



Seasonal Influenza Vaccine: Uptake, Attitude, and Knowledge Among Patients Receiving Immunoglobulin Replacement Therapy

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Abstract

Influenza is a potential cause of severe disease in the immunocompromised. Patients with hypogammaglobulinemia, in spite of adequate replacement therapy, are at risk of significant morbidity and adverse outcomes. A seasonal vaccine is the primary prophylactic countermeasure to limit disease. The aim of this study was to evaluate the attitude, knowledge, and influenza vaccine uptake among Irish patients receiving immunoglobulin replacement therapy (IgRT), as well as uptake in co-habitants. Fifty-seven percent of patients receiving IgRT at a regional immunology referral center completed a questionnaire evaluation. Seventy-six percent of IgRT patients received the influenza vaccine for the 2019 season. Ninety-eight percent recognized that influenza could be prevented with vaccination, and 81% deemed it a safe treatment. Ninety-three percent correctly identified that having a chronic medical condition, independent of age, was an indication for vaccination. Despite excellent compliance and knowledge, many were not aware that vaccination was recommended for co-habitants, and only 24% had full vaccine coverage at home. Those who received advice regarding vaccination of household members had higher rates of uptake at home. This study demonstrates awareness and adherence to seasonal influenza vaccine recommendations among patients receiving IgRT. Over three quarters felt adequately informed, the majority stating physicians as their information source. We identified an easily modifiable knowledge gap regarding vaccination of household members. This data reveals a need to emphasize the importance of vaccination for close contacts of at-risk patients, to maintain optimal immunity and health outcome.

Keywords Influenza vaccine · Immunoglobulin replacement therapy · IVIg · SCIg · Hypogammaglobulinemia

Introduction

Seasonal influenza is a transmissible acute respiratory illness that causes a mild infection in the majority of people. It is a public health concern as high-risk populations have an increased likelihood of severe disease [1, 2]. There are year-to-year minor antigenic drift and periodic major antigenic shift; thus, annual vaccination is required and has been shown to effectively reduce morbidity and mortality [3, 4].

Infection-related complications are more prevalent in immunocompromised individuals, those over 65 years of age, people with chronic health conditions, and pregnant women [5–8]. The

World Health Organization (WHO) estimates over 40,000 people in the European Union die prematurely each year from influenza-related complications, and this figure can be reduced if at least 75% vaccine coverage is attained in risk groups [9, 10]. Disease surveillance is undertaken in most developed countries; however, many nations, including Ireland, have no central registry for vaccine monitoring [11, 12].

Patients with hypogammaglobulinemia are particularly susceptible to disease affecting the respiratory tract [13]. Regular immunoglobulin replacement therapy (IgRT), intravenous or subcutaneous, is the mainstay of management for these patients. Pooled immunoglobulin provides protective titers to most common vaccine agents (mumps, rubella, varicella); however, protection against influenza is ineffective due to antigenic drift [14, 15]. Patients can glean some protective benefit from vaccination, despite impaired ability to develop antibodies; thus, annual vaccination is recommended [16, 17]. In this setting, vaccination of close contacts is vital to limit transmission. Irish and most international guidelines specifically advise vaccination for healthcare workers, carers, and co-habitants of at-risk populations [18–20].

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International data demonstrated that failure of patients to identify as “at-risk” as well as perceived cost of vaccination are negative determinants for compliance [21, 22]. Of concern, Irish population-based figures demonstrated a disappointing 28% uptake in those < 65 years with a chronic medical condition, while a 60% uptake in individuals ≥ 65 years still falls short of WHO target coverage [21]. Similar low rates of vaccine uptake are reflected in population-based studies of many developed nations [23, 24].

Global data consistently report suboptimal vaccine uptake in adults with chronic medical conditions; however, there is scant information available on vaccine compliance in those with immunodeficiency disorders [25]. Those with hypogammaglobulinemia are specifically vulnerable to infectious complications leading to hospital admission and adverse health outcomes [17]. Understanding influenza vaccine coverage and attitudes toward vaccination in this group is of particular importance to tailor education and identify specific barriers.

The objectives of this study were to measure seasonal influenza vaccine uptake among patients receiving regular IgRT in our center and to explore knowledge and attitudes toward the influenza vaccine in this population.

