Seasonal influenza immunisation in Europe. Overview of recommendations and vaccination coverage for three seasons: pre-pandemic (2008/09), pandemic (2009/10) and post-pandemic (2010/11)

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Since 2008, annual surveys of influenza vaccination policies, practices and coverage have been undertaken in 29 European Union (EU)/ European Economic Area (EEA) countries. After 2009, this monitored the impact of European Council recommendation to increase vaccination coverage to 75% among risk groups. This paper summarises the results of three seasonal influenza seasons: 2008/09, 2009/10 and 2010/11. In 2008/09, 27/29 countries completed the survey; in 2009/10 and 2010/11, 28/29 completed it. All or almost all countries recommended vaccination of older people (defined as those aged ≥50, ≥55, ≥59, ≥60 or ≥65 years), and people aged ≥6 months with clinical risk and healthcare workers. A total of 23 countries provided vaccination coverage data for older people, but only 7 and 10 had data for the clinical risk groups and healthcare workers, respectively. The number of countries recommending vaccination for some or all pregnant women increased from 10 in 2008/09 to 22 in 2010/11. Only three countries could report coverage among pregnant women. Seasonal influenza vaccination coverage during and after the pandemic season in older people and clinical groups remained unchanged in countries with higher coverage. However, small decreases were seen in most countries during this period. The results of the surveys indicate that most EU/EEA countries recommend influenza vaccination for the main target groups; however, only a few countries have achieved the target of 75% coverage among risk groups. Coverage among healthcare workers remained low.

Introduction

Influenza is a contagious viral respiratory infection, which typically occurs as epidemics during the winter months in temperate zones. Although the illness caused by influenza is usually self-limiting, even in those outside recognised risk groups, it can cause considerable impact on an individual's daily life. At a population level, large numbers of cases with mild to moderate severity of illness increase demands on health services and decrease productivity in the workforce, with associated economic cost and social disruption [1-3]. The number of people affected varies from year to year among countries, making it hard to predict the annual number of deaths or economic impact.

Annual influenza epidemics are associated with high morbidity and mortality. The European Centre for Disease Prevention and Control (ECDC) estimates that on average nearly 40,000 people die prematurely each year from influenza in countries of the European Union (EU)/European Economic Area (EEA) covered by Vaccine European New Integrated Collaboration Efforts (VENICE). VENICE covers all EU/EEA countries except Lichtenstein [4]. Death has been reported in 0.5–1 per 1,000 cases of influenza, with the highest hospitalisation rates occurring among children less than two years of age and individuals ≥65 years in United States [5]. The most effective single public health intervention to mitigate and prevent seasonal influenza is vaccination [6]. Unlike the situation for most childhood vaccines, the European policy for influenza is protection of

those at higher risk either directly by vaccinating them or indirectly by vaccinating those who are likely to infect them (healthcare workers (HCWs) and pregnant women). Vaccination of pregnant women protects the women during and immediately after pregnancy and also decreases the risk to their infant [7].

The primary indicators of success in implementation of vaccination programmes are the group coverages, i.e. the proportion of specific target populations who have been vaccinated. In December 2009, the European Council unanimously recommended that EU countries adopt and implement national action plans to achieve 75% influenza vaccination coverage in all at-risk groups by the influenza season of 2014/15 [8]. The selection of risk groups followed guidance from ECDC and recommendations of the World Health Organization (WHO): 'older' individuals (often defined as aged ≥65 years) and people of all ages above six months with underlying medical conditions [9-11], referred to in this article as clinical risk groups. This EU recommendation encouraged countries to adopt and implement national, regional or local action plans or policies to improve seasonal influenza vaccination including among HCWs and to measure coverage in all risk groups. Countries were also encouraged to report on a voluntary basis to the European Commission on the implementation of the recommendation. ECDC-supported VENICE surveys have been to be the most effective way of doing this without placing additional reporting burdens on countries [12,13].

The overall aim of this paper is to document progress towards achieving the 75% coverage target in risk groups in the EU/EEA Member States since the 2009 recommendation. More specific objectives are to provide an overview of data collected for pre-pandemic (2008/09), pandemic (2009/10) and post-pandemic (2010/11) influenza seasons in order to monitor the progress of specific items in the recommendation and to identify changes in country-specific vaccination recommendations for the targeted age and risk groups during this period and also to report on vaccination coverage in the first season after the 2009/10 pandemic across EU/EEA countries.

Methods

The methodology of the VENICE project influenza surveys has been previously described [14-16]. In November 2011, VENICE conducted the fourth seasonal influenza vaccination survey and collected data for the 2010/11 influenza season. This survey was a collaborative study between EU/EEA countries, ECDC and the VENICE project group.

A standard questionnaire (similar to those used in previous years) was amended to reflect additional information needs for the 2010/11 season. This can be seen in the full survey report [12,17]. Following a pilot phase, the questionnaire was placed on a restricted-access web platform. The questionnaire contained prefilled data from the previous survey relating to the 2009/10 season. Experts (gatekeepers) of all 27 EU Member countries plus Norway and Iceland identified in each country at the beginning of the VENICE project in 2006 were asked to update information on vaccination policies and action plans and were requested to provide the available vaccination coverage rates for the 2010/11 influenza season.

