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Seasonal Inactivated Influenza Vaccination in Oncology Settings

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Abstract

Aims
The aims of this study were to establish the uptake rate of seasonal influenza vaccine amongst oncology healthcare workers (HCWs) during the 2016/17 influenza season and to ascertain which factors were associated with or predicted vaccination, along with determining if national guidance regarding influenza vaccination for cancer patients is implemented.

Methods
A national cross-sectional study was carried out on clinical staff working in oncology day wards.

Results
Vaccine uptake during the 2016/17 season among oncology day ward staff was 48%. Fear of vaccine side-effects, believing that if one is healthy, there is no need for vaccination, and doubt about vaccine effectiveness negatively predicted vaccination. Most staff (87.6%) recommend vaccination to some or all patients.

Conclusion
Every effort should be made to ensure HCWs are given the opportunity to get vaccinated, provided with evidence of vaccine effectiveness and safety and empowered to recommend influenza vaccination to their patients.

Introduction

Influenza is responsible for between three and five million cases of severe illness and 250,000 to 500,000 deaths annually worldwide.[1,2] All cancer patients are vulnerable to influenza.[3] These patients present with fewer clinical symptoms, have prolonged viral shedding, are at increased risk for nosocomial transmission, are more apt to develop antiviral resistance and are more likely to progress to lower respiratory tract disease.[4] Significant mortality has been observed in this group of patients following progression to lower respiratory tract infections.[3,5,6] Immunisation Guidelines for Ireland recommend annual seasonal inactivated influenza vaccine for all cancer patients, with the exception of those treated with combination checkpoint inhibitors.[7] Vaccination is doubly important, as it reduces the risk of serious complications of an influenza infection and avoids the potential risk of postponing cancer treatment because of infection.[8] Many cancer patients mount attenuated or inadequate protective responses to influenza vaccine.[4] In healthcare settings with large numbers of cancer, transplant and immunosuppressed patients,

vaccination of Healthcare Workers (HCWs) is a critical component of influenza prevention and control. National Immunisation Guidance recommends that all HCWs receive annual influenza vaccine.[7] Influenza vaccine uptake in hospital HCWs has increased in recent years, and was 44.8% during the 2017/18 season.[9] There are on-going efforts to improve vaccine uptake among HCWs through improving access to vaccination opportunities, increasing awareness of the importance of vaccination and promotion of the influenza vaccine, often through incentives.

The uptake rate of seasonal influenza vaccine amongst HCWs in oncology settings has never been ascertained and routine data are not available to determine vaccination rates. The aims of this study were to establish the uptake rate of seasonal influenza vaccine amongst HCWs in oncology settings during the 2016/17 influenza season and to ascertain which factors were associated with or predicted vaccination, along with determining if current national guidance regarding seasonal influenza vaccination for cancer patients is being implemented.

Methods

A national cross-sectional study was carried out on doctors and nurses working in all 26 designated oncology day wards on one day in September 2017. A two-page, paper-based, anonymous survey was developed from previous surveys, with questions adapted to an Irish context.[10-15] Ethical approval for the study was obtained from the Saolta Hospital Group Ethical Approval Committee. In order to promote the study and encourage participation, memos were circulated to hospital management. The national Medical Oncology and Haemato-oncology Clinical Leads Group were asked to lend their support. Personal contact was made with key oncology staff in order to coordinate survey distribution and return.

Data were analysed using IBM SPSS version 22. Univariate analyses (chi-square tests) were used to compare demographic characteristics of vaccinated staff with those of unvaccinated staff. Differences in respondents' responses and knowledge scores in vaccinated and unvaccinated groups were established using chi-squared analysis. Binomial logistic regression was performed on the data to assess the impact the variables of interest had on the likelihood of vaccination during the 2016/17 influenza season.

Results

The response rate from hospitals was 24/26 (92%) with 185 respondents. In total, 16 hospitals indicated the numbers of staff present the day the survey was conducted and the number of returned surveys. The response rate among staff present on the day of the survey in these 16 hospitals was 89.9%.

Over 48% (n=89) of respondents indicated that they had received the influenza vaccine for the 2016/17 season. An equal proportion (48.1%) were not vaccinated. A small number (n=6) responded that although they were not vaccinated, it had been their wish to be vaccinated. Difficulty in accessing vaccine clinics due to clinical commitments was the most frequently cited barrier (n=6).

There was no statistically significant association between vaccination and gender, occupation, years of professional experience or age (Table 1). Analysis of results by non-occupational reason for vaccination (e.g. chronic disease, pregnancy) indicates that vaccination uptake was 3.33 times higher in those with a non-occupational reason for vaccination. When this result was adjusted for age, this association reduced to 3.09 ($p<0.05$, 95% CI 1.05-9.12).