Methods

Information was gathered from November 2019 to March 2020, among adults receiving regular IgRT under the care of the Immunology department in a large Irish tertiary

referral hospital. A previously validated questionnaire was used with minor modifications ([22] Appendix). The questionnaire covered four domains: demographics, vaccination and health status, knowledge and education, and co-habitant vaccination. All home-based and hospital day ward-based patients receiving IgRT were invited to take part. Vaccination was not provided by the Immunology department; thus, the data reflects patients receiving vaccination in the community.

Responses were anonymized. The study design and questionnaire were approved by the local Research Ethics Committee (Appendix). Descriptive statistics and chi-squared analysis were applied where relevant and statistical significance set at $p < 0.05$.

Results

The response rate to the questionnaire was 57% (55/97). Socio-demographic characteristics are detailed in Table 1. The mean age of participants was 51.5 years (22–80 years), and there was a slight male predominance (56%; Table 1). Education status was high among participants; 62% had a tertiary level qualification, and 27% had completed secondary level studies. A sizable portion, 67%, had access to a medical or general practitioner (GP) visit card, thus are eligible for free public health services in Ireland, compared with approximately 30% of the general population ([26]; Table 1). Granting of a medical/GP card is primarily based on income grounds, or if the burden of healthcare costs would result in hardship.

Table 1 Demographics of study participants. Mean age was 51.5 years, and 56% were male. Educational attainment was high, but this did not significantly impact on vaccine status. Access to a medical/GP card was associated with increased vaccine uptake, which was independent of solely having access to free vaccination. Chi-squared results are represented by p values, * $p < 0.05$

	Number (%)	Vaccination		Chi-squared
		Yes (%)	No (%)	
Age				
18–49	28 (51%)	21 (75%)	7 (25%)	0.58
50–64	13 (24%)	9 (69%)	4 (31%)	
> 65	14 (25%)	12 (86%)	2 (14%)	
Gender				
Male	31 (56%)	20 (65%)	11 (35%)	0.015*
Female	24 (44%)	22 (92%)	2 (8%)	
Education level				
Primary	4 (7%)	4 (100%)	0	0.4688
Secondary	15 (27%)	12 (80%)	3 (20%)	
Tertiary	34 (62%)	25 (73%)	9 (27%)	
Unanswered	2 (4%)			
Healthcare				
Medical/GP card	37 (67%)	32 (86%)	5 (14%)	0.0074*
Neither	17 (31%)	9 (53%)	8 (47%)	
Unanswered	1 (2%)			
Cost of vaccine				
Access to free Vaccine.	41 (75%)	33 (80%)	8 (20%)	0.22
Pay for vaccine	14 (25%)	9 (64%)	5 (36%)	

In total, 76% participants received the influenza vaccine for the 2019 season, meeting WHO target coverage rate ([25]; Table 2). Levels of vaccination were similar throughout age distributions. There was a notable sex difference, 22 of 24 female patients (92%) being vaccinated compared with 20 of 31 males (65%) (chi-squared < 0.05; Table 1). Vaccine uptake was marginally lower in the preceding years (Table 2). There was consistency with the same patients not engaging in vaccination; however, true rates could be clouded by recall bias.

Most patients (67%; Table 3) had previously received information regarding the seasonal influenza vaccine. The majority (78%) specified that information was given by

healthcare staff. Within this group, various media channels were stated as a secondary information source. For the most part, patients found previous information helpful; 62% reported it as good or very good, while the remaining 30% reported it as moderately useful (Table 3). Ten of 13 unvaccinated patients elaborated on reasons for non-vaccination. The stated reasons included the incorrect belief that vaccination was redundant in those with hypogammaglobulinemia, that vitamin supplements gave sufficient protection, a lack of concern about contracting influenza, or being too unwell to receive it. Association between receiving information and vaccine uptake fell short of statistical significance (chi-squared $p = 0.09$;

Table 2 Vaccination and health status. In the 2019/20 season, 76% of participants received the influenza vaccine. Numbers were lower in preceding years, as was recall. The majority of participants were not concerned about contracting influenza and reported positively on health status