We sought accurate and validated information on population groups that were targeted for influenza vaccination (age, occupation, clinical risk or other groups, e.g. contacts of infants less than six months of age or immunosuppressed individuals), most recent (at the time of survey) vaccination coverage results by population group for the 2010/11 influenza season (or most recent season if not available) and planned policy or operational changes across countries expected in forthcoming years. National survey returns were validated by the gatekeepers with authorities in their ministries of health.

We present and compare vaccination coverage data for the older population, clinical risk groups, pregnant women and HCWs obtained from the three latest consecutive VENICE surveys. All data provided in this paper for the 2009/10 influenza season refer to seasonal influenza vaccination during the 2009/10 pandemic (coverage with the pandemic vaccines have already been reported by VENICE [17]). Influenza vaccination recommendations that are detailed by age group for the 2010/11 influenza season refer to vaccination regardless of other clinical risk indications. Vaccination coverage data in the countries covered by VENICE were provided for one, two or all three influenza seasons, depending on data availability in each country. The methods used (administrative or survey) to calculate vaccination coverage for people in clinical risk groups and HCWs [18] are recorded in this paper. For comparison of vaccination coverage, we did not use any statistical test.

Vaccination coverage data for the United Kingdom (UK) were provided separately for Northern Ireland, Wales, England and Scotland. In our analysis, the UK is counted as one country, but coverage data are presented for each part. Vaccination coverage for pregnant women in the UK was calculated separately for those who were healthy and those with a clinical risk indication.

Results

Response rate

Of the 29 EU/EEA countries participating in the VENICE project, 27 provided data for 2008/09 influenza season (Bulgaria and Luxembourg did not respond to the survey); 28 countries reported data for 2009/10 season (the UK did not respond to the survey, but provided vaccination coverage data); 28 countries responded to the survey that collected data for the 2010/11 influenza

Table 1

Age groups recommended for seasonal influenza vaccination by EU/EEA country[a] (n=29) in the 2010/11 influenza season

Country	Age group										
	Children					Adults (years)					
	≥6 months –2 years	≥6 months –3 years	≥6months –4 years	≥6months –12 years	≥6months –<18 years	≥18 –64	≥50	≥55	≥59	≥60	≥65
Austria					X		X				
Belgium											X
Bulgaria											X
Cyprus											X
Czech Republic											X
Denmark											X
Estonia					X	X					X
Finland		X									X
France											X
Germany										X	
Greece										X	
Hungary											X
Iceland										X	
Ireland[b]							X				
Italy											X
Latvia	X										X
Lithuania											X
Luxembourg											X
Malta			X					X			
The Netherlands										X	
Norway											X
Poland					X			X			
Portugal											X
Romania											X
Slovakia				X					X		
Slovenia	X										X
Spain											X
Sweden											X
United Kingdom											X

EEA: European Economic Area; EU: European Union.

[a] All EU/EEA countries except Lichtenstein, surveyed by the Vaccine European New Integrated Collaboration Effort (VENICE) seasonal influenza survey, November 2011.

[b] Vaccination was recommended for individuals aged >50 years but only those aged >65 years were vaccinated free of charge. Vaccination coverage was calculated for those aged >65 years.

season (Finland did not respond to the survey, but provided clarifying information regarding age groups recommended for vaccination for the 2010/11 season at the time of writing. Consequently, the number of countries in some parts of the results section in this paper was 29).

Policy initiatives

At the time of completion of the 2010/11 influenza seasonal survey (November 2011), it was reported that seven countries had updated a previous action plan and two had developed plans after the Council recommendation to improve seasonal influenza vaccination coverage by 2014/15. The Netherlands had already achieved the target coverage. There was no report of any action plan for 18 countries.

Vaccination recommendations

Age groups targeted for seasonal influenza vaccination

All 29 countries recommended seasonal influenza vaccination for the older-age population in 2010/11; however, the specified age differed between countries. Of the 29 countries, 20 recommended vaccination for individuals ≥65 years. In four countries (Germany, Greece, Iceland and the Netherlands), vaccination was recommended for those aged ≥60 years. Two countries (Malta and Poland) recommended vaccination for individuals ≥55 years; Slovakia recommended vaccination for individuals aged ≥59 years. The remaining two countries (Austria and Ireland) recommended vaccination for those ≥50 years. In Ireland, however, vaccination is only provided free of charge and vaccination coverage

Table 2

Population groups recommended for seasonal influenza vaccination in EU/EEA countries[a] during three influenza seasons

