

Healthcare Professionals' Knowledge of Influenza and Influenza Vaccination: Results of a National Survey in Poland

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Abstract

In Poland, the seasonal influenza vaccination rate is just barely 3% which may be related to the unsatisfactory knowledge of influenza among healthcare professionals, poor recognition of the benefits of influenza immunization and the fear of side effects. To address these issues, we surveyed healthcare professionals through an online questionnaire consisting of 18 closed-ended items. The questionnaire was completed by 495 healthcare professionals, mostly physicians (83%). The results revealed gaps in the knowledge concerning influenza diagnosis, complications, risk groups, and prognostic factors. On average, respondents only answered 4.8 of the 18 questions correctly (27%). Only 10% of respondents passed the threshold of 50% correct answers. The knowledge of contraindications to vaccination far outweighed the knowledge of indications for vaccination. Poor knowledge with a focus on the adverse effects of immunization may be a significant factor responsible for the low vaccination rate in Poland. To increase vaccination rate, healthcare professionals need to be educated about influenza-related risks and benefits of vaccination.

Keywords

Decision making • Healthcare professionals • Immunization • Influenza • Recommendations • vaccination

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1 Introduction

Influenza viruses are *Orthomyxoviridae* and are classified into three distinct types: A, B, and C. Epidemics of influenza A and B occur annually during the winter season in temperate regions of the northern hemisphere, including Poland, while influenza C viruses cause sporadic respiratory tract infections. Influenza viruses cause a broad spectrum of respiratory tract diseases, ranging from asymptomatic infection to pneumonia and acute respiratory distress syndrome, and they are responsible for significant morbidity, hospitalizations, and mortality worldwide. During the latest influenza season of 2016/2017, approximately 3.79 m cases of influenza-like illness were registered in Poland, with 13,000 hospitalizations and 24 deaths being attributed to influenza (National Influenza Center 2017).

Influenza A has a potential to cause global pandemics. Five pandemics occurred in the last century: A/H1N1 ('Spanish flu' in 1918), A/H2N2 ('Asian flu' in 1957), A/H3N2 ('Hong Kong flu' in 1968), A/H1N1 ('Russian flu' in 1977), and most recently, A/H1N1pdm09 ('Swine flu' in 2009) (RCPCH 2016; CDC 2015, 2016). The threat of a new influenza pandemic is always present. For the aforementioned reasons, knowledge of influenza, possible complications, treatment, and prevention is crucial for healthcare practitioners. The effective prevention with immunization and a rapid diagnosis, followed by administration of antivirals when necessary, and the isolation of infectious patients are fundamental for the limiting of influenza spread and burden. The annual influenza vaccination is the most effective preventive measure. Polish and other national guidelines are updated regularly and, in recent years, indications for the vaccine use have become broader and cover, apart from the healthy population aged over 6 months, such risk groups as pregnant women and immunocompromised individuals (Grohskopf et al. 2016). Despite the broad indications, influenza vaccination rate remains very low in Poland, amounting to 2.2–3.4% of the general population. In more

detail, vaccination rate is about 9% among healthcare professionals, 0.5–1% in children aged 6 months to 4 years, and 7–13% among the elderly aged over 65 (Czarkowski et al. 2016). Since healthcare professionals are crucial to the implementation and execution of recommendations for the vaccination, its low coverage rate may be related to their unsatisfactory knowledge of influenza, poor recognition of immunization benefits, and unjustified fears of side effects. To address these issues, we examined physicians' knowledge of influenza, its complications and treatment, and the indications and contraindications to vaccination.

2 Methods

This survey-type study was approved by the Ethics Committee of Warsaw Medical University in Poland and it was conducted in accord with the principles of the Declaration of Helsinki for Human Research of the World Medical Association. The population sample surveyed consisted of 495 random healthcare professionals from Poland, mostly women (70%). Four hundred and eleven respondents (83%) were physicians, notably general practitioners, while rheumatologists and cardiologists were the most commonly represented subspecialists. Table 1 summarizes the basic demographic information and characteristics of the participants.