Influenza vaccination			
Year	Yes (%)	No (%)	Unsure (%)
2019	42 (76%)	13 (24%)	0
2018	39 (71%)	15 (27%)	1 (2%)
2017	37 (67%)	13 (24%)	5 (9%)
2016	38 (69%)	11 (20%)	6 (11%)
2015	31 (56%)	12 (22%)	12 (22%)
Perception of Health: 1 bad, 10 very good			
Self-reported score	N (%)		
10–7	38 (69%)		
6–4	12 (22%)		
3–1	5 (9%)		
Hospital admission in the last 12 months			
Amount	Total	Infective cause	Non-infective cause
0	37 (67%)	n/a	n/a
1	10 (18%)	6 (60%)	4 (40%)
> 1	8 (15%)	6 (75%)	2 (25%)
Concern about developing influenza: 1 not worried, 10 very worried			
Self-reported score	N (%)		
10–7	15 (69%)		
6–4	19 (9%)		
3–1	20 (22%)		
Unanswered	1 (2%)		
Usefulness of influenza vaccine: 1 not useful; 10 very useful			
Self-reported score	N (%)		
10–7	43 (78%)		
6–4	11 (20%)		
3–1	0		
Unanswered	1 (2%)		
Danger of influenza vaccine: 1 not dangerous, 10 very dangerous			
Self-reported score	N (%)		
10–7	6 (11%)		
6–4	4 (7%)		
3–1	45 (82%)		
Unanswered	1 (2%)		

Table 3 Vaccine-associated knowledge and education. The majority of participants correctly identified vaccine-preventable disease and populations at increased risk of severe disease from influenza. Most had received information about the influenza vaccine before, which they found useful, and healthcare professionals were stated as the primary source. Chi-squared results are represented by *p* values

Can vaccination protect against infection?	Yes (%) 47 (85%)	No (%) 3 (5%)	Uncertain 5 (10%)	
What diseases are vaccine-preventable?				
Disease	N (%)			
Influenza	54 (98%)			
Pneumonia	34 (62%)			
Meningitis	27 (49%)			
AIDS/HIV	2 (4%)			
Heart attack	0			
Common cold	5 (9%)			
Who is at-risk of severe influenza?				
Population	Yes (%)	No (%)	Uncertain (%)	
Healthy 5–18 year olds	10 (18%)	45 (82%)	5 (9%)	
< 65 years with chronic disease	51 (93%)	4 (7%)	0	
Healthy young adults	5 (9%)	50 (91%)	0	
> 65 years old	51 (93%)	4 (7%)	0	
Pregnant women	18 (33%)	35 (63%)	2 (4%)	
Influenza awareness				
Statement	Agree (%)	Disagree	Uncertain	
Influenza is rare.	3 (5%)	46 (84%)	6 (11%)	
Influenza is serious.	44 (80%)	2 (4%)	9 (16%)	
Influenza may be prevented.	38 (69%)	5 (9%)	12 (22%)	
Education regarding the influenza vaccine				
Received vaccination, 2019				
Previously received information	N (%)	Yes (%)	No (%)	Chi-squared
Yes	37 (27%)	30 (81%)	7 (19%)	0.093
No	18 (33%)	12 (67%)	6 (33%)	
From a healthcare worker	29 (78%)	24 (88%)	5 (17%)	
From a non-healthcare source	5 (14%)	4 (80%)	1 (20%)	
Not stated	3 (8%)			
Usefulness of information provided		Yes	No	Chi-squared
Very good–good	34 (62%)	27 (79%)	7 (21%)	0.33
Moderate	15 (27%)	10 (67%)	5 (33%)	
Bad–very bad	0	n/a		
Unanswered	6 (11%)	n/a		

Table 3). However, interpretation and integration of healthcare advice is challenging to accurately quantify.

Most participants expressed only mild to moderate concern regarding contracting influenza, which was paralleled by good self-reported health status and relatively low hospital admission rate (Table 2). In general, participants regarded the influenza vaccine favorably; 78% felt it was useful, and 82% deemed it to be safe (Table 2). Patients understood that influenza was not rare (84%), could be serious (80%), and was vaccine-preventable (69%; Table 3). Patients also correctly identified other vaccine-preventable diseases (Table 3). Furthermore, most participants (93%) recognized that persons over 65 years of age and younger adults with chronic medical conditions were at risk of more severe illnesses from influenza and correctly recognized that healthy children (45; 82%), and young adults without chronic conditions (50; 91%) were not in the same risk category. Pregnant women are deemed an at-risk group; only 34% of our population identified this correctly [25].

