Low acceptance of vaccination against the 2009 pandemic influenza A(H1N1) among healthcare workers in Greece

G Rachiotis[1], V A Mouchtouri[1], J Kremastinou[2], K Gourgoulianis[3], C Hadjichristodoulou (xhatzi@med.uth.gr)[1]
1. Department of Hygiene and Epidemiology, Medical Faculty, University of Thessaly, Thessaly, Greece
2. Department of Public and Administrative Hygiene, National School Public Health, Athens, Greece
3. Department of Respiratory Medicine, Medical Faculty, University of Thessaly, Thessaly, Greece

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A questionnaire survey on the attitude of healthcare workers towards pandemic influenza vaccination showed low acceptance (17%) of the pandemic vaccine. Factors associated with vaccine uptake were acceptance of seasonal influenza vaccination, medical profession and age. The main reason for refusal of vaccination was fear of side effects, which was stronger in those who received information on the safety of the vaccine mainly from mass media.

Introduction

As of 31 January 2010, worldwide more than 209 countries and overseas territories or communities have reported laboratory-confirmed cases of 2009 pandemic influenza A(H1N1). In addition, at least 15,174 deaths related to this infection have been recorded [1]. In Europe, the pandemic is well past its peak and medium intensity transmission is now confined to five countries, all in eastern or south-eastern Europe. One of those countries is Greece, where the recorded number of fatal cases caused by 2009 pandemic influenza is currently 118 [2].

According to recommendations from the World Health Organization (WHO) all countries should immunise their healthcare workers as a first priority in order to protect the vital health infrastructure [3].

To our knowledge, information on healthcare workers' intention to take up vaccination against the 2009 pandemic influenza is sparse [4]. Consequently, the aim of our study was to investigate the attitude of healthcare workers towards this vaccine and possible factors associated with vaccine uptake.

Methods

Questionnaire

A structured, self-administered, anonymous questionnaire was distributed to a convenience sample of 441 healthcare workers in five public hospitals (one university hospital and four general hospitals) in the region of Thessaly, Greece. In particular, five healthcare workers invited all personnel at work during two consecutive days to participate in the study. The survey was conducted on 9 and 10 November 2009, one week before the official start of national vaccination campaign against the 2009 pandemic influenza A(H1N1) in Greece. The questionnaire included questions on demographics, willingness to accept seasonal influenza vaccination and willingness to accept the 2009 pandemic influenza vaccine. In the case of vaccination refusal the participants were requested to define the reason: lack of time, inertia; perception of not being at risk of serious illness, use of alternative drugs, fear about vaccine safety. In the case of fear about vaccine safety, the participant was requested to specify the concern given the following alternatives: Guillain-Barrés syndrome, systemic anaphylactic reaction, development of influenza illness, local side effects, other. Moreover, the healthcare workers were asked about their level of information on the safety of pandemic influenza A(H1N1) vaccines (no information/insufficient information, sufficient/very good information) and on their sources of information on influenza A(H1N1) vaccine safety: Internet, hospital infection control committee, National Hellenic Centre for Disease Control and Prevention (CDCP), medical journals/books, television and radio stations, newspapers/magazines, representatives of pharmaceutical companies. Finally, participants were asked to express their opinion on the value of vaccinations as an important means for the protection of public health, and in particular of healthcare workers.

Statistical analysis

The collected answers were entered in a database created within Epi Info 2000 software. Absolute and relative frequencies were presented for qualitative variables, while quantitative variables were presented as mean (standard deviation). Chi-square test or Fischer's exact test was used for the univariate analysis of qualitative variables and Student's t-test or Mann Whitney test for quantitative variables. In order to identify factors

associated with vaccination uptake, logistic regression analysis was performed separately for seasonal and pandemic influenza vaccination. Statistical analysis was performed with Epi-Info software. Relative risk

Table 1

Characteristics of healthcare workers and attitudes towards vaccinations against seasonal influenza and the 2009 pandemic influenza A(H1N1), Thessaly, Greece, November 2009 (n=441)

