

NATIONAL SEASONAL INFLUENZA VACCINATION SURVEY IN EUROPE, 2008

Jolita Mereckiene (jolita.mereckiene@hse.ie)^{1,2}, S Cotter^{1,2}, A Nicol³, Daniel Lévy-Bruhl^{4,2}, A Ferro^{5,2}, G Tridente^{6,2}, G Zanoni^{6,2}, P Berra^{6,2}, S Salmaso^{5,2}, D O'Flanagan¹, D O'Flanagan², on behalf of the VENICE project gatekeepers group⁷

1. Health Protection Surveillance Centre, Dublin, Ireland

2. Vaccine European New Integrated Collaboration Effort (VENICE) Project

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

4. Institut de Veille Sanitaire, Saint-Maurice, France

5. Istituto Superiore di Sanità, Rome, Italy

6. The Green Channel Regional Reference Centre, Veneto, Italy

7. List of gatekeepers is available on VENICE website: <http://venice.cineca.org>

A cross-sectional survey was undertaken with the European Union (EU) Member States and Norway and Iceland to describe seasonal influenza immunisation in the 2006-7 season, in particular to identify country-specific recommendations for risk groups, obtain vaccine uptake information and allow comparison with global recommendations. A standardised questionnaire was completed electronically by each country's project gatekeeper. Of the 29 countries surveyed, 28 recommended seasonal influenza vaccination for older age groups (22 for those aged > 65 years), and in one country vaccine was recommended for all age groups. All countries recommended vaccinating patients with chronic pulmonary and cardiovascular diseases and most countries advised to immunise patients with haematologic or metabolic disorders (n=28), immunologic disorders (n=27) and renal disease (n=27), as well as residents of long-term care facilities (n=24). Most countries recommended vaccination for staff in hospitals (n=25), long-term care facilities (n=25) and outpatient clinics (n=23), and one-third had such recommendations for workers in essential (n=10), military (n=10) and veterinary services (n=10) and poultry industry (n=13). Eight countries recommended vaccine for pregnant women; and five advised to vaccinate children (with age limits ranging from 6 months to 5 years). Twenty countries measured influenza vaccine uptake among those aged > 65 years (range 1.8%-82.1%), seven reported uptake in healthcare workers (range 14%-48%) and seven assessed coverage in persons with underlying medical conditions (range 27.6%-75.2%). The data provided by this study can assist EU states to assess and compare their influenza vaccination programme performance with other countries. The information provides a comprehensive overview of policies and programmes and their outcomes and can be used to inform joint discussions on how the national policies in the EU might be standardised in the future to achieve optimal coverage. Annual surveys could be used to monitor changes in these national policies.

Background

Although immunisation against influenza is believed to benefit the elderly, measuring precise effectiveness of vaccine against morbidity and mortality in this group is difficult. Several recent studies and reviews have calculated widely varying levels of

effectiveness and have described methodological hurdles for making accurate measurements [1,2]. One randomised study among older adults found that vaccine efficacy was 57% for preventing laboratory-confirmed influenza infection among adults aged 60-69 years and 23% among a small number of persons aged 70 years and older [3].

In May 2003, the World Health Assembly (WHA) recommended vaccination for all people at high risk, which it defined as the elderly and persons with underlying diseases. The participating countries, including all European Union (EU) Member States, also committed to the goal of attaining vaccination coverage of the elderly population of at least 50% by 2006 and 75% by 2010 [4].

The Vaccine European New Integrated Collaboration Effort (VENICE, <http://venice.cineca.org/>) project was launched in January 2006. It is funded by the European Commission Directorate General for Health and Consumer Protection (DG SANCO) within the framework of the EU Public Health Programme and supported by the European Centre for Disease Prevention and Control (ECDC). Currently 27 EU Member States and two EEA countries (Norway and Iceland) participate in the project whose aim is to establish a European network of experts who work with national immunisation programmes. Immunisation programmes and vaccination policies in Europe differ from country to country, partially reflecting the differences in healthcare delivery systems [5]. Prior to this work there had only been one European wide survey published in 2003 and there was no information routinely available to policy makers on the current status of influenza programmes and how they were implemented and monitored [6]. There is a need to improve knowledge on which population groups are targeted for vaccination, how immunisation programmes are resourced and which indicators are (or could be) used for monitoring vaccine uptake.