An online questionnaire consisting of 18 mostly multiple-answer, closed-ended items was designed explicitly for the purpose of this

Table 1 Demographics and professional qualifications of study participants

	<i>n</i> (%)
Gender	
Men	149 (30.1)
Women	346 (69.9)
Profession	
Doctors	411 (83.0)
Nurses	18 (3.7)
Medical students	20 (4.0)
Others	46 (9.3)

study by two members of the Polish Expert Committee of the National Program for Influenza Prevention. The items contained a variable list of correct choices. When more than one choice was correct, all correct choices in an item had to be checked off to include the item into correct responses. The questionnaire items, along with the responses provided by the interviewees, are displayed in Table 2. The survey was conducted on-line *via* social media or email among a varied group of healthcare professionals. The questionnaire was anonymous and voluntary, and the participants were informed about its aim. Answers were scored as correct based on published literature and current recommendations of the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC).

3 Results

On average, respondents gave correct answers to 4.8 out of the 18 survey items, i.e., each item was correctly addressed by about a quarter of respondents (133/495 or 26.9%). The majority of correct responses (88.5%) concerned the contraindications to influenza vaccination and the recommendations for use of antivirals in influenza treatment (63.0%). More than half of respondents (56.6%) knew the cardiovascular indications for immunization against influenza, but a substantial number (44.4%) failed to recognize the general recommendations for immunization as set out in the Polish Immunization Program of 2014.

The knowledge of subspecialists about influenza virus was far from being sufficient as well, with just 5% of respondents being able to correctly name the virus type that was responsible for 'avian flu'. Only did 8.9% of respondents give correct answers concerning the transmission routes of influenza virus. Outstandingly, the majority appeared unaware of the possibility of vertical transmission, for instance from mother to child. The gaps in practical knowledge were particularly worrisome in some specific areas such as influenza complications in pregnant women

(10.3% of correct answers), vaccine administration routes (11.3% of correct answers), influenza diagnosis tests (12.1% of correct answers), and interpretation of rapid test (13.9% of correct answers). Only did 9.7% of respondents give correct answers concerning the symptoms raising a specter of a severe or progressive course of influenza. Healthcare professionals also had a difficulty in defining the proper vaccine dosing in the pediatric population (16.3% of correct answers). However, a low number of pediatricians participating in the study (4% of respondents) could bear on this matter. Finally, only did 10% of respondents pass the survey with the threshold set at 50% of correct answers (Table 2).

4 Discussion

Every year, approximately 5–20% of the population acquires influenza. Although the majority of influenza infections are benign, self-limiting, and require only symptomatic care, a substantial number of cases result in complications, hospitalizations, and deaths. The analysis of long-term data in the US population of approximately 300 m people has revealed that the number of annual influenza-related deaths from respiratory and circulatory causes ranged from 3349 to 48,614, with an average of 23,607 deaths (CDC 2010, 2015). In the EU, the annual number of individuals of all ages infected with influenza is estimated at 25–100 m, with approximately 38,500 deaths (CDC 2016). In Poland, there were 3,793,770 cases of influenza and influenza-like illness reported in the most recent 2016/17 epidemic season, with 13,779 hospitalizations or 0.36% of patients being hospitalized, and 24 deaths. The incidence was estimated at 9842 *per* 100,000 people (National Influenza Center 2017). Although these figures change in a variable manner every next year, there is a consistent impression that the disease incidence increases (Table 3), which may likely be due to persistently low vaccination rate. These data, even though they are likely underestimated due to the imperfect, passive reporting system,