Characteristic	N/total (%) or mean (SD)
Sex	
Male	150/437 (34.3)
Female	287/437 (65.7)
Age (mean, SD)	37.8 (9.97)
Educational level	
Lyceum	44/430 (10.2)
Professional training	25/430 (5.8)
Technological	124/430 (28.8)
University	202/430 (47.0)
Master/PhD	35/430 (8.1)
Occupation	
Doctor	215/435 (49.4)
Nurse	169/435 (38.9)
Paramedic	28/435 (6.4)
Other	23/435 (5.3)
Years of work (mean, SD)	13.34 (10.02)
Vaccinations are an important means of protecting public health, and in particular of healthcare workers:	
I agree	378/390 (96.9)
I disagree	12/390 (3.1)
My opinion on vaccination in general is:	
I agree	354/370 (95.7)
I disagree	16/370 (4.3)
Are you going to be vaccinated with seasonal influenza vaccine?	
Yes	124/432 (28.7)
No	308/432 (71.3)
If no, please specify:	
I do not have enough time	8/308 (2.6)
Inertia	13/308 (4.2)
Use of alternative drugs	4/308 (1.3)
I am not at risk of serious illness	133/308 (43.2)
Fear over vaccine safety	134/308 (43.5)
If yes, please specify:	
Guillain-Barré Syndrome	20/134 (14.9)
Anaphylactic reaction	12/134 (9)
Influenza illness	19/134 (14.2)
Local side effects	9/134 (6.7)
Other	3/134 (2.2)
Are you going to be vaccinated with the pandemic influenza vaccine?	
Yes	72/424 (17.0)
No	352/424 (83.0)
If no, please specify:	
I do not have enough time	7/352 (2)
Inertia	3/352 (0.9)
Use of alternative drugs	5/352 (1.4)

I am not at risk of serious illness	58/352 (16.5)
Fear over vaccine safety	265/352 (75.3)
If yes, please specify:	
Guillain-Barré syndrome	53/265 (20)
Anaphylactic reaction	26/265 (9.8)
Influenza illness	26/265 (9.8)
Local side effects	9/265 (3.4)
Other	24/265 (9.1)
My information about pandemic vaccine safety is	
No information/insufficient	252/431 (58.5)
Sufficient/very good	179/431 (41.5)
Sources of information	
Internet	178/441 (40.4)
Hospital Infections Control Committee	138/441 (31.3)
Hellenic Centre for Disease Control and Prevention	94/441 (21.3)
Medical journals/books	103/441 (23.4)
Pharmaceutical companies	6/441 (1.4)
Television, radio stations	226/441 (51.2)
Newspapers/magazines	125/441 (28.3)

N: number; SD: standard deviation.
Some questions were not answered by all participants (missing values).

Table 2

Univariate analysis of acceptance of vaccination against 2009 pandemic influenza A(H1N1), healthcare workers, Thessaly, Greece, November 2009 (n=441)

Factor	Acceptance of vaccination against 2009 pandemic influenza A(H1N1)		
	N/total (%)	RR (95% CI)	P value
Age			
≤ 38 years (reference value)	29/131 (12.6)	1.78(1.15-2.75)	0.007
› 38 years	41/183 (22.4)		
Sex			
Male	43/147 (29.3)	2.75 (1.79-4.21)	‹0.001
Female (reference value)	29/273 (10.6)		
Educational level			
Lyceum/professional training	4/68 (5.9)	0.30 (0.11-0.80)	0.006
University/ technological (reference value)	67/345 (19.4)		
Occupation			
Medical	56/210 (26.7)	6.30 (3.08-12.86)	‹0.001
Nursing/paramedical (reference value)	8/189 (4.2)		
Vaccinations are important for the protection of public health			
Yes	70/364 (19.2)	2.31 (0.35-15.25)	0.34
No (reference value)	1/12 (8.33)		
My opinion about vaccinations			
I agree	69/341 (20.2)	3.24 (0.48-21.85)	0.168
I disagree (reference value)	1/16 (6.25)		
Duration of employment			
≤ 13 years (reference value)	38/166 (22.9)	1.69 (1.08-2.63)	0.018
› 13 years	28/207 (13.5)		
Acceptance of seasonal influenza vaccination			
Yes	52/122 (42.6)	6.68 (4.13-10.8)	‹0.001
No (reference value)	19/298 (6.4)		

CI: confidence interval; N: number; RR: relative risk.