Recommendation for target population groups	Number of countries where vaccination was recommended by influenza season		
	2008/09 (n=27)	2009/10[b] (n=28)	2010/11 (n=28)
Clinical risk groups, disorders			
Chronic pulmonary diseases	27	28	28
Cardiovascular diseases	27	28	28
Renal diseases	25	28	28
Haematological/metabolic disorders	26	28	28
Immunosuppression due to disease or treatment	25	28	28
HIV/AIDS	24	24	25
Any condition compromising respiratory function[c]	12	18	19
Hepatic diseases	15	17	19
Children on long-term aspirin therapy	18	17	16
Morbid obesity (body mass index >40 kg/m2)	–	–	9
Pregnancy-related recommendations			
Vaccination recommended during pregnancy	10	16	22[d]
Any trimester	–	–	9
Either 2nd or 3rd trimester	–	–	13
Postpartum if not vaccinated during pregnancy	–	–	1
Occupational setting			
Healthcare workers	22	23	25
People in essential services (police and fire service)	5	8	8
Military personnel	6	9	10
Poultry industry workers	13	11	12
Families that raise poultry, pigs or waterfowl	4	9	9
Pig industry workers	–	–	8
Educational sector workers	–	–	5
Public transport workers	–	–	6
Energy sector workers	–	–	3
Finance/banking sector workers	–	–	4
Border control/Immigration/customs staff	–	–	4
Other settings/groups			
Residents of long-term care facilities	22	24	25
Household contacts of:			
Individuals belonging to the clinical risk groups	–	10	14
Children <6 months of age	–	6	11
Immunosupressed individuals	–	9	16
Older people (e.g. aged ≥65 years)	–	4	10

AIDS: acquired immunodeficiency syndrome; EEA: European Economic Area; EU: European Union; HIV: human immunodeficiency virus.
Dashes in cells mean that this information was not previously collected, nor specifically asked.

[a] A total of 27 or 28 EU/EEA countries except Lichtenstein surveyed by the Vaccine European New Integrated Collaboration Effort (VENICE) seasonal influenza surveys.

[b] The data refer to seasonal influenza vaccine recommendations in the 2009/10 pandemic influenza season.

[c] Any condition (e.g. cognitive dysfunction, spinal cord injuries, seizure disorders or other neuromuscular disorders) that can compromise respiratory function or the handling of respiratory secretions or that can increase the risk of aspiration.

[d] Recommended for all pregnant women in 19 countries; for those with additional clinical risk in three countries.

monitored for individuals aged ≥65 years. Detailed information on age groups targeted for the 2010/11 influenza season is presented in Table 1.

Of the 29 responding countries, eight (Austria, Estonia, Finland, Latvia, Malta, Poland, Slovakia and Slovenia) reported recommending seasonal influenza vaccination for various age groups of healthy children aged <18 years in the 2010/11 influenza season. In Latvia and Slovenia, vaccination was recommended for children aged ≥6 months to 2 years; in Finland, vaccination was recommended for children aged ≥6 months to 3 years; in Malta, vaccination was recommended for children aged ≥6 months to 4 years; in Slovakia, vaccination was recommended for children aged <12 years. Austria, Estonia and Poland recommended vaccination for children aged ≥6 months to <18 years.

Only two countries reported changes in the age groups recommended for vaccination in the 2010/11 season compared with the 2009/10 season. Poland recommended vaccination for those <18 years in 2010/11, which had not been recommended in previous seasons. Hungary recommended vaccination for those aged ≥65 in 2010/11 instead of those aged ≥60 years as in 2009/10.

Clinical risk groups targeted for seasonal influenza vaccination in the 2010/11 season

All 28 responding countries in 2010/11 recommended vaccination for individuals with chronic pulmonary, cardiovascular and renal disease, those who were immunosuppressed due to disease or treatment and those with haematological and metabolic disorders. A total of 19 countries recommended vaccination for individuals with any condition compromising respiratory function. Nine countries recommended vaccination for individuals with morbid obesity (body mass index ≥40 kg/m^2).

In comparison with previous VENICE surveys and since the Council recommendation, a number of countries had made changes to their seasonal influenza vaccination recommendations and policies compared with previous seasons, specifically related to risk groups. The number of countries that recommended vaccination for pregnant women increased (16 countries in 2009/10 vs 22 countries in 2010/11). Of the 22 countries in 2010/11, 19 recommended vaccination for all pregnant women; three recommended vaccination for pregnant women with an additional clinical risk condition. A total of 13 countries recommended vaccination during the second or third trimester and nine countries recommended vaccination at any stage during pregnancy.

From 2009/10 to 2010/11, more countries included a recommendation that household contacts of people in clinical risk groups, older individuals or children less than 6 months of age should be vaccinated (e.g. 10 countries in 2009/10 vs 14 countries in 2010/11 for household contacts of individuals belonging to clinical risk groups; six countries in 2009/10 vs 11 countries in 2010/11 for household contacts of children less than 6 months of age) (Table 2). There were no substantial changes relating to recommendations regarding vaccination of members of occupational groups. Of the 28 responding countries, 20 recommended vaccination for all HCWs and five only to some HCWs in 2010/11 (the recommendations differed in these five countries: e.g. staff with close contact with patients; or staff with no contact with patients, but contact with potentially contaminated material; or social care staff directly involved in frontline patient care). Three countries did not recommend vaccination for HCWs.

