

# ACCEPTANCE OF SEASONAL INFLUENZA VACCINATION AMONG SLOVENIAN PHYSICIANS, 2016

## SPREJEMLJIVOST CEPLJENJA PROTI SEZONSKI GRIPU MED SLOVENSKIMI ZDRAVNIKI, 2016

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### ABSTRACT

#### Keywords:

influenza, vaccinations,  
physicians, Slovenia

**Introduction:** Vaccination against seasonal influenza is recommended for all healthcare workers including physicians in Slovenia to protect vulnerable individuals and reduce transmission of influenza viruses. The aim of our study is to determine the uptake of seasonal influenza vaccination among Slovenian physicians, to identify factors associated with that vaccination and assess their attitudes and beliefs regarding vaccination and vaccine-preventable diseases.

**Methods:** A cross-sectional survey was performed among physician members of the Slovenian Medical Chamber. The link to the anonymous web-based questionnaire was sent to 8,297 physicians. We estimated the overall proportion of physicians who vaccinate against influenza, while the possible associations with collected explanatory variables were explored in univariate analyses.

**Results:** The response rate to the survey was 10.8%. 75.9% (95% CI: 73.1-78.7%) physicians vaccinate themselves against influenza (regularly or occasionally) and 24.1% (95% CI: 21.2-26.8%) do not vaccinate (not any more or never). In univariate analysis only, the area of work was statistically significant when associated with vaccinating against influenza ( $p=0.002$ ). Among physicians who expressed some misconceptions regarding vaccination and vaccine-preventable diseases (it is better to overcome disease naturally as vaccines pose a higher risk than disease) the proportion of vaccinated against influenza was low (43.2%; 95% CI: 27.9-58.4%, 27.3%; 95% CI: 7.1-47.5%).

**Conclusion:** Not trusting in vaccination or professional recommendations regarding vaccination and some misconceptions regarding vaccination and vaccine-preventable diseases may influence the decision to be vaccinated against seasonal influenza among Slovenian physicians.

### IZVLEČEK

#### Ključne besede:

sezonska gripa,  
cepljenje, zdravniki,  
Slovenija

**Uvod:** Cepljenje proti sezonski gripu je priporočljivo za zaščito ranljivih posameznikov in zmanjšanje prenosa virusov influence za vse zdravstvene delavce v Sloveniji, vključno z zdravniki. Namen raziskave je bil med slovenskimi zdravniki ugotoviti delež cepljenih proti sezonski gripu, določiti dejavnike, povezane s tem cepljenjem ter oceniti njihov odnos in prepričanja glede cepljenja in bolezni, ki jih preprečujemo s cepljenjem.

**Metode:** Izvedena je bila presečna raziskava med zdravniki, ki so člani Zdravniške zbornice Slovenije. Link do anonimnega spletnega vprašalnika je bil poslan 8.297 zdravnikom. Ocenili smo skupni delež zdravnikov, ki se cepijo proti gripu, morebitno povezanost z izbranimi pojasnjevalnimi spremenljivkami smo proučili z univariatnimi analizami.

**Rezultati:** Stopnja odgovora v raziskavi je bila 10,8%, 75,9% (95% CI: 73,1-78,7%) zdravnikov se cepi proti gripu (redno ali občasno), 24,1% (95% CI: 21,2-26,8%) pa se jih ne cepi (ne več ali nikoli). V univariatni analizi se je le področje dela izkazalo za statistično značilno povezano s cepljenjem proti sezonski gripu ( $p = 0,002$ ). Med zdravniki, ki so izrazili nekatera napačna prepričanja v zvezi s cepljenjem in boleznimi, ki jih preprečujemo s cepljenjem (bolje je bolezen preboleti po naravni poti, cepiva predstavljajo večje tveganje kot bolezen), je bil delež cepljenih proti influenci nizek (43,2%; 95% CI: 27,9-58,4%, 27,3%; 95% CI: 7,1-47,5%).