(RR), adjusted odds ratio (OR) and 95% confidence intervals (95% CI) were also calculated. The level of statistical significance was set at 0.05.

Results

The demographic characteristics of the respondents are shown in Table 1. In total 441 questionnaires were returned. The number of missing values varied from question to question.

The overall acceptance of pandemic and seasonal influenza vaccines was 17% (95% CI: 13.6-21%) and 28.7% (95% CI: 24.5-33.3%), respectively. Moreover, 378 of 390 respondents (97%) stated that vaccinations are important for the protection of public health, and in particular of healthcare workers. The most common reason of refusing the pandemic influenza vaccine was fear about vaccine safety (75.3%), most frequently fear of the Guillain-Barrés syndrome. About 58.5% of the participants said that their information about pandemic influenza vaccine safety was insufficient (Table 1).

Table 3

Multivariate analysis of acceptance of vaccination against 2009 pandemic influenza A(H1N1), healthcare workers, Thessaly, Greece, November 2009 (n=441)

Factor	Acceptance of vaccination against 2009 pandemic influenza A(H1N1)	
	OR (95% CI)	P value
Age group		
>38 years	2.28 (1.16-4.48)	0.01
≤38 years (reference value)	1.00	
Sex	0.78 (0.37-1.63)	0.51
Educational level		
Lyceum/professional training (reference value)	1.00	0.83
University/technological	1.19 (0.22-6.31)	
Occupation		
Medical	6.34 (2.31-17.4)	<0.001
Nursing/paramedical (reference value)	1.00	
Acceptance of seasonal influenza vaccination		
Yes	10.2 (5.1-20.4)	<0.001
No (reference value)	1.00	

CI: confidence interval; OR: odds ratio.

Table 4

Source of information and fear over 2009 pandemic influenza A(H1N1) vaccine safety, healthcare workers, Thessaly, Greece, November 2009 (n=441)

	N (%)	RR (95% CI)	P value
My information about the safety of vaccines against pandemic influenza A(H1N1) is			
Sufficient/very good	95/179 (53.1)	0.75 (0.64-0.89)	<0.001
No information/insufficient information	176/252 (69.8)		
Source of information			
Internet			
Yes	100/178 (56.2)	0.83 (0.71-0.97)	0.017
No	177/263 (67.3)		
Hospital Infection Control Committee			
Yes	93/138 (67.4)	1.10 (0.95-1.28)	0.179
No	184/303 (60.7)		

Hellenic Centre for Disease Control and Prevention			
Yes	43/94 (45.7)	0.67 (0.53-0.85)	<0.001
No	234/347 (67.4)		
Medical journals/books			
Yes	56/103 (54.4)	0.83 (0.68-1.00)	0.042
No	221/338 (65.4)		
Pharmaceutical companies			
Yes	3/6 (50.0)	0.79 (0.35-1.77)	0.513
No	274/435 (63.0)		
Television/radio stations			
Yes	157/226 (69.5)	1.24 (1.07-1.44)	0.003
No	120/215 (55.8)		
Newspapers/magazines			
Yes	86/125 (68.8)	1.13 (0.98-1.31)	0.101
No	191/316 (60.4)		

CI: confidence interval; N: number; RR: relative risk.

