Original Article

A study to assess the utilization of the influenza vaccine amongst doctors and nurses in the medical wards at Mater Dei Hospital

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Abstract

Introduction: Seasonal influenza may be associated with a high morbidity and mortality rate. Efforts at promoting effective influenza vaccination in the general population and amongst health-care workers have been of increasing importance over recent years.

Aim: To assess use of influenza vaccine amongst doctors and nurses working in the medical wards at Mater Dei Hospital.

Method: Data was collected using questionnaires supplied to nurses on the wards and posted online to doctors.

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Results: A total of 130 questionnaires were completed. Results showed underutilization of the vaccine, with only 34% of respondents taking the vaccine in 2015. 43% of doctors (*n*=76) and 20% of nurses (*n*=54) confirmed taking the vaccine. 44% of senior doctors (HST level and above; *n*=27), were compliant with the vaccination; 43% of the junior doctors (*n*=49) took the vaccine, of which foundation-year doctors formed the larger portion (FY 55%; BST 19%). In the case of nurses, 25% of the 8 senior nurses took the vaccine, and 19% of the 46 staff nurses were compliant. The commonest reasons for non-compliance to vaccination included doubt about its beneficial effects and fear of side effects. The most effective method for promoting the influenza vaccine included nurses handing out the vaccine on site

Conclusion: The influenza vaccination coverage-rate in Malta amongst health-care workers during the 2015-2016 season was estimated to be 33.8%. The audit was limited by its small sample size and selection bias. Improved education about the beneficial effects of the vaccine is recommended in order to improve outcomes.

Keywords

Influenza, vaccine, immunization, health-care workers

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Introduction

Influenza, is an acute infectious disease caused by an RNA virus which attacks the respiratory system. It is one of the most common causes of human respiratory tract infections and holds a high morbidity and significant mortality rates. The 1918 pandemic killed about 50 million people all over the world.[1] Influenza outbreaks usually occur in annual cycles, mainly during the winter months. Symptoms can be mild to severe and include: high fever, coryza, sore throat, cough, myalgia, headache and generalized lethargy and

malaise. Disease severity is greatest in the elderly, infants, and immunocompromised patients. Transmission occurs mainly via air-borne droplets of respiratory tract secretions as well as by direct contact.

The most effective measure against the influenza virus has been shown to be the prevention of infection by vaccination with inactivated or live attenuated virus. Studies in young and healthy individuals have shown 70% to 90% effectiveness in preventing influenza, with lower rates seen in the elderly population.[2] Continuous viral antigenic drift causes new variant strains of influenza to emerge, rendering previously effective vaccines ineffective after a few years and hence annual re-vaccination is recommended.

The aim of this audit was to establish the vaccination rate amongst doctors and nurses in Malta during Autumn 2015, with the purpose of initiating the necessary changes in order to improve the vaccination rate amongst health care workers, both for their own protection and for the protection of patients. The risk of exposure to influenza virus is higher in health care workers than the general population, due to their increased contact with infected patients during routine clinical practice.

Method

Questionnaires were supplied to doctors and nurses working in the medical wards at Mater Dei Hospital. Nurses received a paper version of the questionnaire by hand whilst doctors received a link to an electronic version of the identical questionnaire via email or through social media.

The wards included in the audit included the respiratory wards (M3 and M6), cardiac medical ward, neuro-medical ward, the acute medical admission wards (MAU1, MAU2 and MAU3) and the medical wards M1 and M2.

The questionnaire was centered around the influenza vaccine which was distributed during the month of Autumn 2015. It included questions which addressed whether or not the vaccine was taken and the main reasons which affect health care workers in their decision to take the vaccine. The best method for publicizing the influenza vaccine was also addressed. The questionnaire is included in Appendix 1.

Results

Demographic details

A total of 130 questionnaires were completed. Out of the respondents, 44 (33.8%) were male and 86 (66.2%) were female. 87 respondents (66.9%) were aged between 20 and 30 years, while 43 (33%) were above the age of 30. In total, 76 doctors and 54 nurses replied to the questionnaire. The response rate among nurses was 54%. It is not possible to estimate the response rate among doctors as the number of doctors contacted is unknown.

Percentage of respondents who took the vaccine in 2015

A total of 44 (33.8%) respondents took the vaccine in 2015, out of which 33 were doctors, and 11 were nurses (refer to table 1). It was noted that 20.3% of nurses who replied to the questionnaire took the vaccine during Autumn 2015, compared to the 43.4% of doctors who took the vaccine during the same time frame. There was a significant difference in the uptake of the vaccine between doctors and nurses (p=0.0063; using N-1 Chi Squared test with 95% confidence interval).

Table 1: *Vaccine uptake in 2015*

	Took the vaccine (%)	Did not take vaccine (%)
Doctors	33 (43.4%)	43 (56.6%)
Nurses	11 (20.3%)	43 (79.7%)
Total	44 (33.8%)	86 (66.2%)

Respondents who took the vaccine according to grade

Compliance to the influenza vaccine was highest amongst the junior doctors (FY1/FY2) at 54%, and amongst the more senior staff; Consultant/RS, HST and Senior Staff nurses; 44% and 25% respectively. The lowest compliance rates were amongst the middle grade doctors (BST = 18%) and more junior staff nurses (19%). Refer to table 2 and figure 1 below.