Table 2 Survey results

Items	(Multiple choice questionnaire; correct answers are underlined)	Correct answers	Incorrect answers
		n (%)	n (%)
1	Indicate the most common complications of influenza in children:	120 (24.2)	375 (75.8)
	<u>Otitis media</u>		
	Myocarditis		
	Febrile seizures		
2	Cardiovascular indications for immunization against influenza are:	280 (56.6)	215 (43.4)
	Isolated hypertension		
	<u>Heart infarction in past</u>		
	<u>Ischemic heart disease</u>		
3	Use of which of the following is a contraindication for influenza vaccination:	438 (88.5)	57 (12.5)
	Immunostimulants		
	Antiretroviral drugs		
	Topical corticosteroids		
	HIV infection		
	Renal transplantation performed 2 years earlier		
4	Choose correct statements on isolation of influenza patients and influenza infectiousness according to CDC and WHO guidelines:	111 (22.4)	384 (87.6)
	5-days isolation in adults and 7-day isolation in children		
	<u>7-day isolation is indicated for all persons with influenza or, if symptoms persist, until 24 h after their resolution</u>		
	<u>Viral shedding and duration of viral transmission is longer in children than in adults</u>		
5	Choose correct statements about influenza vaccination in pregnant women:	140 (28.3)	355 (71.7)
	Vaccination is recommended for pregnant women in the second and third trimester		
	<u>Vaccination is recommended regardless of trimester</u>		
	Vaccination is not recommended for pregnant women		
	Frequency of vaccine's adverse effects is slightly higher in pregnant women than in the general population		
6	Possible routes of influenza virus transmission are:	44 (8.9)	451 (91.1)
	<u>Airborne – via droplets</u>		
	<u>Person-to-person contact</u>		
	<u>Vertical</u>		
7	Indicate the highly pathogenic avian influenza viruses	23 (4.7)	472 (95.3)
	A H7N9		
	<u>A H5N1</u>		
	<u>A H7N7</u>		
	A H1N1		

(continued)

Table 2 (continued)

Items	(Multiple choice questionnaire; correct answers are underlined)	Correct answers	Incorrect answers
		n (%)	n (%)
8	According the polish immunization program, the indication for immunization covers which of the following groups:	220 (44.4)	275 (55.6)
	<u>Pregnant women or those who intend to become pregnant</u>		
	<u>Chronically ill children (over 6 months of life) and adults;</u> particularly those with respiratory insufficiency, asthma, chronic obstructive pulmonary disease, heart failure, ischemic heart disease, renal failure, nephritic syndrome, liver diseases, metabolic disorders including diabetes, neurological diseases and disorders (individual and clinical indications)		
	<u>Immunosuppressed individuals (individual and clinical indication)</u>		
	<u>All persons over 6 months of life;</u> particularly healthy children aged 6 months to 18 years of life (epidemiological indications)		
9	Indicate the relationship between influenza, vaccination and Guillain Barré syndrome (GBS)	89 (18.0)	406 (82.0)
	<u>GBS occurring 6 weeks following vaccination is a contraindication to future vaccination</u>		
	<u>Risk of GBS is much lower after vaccination than after influenza infection</u>		
	Risk of GBS is much higher after vaccination than after influenza infection		
	Risk of GBS after vaccination is akin to that after influenza infection		
10	Indicate the correct mode of influenza vaccine administration in a 5-year-old child who received the first dose of vaccine during the previous season:	81 (16.4)	414 (83.6)
	One 0.5 ml dose of influenza vaccine should be administrated during the current season		
	Two doses 0.25 ml of influenza vaccines 4 weeks apart, should be administered during the current season		
	<u>Two doses 0.5 ml of influenza vaccines 4 weeks apart should be administered during the current season</u>		
	One dose 0.25 ml of influenza vaccine should be administrated during the current season		
11	Indicate medications recommended for influenza prophylaxis and therapy:	119 (24.0)	376 (76.0)
	Inosine pranobex		
	Amantadine		
	<u>Oseltamivir</u>		
	<u>Zanamivir</u>		
	Rimantadine		
12	Indicate correct statements about use of neuraminidase inhibitors in treatment of high risk patients:	312 (63.0)	183 (37.0)
	Treatment should be started as soon as the complications appear and be continued for 5 days		
	<u>Treatment should be started as soon as influenza is suspected and be continued for 5 days</u>		
	Treatment should be started as soon as laboratory confirmation of influenza appears and continued until the symptoms resolve		
	Neuraminidase inhibitors are recommended only for hospitalized patients		