Table 5

Acceptance of vaccination against 2009 pandemic influenza A(H1N1) and source of information, healthcare workers, Thessaly, Greece, November 2009 (n=441)

Factor	Acceptance of vaccination against 2009 pandemic influenza A(H1N1)		
Source of information	**N (%)**	**RR (95% CI)**	**P value**
Internet			
Yes	44/174 (25.3)	2.25 (1.46-3.47)	<0.001
No	28/222 (255)		
Hospital Infection Control Committee			
Yes	25/130 (19.2)	1.20 (0.77-1.86)	0.411
No	47/294 (16.0)		
Hellenic Centre for Disease Control and Prevention			
Yes	30/92 (32.6)	2.57 (1.71-3.87)	<0.001
No	42/332 (12.7)		
Medical journals/books			
Yes	29/99 (29.3)	2.21 (1.46-3.34)	<0.001
No	43/325 (13.2)		
Pharmaceutical industry			
Yes	1/6 (16.7)	0.98 (0.16-5.94)	0.98
No	71/418 (17.0)		
Television/radio stations			
Yes	26/218 (11.9)	0.53 (0.34-0.83)	0.004
No	46/206 (22.3)		
Newspapers/magazines			
Yes	16/122 (13.1)	0.70 (0.42-1.18)	0.1777
No	56/302 (18.5)		

CI: confidence interval; N: number; RR: relative risk.

The most frequent source of information on vaccine safety was television and radio stations (51.2%) followed by the internet (40.4%), hospital infectious control committee (31.3%), and newspapers/magazines (28.3%). Univariate analysis showed that sex, age, educational level, occupation, duration of employment, and acceptance of seasonal influenza vaccination were significantly associated with acceptance of the pandemic influenza vaccine (Table 2).

Healthcare workers who had a positive attitude towards seasonal influenza vaccination had a higher rate of acceptance of the pandemic influenza vaccine than colleagues who refused the seasonal influenza vaccine (RR: 6.3; 95%CI: 3.08-12.86). Multivariate analysis revealed that occupation (OR: 6.34; 95% CI: 2.31-17.4), acceptance of seasonal influenza vaccination (OR: 10.2; 95% CI: 5.1-20.4) and age (OR: 2.28; 95% CI: 1.16-4.48) were independently associated with the acceptance of pandemic influenza vaccination (Table 3).

In order to explore the impact of information on the fear of side-effects, univariate analysis was performed (Table 4). It documented that healthcare workers with sufficient/very good information about safety of the pandemic influenza vaccine had a lower risk of reporting fear over vaccine safety than colleagues with insufficient information (RR: 0.75; 95% CI: 0.64-0.89). Further analysis revealed an impact of the information source on the reporting of fear of side effects. In particular, healthcare workers who had received information about pandemic influenza vaccine safety from television and radio stations demonstrated an increased risk of reporting negative attitude towards the vaccination due to fear of side effects (RR: 1.24; 95% CI: 1.07-1.44), while healthcare workers who received information on the vaccine's safety from medical journals, the internet, hospital infection control committees, and the CDCP had a significantly decreased risk of reporting fear over vaccine safety (Table 4).

The impact of the source of information on acceptance of the pandemic influenza vaccine is presented in Table 5. Interestingly, participants who received information on vaccine safety from the CDCP, medical journals and the internet documented a higher probability for vaccination acceptance.

Multivariate analysis (results not shown) revealed an independent association of source of information on vaccine safety with acceptance of pandemic influenza vaccination. In particular, information sources like the CDCP, and medical journals were independently associated with the probability of accepting pandemic influenza vaccination (OR: 2.36; 95% CI:1.32-4.12 for CCPD; OR:2.13; 95% CI:1.20-3.80 for medical journals). In contrast, information on vaccine safety related to mass media and particularly to television and radio stations was independently associated with a decreased probability for accepting the vaccination (OR: 0.53; 95% CI:0.31-0.93).

Regarding seasonal influenza vaccination, our study revealed an acceptance rate of 28.7%. Multivariate analysis indicated that only age was independently associated with the likelihood of accepting seasonal influenza vaccination (OR: 1.62; 95% CI: 1.02-2.56) (Table 6).