Vaccination coverage rates

Overall, 23 countries provided vaccination coverage data. This is very similar to the situation before the Council recommendation (22 vs 23 countries for 2008/09 and 2010/11, respectively). Six countries (Austria, Belgium, Bulgaria, Cyprus, Czech Republic and Greece) were unable to provide any group-specific coverage data in any of three influenza seasons surveyed.

Table 3

Vaccination coverage for seasonal influenza for children in nine European Union countries[a]

Method for coverage calculation by country	Vaccination coverage (%) by influenza season by age group		
	2008/09	2009/10[b]	2010/11
Administrative method			
≥6 months–<2 years			
Latvia	0.3	0.1	0.1
≥6 months–<3 years			
Finland	–	32	–
≥6 months–<5 years			
Estonia	1	1	–
Poland	2	1	1
Italy	–	6.1	–
Slovenia	0.7	0.8	0.5
≥6 months–<10 years			
France	–	–	13.8
≥6 months–14 years			
Estonia	–	–	0.9
≥6 months–15 years			
Slovakia	8.6	7.5	4.3
5–14 years			
Estonia	2	1	–
Italy	–	5.1	–
Poland	2.9	1.7	1.8
5–18 years			
Slovenia	1.1	1.2	0.5
10–19 years			
France	–	–	16.7
Survey method			
≥6 months–4 years			
France	–	9.9	–
5–14 years			
France	–	6.5	–
≥6 months–15 years			
Portugal	–	13	9.6

EEA: European Economic Area; EU: European Union.

Dashes in cells mean that vaccination coverage was not provided.

[a] Nine of all the EU/EEA countries except Lichtenstein surveyed by the Vaccine European New Integrated Collaboration Effort (VENICE) seasonal influenza survey.

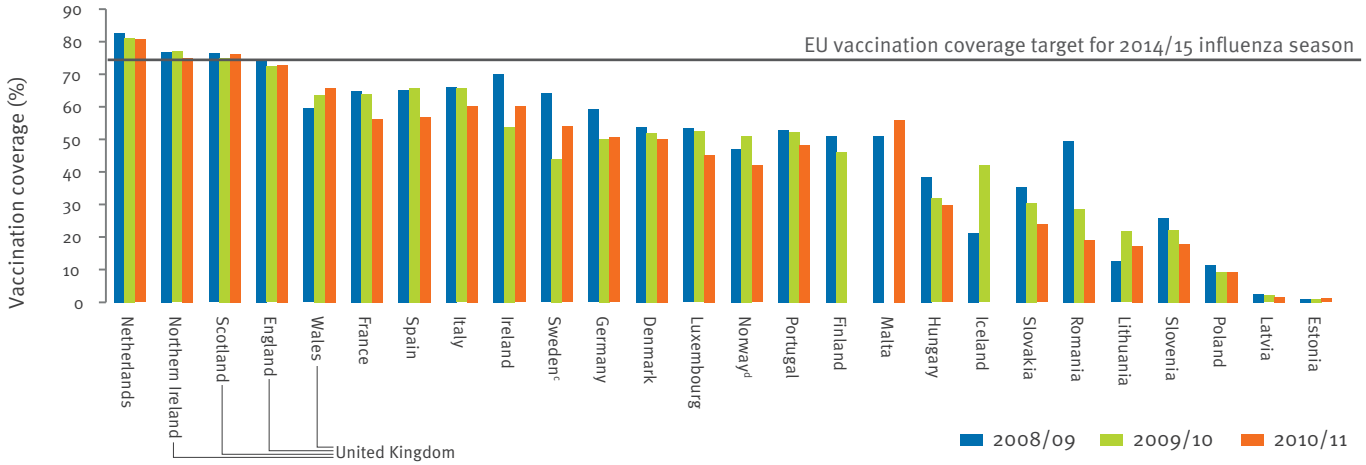
[b] The data refer to seasonal influenza vaccine recommendations in the 2009/10 pandemic influenza season.

Healthy children and adolescents

Nine countries reported vaccination coverage data for a variety of age groups of children and adolescents calculated by administrative or survey methods for at least one of the three influenza seasons (Table 3). Six of these countries (Estonia, Finland, Latvia, Poland, Slovakia and Slovenia) recommended vaccination of children or adolescents, while three other countries (France, Italy and Portugal) provided vaccination

Figure 1

Reported seasonal influenza vaccination coverage in older[a] population in 23 EU/EEA countries[b] during three influenza seasons



EEA: European Economic Area; EU: European Union.

[a] Defined as those aged >55, >59, >60 or ≥65 years in the responding countries.

[b] All EU/EEA countries except Lichtenstein, surveyed by the Vaccine European New Integrated Collaboration Effort (VENICE) seasonal influenza survey. The United Kingdom is counted as one country here.

[c] Reports for Sweden were received for only around 60% of the population for the 2009/10 influenza season.

[d] Coverage results for Norway were calculated for those aged ≥65 years and clinical risk groups together.

coverage for some age groups although vaccination was not recommended for healthy children and adolescents in these countries. Two of the countries that recommended influenza vaccination for children did not provide vaccination coverage data (Austria and Malta).