(continued)

Table 2 (continued)

Items	(Multiple choice questionnaire; correct answers are underlined)	Correct answers	Incorrect answers
		<i>n</i> (%)	<i>n</i> (%)
13	Influenza can be a self-limiting or progressive disease. Indicate symptoms of progressive influenza:	48 (9.7)	447 (90.3)
	Fever >40 °C		
	<u>Chest pain, breathing effort in children</u>		
	<u>Impaired consciousness</u>		
	<u>Exacerbation of a chronic disease</u>		
14	Indicate possible complications of influenza in pregnant women:	51 (10.3)	444 (89.7)
	<u>Pneumonia</u>		
	<u>Respiratory failure</u>		
	<u>Stillbirth</u>		
	<u>Preterm birth</u>		
	<u>Newborn being small for gestational age</u>		
15	Indicate factors influencing the interpretation of a rapid flu test:	69 (14.0)	426 (86.0)
	<u>Patient age</u>		
	<u>Duration of symptoms</u>		
	<u>Disease prevalence in population</u>		
16	Indicate the methods of influenza diagnosis:	60 (12.1)	435 (87.9)
	<u>Immunofluorescence tests</u>		
	<u>RT-PCR method</u>		
	<u>Viral culture</u>		
	<u>Serological tests</u>		
17	Please indicate the possible routes of influenza vaccination:	56 (11.3)	439 (88.7)
	<u>Intramuscular</u>		
	<u>Subcutaneous</u>		
	<u>Intradermal</u>		
	<u>Intranasal</u>		
	<u>Oral</u>		
18	Indicate correct statements about co-infection of influenza with other pathogens:	133 (26.9)	362 (73.1)
	<u>Influenza virus 'facilitates' pneumococcal infections</u>		
	<u>Influenza virus 'facilitates' meningococcal infections</u>		
	<u>Influenza virus 'facilitates' respiratory tract infections with other pathogens</u>		
	<u>Co-infection with influenza type A and B viruses is possible</u>		

CDC Centers for Disease Control and Prevention, WHO World Health Organization

show that influenza is now the most dangerous infectious disease and one of the most significant threats to public health. The US ACIP, the European CDC, and the WHO recommend vaccination as the most effective preventive measure for seasonal influenza and as the first-line intervention to control the impact of seasonal influenza on public health (Grohskopf et al. 2016;

WHO 2016b; European Commission 2014; Council of the European Communities 2009). The Polish National Immunization Program recommends the annual influenza vaccination for all individuals without medical contraindications who are 6 months of age and older. High-risk individuals, their close contacts, and healthcare workers remain the high-priority

Table 3 Influenza-related morbidity and mortality in Poland in recent epidemic seasons

Influenza season	^a Morbidity; <i>n</i>	^a Hospitalizations; <i>n</i>	Percent of hospitalizations	Incidence per 100,000	Deaths; <i>n</i>
2014/15	2,788,911 (+43%)	9,013 (+40%)	0.32%	7339	10
2015/16	3,070,082 (+10%)	12,309 (+37%)	0.40%	8079	111
2016/17	3,793,770 (+24%)	13,779 (+12%)	0.36%	9842	24

^aPercent of increase from the preceding season in parenthesis. Data preceding the 2014/15 season not shown

target groups for immunization. Despite clear and broad recommendations, the percentage of individuals vaccinated against influenza in the general population has been highly unsatisfactory, ranging from 2 to 5% in 2005–2014 (Czarkowski et al. 2015). One of the underlying reasons is that vaccines have become not only a domain of medical knowledge but also a subject of a heated public debate in recent years. The anti-vaccination movements and the popularization of pseudo-scientific contents on the Internet seem to significantly influence both medical professionals' opinions and the decision-making process concerning immunization. The main inclination observed is to stoke fear and overstate the side effects of vaccines while to understate the risk of vaccine-preventable diseases and, in extreme cases, denying their existence (NWO Report 2017; Verger et al. 2016; BeWellBuzz 2015; Healy et al. 2014). In 2011, the WHO definition of vaccine hesitancy was coined as 'delay in the acceptance or refusal of vaccines despite the availability of vaccination services' and a working group on vaccine hesitancy has been established (WHO 2014, 2016a). Vaccine hesitancy is a complex and emerging global problem that requires local monitoring. In Poland, the number of people questioning (negating) mandatory vaccinations in Poland tripled in 2011–2014.