Table 1: Characteristics of vaccinated and unvaccinated groups.

Demographic variable	Unvaccinated	Vaccinated	Total no.	P value	Odds ratio (95% CI)
Gender					
Female n (%)	86 (52.8)	77 (47.2)	163	0.49	1.44 (0.51-4.04)
Male n (%)	7 (43.8)	9 (56.2)	16		
Age (years)					
18 to 29	14 (58.3)	10 (41.7)	24	-	
30 to 39	28 (50.0)	28 (50.0)	56		
40 to 49	43 (55.1)	35 (44.9)	78		
50 to 59	7 (41.2)	10 (58.8)	17		
60 and older	1 (33.3)	2 (66.7)	3		
<50 years	***85 (53.8)***	***73 (46.2)***	***158***	***0.24***	***0.57 (0.22-1.48)***
≥50 years	***8 (40.0)***	***12 (60.0)***	***20***		
Occupation					
Nurse	74 (52.9)	66 (47.1)	140	-	
NCHD	7 (38.9)	11 (61.1)	18		
Consultant	3 (60.0)	2 (40.0)	5		
Nurse	***74 (52.9)***	***66 (47.1)***	***140***	***0.40***	***0.69 (0.28-1.67)***
Doctor	***10 (43.5)***	***13 (56.5)***	***23***		
Years of professional experience					
1 to 5	14 (53.8)	12 (46.2)	26	0.97	
6 to 10	17 (54.8)	14 (45.2)	31		
11 to 20	32 (51.6)	30 (48.4)	62		
>20	30 (50.0)	30 (50.0)	60		
Non-occupational reason for influenza vaccination					
Yes	5 (26.3)	14 (73.7)	19	<0.05	0.30 (0.1-0.88)
No	82 (54.3)	69 (45.7)	151		

Knowledge of seasonal influenza vaccination was tested by six true/false questions (Table 2).

Table 2: Knowledge of seasonal influenza vaccination: frequency and proportion of correct and incorrect responses among surveyed oncology day ward staff.

	Correct (%)	Incorrect (%)	Don't know (%)
1. Seasonal influenza vaccine is a live vaccine (false)	91 (50.8)	78 (43.6)	10 (5.6)
2. It is necessary for healthcare workers to be vaccinated every year (true)	149 (81.4)	26 (14.2)	8 (4.4)
3. Vaccination of staff reduces the likelihood of a hospital outbreak (true)	157 (85.3)	16 (8.7)	11 (6.0)
4. Inactivated seasonal influenza vaccine is recommended for all cancer patients (true at time of survey completion)	127 (71.0)	28 (15.6)	24 (13.4)
5. Seasonal influenza vaccine can cause flu (false)	121 (66.8)	45 (24.9)	15 (8.3)
6. Immune response to vaccination may be blunted in those receiving chemotherapy (true)	81 (45.5)	53 (29.8)	44 (24.7)

A knowledge score of four or more was higher in those who were vaccinated (76.4%) than in those who were unvaccinated (57.9%). When adjusted for age, those with a knowledge score of four or more were 3.2 times more likely to be vaccinated than those with a score of less than four (p = 0.02, 95% CI 1.2-8.52).

Respondents were asked to reply to 18 statements assessing perceptions to influenza disease and vaccine and cues to action in influenza vaccination (Table 3). Differences in responses for vaccinated and unvaccinated HCWs were statistically significant for all statements, except for statements four (perceived severity) and seven (a perceived barrier).

Table 3: Perception of and cues to action for influenza vaccination among surveyed oncology day ward staff.

Perceptions and cues to action	Unvaccinated (%)	Vaccinated (%)	P value
Perceived susceptibility			
1. I am at increased risk of getting flu as I am a healthcare worker			
Agree	61 (43.6)	79 (56.4)	0.001
Disagree	17 (77.3)	5 (22.7)	
Neutral	14 (77.8)	4 (22.2)	
2. I'm healthy, so there is no need for me to be vaccinated			
Agree	47 (90.4)	5 (9.6)	<0.001
Disagree	23 (24.7)	70 (75.3)	
Neutral	23 (62.2)	14 (37.8)	
3. Most people are immune, so it doesn't matter if I'm vaccinated			
Agree	2 (50.0)	2 (50.0)	*
Disagree	67 (46.5)	77 (53.5)	
Neutral	24 (75.0)	8 (25.0)	