We conducted a web-based survey to describe the policies and practices of seasonal influenza immunisation programmes in the European Union and two countries of the European Economic Area (EEA), Norway and Iceland, for the 2006-7 influenza season.

This survey may establish the basis for conducting annual surveys of influenza vaccination policies and practices.

More information on the project and detailed results are presented in the “Final Report. National Seasonal Influenza Vaccination Survey in Europe, 2007” (henceforth referred to as: “Final report”), available from: http://venice.cineca.org/Influenza_Study_Report_v1.0.pdf

Methods

The survey was a collaborative study between the ECDC, VENICE project and EU and EEA countries. Each country had previously identified and enrolled gatekeepers responsible for conducting all VENICE surveys inside their countries.

A standardised questionnaire was developed predominately using close-ended questions. Information was sought to describe seasonal influenza vaccination policies during the 2006-7 influenza season; to identify influenza recommendations for different risk groups and the general population; to determine data sources, capacity and feasibility for routine seasonal influenza vaccination coverage monitoring; and to obtain the most recent vaccination coverage results for the general population and for the risk groups targeted by the recommendations. As vaccination coverage is estimated through a variety of means, we asked for information on the methodology used by each country to make these estimates: administrative methodologies (using some kind of information from those who are responsible for delivering vaccination to calculate the numerator and denominator); survey methodologies (using a sample of those targeted for vaccination); or by using pharmaceutical distribution or sales data. In addition information was collected on the form of payment for the costs of vaccine and its administration. The questionnaire is available in the “Final report”, Appendix 2.

The questionnaire was piloted by three VENICE project-leading partners: Italian Istituto Superiore di Sanità (ISS), the French Institut de Veille Sanitaire (INVS) and the Irish Health Protection Surveillance Centre (HPSC). After the pilot, the questionnaire was reviewed and amended. The questionnaire was deployed as a cross-sectional web-based survey in January 2008 and was available for all participating countries on VENICE website. Gatekeepers in each participating country entered data directly on-line. The data were analysed using the computer-based EpiInfo (version 3.3.2) software. Gatekeepers in each country were asked to validate the results.

Not all countries were able to provide data on influenza vaccine uptake in our survey, but information on some countries was available from a study undertaken by the University of Zurich for the 2006-7 season [7]. In this study a population-based computer-assisted telephone survey was carried out in eleven countries. These data were used for vaccine coverage comparisons in our study and are presented here.

Results

Response rate and results of data validation

The response rate to the survey was 100% (29/29). Response rate to data validation was 83% (24/29) as of 2 April 2008.

Recommendations for specific target groups

All countries reported having recommendations on influenza immunisation for specific target groups in the population.

Age groups

The elderly were included in vaccination recommendations in all 29 countries (100%). Twenty-two countries reported specific recommendations for those aged 65 years or older, in six countries immunisation was recommended from the age of 50 (Poland), 55 (Malta) or 60 years (Germany, Greece, Hungary and Iceland). Austria was the only country in the survey which recommended influenza vaccination for all age groups. Besides Austria, five countries (Estonia, Finland, Latvia, Slovakia and Slovenia) recommended routine immunisation of children (with the age limits varying from six months to five years). Detailed information regarding vaccination recommendations for various age groups is presented in “Final report” Table 1.

People with chronic medical conditions

Seasonal influenza vaccine for patients with chronic pulmonary and cardiovascular diseases was recommended by all countries (100%). Nearly all countries recommended vaccinating individuals with haematological or metabolic disorders (n= 28, 97%), those with immunologic disorders (with or without HIV/AIDS) (n=27, 93%) and those with renal diseases (n= 27, 93%). Eight countries (28%) recommended vaccine for pregnant women (Table 1).

Other groups

Twenty-four participating countries (83%) recommended vaccination for residents of long-term care facilities. Fourteen countries (48%) advised to vaccinate household contacts of persons for whom vaccination was recommended.

Occupational groups

Most countries indicated that influenza immunisation was recommended for healthcare staff working in occupational settings such as hospitals (n=25, 86%), long-term care facilities (n=25, 86%) and outpatient care clinics (n=23, 79%). Some countries recommended vaccination for poultry industry workers (n=13, 45%) and essential, military and veterinary services (each n=10, 34%) (Figure 1). Three countries, Denmark, Finland and Sweden (10%) did not have recommendations for vaccination in any occupational setting.