Six (11%) respondents live alone, 33% have one co-habitant, 22% have 2, and 34% have 3 or more co-habitants (Table 4). Despite excellent personal vaccine compliance and apparent influenza awareness, just over half (57%) of those surveyed were aware that seasonal influenza vaccination is recommended for co-habitants. Most of this group (73%) stated specific advice

came from a healthcare source (Table 4). There was a positive correlation between receiving advice regarding vaccination of co-habitants and uptake in at least one household member (chi-squared, $p < 0.001$). Unfortunately, overall household vaccination rates were suboptimal. Of the 49 participants (89%) that live with at least one other person, less than half (48%) reported vaccination of one or more household members. Twelve (24%) had vaccine coverage of all household members (Table 4).

Discussion

The seasonal influenza vaccine is the most effective way of preventing influenza disease, and annual vaccination is recommended to close contacts of high-risk populations to limit transmission [3]. Despite potential disease severity, availability of an effective vaccine, and public campaigns to encourage uptake, compliance remains low in many susceptible groups [21, 22].

Patients with hypogammaglobulinemia are deemed at high risk of infective complication, in spite of adequate immunoglobulin replacement therapy [17, 27]. Those with antibody deficiency might benefit modestly from vaccination and may rely greatly on herd immunity for optimal health outcomes [28]. The focus of this study was to assess seasonal influenza

Table 4 Vaccination of co-habitants. Most participants had at least one household member. Over half were aware that vaccination is indicated for co-habitants, but less than one quarter had full vaccine cover at home.

Awareness about vaccination for co-habitants was correlated with increased uptake. Chi-squared results are represented by *p* values, **p* < 0.05

Household contacts		Vaccination of co-habitants			
Live Alone	6 (11%)				
1	18 (33%)				
2	12 (22%)				
≥ 3	19 (34%)				
	<i>N</i> (%)	All co-habitants	Some co-habitants	None	
Have co-habitants	49 (89%)	12 (24%)	n/a	25 (51%)	
Lives with 1	18 (37%)	8 (44%)	n/a	10 (59%)	
Lives with ≥ 2	31 (63%)	4 (13%)	12 (39%)	15 (48%)	
Aware that cohabitants should be vaccinated		≥ 1 Co-habitant vaccinated			Chi-squared
	<i>N</i> (%)	Yes (%)	No (%)		
Aware of vaccination	28 (57%)	22	6		< 0.001*
Not aware	21 (43%)	1	20		
Information source					
Informed by healthcare worker	19 (68%)				
Informed by non-healthcare worker	7 (25%)				
Unanswered	2 (7%)				

vaccine in patients and co-habitants of those receiving IgRT. We report a reassuring 76% uptake of the influenza vaccine during the 2019/20 season, which meets the WHO target coverage rate for at-risk groups [4] (Table 2). Compliance was 73% in those < 65 years, exceeding uptake rates of age-matched patients with other chronic diseases in numerous developed nations [21–24]. This was a single-center study with a small sample size; however, our results are in keeping with two North American surveys for the 2016/17 season. One reported 75% uptake among one thousand adults with a primary antibody deficiency; the other reported 76% in over 600 patients with CVID [25, 29]. Neither study investigated patient insight or vaccination of co-habitants.

In our study, vaccination rates were consistent between age groups, but there was a sex bias; 92% compliance among females, compared with 65% in males (chi-squared, *p* < 0.05; Table 1). The reason for this is unclear. A gender difference in vaccine uptake is not universally reported. International data is mixed; many report no difference, several studies find men are more likely to receive vaccination than women, and others report the reverse [30–32].

Previous studies have shown certain factors are associated with increased vaccine uptake, knowledge that influenza is common and can be serious, trust in the safety of vaccination, and physician recommendation [21, 23, 24]. Many of these factors were identified in our study, and it is widely acknowledged that recommendation by a healthcare worker is one of the strongest modifiable factors to encourage vaccine uptake [33, 34]. Our data support the important role of physicians in

vaccine advocacy, particularly concerning advice for vaccination of co-habitants (Table 4). Various studies report the misconception that the influenza vaccine can cause an acute influenza infection is a common barrier to vaccination [23]. This was not prevalent in our group.