Table 3. Continued

Perceived severity			
4. Influenza is a serious disease that may lead to complications			
Agree	85 (49.4)	87 (50.6)	*
Disagree	4 (100.0)	0 (0)	
Neutral	4 (66.7)	2 (33.3)	
**Insufficient numbers for univariate analysis*			
Perceptions and cues to action	**Unvaccinated (%)**	**Vaccinated (%)**	**P value**
Perceived benefits			
5. I can protect my family members from flu by being vaccinated			
Agree	56 (42.7)	75 (57.3)	<0.001
Disagree	16 (84.2)	3 (15.8)	
Neutral	21 (65.6)	11 (34.4)	
6. I can protect patients from flu by being vaccinated			
Agree	63 (45.0)	77 (55.0)	<0.05
Disagree	11 (84.6)	2 (15.4)	
Neutral	19 (70.4)	9 (29.6)	
Perceived barriers			
7. By staying at home when I am ill, I can **sufficiently** protect patients without being vaccinated			
Agree	34 (56.7)	26 (43.3)	**0.21**
Disagree	35 (43.8)	45 (56.3)	
Neutral	24 (57.1)	18 (42.9)	
8. As far as I know, there is insufficient scientific evidence that influenza vaccination is effective in preventing flu			
Agree	33 (75.0)	11 (25.0)	<0.001
Disagree	26 (29.9)	61 (70.1)	
Neutral	32 (66.7)	16 (33.3)	
ns – not significant			
Perceptions and cues to action	**Unvaccinated (%)**	**Vaccinated (%)**	**P value**
Perceived barriers *continued*			
9. I think it's better to catch influenza than to get vaccinated against influenza annually			
Agree	13 (100.0)	0 (0.0)	<0.001
Disagree	57 (41.9)	79 (58.1)	
Neutral	22 (71.0)	9 (29.0)	

Table 3. Continued

10. Getting vaccinated against influenza annually is completely up to me			
Agree	85 (54.8)	70 (45.2)	<0.05
Disagree	2 (16.7)	10 (83.3)	
Neutral	5 (35.7)	9 (64.3)	
11. I think that the relevance of annual influenza vaccination is overestimated			
Agree	22 (71.0)	9 (29.0)	<0.001
Disagree	30 (35.7)	54 (64.3)	
Neutral	40 (60.6)	26 (39.4)	
12. My own immune system will protect me from getting the flu			
Agree	40 (75.5)	13 (24.5)	<0.001
Disagree	26 (31.0)	58 (69.0)	
Neutral	27 (60.0)	18 (40.0)	
Perceptions and cues to action	**Unvaccinated (%)**	**Vaccinated (%)**	**P value**
Perceived threats			
13. I am afraid of side effects from the flu vaccine			
Agree	54 (72.0)	21 (28.0)	<0.001
Disagree	19 (28.4)	48 (71.6)	
Neutral	19 (48.7)	20 (51.3)	
14. I believe the flu vaccine can give you flu			
Agree	29 (82.9)	6 (17.1)	<0.001
Disagree	39 (36.8)	67 (63.2)	
Neutral	25 (64.1)	14 (35.9)	
15. People feel unwell after being vaccinated			
Agree	46 (63.9)	26 (36.1)	<0.001
Disagree	9 (24.3)	28 (75.7)	
Neutral	38 (52.8)	34 (47.2)	
Cues to action			
16. Hospital promotion (e.g. posters/leaflets) of vaccination influences my decision to get vaccinated			
Agree	32 (41.0)	46 (59.0)	<0.05
Disagree	38 (64.4)	21 (35.6)	
Neutral	23 (53.5)	20 (46.5)	
Perceptions and cues to action	**Unvaccinated (%)**	**Vaccinated (%)**	**P value**
Cues to action *continued*			
17. Most of my colleagues are vaccinated against influenza annually			
Agree	26 (37.7)	43 (62.3)	0.005
Disagree	38 (55.1)	31 (44.9)	
Neutral	30 (68.2)	14 (31.8)	

Table 3. Continued

18. I think it's the responsibility of healthcare workers to get vaccinated against influenza annually			
Agree	36 (33.3)	72 (66.7)	<0.001
Disagree	21 (91.3)	2 (8.7)	
Neutral	36 (72.0)	14 (28.0)	

In a separate multivariate analysis to Table 3 above, binomial regression was used to predict which independent or explanatory variables best determined vaccination in the 2016/17 season. When adjusted for age and having a non-occupational reason for vaccination, of the 18 predictor variables, only three were statistically significant: fear of influenza vaccine side-effects, the perception that there is insufficient evidence to recommend influenza vaccination and the perception that if one is healthy there is no need to be vaccinated.