**Zaključek:** Nezaupanje v cepljenje ali v strokovna priporočila glede cepljenja ter nekatera napačna prepričanja v zvezi s cepljenjem in boleznimi, ki jih preprečujemo s cepljenjem, lahko vplivajo na odločitev o cepljenju proti sezonski gripu med slovenskimi zdravniki.

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## 1 INTRODUCTION

In Europe, influenza occurs in regular annual epidemics in the winter season. Seasonal influenza epidemics are associated with high morbidity and mortality. Severe illness and complications are more common in certain risk groups, which include those with chronic medical conditions and individuals 65 years of age and above (1-3). Vaccination is the main public health intervention for preventing influenza (3). To protect vulnerable individuals and reduce influenza virus transmission, vaccination is also recommended for healthcare workers.

Immunization protects healthcare workers themselves, and their patients from nosocomial influenza infections. In addition, influenza can disrupt health services and impact healthcare organizations financially. Immunization can reduce staff absences, offer cost savings and provide economic benefits (5). It has also been shown that physicians' knowledge, attitudes and behavior regarding influenza vaccination have a significant impact on the decision-making process of their patients (6).

According to the Slovenian national immunization program for employees, vaccination against influenza is performed based on a safety statement with workplace risk assessment, among persons who are exposed to an infection with seasonal influenza virus or can transmit infection to others through their work, in particular for healthcare professionals, including physicians (7). Vaccination providers reported that only about 3,600 health workers were vaccinated against influenza in Slovenia in the 2016/17 season; based on this data, it is estimated that the vaccination uptake for healthcare workers in this season was only around 10% (8). There is no information on the vaccination uptake among individual profiles of health professionals, including physicians, from this routine monitoring data. Studies in Slovenia aiming at explaining predictors for vaccinating against seasonal influenza and also other vaccinations among healthcare workers (including physicians) and among the general population are very scarce (9-12).

The aim of our study is to determine the uptake of seasonal influenza vaccination among Slovenian physicians, to identify factors associated with this vaccination and assess their attitudes and beliefs regarding vaccination and vaccine-preventable diseases.

## 2 METHODS

### 2.1 Study Population and Data Collection

We conducted a cross-sectional survey among Slovenian physicians, who are members of the Slovenian Medical Chamber. Membership of the Medical Chamber is

compulsory by law in Slovenia for all physicians working at all levels in public or private healthcare. Data for the current analysis was collected in December and January 2016 as a part of a large interdisciplinary study project about vaccination scepticism in Slovenia. In December 2016, an invitation letter the link to the anonymous web-based questionnaire was sent out by e-mail to all 8,297 physicians listed at the time of the study in the registry of the Slovenian Medical Chamber.

We developed the questionnaire after reviewing the literature and pilot-tested it for clarity, length and face validity among several physicians at the National Institute of Public Health. The vaccination status against seasonal influenza was examined with the question "Were you ever vaccinated against seasonal influenza?" and four possible answers "yes, regularly", "yes, occasionally", "yes, but not anymore" and "never". In addition to these responses, individual participants' age, gender, health region and size of place (by number of inhabitants) where workplace is located, area of work, level of healthcare (primary, secondary or tertiary) and previous history of side effects after vaccination were recorded. To assess the attitudes and beliefs toward vaccination in general and vaccine-preventable diseases, the participants were asked of the extent to which they agreed with the given statements and their responses were collected with a five-point scale: completely disagree, mostly disagree, neither disagree nor agree, mostly agree and completely agree.

### 2.2 Statistical Analysis

Statistical analyses were performed using the STATA package version 10.0 (Stata Statistical Software: release 10.0 College Station. TX: Stata Corporation). The responses to questions on seasonal influenza vaccination status were dichotomised, so that participants who regularly or occasionally vaccinate were coded as vaccinate ("1") and participants who do not vaccinate anymore or were never vaccinated were coded as do not vaccinate ("0"), to examine associations between influenza vaccination status and collected explanatory variables (socio-demographic factors, history of side effects after previous vaccinations, attitudes and beliefs toward vaccination and vaccine-preventable diseases). We estimated the overall proportion of Slovenian physicians who vaccinate or do not vaccinate against seasonal influenza with 95% confidence intervals (CI). Possible associations between influenza vaccination status and collected explanatory variables were explored in a univariate analyses by calculating odds ratios (OR) with 95% CI estimates and/or Pearson's chi-square tests for significance. The level of statistical significance was set at  $p < 0.05$ .