TABLE 1

Influenza immunisation recommendations for persons with chronic medical conditions (without regard to age) or pregnancy. National seasonal influenza vaccination survey in Europe, January 2008 (n=29)

Condition	Number of countries (%)
Pulmonary diseases	29 (100)
Cardiovascular diseases	29 (100)
Haematologic or metabolic diseases	28 (97)
Renal diseases	27 (93)
Diseases of the immune system	27 (93)
HIV/AIDS	26 (90)
Children on aspirin	17 (59)
Hepatic diseases	14 (48)
Any condition that can compromise respiratory function	11 (38)
Pregnancy	8 (28)

Monitoring vaccine coverage

All countries except one have mechanisms to monitor influenza vaccination coverage. Most (n=14) measure uptake in both the general population and selected target groups, some (n=7) only in target groups, some (n=7) only in the general population. One country does not have any means of monitoring influenza vaccine coverage.

Concerning monitoring vaccination coverage in specific risk groups targeted by vaccine recommendations, only one country, the United Kingdom reported having mechanisms to monitor influenza vaccination coverage in each of the recommended target groups by actively collecting immunisation data. Further 20 countries had mechanisms for monitoring coverage in some selected risk groups, including 18 countries that monitored uptake in the elderly. Norway reported monitoring influenza vaccination coverage in a combined group including those aged ≥65 years and persons with underlying clinical conditions.

Monitoring coverage in groups other than the elderly was uncommon. Aside from the UK only the Netherlands, Hungary and Iceland reported having mechanisms for monitoring uptake among clinical risk groups and Hungary, Portugal and Iceland had mechanisms to monitor vaccine coverage among staff working in occupational settings. Seven countries reported they had no mechanisms to monitor influenza vaccine coverage in risk groups: Austria, Bulgaria, Czech Republic, Greece, Latvia, Spain and Poland. However, with the exception of Greece these countries monitored coverage rates in the general population. ("Final report", Table 5).

Methods of monitoring coverage

The mechanisms used to measure vaccination coverage vary by country and include health record data, surveys or pharmaceutical data.

Eight countries reported using only administrative methods (number of vaccines administered, payment reimbursement claims) to monitor vaccination coverage. Fourteen countries combined administrative with other methods (surveys or pharmaceutical

data), one country combined survey and pharmaceutical data, one used only survey, and four only pharmaceutical data. Only one country does not have any method and does not monitor vaccine coverage.

Twenty-seven (93%) countries reported using one or several methods to measure the numerator (number of people vaccinated) for assessing influenza vaccine coverage in recent years (2004-2007). Sources used most frequently were health record data (medical documentation and/or computerised medical records and/or immunisation registries/data) which were used in 20 countries. Other countries used pharmaceutical data, surveys or other administrative methods.

Eleven countries (39%) collected data for numerator assessment annually and ten (36%) collected this data once at the end of season (Table 2). Only six countries attempted to monitor coverage during the season.

Eight countries used administrative methodology to estimate the denominator (number of people who should be vaccinated) for the occupational target groups and the group comprising persons with underlying clinical conditions, and ten countries have some information on other group categories. ("Final report" Table 9)

Seven countries used survey methods to estimate vaccination coverage, including household surveys (Germany), telephone surveys (Germany, Ireland, Portugal, Sweden, and France), mail surveys (Cyprus, Sweden) or individual interviews (Belgium).

Pharmaceutical distribution or sales data were formally collected in sixteen countries ("Final report", Table 6)

Vaccination coverage results

The elderly

Influenza vaccination coverage among those aged > 65 years age group was measured in nineteen countries (65%). The range of uptake in this age group varied from 1.8% to 82.1%. In addition, Norway provided combined vaccine uptake for those aged > 65 years

FIGURE 1

Vaccination recommendations for occupational groups. National seasonal influenza vaccination survey in Europe, January 2008 (n=29)