Self-identification, awareness, and knowledge among patients receiving IgRT highlight an understanding that is often absent in other at-risk cohorts. Many perceived barriers to vaccination were not present, for example, mistrust or poor understanding of its role in preventing disease [22, 23] (Table 3). Interestingly, population-based research indicates that the inability to self-identify as “at-risk” is a major barrier to vaccine uptake, particularly in those < 65 years of age [21, 22, 35]. IgRT is a relatively intrusive therapy, and historically, patients have a high rate of healthcare attendances, thus allowing abundant opportunity for patient education. Furthermore, frequent interactions could foster self-identification as being susceptible to infection, making patients more cautious in seeking vaccination [36]. We did not record the duration of IgRT for each participant, so we are unable to specifically comment on frequency of healthcare interactions. Over two-thirds of our participants have access to free public healthcare through a medical/GP card. Correlation between medical/GP card ownership and vaccine uptake was significant (chi-squared < 0.05; Table 2). Similarly, previous Irish data found that having free healthcare was a positive predictor for vaccination [21]. However, when our population was asked specifically about cost incurred by vaccination, there was no significant difference in vaccine uptake between those who paid compared with those

who were vaccinated for free (chi-squared, $p = 0.22$; Table 1). Medical card ownership and increased vaccine uptake are likely multifactorial and not solely based on availability of free vaccination. Cost as a barrier to vaccination is deemed by many physicians to be a foregone conclusion; however, it is an area that merits further scrutiny. Interestingly, a population-based survey in North America demonstrated a divergence in opinion between patients and healthcare providers in this regard. In a setting where access to publicly funded healthcare is limited, a minority of patients viewed cost as a barrier to vaccination, whereas up to two-thirds of physicians believed that monetary concerns were a primary deterrent [35, 37]. As countries strive toward optimal vaccine coverage, efforts are continually being made to identify barriers for engagement. These results emphasize that education and awareness of the influenza vaccine may surpass access to free vaccination; as one is less likely to seek immunization, if unaware of its benefit, regardless of cost.

There was a low rate of vaccine uptake in co-habitants; only 12 participants (24%) had full vaccine cover at home. This study shows a correlation between advice for vaccination of co-habitants and rate of coverage in household members (chi-squared, $p < 0.001$; Table 4). Similar rates of vaccination coverage have been documented by others that assessed household members of those with chronic disease [38]. The age, risk profile, and health of co-habitants were not recorded in our data; thus, we are unable to discriminate between household members that were vaccinated to protect our patient, or for another reason. Nonetheless, these findings do highlight a significant gap in vaccine coverage that exposes our cohort to increased transmission risk. This could be modifiable with focused education regarding the importance of vaccination in all close contacts.

Vaccination of healthy household members may be perceived as challenging. However, data show that decreasing transmission to vulnerable individuals is a strong motivation for healthy adults [37]. In a university-based survey, 71% of unvaccinated healthy students indicated willingness to be vaccinated in light of helping others [37]. These findings emphasize that individuals can be incentivized to engage in vaccination uptake for altruistic means.

Study Strengths and Limitations

This is a small, single-institution study; thus, some findings may not be generalizable to other populations. A response rate of 57% exceeds many population-based questionnaires [24, 29], and 76% influenza vaccine uptake parallels findings from larger international surveys in a similar population [29, 34, 35]. High educational attainment was noted in participants, 62% holding a tertiary level qualification, which in theory could self-bias toward active engagement with healthcare information. Contrary to

this, others have demonstrated that educational level is not a self-determining predictor of vaccine uptake [39, 40].

The questionnaire was extensive and previously validated. Self-selection of those in favor of vaccination could predispose to engagement in the questionnaire. There is no national registry for influenza vaccination to allow us to compare our vaccination rate with an objective measure. However, many studies on self-reported influenza vaccine status have established robust validity in a questionnaire-based approach [25, 40]. Moreover, data collection took place immediately after the vaccination season, thus limiting recall bias.

Conclusion

This study shows satisfactory influenza vaccine uptake among patients receiving IgRT in a large referral hospital. Our population meets WHO target vaccine coverage, parallels international findings, and greatly exceeds influenza immunization in other high-risk groups [21, 25, 29]. The majority of patients had previously received advice on seasonal vaccination, felt well-informed, and stated a physician as their primary information source.