### 3 RESULTS

Web-based questionnaires were filled in by 897 out of 8,297 Slovenian physicians (response rate 10.8%). The median age of participants was 41 years (range 25-85 years) and 71.4% were female (Table 1). Most of them (43.5%) were working in the Ljubljana health region, followed by Maribor (13.7%), Celje (9.0%), Kranj (7.5%), Novo mesto (7.0%), Koper (6.8%), Nova Gorica (5.3%), Murska Sobota (3.39) and Ravne (3.2%). According to the area of work, respondents were working in family or general medicine (23.5%), pediatrics or school medicine (17.9%) and internal medicine or infectious diseases (10.8%), while remaining participants (47.8%) listed other areas (mostly gynecology, anesthesiology, psychiatry, and surgery). Almost half of the physicians (42.3%) who participated in the study, performed most of their work at the primary level of healthcare, 29.7% at secondary level, and 28.1% at tertiary level.

Out of 894 physicians who reported on their vaccination status against seasonal influenza, 75.9% (95% CI: 73.1-78.7) vaccinate against influenza (regularly or occasionally) and 24.1% (95% CI: 21.2-26.8%) do not vaccinate (not anymore or never). The reasons why they vaccinate themselves were (multiple answers possible) because the free vaccination was offered 32.6% (95% CI: 29.1-36.1%), because of the recommendation to vaccinate 23.7% (95% CI: 20.5-27.0%), for personal protection 83.4% (95% CI: 80.7-86.3%), to protect patients and family members 73.6% (95% CI: 70.4-77.0%) and other (influenza vaccine safe and effective, having complications after influenza,

no absence from work due to illness...) 3.8% (95% CI: 2.4-5.3%). Physicians who do not vaccinate against influenza stated the following reasons: fear of side effects of the influenza vaccine 11.6% (95% CI: 7.3-15.9%), doubt in the effectiveness of influenza vaccine 37.2% (95% CI: 30.7-43.7%), not feeling threatened by the disease 47.9% (95% CI: 41.2-54.6%), not having enough information about influenza vaccination 6.0% (95% CI: 2.8-9.2%), having problems after influenza vaccination 10.7% (95% CI: 6.5-14.9%) and others (never having influenza before, having contraindications for influenza vaccination - autoimmune disease, allergy to egg white, short-term effectiveness of the vaccine and because it is necessary to be vaccinated every year, vaccination organised at an inappropriate time, working with mostly healthy patients...) 19.5% (95% CI: 14.2-24.9%).

Influenza vaccination status according to demographic characteristics and history of side effects after previous vaccinations of participants is shown in Table 1. In a univariate analysis only area of work was statistically significant associated with vaccinating against influenza among Slovenian physicians ( $p=0.002$ ). Physicians who worked in family or general medicine had 1.66 (95% CI: 0.81-1.79) higher odds to vaccinate themselves against influenza, those from paediatrics or school medicine has 2.01 (95% CI: 1.25-3.24) higher odds to vaccinate and those from internal medicine or infectious diseases has 2.52 (95% CI: 1.35-4.73) higher odds to vaccinate in comparison to physicians working in other areas of medicine.

**Table 1.** Seasonal influenza vaccination status according to demographic characteristics and history of side effects after vaccination, Slovenian physicians, 2016.