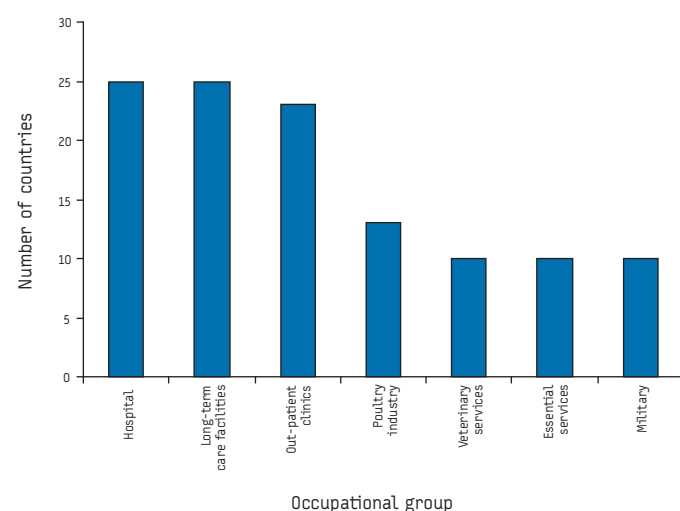


TABLE 2

Frequency and time of collecting numerator data for assessing influenza vaccine coverage. National seasonal influenza vaccination survey in Europe, January 2008 (n=28)

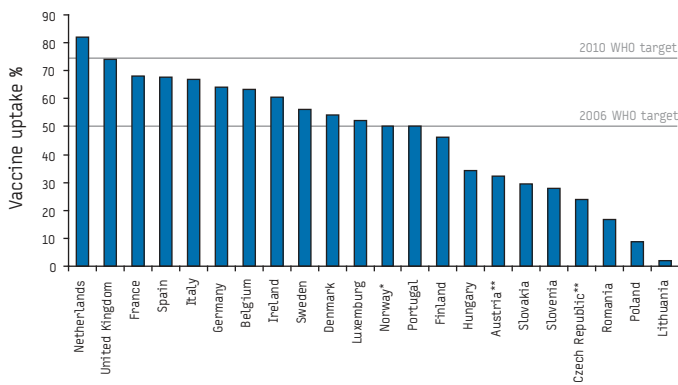
Frequency of numerator assessment	Countries
Monthly	Latvia, Lithuania, United Kingdom
Every two months	Ireland
Every three months	Estonia, Poland
Once, at the end of influenza season	Cyprus, Czech Republic, Hungary, Germany, Luxemburg, Norway, Romania, Slovenia, Malta, Portugal
Annually (specify date/time)	Austria (spring) Bulgaria (April) Denmark (first quarter of the year) Finland (April) Iceland (December) Italy (late spring) Netherlands Slovakia (May) Spain (first quarter of the following year) Sweden (end of summer, before next season) France (September)
Never	Greece

and clinical risk groups (50%) (Figure 2). Generally, members of EU-15 had better coverage than the 12 countries which joined the EU more recently. In the former, vaccine coverage in the elderly ranged from 32.1% to 82.1%, while in the latter coverage ranged from 1.8% to 34.1% (Figure 2).

Healthcare workers and clinical risk groups

Nine countries were able to report vaccination coverage for either healthcare workers or persons with underlying clinical conditions. Five countries reported coverage for both risk groups, two countries reported coverage of healthcare workers only and two countries had

FIGURE 2
Vaccination coverage in those aged ≥ 65 years. National seasonal influenza vaccination survey in Europe, January 2008 (n=22)



* Vaccination coverage in combined group of those aged ≥ 65 years and those with underlying clinical conditions
 **Vaccination coverage estimated through telephone surveys; source: University of Zurich [7]
 Note: Data on vaccination coverage in season 2006-7, except for Germany and Poland (season 2005-6) and Belgium (season 2003-4)

data on clinical risk group coverage only. Coverage in these groups ranged from 14% to 48% for healthcare workers and 27.6% to 75.2% for clinical risk groups (Figure 3).

Payment for vaccination

People aged > 65 years received the influenza vaccine free of charge in 13 (45%) countries, eight of which had achieved coverage > 50%. In three countries the elderly paid the full cost of vaccine and administration. In 12 countries the vaccine was free of charge for some people in the older age groups or there were partial subsidies for this age group, whereas in one (Sweden) the form of payment varied by county. (Figure 4)

Most countries offered free or partially refunded vaccination for other target groups:

In 12 countries vaccination was free for all and in five for some of the patients with underlying chronic illness. Nine countries offered free vaccination to all recommended occupational groups, 12 countries to some recipients in these groups. All children received the vaccine free of charge in three countries and some

FIGURE 3
Vaccination coverage in clinical risk groups and healthcare workers. National seasonal influenza vaccination survey in Europe, January 2008 (n=9)