Those who did not agree (disagreed and neutral) with the statement "I am afraid of side-effects of the flu vaccine" were 1.8 times more likely to be vaccinated than those who agreed. Those who did not agree that there is insufficient scientific evidence for influenza vaccine efficacy were twice as likely (OR 2.02, 95%CI 1.15 – 3.55, p= 0.01) to be vaccinated compared to those who agreed. Participants who did not agree with the statement "I'm healthy, so there is no need for me to be vaccinated" were 3.94 times more likely to be vaccinated than those who agreed (95% CI 2.24 – 6.93, p<0.0005).

Practice of Recommending Vaccination to Patients in Oncology Day Wards

Most frequently (45.9%, n = 85) respondents recommended influenza vaccination to all their patients. Almost 40% (n=73) recommend the vaccine to some (but not all) patients. This was frequently attributed to variation in consultant practice. A minority of respondents (12.4%, n=23) stated that they never recommend the influenza vaccine to patients, most frequently due to not believing it was their responsibility. A lack of awareness that they should offer vaccination was the next most frequently cited reason. When asked who was responsible for advising patients about vaccination, more than half of surveyed staff felt any clinical staff member (55.1%, n = 102) or specifically the patient's treating consultant (55.7%, n = 103) was appropriate. Few (5.4%, n=10) felt that no staff member should be advising patients to receive the vaccine.

Discussion

The 2016/17 seasonal influenza vaccine uptake in surveyed oncology day ward staff in Ireland was 48%. This rate was comparable to that observed previously in a German cancer centre [16] but lower than that observed in US oncology settings.[3, 4] It is higher than the hospital HCW rate observed nationally in the 2017/18 season (44.8%)[9] and exceeds the HSE target at the time of the survey of 40%.

Very few respondents reported being unable to receive the vaccine due to time constraints or difficulty in accessing vaccination clinics. This suggests that opportunities for staff to avail of vaccination are, for the most part, sufficient.

This study highlighted that false beliefs about influenza and influenza vaccination are held by some oncology staff. These included disbelief in the benefits that vaccination provides to HCWs and their patients, the susceptibility HCWs have to influenza and the effectiveness of the vaccine. Some respondents also highlighted fears centred on vaccine side-effects and a belief that vaccination can lead to influenza.

When age-adjusted, all perceptions and cues to action had a statistically significant association with vaccination (with the exception of the perceptions that influenza is a serious disease and that by staying at home when unwell, staff protect patients sufficiently). When adjusted for age and having a non-occupational reason for vaccination, the following

perceptions predicted vaccination: not having a fear of vaccine side-effects, not believing that if one is healthy, there is no need for vaccination and lastly, not believing that there is insufficient evidence of the efficacy of influenza vaccination.

Those with a higher knowledge score were three times more likely to be vaccinated. These findings are in line with past international research.[13-15, 17-25]

The majority of respondents recommend influenza vaccination to some or all of their patients. Individual consultant recommendation and practice was commonly cited as a factor in not recommending vaccination to all patients, suggesting there is differing practice among oncologists in recommending the influenza vaccine. Consultant oncologists can influence vaccine recommendation to patients.

This survey focused on oncology day ward staff and was not representative of all who work in oncology. Private hospitals where chemotherapy may also be administered were omitted. However, the survey was nationally representative with 24 of 26 hospitals partaking in the survey. In order to achieve a good response rate, the survey was conducted over one day and therefore was only representative of those HCWs present on that day. However, uptake of the survey was almost 90% in 16 hospitals and 185 staff were included. Most respondents were female, and nurses, which is likely representative of those working in this setting. Consequently the data were homogenous, and difficulties arose in adjusting for the potential confounding impacts of occupation and gender. The cross-sectional study design is open to limitations. Vaccine uptake rates for the previous influenza season were self-reported. However, as the survey was anonymous, and uptake was for one previous season, there is no reason to suspect that this led to recall bias.

Although vaccine uptake in oncology day-ward staff exceeds the national HCW target, there is still scope for improvement. This study suggests that the strongest predictors of vaccination are fear of side-effects, disbelief in vaccine effectiveness and the perception that vaccination is not required if one is healthy. Targeting these misconceptions and allaying fears may be of use in increasing vaccine uptake. Oncology patients are especially vulnerable to influenza complications. They are more likely to acquire infection through contact with healthcare settings and are less likely to mount a response to vaccination. A safe and relatively effective method of primary prevention is available to protect these patients and their HCWs. Every effort should be made to ensure HCWs are given the opportunity to get vaccinated, are provided with evidence of vaccine effectiveness and safety and are empowered to recommend influenza vaccination to their patients.

Conflicts of Interest Statement:
The authors have no conflicts of interest to declare.

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