Characteristic	All		Vaccinated*			OR	95% CI	p
	N	%	N	%	95% CI			
All	894	100.0	679	75.9	73.1-78.7			
<b>Gender</b>								
Male	253	28.6	190	75.1	69.7-80.5	1		0.649
Female	632	71.4	483	76.5	73.2-79.9	1.08	0.77-1.52	
<b>Age (years)</b>								
25-34	305	34.9	239	78.4	73.7-83.0	1		0.605
35-44	187	21.4	138	73.8	67.4-80.2	0.78	0.51-1.20	
45-54	166	18.0	123	74.5	67.8-81.3	0.81	0.52-1.26	
55-64	150	17.2	112	74.7	67.6-81.7	0.81	0.51-1.29	
≥65	65	7.4	52	81.2	71.4-91.1	1.20	0.60-2.37	
<b>Health region</b>								
Celje	80	9.0	59	73.7	63.9-83.6	0.22	0.04-1.03	0.092
Koper	60	6.8	48	80.0	69.6-90.4	0.31	0.06-1.53	
Kranj	67	7.5	56	84.8	76.0-93.7	0.43	0.09-2.15	
Ljubljana	386	43.5	290	75.3	71.0-79.6	0.23	0.05-1.02	
Maribor	122	13.7	87	71.3	63.2-79.4	0.19	0.04-0.89	
MurskaSobota	35	3.9	31	88.6	77.5-100.0	0.60	0.10-3.59	
Nova Gorica	47	5.3	33	70.2	56.6-83.8	0.18	0.03-0.93	
Novo mesto	62	7.0	45	73.8	62.4-85.1	0.22	0.04-1.10	
Ravne	28	3.2	26	93.0	82.7-100.0	1		
<b>Place of work - size</b>								
<2,000 inhabitants	28	3.1	19	67.7	49.4-86.3	1		0.720
2,000-10,000 inhabitants	171	19.3	133	77.8	71.5-84.1	1.66	0.69-3.98	
10,000-100,000 inhabitants	291	32.8	219	75.8	70.8-80.7	1.48	0.64-3.43	
>100,000 inhabitants	398	44.8	303	76.3	72.1-80.5	1.53	0.67-3.49	
<b>Area of work</b>								
Family/general medicine	207	23.5	155	74.9	68.9-80.8	1.19	0.81	0.002
Paediatrics/school medicine	158	17.9	131	83.4	77.6-89.3	2.01	-1.79	
Internal med./infectious diseases	95	10.8	82	86.3	79.3-93.3	2.52	1.25-3.24	
Other	421	47.8	300	71.4	68.1-75.8	1	1.35-4.73	
<b>Level of healthcare</b>								
Primary	363	42.3	275	75.8	71.3-80.2	1		0.438
Secondary	255	29.7	189	74.4	69.0-79.8	0.93	0.64-1.35	
Tertiary	241	28.1	190	79.2	74.0-84.3	1.22	0.82-1.80	
<b>Had side effects after previous vaccination</b>								
No	670	75.9	504	75.6	72.3-78.8	1		0.670
Yes	213	24.1	164	77.0	71.3-82.7	1.08	0.74-1.59	

\*regularly or occasionally against seasonal influenza

CI: confidence interval; OR: odds ratio; p: p value.

Number of individuals vary according to the number of missing values for individual variables.

Table 2 shows the association between seasonal influenza vaccination status and attitudes and beliefs toward vaccination and vaccine-preventable diseases. The proportion of participants who agreed to given statements and vaccinate themselves against influenza differed significantly from participants who disagreed. Among physicians who agreed with statements that they trust in vaccines and vaccinations or that they trust in

professional recommendations regarding vaccination, the proportion of those who vaccinate against influenza was higher (79.6%; 95% CI: 76.8-82.4% and 78.8%; 95% CI: 76.0-81.6%) than among those who expressed distrust (14.3%; 95% CI: 0.5-28.1% and 13.0%; 95% CI: 0-28.0%). Among physicians who agreed with the statements that it is better to overcome disease naturally, that they are afraid of vaccines' side effects and that vaccines pose a higher

risk than disease, the proportion of those who vaccinate themselves against influenza was lower (43.2%; 95% CI: 27.9-58.4%, 49.1%; 95% CI: 36.0-62.3% and 27.3%; 95% CI:

7.1-47.5) than among those who expressed disagreement with dose statements (80.3%; 95% CI: 77.4-83.1%, 80.7%; 95% CI:77.9-83.6% and 78.6%; 95% CI:75.8-81.4%).