Vaccine uptake among household members was low, thus potentially increasing influenza transmission risk. To our knowledge, this is the first time that this has been reported in an immunodeficiency cohort. This study demonstrates a need to specifically recommend immunization to close contacts and household members of these patients. Enhancing vaccination rates in co-habitants to those at-risk is likely achievable. In light of the current study, we recommend healthcare workers emphasize the importance of an annual influenza vaccine to patients on IgRT and educate them that vaccination of close contacts offers additional protection. For optimal impact, this advice should be teamed with complementary written information. A follow-up study is being planned to assess the outcome of this intervention and further delineate vaccination uptake rate of co-habitants.

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Author Contributions FC and NC conceived the research and designed the study. FC interpreted data and wrote the manuscript; FC, CK, AS, DE, and NC contributed to the acquisition of clinical data and recruitment of participants. All authors read and approved the manuscript.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

Appendix

Section A&B. These sections are designed to gather information about your socio-demographic characteristics and health status.

A1. Sex: Male Female

A2. How old were you on your last birthday? _____

A3. What is your highest level of education? Primary School Secondary School Third Level

A4. What is your marital status? Married Single (never married) Other _____

A5. What is your occupation? _____

A6. How many people live with you? _____

B1. Do you have a Medical Card GP Visit Card Neither

B2. Have you been hospitalised in the last year? Yes No, (how many times? _____),
Why?

1) _____ 2) _____

3) _____ 4) _____

B3. On a scale from 1 to 10, how would you classify your current state of health?
(1 bad; 10 very good) _____

Section C. This section is designed to gather information about your knowledge of vaccine-preventable diseases.

C1. Vaccinations are interventions that protect against infectious disease? Yes No

C2. Which of the following diseases can be avoided with vaccination?

flu pneumonia meningitis shingles AIDS /HIV

hepatitis C heart attack cold

C3. In your opinion, which of the following subjects are at higher risk of developing severe forms of flu?

children <6 months old children and young persons (5-18 years) <64 years old with chronic conditions healthy young adults elderly (≥65 years old) pregnant women

other (please specify) _____

C4. For each of the following statements indicate whether you are in agreement, uncertain or disagree	agreement	uncertain	disagree
Flu is rare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flu is serious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flu may be prevented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section D. This section is designed to gather information about your attitudes towards flu and the flu vaccine.

D1. On a scale from 1 to 10, how much are you worried about developing flu? (1 not worried; 10 very worried) _____

D2. On a scale from 1 to 10, how useful do you believe vaccination to prevent flu? (1 not useful; 10 very useful) _____

D3. On a scale from 1 to 10, how dangerous do you believe the flu vaccination to be? (1 not dangerous; 10 very dangerous) _____

D4. If you think it to be dangerous why? _____

Section E. In this section I will ask you some questions on health-related behaviors.

E1. Did you receive a vaccination against flu in 2018? Yes No

Who advised you to have it?: _____

If no, why? _____

E2. Did you receive a vaccination against flu in previous years?

	YES	NO	NOT SURE	REASON
2017	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2016	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2015	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2014	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

E3. Do you intend to receive a vaccination against flu this winter?

if yes,

why? _____

if no,

why? _____

if not sure,

why? _____

E4. Were any of your household members (wife/husband, children, caregiver, etc.) advised to get the flu vaccination?

Yes No Not sure

If yes, by whom? _____

E5. Did they receive flu vaccine in 2018? Yes No Not sure

If yes, how many? _____ of _____

E6. In your opinion, how much will it cost you to get the flu vaccination?

it is totally at my charge it is totally free it is partially at my charge

other _____

Section F. This section is designed to assess the sources from which you acquire information about flu vaccination

F1. Have you received information about flu vaccination before today?

Yes No, from whom?

F2. How useful did you believe previous information about flu vaccination to be?

very bad bad moderate good very good

F3. Do you feel you need more information about flu vaccination? Yes No

If yes,

why? _____

If no,

why? _____

Thank you for completing our questionnaire.

Please use the enclosed stamped addressed envelope to return the completed survey and signed consent form.

Address: Immunology Department, St James's Hospital, Dublin 8.

If you have any question please contact the Immunology Department on (01) 416 4147.

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