Older population groups

A total of 23 countries were able to provide vaccination coverage rates of their older population groups targeted for vaccination for two or three influenza seasons (2008/09, 2009/10 or 2010/11), i.e. notwithstanding the recommendations of the European Council and WHO, six countries were not gathering any age group-specific data on vaccination coverage. The data provided for each country refer to the specific age group defined by each country as constituting the older population (≥50, ≥55, ≥59, ≥60 or ≥65 years).

Vaccination coverage among older age groups ranged from 1% (Estonia) to 82% (the Netherlands) in 2008/09 influenza season. The highest reported vaccination coverage rates were in the Netherlands and some parts of the UK (England, Northern Ireland and Scotland) that achieved or almost achieved EU 2014/15 target. Five countries (France, Germany, Ireland, Italy and Spain) reported vaccination coverage around 60% for this specific age group. Denmark, Finland, Luxembourg, Malta, Norway, Portugal and Sweden reported vaccination coverage around 50%. In six countries (Hungary, Iceland, Lithuania, Romania, Slovakia and Slovenia) vaccination coverage was below 50%. In the remaining three countries (Estonia, Latvia and Poland), vaccination coverage was about 10% or less.

Comparing pre-pandemic, pandemic and post-pandemic influenza seasons, there were small decreases in vaccination coverage in half of the countries. In contrast, Ireland, Scotland and Wales reported coverage that was slightly higher in the post-pandemic influenza season in comparison with that during the pandemic (Figure 1).

Clinical risk groups

Of 28 countries surveyed, seven were able to provide vaccination coverage rates for one, two or three influenza seasons for people in clinical risk groups. The coverage varied, ranging from approximately 29% in Ireland (2009/10) to 70% in the Netherlands (2010/11) and 80% in Northern Ireland (2009/10). In all countries that reported vaccination coverage rates, except the Netherlands and Northern Ireland, vaccination coverage was well below the 2014/15 EU target. The Netherlands almost achieved and Northern Ireland had already achieved the target.

Comparing pandemic and post-pandemic influenza seasons in some countries, there was a decrease in coverage of these risk groups (e.g. in Netherlands and Portugal); however, in others (e.g. Scotland), an increase in vaccination coverage was reported.

Overall, three Member States (Romania, Slovenia and the UK) were able to report vaccination coverage rates among pregnant women. The coverage was low in Romania and Slovenia (3.7% and 2.4%, respectively). In the UK, there was variation in reported coverage,

Table 4

Vaccination coverage for seasonal influenza for clinical risk groups, pregnant women, residents of long-term healthcare facilities and healthcare workers[a]