The impact of vaccine hesitancy on the vaccination rate has been observed in many countries and noted with concern by the Strategic Advisory Group of Experts on Immunization. The present survey revealed three main problems. Firstly, the unsatisfactory level of healthcare professionals' knowledge of influenza and influenza immunizations, which can be partly explained by the information glut that it is difficult to navigate through to draw a sensible meaning, a

deluge of highly-specialist information, and other, not strictly factual but time-consuming activities, e.g., frequently changing reimbursement rules, healthcare professionals should be aware of. The insufficient knowledge of vaccination against influenza among healthcare professionals is a phenomenon present in numerous countries, being confirmed by a low vaccination rate that remains persistently lower than the population target of 75% (Hulo et al. 2017; Newcombe et al. 2016; Nutman and Yoeli 2016; Kassianos 2015; Castilla et al. 2013; Opstelten et al. 2008). Secondly, there appears a striking disproportion between the good knowledge of healthcare professionals on contraindications to vaccination and poor knowledge on indications to immunization, influenza complications, and the risk groups. Undoubtedly, this incomplete knowledge contributes to the low vaccination rate against influenza in Poland. Lastly, there is an issue of the universal trivialization of influenza infection. As a result, healthcare professionals are not well aware of symptoms pointing to the possible presence of a severe disease or of poor prognostic factors. General practitioners mostly see ambulatory patients with a benign disease course. Their personal experience may tame the true perception of influenza severity and burden, and may result in disease trivialization, often confused with a common cold. The present study also showed that most respondents could not properly define the risk groups, the signs and symptoms of severe influenza, and the predictors of its complications. In all likelihood, this is also reflected in a low vaccination rate specifically concerning the healthcare professionals in Poland, amounting to barely 6% in 2007/08 and 9% in the most recent 2016/17 season. A number of studies have examined the decision-making process

regarding vaccinations. The results indicate that one of the most important factors influencing one's decision to become vaccinated is the attitude of the physician providing advice to the patient (Arriola et al. 2015; WHO 2014; Leask et al. 2012; Cooper et al. 2008; Schmitt et al. 2007). Healthcare professionals' knowledge and attitudes about vaccines determine the intention to recommend the vaccine to patients and thus also vaccine uptake by patients (Nessler et al. 2014; Flicoteaux et al. 2014; Clark et al. 2009; Hollmeyer et al. 2009; Posfay-Barbe et al. 2005).

We believe the present study has identified the essential reason for a low influenza vaccination rate in Poland, which is the poor knowledge of a disease threat, with the undue perception of contraindications to immunization and an excessive fear of adverse effects. In 2016, European recommendations concerning the diagnosis and prevention of seasonal influenza were 'harmonized to better identify influenza outbreaks and to move towards reaching the target vaccination rate of 75% throughout Europe' (Kassianos et al. 2016). Hopefully, the harmonizing of recommendations will facilitate the assimilation of knowledge, but it cannot substitute for the continuing medical education.

5 Conclusions

The study identified the most important reasons for a low influenza vaccination rate in Poland, which are the disease trivialization and unsatisfactory knowledge among healthcare professionals of influenza and influenza immunization, combined with the perception of an exaggerated relevance of side effects of, and contraindications to, vaccination. All healthcare workers should be provided with continuous education programs focused on influenza complications, poor prognostic factors, risk groups, and the indications for vaccination. Subspecialists should be educated that influenza can exacerbate diseases in their field of specialization, which can be prevented with a vaccine.

Conflicts of interest The authors declare no conflicts of interest in relation to this article.

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