**Table 2.** Seasonal influenza vaccination status according to attitudes and beliefs toward vaccination and vaccine-preventable diseases, Slovenian physicians, 2016.

	All		Vaccinated*			p
	N	%	N	%	95% CI	
<b>I fully trust professional recommendations regarding vaccination.</b>						
agree	825	93.6	650	78.8	76.0-81.6	<0.001
undecided	33	4.1	17	51.5	33.5-69.5	
disagree	23	2.6	3	13.0	0.0-28.0	
<b>I fully trust in vaccination and vaccines.</b>						
agree	804	91.3	640	79.6	76.8-82.4	<0.001
undecided	49	5.6	27	55.1	40.7-69.5	
disagree	28	3.2	4	14.3	0.5-28.1	
<b>By vaccinating the majority, we significantly contribute to the protection of those who cannot be vaccinated.</b>						
agree	839	95.4	660	78.7	75.9-81.4	<0.001
undecided	21	2.4	2	9.5	0.0-23.2	
disagree	19	2.2	6	31.6	8.5-54.6	
<b>It's far better to overcome the disease naturally than to be vaccinated.</b>						
agree	44	5.0	19	43.2	27.9-58.4	<0.001
undecided	96	10.8	56	58.3	48.3-68.4	
disagree	745	84.2	598	80.3	77.4-83.1	
<b>Because of the way the vaccine works, they will never be completely safe.</b>						
agree	409	46.3	297	72.6	68.3-76.9	0.001
undecided	139	15.7	97	69.8	62.0-77.5	
disagree	336	38.0	278	82.7	78.7-86.8	
<b>I'm afraid of vaccination because I'm afraid of the side effects of vaccines.</b>						
agree	59	6.7	29	49.1	36.0-62.3	<0.001
undecided	75	8.6	38	50.7	39.0-62.2	
disagree	743	84.7	600	80.7	77.9-83.6	
<b>Vaccination poses a higher risk to the health of the vaccinated person than a disease that can be prevented by vaccination.</b>						
agree	22	2.5	6	27.3	7.1-47.5	<0.001
undecided	27	3.1	9	33.3	14.3-52.3	
disagree	836	94.5	657	78.6	75.8-81.4	
<b>It is very important that all healthcare workers are regularly vaccinated against influenza.</b>						
agree	588	66.6	548	93.2	91.1-95.2	<0.001
undecided	152	17.2	72	47.4	39.3-55.4	
disagree	143	16.2	51	35.7	27.7-43.6	
<b>The influence of the pharmaceutical industry on the decision-making bodies on vaccines is very high in Slovenia.</b>						
agree	129	14.6	66	51.2	42.4-59.9	<0.001
undecided	296	33.4	214	72.3	67.7-77.4	
disagree	460	52.0	393	85.4	82.2-88.7	

\*regularly or occasionally against seasonal influenza

CI: confidence interval; p: p value.

Number of individuals vary according to the number of missing values for individual variables.

#### 4 DISCUSSION

Three quarters of Slovenian physicians who participated in our study reported that they regularly or occasionally vaccinate themselves against seasonal influenza. Physicians who worked in family/general medicine, paediatrics/school medicine or internal medicine/infectious diseases were more likely to vaccinate themselves against seasonal influenza in comparison to physicians working in other areas of medicine. There was a higher proportion of vaccinated against influenza among physicians who expressed trust in vaccination or professional recommendations regarding vaccination. However, among physicians who expressed some misconceptions regarding vaccination and vaccine-preventable diseases, the proportion of vaccinated against influenza was low.