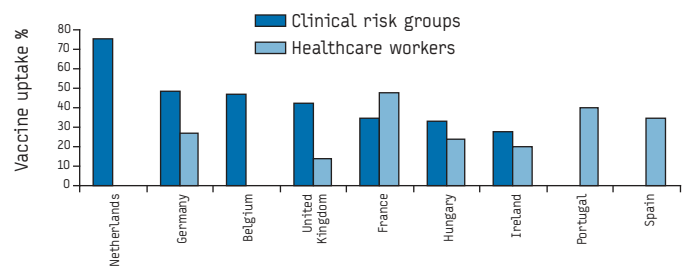
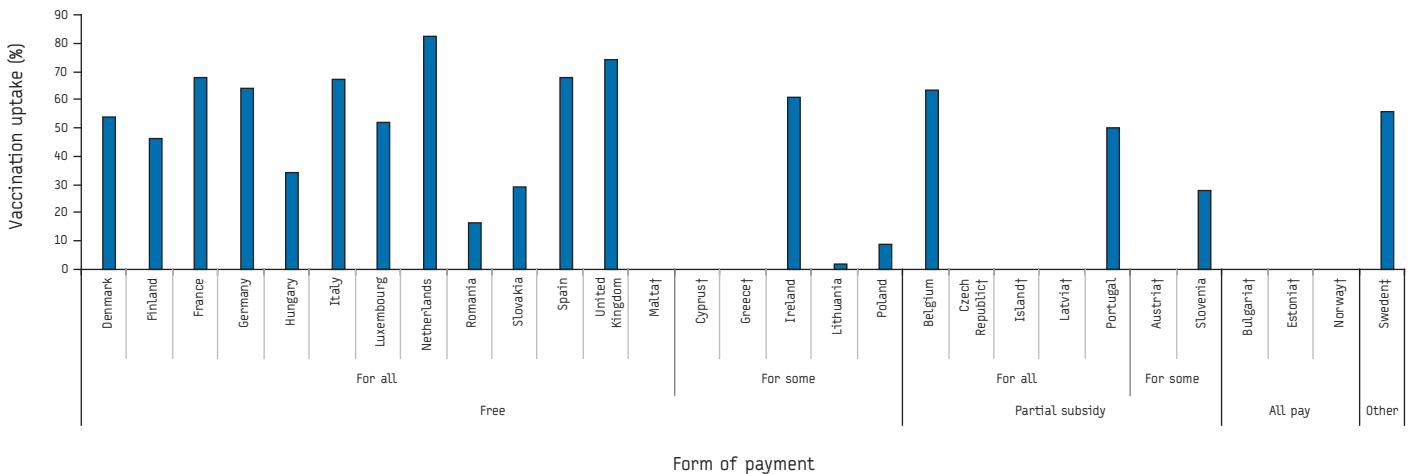


FIGURE 4
Costs of vaccination and vaccination coverage for persons aged ≥ 65 years, by country. National seasonal influenza vaccination survey in Europe, January 2008 (n=29)



Note: Data on vaccination uptake in season 2006-7, except for Germany and Poland (season 2005-6) and Belgium (season 2003-4)
 † Countries unable to provide data on vaccination coverage in persons aged > 65 years
 ‡ In Sweden subsidies vary by county, approximately two-third of counties give free vaccination to this age groups



children in 10 countries. (Figure 5, more details in “Final report” Table 13).