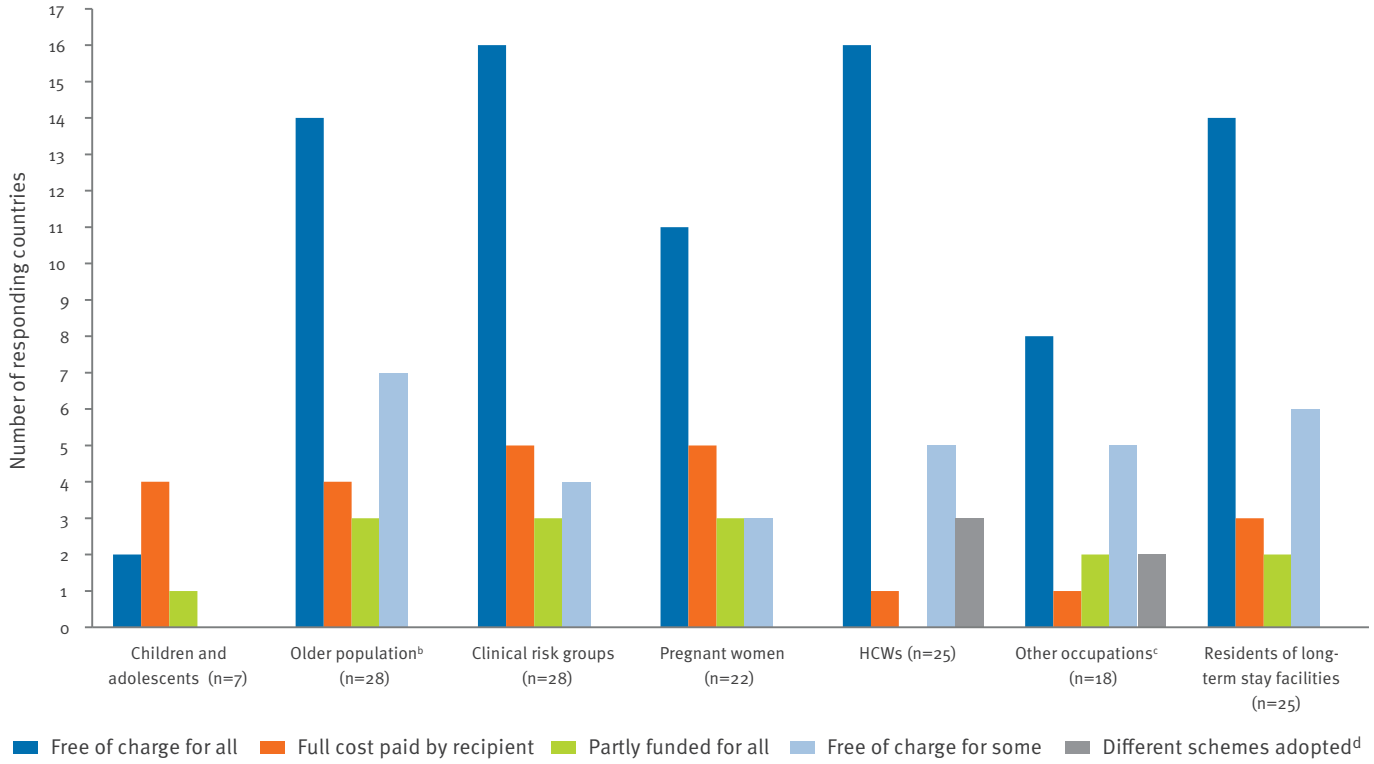
Influenza season	Country and method for calculation of influenza vaccination coverage[b]																			
	France		Germany	Hungary	Ireland	Netherlands	Norway		Portugal		Romania	Slovakia	Slovenia	Spain	United Kingdom					
															England		Northern Ireland	Scotland		Wales
	A	S	S	A	S	A	A[c]	S	A	S	A	A	A	A	A		A	A		A
Clinical risk groups (n=7)[d]																				
2008/09	39.4	–	43.3	–	–	71.5	47	–	–	36	–	–	–	–	47.1		74	47.8		40.8
2009/10[h]	47.2	–	39.8	–	28.9	70.4	51	33	–	32	–	–	–	–	51.6		80	51.1		49.1
2010/11	37.2	–	41	–	–	68.9	47	38	–	29	–	–	–	–	50.4		78.7	56.1		48.5
Pregnant women (n=3)[d]																				
2010/11	–	–	–	–	–	–	–	–	–	–	3.7	–	2.4	–	36.6[e]	56.6[f]	–	64.9[e]	74.8[f]	–
Healthcare workers (n=10 countries)[d]																				
2008/09	–	25.6	30.5	44	–	–	–	–	32	–	97.8	–	–	32.4	–	–	–	–	–	–
2009/10[h]	–	33.9	27.3	53.6	26.5	–	–	12	44	–	–	–	–	34.8	–	26.4	18	–	–	11.6
2010/11	–	27.6	25.8	41.2	–	–	–	14	34	–	63.9	–	16.6	21.1	–	34.7	–	–	30.4	18.5
Residents of long-term care facilities (n=2)[d]																				
2008/09	–	–	–	–	–	–	–	–	80[g]	–	–	82.6	–	–	–	–	–	–	–	–
2009/10[h]	–	–	–	–	–	–	–	–	87	–	–	82.9	–	–	–	–	–	–	–	–
2010/11	–	–	–	–	–	–	–	–	85	–	–	82.9	–	–	–	–	–	–	–	–
Staff of long-term care facilities (n=1)[d]																				
2009/10[h]	–	–	–	–	–	–	–	–	36	–	–	–	–	–	–	–	–	–	–	–
2010/11	–	–	–	–	–	–	–	–	27	–	–	–	–	–	–	–	–	–	–	–

EEA: European Economic Area; EU: European Union.
Dashes in cells mean that data were not provided.

[a] All EU/EEA countries except Lichtenstein, surveyed by the Vaccine European New Integrated Collaboration Effort (VENICE) seasonal influenza survey, November 2011.
[b] A: by administrative method; S: by survey method.
[c] Coverage results calculated for those aged >65 years and clinical risk groups together.
[d] Numbers in parentheses are the number of EU countries that provided vaccination coverage for the particular population group. UK calculated as one country here.
[e] Refers to healthy women
[f] Refers to women with an additional clinical risk factor.
[g] Data were not reported from one region in 2008/09.
[h] The data refer to seasonal influenza vaccine recommendations in the 2009/10 pandemic influenza season.

Figure 2

Payment scheme for influenza vaccine for different age, risk or target groups in EU/EEA countries[a] in the 2010/11 influenza season



EEA: European Economic Area; EU: European Union; HCW: healthcare worker.

[a] EU/EEA countries except Lichtenstein, surveyed by the Vaccine European New Integrated Collaboration Effort (VENICE) seasonal influenza survey, November 2011.

[b] Older population defined as those aged ≥55, ≥59, ≥60 or ≥65 years in the responding countries.

[c] Occupations, clinical risk groups, pregnant women, HCWs and residents of long-stay care facilities as specified in Table 2, according to national recommendations.

[d] Full cost paid by recipient or paid by employer; free of charge for some, paid by recipient for others.

which was calculated separately for healthy pregnant women (37% and 65% in England and Scotland, respectively) and for those with additional clinical risk factors (57% and 65% in England and Scotland, respectively) (Table 4).