Our study showed that around 75% of physicians who participated in our study reported that they regularly (52%) or occasionally (23%) vaccinate themselves against seasonal influenza. Our results are comparable to the results of the first national survey conducted in 2010 among Slovenian doctors and dentists assessing their uptake of pandemic and seasonal influenza vaccine, where 42% of physicians reported that they were vaccinated against pandemic and seasonal influenza in the last season, and 10% only against seasonal influenza (9). If we compare these results to the results of routine monitoring of seasonal influenza vaccination coverage among healthcare workers in Slovenia, showing that only about 10% of them vaccinate every season (8), we can conclude that the vaccination coverage among physicians is higher than among other profiles of healthcare workers. Therefore, other profiles should be included in similar studies, especially nurses, most of whom have an even higher level of contact with patients. The vaccination coverage of healthcare workers is also not optimal in other European countries. According to the report from the European Center for Disease Control in 2014, 17 countries provided data on vaccination coverage among healthcare workers that ranged from 5.7% to 54.4% (median 26.9%).

Among the examined demographic characteristics, only area of work was statistically significant when associated with vaccinating against seasonal influenza in our study. For comparison, in a similar study among Slovenian physicians and dentists from 2010, acceptance of the pandemic and seasonal influenza vaccine was determined by higher age, being an internal medical trainee or specialist, working in a hospital, performing any kind of vaccination, and having a chronic disease. Like in our study, those who declined vaccination believed that they did not need to be vaccinated, had safety concerns and were afraid of side effects (9). Another study performed among the Slovene general population aged 18 and over showed that, in addition to common predictors, a decision in

favor of the seasonal and pandemic influenza vaccinations were related to age, gender, chronic illnesses, working in healthcare, trust in media news, and vaccination side-effects in someone close. It was also related to trust in vaccine safety and professional information in favor of vaccination, and the decision of someone close to vaccinate (10).

Among the physicians included in our study, some expressed distrust in vaccination or professional recommendations regarding vaccination and some expressed certain misconceptions regarding vaccination and vaccine-preventable diseases. Among these, the proportion of vaccinated against influenza was lower. This is supported with scientific evidence that vaccination is a safe and effective measure that undeniably saves lives and remains one of the most important measures for reducing the burden of communicable diseases (13). For the individual, the risk of damage due to vaccination is significantly lower than the risk of complications due to vaccine-preventable disease (14, 15). There is a lack of acceptance of vaccines by the general population, but physicians also report doubts about risks and usefulness of vaccines or low vaccine acceptance among themselves (16). Physicians with such doubts may hesitate to recommend vaccination to their patients (17). Therefore, the confidence of physicians in the efficacy and safety of vaccines and vaccinations is very important. The gaps were identified in the initial training and the continuous medical education of physicians regarding vaccination in Slovenia and Europe (16, 18, 19). Education on the effectiveness and safety of vaccination should be one of the priority public health measures for improving knowledge and eliminating barriers to vaccination among physicians (16).

The limitations of our study include validity constraints of self-reported information, while declaration or desirability biases cannot be excluded. Unfortunately, attitudes and beliefs were not measured specifically for influenza and influenza vaccination but for vaccination and vaccine-preventable diseases in general. The main limitation of our study was the low response rate that limits the generalisability of the results. The anonymity of responders prevented us from sending a reminder letter to the non-responders. There is the possibility of selection bias, if more physicians with a positive opinion on vaccination who vaccinate more were more likely to respond to the survey. If such bias exists, it may lead to an overestimation of the proportion of Slovenian physicians who vaccinate themselves against seasonal influenza.

## 5 CONCLUSION

Not trusting in vaccination or professional recommendations regarding vaccination and certainly some misconceptions regarding vaccination and vaccine-preventable diseases may influence the decision to be vaccinated against seasonal influenza among Slovenian physicians. It is important that healthcare workers themselves, especially physicians, trust in vaccination and are its promoters, as they can significantly influence beliefs and behaviors associated with the vaccinations of their patients. It is also important for physicians to vaccinate regularly against seasonal influenza because they protect themselves, their family members and their patients against infection.

## CONFLICT OF INTEREST

The authors declare that they have no financial, professional or personal conflicting interests related to this article.

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## ETHICAL APPROVAL

The Republic of Slovenia National Medical Ethics Committee approved the project proposal for the study (Consent number: 127/03/14).

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