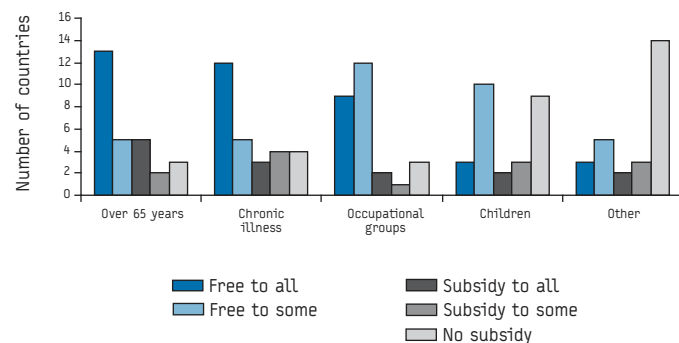
Discussion

This is the second published study which investigates influenza vaccination policy across all EU Member States, Norway and Iceland simultaneously, and reflects most up to date information available from each country [6]. ECDC undertook a smaller study with its Advisory Forum members in 2006 that served as a model to develop this study. Validation for the results is afforded by comparison with a recent population-based computer-assisted telephone survey carried out in eleven European countries for 2006-7 influenza season [7]. The coverage results were similar except for two countries. The VENICE approach involving gatekeepers already engaged in immunisation services would seem to be successful although validation and ‘sign-off’ by the authorities themselves was more difficult. It was impressive that this survey, despite its complexity, was completed in a short time (12 weeks from start to finish). A strong conclusion would be that ECDC and VENICE could make this an annual survey. Annual completion would become easier as it would simply be a matter of updating the previous years’ results and noting differences. The standardised information that this could provide would enable the EU Member States, ECDC, other EU institutions and WHO to assess their progress towards achieving implementation of internationally accepted recommendations on influenza prevention and control.

Our study highlights the challenges facing those authorities in Europe that have to implement the 2003 WHA resolution. The health systems in Europe are quite different. Some countries have different policies regarding influenza vaccination between different regions/counties within national borders. Vaccine coverage is measured by different methods (medical records, surveys, data from the pharmaceutical industry) in different countries making direct comparisons difficult. However this survey shows that all EU countries, Norway and Iceland have adopted the 2003 WHA recommendation that vaccine should be offered to the elderly. All countries offer influenza vaccine for those aged 65 years and older, with a few countries lowering the age limit to 50, 55 or 60 years. What countries are finding hard is to monitor and achieve performance when compared against the WHA targets (coverage in the elderly of 50% by 2006 and 75% by 2010).

FIGURE 5

Costs of vaccination by group. National seasonal influenza vaccination survey in Europe, January 2008 (n=29)



In the 2003 survey of 26 European countries, 18 countries reported having mechanism for monitoring vaccination coverage, and 14 could monitor coverage in the elderly with an uptake ranging from 25% to 81% [6]. In our survey, 19 of the 29 countries monitored uptake specifically in the elderly obtaining a range of 2% to 82%. Norway measured it combined with risk groups. Comparison of the results for the nine countries that participated in both surveys is encouraging, with all countries improving coverage, some dramatically, which suggests that an ability to monitor uptake results in improvement (“Final report” Table 10). The fact that more countries were able to provide vaccine coverage data this year is also encouraging and suggests that countries are striving to obtain this data. However extrapolation of the trend data from the telephone surveys conducted by the University of Zurich [7] suggest that unless there is a radical improvement in the next two seasons only two or three of the 29 EU/EEA countries are likely to achieve the 2010 WHA target. Coverage in the elderly and those with chronic illnesses will become ever more important in the EU. Population projections for the 25 EU countries indicate that the proportion of the elderly population that was 17% in 2003 will rise to 29% by 2050 [8].

Currently only five countries recommend vaccination for young children and one country recommends vaccination for all age groups (Austria). Increasingly, children are seen as a group that bears substantial morbidity from influenza and plays a role in transmitting influenza to vulnerable contacts. Vaccination of this age group is already recommended in some countries outside Europe [9,10]. The limited effectiveness of the currently available vaccines in young children may have been an impediment for many countries to embark on such a strategy. However an ECDC convened panel noted few data from Europe itself and that information is now urgently needed [11].

The European situation regarding vaccination coverage among other groups for whom vaccination is recommended (occupational groups, people with underlying medical conditions, residents of long stay care facilities, household contacts of persons to whom vaccination is recommended etc.) is highly variable. Influenza vaccine is recommended for these groups in many countries but monitoring and data for vaccine coverage was available for less than one-third of the countries. It seems a major challenge for monitoring vaccine coverage are the difficulties in obtaining information on the denominator, i.e. the size of these risk groups, which can be inaccurate due to the lack of registries for target groups, population movement, or inaccurate census.

Another issue regarding influenza vaccine coverage is assessment of the numerator, i.e. the number of those who are vaccinated. All, except two, countries assess some numerator, but have to use different methods to obtain this information: health records, pharmaceutical distribution and sales data or surveys (telephone, mail, household). As different methods are used it is challenging to harmonise vaccine coverage monitoring and to compare vaccine coverage rates between countries. Numerators can be underestimated due to underreporting, incomplete reporting and failure to include information from all relevant sources. The numbers can also be overestimated, such as when vaccine sales data are used, as these data may not necessarily reflect the number of actually administered doses. Because of the demonstrated diversity of European immunisation delivery and monitoring systems it may be worth to consider obtaining comparable influenza vaccine

coverage data through the utilisation of a standard sampling methodology across all countries.