Healthcare workers

A total of 10 of the countries were able to report vaccination coverage for one, two or three influenza seasons for HCWs. The reported vaccination coverage varied, ranging from 12% (Norway and Wales in 2009/10) to 98% (Romania in 2008/09). In England, Hungary, Portugal and Scotland, coverage was between 30% and 50% in 2010/11. The remaining countries (France, Germany Norway, Slovenia, Spain and Wales), with exception of Romania, reported vaccination coverage ranged between 14% and 28% in 2010/11. When comparing the pandemic and post-pandemic influenza seasons, there was decrease in vaccination coverage in France, Germany, Hungary, Portugal and Spain, while increased vaccination coverage was reported in England, Wales and Norway. Detailed information is presented in Table 4.

Payment scheme for influenza vaccine

Older individuals (aged ≥50, ≥55, ≥59, ≥60 or ≥65 years, depending on the recommendation in specific countries) received influenza vaccine free of charge in 14 countries in 2010/11; seven of these countries reported vaccination coverage around 50% in older individuals.

Of seven countries that recommended vaccination for children in the 2010/11 influenza season, only two offered the vaccine free of charge (Malta and Slovakia). In four of them (Austria, Estonia, Poland and Slovenia), the full cost was paid by the recipient and in Latvia, the vaccine was partly funded.

The vaccine for members of clinical risk groups and HCWs was free of charge in 16 countries; for pregnant women and residents of long-stay care facilities, the vaccine was free of charge in 11 and 14 countries, respectively, in 2010/11 (Figure 2).

Discussion

The analyses presented in this paper summarise information obtained from annual surveys implemented by VENICE among EU/EEA Member States. The results provide part of the data used to monitor progress following the 2009 Council recommendation [8]. Other relevant data were collected by the European Commission for an interim report which was prepared in 2013 [19]. The same data can also be used to monitor WHO recommendations for groups to be targeted for vaccination (revised in 2012)[20].

Interpretation of results for the period 2008/09 to 2010/11 is complicated as there was both the introduction of the seasonal influenza recommendation and the very varied experience of the pandemic and its vaccination campaigns across European countries [13,21,22]. Given the difficulties experienced with pandemic vaccination in some European countries, it is reassuring that coverage in the older age groups held up as well as it did in 2010/11. However, there has been little improvement in seasonal vaccination coverage in other risk groups despite national and the Council recommendations; in some countries, coverage has decreased. Since only nine countries in November 2011 reported having action plans to implement the Council recommendation, it may be that countries delayed implementing the recommendation, given their pandemic experience.

The challenges that countries face implementing national and Council recommendation varied and may be related to different knowledge, attitudes and practices, risk perception, health systems and related cost issues that differ by country across the region. In addition, media coverage and public debate about vaccine effectiveness, which depends on the match with circulating vaccine strains, can negatively impact vaccination coverage [23,24]. The experience of narcolepsy following use of pandemic vaccines in some EU/EEA countries undoubtedly had a negative impact on public perception of vaccine safety, which may also have led to subsequent decrease in coverage in some countries [25,26]. Anti-vaccination groups and media coverage may also have contributed to this decrease [27].

Many countries appear to have had difficulties monitoring coverage in target groups other than older people. This may be related to differences in health system delivery, how vaccination is implemented in the country and data collection or information systems available for capturing such data. What is possible in one country may not be easily adopted in another.

During and after the pandemic, a number of countries made changes to national recommendations regarding additional risk groups who would benefit from vaccination, influenced by collected epidemiological data during pandemic. More countries recommended vaccination of pregnant women and individuals with morbid obesity. Morbid obesity was recognised as an independent risk factor for hospitalisation and death due to pandemic influenza [28-30]. Before the pandemic, no EU/EEA country had included this group in recommendations for influenza vaccination.

There is currently no consensus within European countries regarding routine seasonal influenza vaccination of children, although such recommendation is now standard in the United States [31] and WHO is recommending vaccination of children ≥6 to 59 months of age [20]. Since the pandemic, more countries are adopting such recommendations [32]. The reluctance of countries to recommend routine seasonal influenza vaccination of children may reflect a lack of evidence regarding cost-effectiveness and risk perception of this measure [32]. Partially, this reflects that there are so few data from Europe. Even in those countries that have recommended seasonal vaccination of children for a number of years, the reasons for low coverage have not been explored in our study but it may reflect low risk perception among the public and the medical community. Live intranasal vaccines that do not require injection were licensed by the European Medicines Agency in 2010 and may increase acceptance and delivery of annual vaccination among those EU/EEA countries recommending vaccination for children [33].

The 2010/11 survey found an increase in the number of countries recommending seasonal influenza vaccination for pregnant women. This increase may reflect better awareness of influenza morbidity among pregnant women that was notably evident during the pandemic [34-36]. A body of literature has demonstrated the safety and effectiveness of vaccine in this group and there may also be benefits for the fetus and newborn child [37,38]. It is disappointing that only three of the 22 countries recommending vaccination of pregnant women were able to report coverage data for this high-risk population. In line with a growing consensus on the importance of vaccination for pregnant women, it is clear that this is an area in which countries should seek to improve information on programme implementation.