Discussion

Our study revealed a low acceptance (17%) of vaccination against the 2009 pandemic influenza among Greek healthcare workers. There is some evidence that the willingness of European healthcare workers to be vaccinated with seasonal influenza vaccine is poor, ranging from 14% in the United Kingdom to 48% in France [5].

Table 6

Multivariate analysis of acceptance of seasonal influenza vaccination, healthcare workers, Thessaly, Greece, November 2009 (n=441)

Factor	Vaccination acceptance	
	OR (95% CI)	P value
Age group		
›38 years	1.62 (1.02-2.56)	0.037
≤38 years (reference value)		
Sex	0.65 (0.38-1.09)	0.106
Educational level		
Lyceum/ professional training (reference value)	1.36 (0.62-2.95)	0.430
University/technological		
Occupation		
Nursing/paramedical (reference value)	1.59 (0.90-2.82)	0.107
Medical		

CI: confidence interval; OR: odds ratio

Strong independent positive determinants for accepting the pandemic influenza vaccine were acceptance of seasonal influenza vaccination and medical profession. These findings are line with a previous study conducted in Hong-Kong [4]. The main reason for the low acceptance of the vaccine - apart from the perception that the 2009 pandemic influenza A(H1N1) is not a serious illness - was the fear of adverse effects and in particular Guillaine-Barrés syndrome. Nevertheless, it is of interest that 48.3% of the participants did not specify which side effect they feared. Fear of vaccine-related side effects was dependent on the source of information on vaccine safety and especially pronounced in those receiving information from television and radio stations, reflecting the fact that mass media play a disproportionate role in the information sources on the safety of pandemic influenza vaccines.

Multivariate analysis identified a positive attitude towards seasonal influenza vaccination as the strongest determinant for accepting the pandemic influenza vaccine. Similar observations have been made in other studies on influenza A(H5N1) [6] and pandemic influenza A(H1N1) vaccines [4]. Compared with nurses and paramedics, medical doctors had a sixfold higher rate of acceptance the pandemic vaccine, although even this rate of 27% was suboptimal. These findings are in line with a study conducted in Hong Kong and highlight the necessity to target nurses and paramedics with information to change their attitude towards this vaccination [4].

Acceptance of the pandemic vaccine also increased with age. This is in part explained by the fact that it was shown to be independently associated with the acceptance of seasonal influenza vaccination, which increases with age. The uptake of the seasonal influenza vaccination in our study was 28.7%, considerably higher than that of the pandemic vaccine, but not satisfactory. Previous studies have also recorded low coverage with seasonal influenza and hepatitis B vaccination in healthcare workers in Greece [7,8].

Our study has the limitation of being a cross-sectional questionnaire study, and some information bias could have occurred. We believe that the acceptance rate the pandemic influenza vaccine found in our study could be overestimated given that healthcare workers who were not interested in the vaccination may not have been motivated to participate in the survey. On the other hand, healthcare workers who believe that influenza vaccination is an obvious solution may also have been less inclined to participate than persons who are concerned over vaccine safety. An additional limitation is the sampling method (convenience sample). However, we believe that the figures reported here are a satisfactory reflection of the intentions of Greek healthcare workers regarding pandemic influenza vaccination, given that our sample included staff from both university and general hospitals and that Thessaly is a large region in Greece, with almost 8% of the country's population. At least one hospital from each of the four prefectures of the region was included in the study, the sample could therefore be considered as geographically representative. Furthermore, unpublished data from a general hospital in Athens indicated acceptance rates similar to those provided by our study.

Conclusion

The low acceptance rate of the pandemic vaccine among Greek healthcare workers is alarming given that they are used as an example for their patients and the public [9]. Vaccination is important in order to keep the healthcare system operating at maximum capacity during a pandemic [10]. Policy makers in Greece, and maybe in other countries in Europe could consider our findings in order to improve the vaccination strategy for healthcare workers in future vaccination campaigns.

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