Vaccination of healthcare workers was recommended in the WHA in 2003 [12]. This is based on a number of reasons. There is good evidence that vaccination of staff provides indirect protection to vulnerable elderly patients in care homes, a group at high risk of the severe effects of influenza [13,14]. Vaccination of healthcare workers also has direct benefit for this occupational group as it provides individual protection and reduces absenteeism from work, and fewer working days are lost [15,16]. Our study found that most of the countries recommended vaccination for staff working in healthcare facilities but vaccine coverage was known only in one-third of the countries and, as seen in other studies, the uptake was very low [7].

Thirteen of the 20 countries which were able to estimate vaccine uptake among those aged 65 years or older achieved the 2006 WHO target. One country (the Netherlands) has already achieved the 2010 WHO target uptake in this group. The fact that nine EU/EEA countries still in early 2008 did not have any system in place with which they could estimate uptake in this high risk group is worrying and suggests that Europe will struggle to achieve the WHA target for 2010 or even to produce good statistics. Therefore a strong conclusion of this study is the need for all European authorities to have information systems in place that can monitor influenza vaccine coverage.

Previous studies have shown that subsidising the cost of vaccination increases the uptake rate [7]. Costs associated with vaccination can be a deterrent to the uptake, particularly if borne by the individual. This survey reports that half of the countries have adopted a policy of provision of free vaccine, in total or in part, predominantly for the elderly, individuals with chronic disease, occupational groups. Only three countries reported that the costs of vaccine and its administration are borne fully by recipients >65 years and these countries had noticeably low uptake.

Increasingly, European states are appreciating the need to have in place systems and processes to deal with the emergence of a pandemic strain including use of specific vaccines when these become available [17]. All countries should have the ability to deliver and monitor influenza vaccination programmes in the non-emergency setting (seasonal influenza programme) to be able to build on these well established, tested systems to prepare for the potential pandemic.

Conclusion

The limitations of our results predominantly relate to factors which make comparison of data between countries difficult but which are beyond the control of this study. As demonstrated, there is substantial variation in health systems, delivery of immunisation programmes and immunisation recommendations between and, sometimes, within countries. Various methodologies are used to measure immunisation coverage, and even when similar methodologies are described, it is possible that the accuracy of such estimates may vary between countries depending on the strength of information systems (ability to calculate numerator and denominator, target population groups etc.). However, having identified these differences, European countries are now better informed to identify how they can standardise their approach and in future provide more easily comparable data. The importance of

high quality and comprehensive information systems in identifying populations targeted for influenza vaccine and in then monitoring uptake in these groups has been highlighted in this study. Countries can benefit by learning from each other; how some countries achieved high uptake, whether related to additional immunisation resources, social mobilisation, or incentives.

This is one of the first EU-wide surveys on influenza vaccination programmes and shows variability between countries with regard to recommendations for vaccine usage and uptake rates. Our survey revealed that there is substantial gap between recommendations and real vaccine uptake. Vaccine uptake in most countries needs to be improved.

However the data provided by this study can assist in standardising national and EU-level policies and recommendations and monitoring influenza immunisation programmes in future years. Survey results have shown that achieving high vaccine coverage for those who are at risk remains a serious public health challenge. We believe that European countries can use the results of our study to assess their own progress towards achieving WHO goals of influenza vaccine uptake and identify local obstacles that must be overcome if these goals are to be met. Policies and resources of countries that perform best can provide insight to guide other states struggling to achieve high uptake rates.

Acknowledgments

We would like to acknowledge to all VENICE gatekeepers and JT Weber (ECDC, CDC) who contributed to conducting this study. We would like also to thank Eva Appelgren and Luca De Matte for their contribution conducting this survey.