In operational terms, HCWs are a crucial group involved in influenza vaccination. They should be vaccinated to protect their patients; they have to give the vaccine and to advocate the vaccination to their patients. Repeated surveys have indicated that it is the opinion of the doctor or nurse that is most important in determining whether or not a person is immunised [39-41]. While most countries have long-standing recommendations to immunise HCWs with seasonal influenza vaccine, only a third could report vaccination coverage rates for any season. In addition, in most of these countries, coverage among HCWs is still low (with Romania and Hungary being the exceptions) and does not show signs of improvement. Moreover, it is surprising that coverage data for staff working in long-term care facilities were provided by only one country and coverage data for residents of such facilities was known in only two countries.

Costs associated with vaccine can be a deterrent or barrier for vaccination, particularly if the costs are borne by the individual [27]. We found that half of the countries surveyed have adopted a policy of provision of vaccine free of charge, in total or in part, predominantly for elderly people, individuals with chronic disease, pregnant women and HCWs. However, four of seven countries reported that the full cost is paid for vaccination of children.

Survey limitations

The survey data presented here have limitations. Comparison of vaccination coverage data is difficult across European countries as different methods of estimating coverage are often used; within a given country, comparisons between years may be difficult if methods or response rate differ by year. How countries enumerate the denominator data (numbers eligible for vaccination) is often difficult to determine, especially when it comes to less specific groups, such as the clinical risk groups and HCWs. The enumeration of numbers vaccinated (numerator data) also has limitations as countries may use either data provided from administrative records or immunisation registries or from others surveys, both of which may have their own limitations. While the surveys report exact details on how numerator and denominator data are calculated, the surveys do not explore or report the specific limitations. Denominator data for clinical risk groups are particularly difficult to estimate accurately for most EU/EEA countries, reflecting the lack of information systems (disease registers) or other standardised methodologies for collecting these data in the countries. Some countries have used population surveys to estimate the number of individuals at risk. But even this may not be comparable between countries as a variety of methodologies have been used (e.g. household surveys, mail, face to face, telephone interviews). The reasons for low or high uptake across EU/EEA countries were not collected in these surveys: future studies are needed.

Recommendations

Additional efforts are needed to increase vaccination coverage among older population groups, individuals with a clinical risk indication, pregnant women and HCWs in order to achieve the target of 75% by the winter of 2014/15. The continued low vaccination coverage levels reported for HCWs are of concern and highlight the need for more focused and intensive health promotion and implementation of vaccination campaigns.

Some countries have achieved coverage higher than the target and there is value in sharing information between countries on how this has been achieved. Additional country-level research is required to identify the reasons for non-vaccination so that specific issues can be addressed through more targeted promotion campaigns. All countries should strive to collect information on vaccination coverage for older age groups as well as those in other risk groups, without which monitoring progress is not possible.

VENICE gatekeepers

Austria: Christina Kral, Jean Paul Klein; Belgium: Pierre Van Damme, Martine Sabbe, Françoise Wuillaume; Bulgaria: Mira Kojouharova; Czech Republic: Bohumir Kriz, Jan Kyncl; Cyprus: Chrystalla Hadjianastassiou, Soteroulla Soteriou; Denmark: Palle Valentiner-Branth, Tyra Grove Krause, Hanne-Dorte Emborg; England: Richard Pebody; Estonia: Natalia Kerbo, Irina Filippova; Finland: Tuija Leino; France: Daniel Levy-Bruhl, Isabelle Bonmarin; Germany: Sabine Reiter, Ole Wichmann; Greece: Theodora Stavrou; Hungary:-Zsuzsanna Molnàr; Iceland: Thorolfur Gudnason; Ireland: Suzanne Cotter; Italy: Fortunato D'Ancona, Caterina Rizzo; Latvia: Jurijs Perevoscikovs; Lithuania: Egle Savickiene; Luxembourg: Berthet Francoise; Malta-Tanya Melillo; the Netherlands: Bianca Snijders, Hester de Melker; Northern Ireland: Brian Smyth; Norway: Berit Feiring; Poland: Iwona Stankiewicz; Portugal: Paula Valente, Teresa Fernandes; Romania: Rodica Popescu; Scotland: Jim McMenamin ; Slovakia: Helena Hudecova; Slovenia: Alenka Kraigher, Veronika Učakar; Spain: Aurora Limia, Isabel Pachon del Amo; Sweden: Annika Linde; Wales: Simon Cottrell.

The gatekeepers are also listed in the 2010/11 report on the VENICE website [17].

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Conflict of interest

None declared.

Authors' contributions

The work presented here was carried out in collaboration between all authors. AN, DOF, PL and TN defined the research theme. JM, SC, DA and TW worked on designing methods for survey and developing survey tool, interpreted results. JM analysed data, interpreted results and wrote the draft manuscript. AN, DLB, CG, PVB, IS and EA provided their comments, participated in discussions, writing the manuscript. LD contributed providing IT support. Gatekeepers completed a questionnaire in each EU/EEA Member State. All authors have contributed to, seen and approved the manuscript.

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