K. Influenza. In: Kostrzewski J, Magdzik W, Naruszewicz-Lesiuk D, editors. *Choroby zakaźne i ich zwalczanie na ziemiach polskich w XX wieku*. Warszawa: Wydawnictwo Lekarskie PZWL; 2001. p. 233-242 [in Polish].
19. Kantoch M. Medical virology (*Wirusologia lekarska*). Warszawa: Wydawnictwo Lekarskie PZWL; 1998 [in Polish].
20. Brydak LB. Influenza and its prophylaxis (*Grypa i jej profilaktyka*). 2nd ed. Poznań: Wydawnictwo Termedia; 2004 [in Polish].
21. The National Influenza Pandemic Preparedness Plan for Poland. Prepared by the National Influenza Pandemic Committee on the basis of the project prepared by the National Influenza Center (Brydak Lidia B., Machala Magdalena), 10 August 2005. Available from: <http://www.gis.gov.pl/pdf/grypa/plan.pdf>
22. Druce J, Tran T, Kelly H, et al. Laboratory diagnosis and surveillance of human respiratory viruses by PCR in Victoria, Australia, 2002-2003. *J Med Virol*. 2005;75(1):122-9.
23. Meerhoff T, Fleming D, Smith A, Mosnier A, van Gageldonk-Lafeber AB, Paget WJ; EISS RSV Task group. Surveillance recommendations based on an exploratory analysis of respiratory syncytial virus reports derived from the European Influenza Surveillance System. *BMC Infect Dis*. 2006;6:128.
24. Meerhoff TJ, Paget WJ, Aguilera JF, van der Velden J. Harmonising the virological surveillance of influenza in Europe: results of 18-country survey. *Virus Res*. 2004;103(1-2):31-3.

This article was published on 21 February 2008.

Citation style for this article: Romanowska M, Nowak I, Rybicka K, Brydak LB. The introduction of the SENTINEL influenza surveillance system in Poland - experiences and lessons learned from the first three epidemic seasons. *Euro Surveill*. 2008;13(8):pii=8046. Available online: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=8046>