References

1. Influenza. In: Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. 10th ed. Washington DC: Public Health Foundation, 2008. p. 235-55. Available from: <http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm>
2. Mangtani P, Cumberland P, Hodgson CR, Roberts JA, Cutts FT, Hall AJ. A cohort study of the effectiveness of influenza vaccine in older people, performed using the United Kingdom general practice research database. *J Infect Dis*. 2004;190(1):1-10.
3. Nichol KL, Nordin JD, Nelson DB, Mullooly JP, Hak E. Effectiveness of Influenza Vaccine in the Community-Dwelling Elderly. *N Engl J Med*. 2007;357(14):1373-81.
4. World Health Organization. Resolution of the World Health Assembly (WHA 56.19). Prevention and control of influenza pandemics and annual epidemics. WHA 10th plenary meeting. 28-5-2003. Ref Type: Bill/Resolution
5. Pastore Celentano L, Lopalco PL, O'Flanagan D, Lévy-Bruhl D, Ferro A, Tridante G et al. VENICE: Europe's new network for vaccination. *Euro Surveill*. 2007;12(3):pii=3116. Available from: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=3116>
6. Kroneman M, Paget WJ, van Essen GA. Influenza vaccination in Europe: an inventory of strategies to reach target populations and optimise vaccination uptake. *Euro Surveill*. 2003;8(6):pii=418. Available from: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=418>
7. Blank PR. Seasonal influenza vaccination in eleven European countries, 2006/7 survey - driver, barriers and cost benefit of the flu vaccine. Vaccination strategy workshop, Luxembourg. 2008 February 14; Luxembourg. [conference communication]
8. Tsovala S, Mortensen J. Cross-atlantic exchange to advance long-term care. CEPS Special report. Brussels: Centre for European Policy Studies (CEPS); 2006 Sep. ISBN 92-9079-666-9.

9. Advisory Committee on Immunization Practices, Smith NM, Bresee JS, Shay DK, Uyeke TM, Cox NJ, et al. Prevention and Control of Influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep.* 2006;55(RR-10):1-42. Available from: www.cdc.gov/mmwr/PDF/rr/rr5510.pdf
10. Influenza vaccine. Part 4: Active immunizing agents. In: *Canadian Immunization Guide*. Ottawa: Public Health Agency of Canada; 2006. p. 209-20. Available from: <http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php#toc>
11. European Centre for Disease Prevention and Control. Technical Report of the Scientific Panel on Vaccines and Immunisation: Infant and children seasonal immunisation against influenza on a routine basis during inter-pandemic period. Stockholm: ECDC; 2007. Available from: http://ecdc.europa.eu/documents/pdf/Flu_vacc_18_Jan.pdf
12. World Health Organization. Amid SARS concerns, WHO urges influenza vaccinations for high-risk groups. *World Health Organization notes for the media*. 2003 Sep. Available from: <http://www.who.int/mediacentre/news/notes/2003/np22/en/>
13. Carman WF, Elder AG, Wallace LA, McAulay K, Walker A, Murray GD et al. Effects of influenza vaccination of health-care workers on mortality of elderly people in long-term care: a randomised controlled trial. *Lancet*. 2000;355(9198):93-7.
14. Hayward AC, Harling R, Wetten S, Johnson AM, Munro S, Smedley J et al. Effectiveness of an influenza vaccine programme for care home staff to prevent death, morbidity, and health service use among residents: cluster randomised controlled trial. *BMJ*. 2006;333(7581):1241.
15. Saxén H, Virtanen M. Randomized, placebo-controlled double blind study on the efficacy of influenza immunization on absenteeism of health care workers. *Pediatr Infect Dis J*. 1999;18(9):779-83.
16. Wilde JA, McMillan JA, Serwint J, Butta J, O'Riordan MA, Steinhoff MC. Effectiveness of influenza vaccine in health care professionals: a randomized trial. *JAMA*. 1999;281(10):908-13.
17. European Centre for Disease Prevention and Control. Pandemic preparedness in the EU/EEA: status report as of autumn 2007. Stockholm: European Centre for Disease Prevention and Control; 2007. Technical Report. Available from: http://www.ecdc.europa.eu/Health_topics/Pandemic_Influenza/pdf/Pandemic%20prepare%20web%201.pdf

This article was published on 23 October 2008.

Citation style for this article: Mereckiene J, Cotter S, Nicoll A, Lévy-Bruhl D, Ferro A, Tridente G, Zanoni G, Berra P, Salmaso S, O'Flanagan D, O'Flanagan D, on behalf of the VENICE project gatekeepers group. National Seasonal Influenza Vaccination Survey in Europe, 2008. *Euro Surveill*. 2008;13(43):pii=19017. Available online: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19017>