***Figure 1**: Percentage of Health care workers who took the vaccine according to Grade*

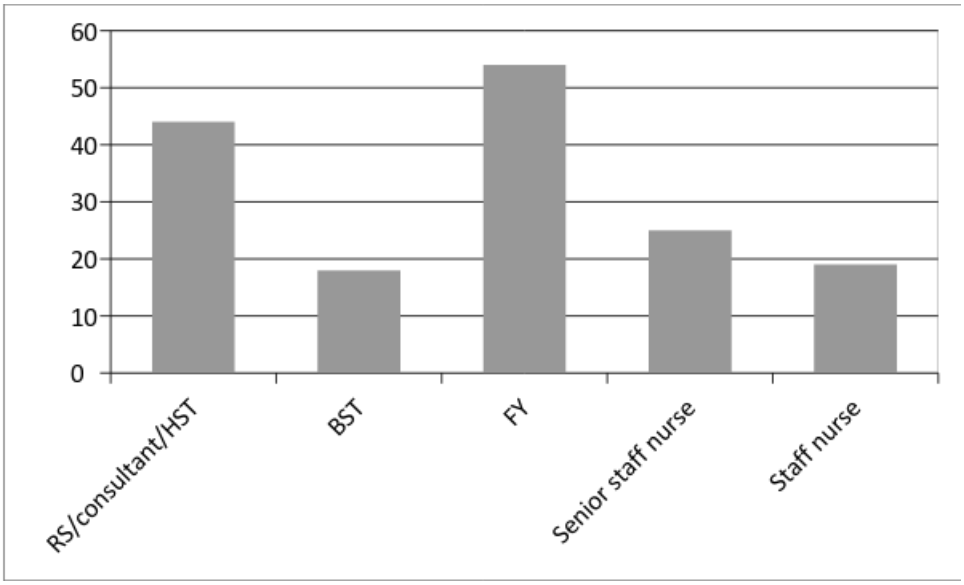


***Table 2**: Percentage of Health care workers who took the vaccine according to Grade*

Grade	Number of respondents	Number who took vaccine	Percentage who took vaccine
RS/consultant/HST	27	12	44%
BST	16	3	18%
FY1/2	33	18	54%
Senior staff nurse	8	2	25%
Staff nurse	46	9	19%

***Figure 2**: Reasons why respondents took the vaccine. Vertical axis represents number*

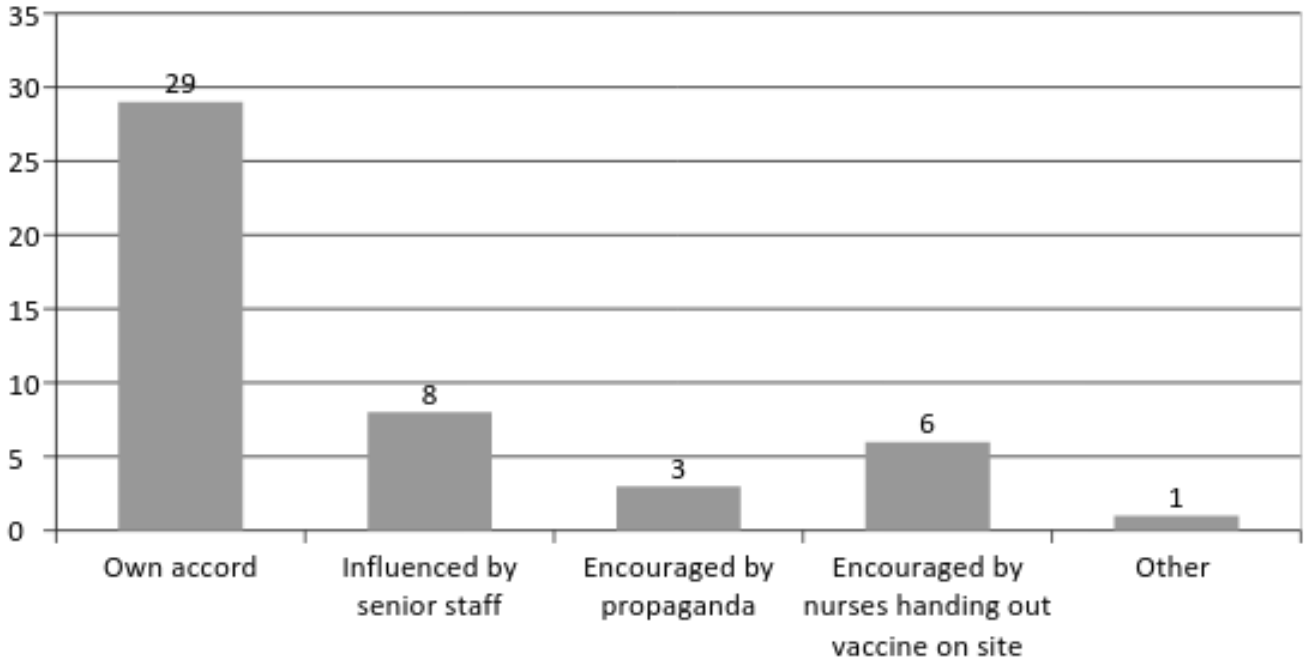


***Figure 3**: Reasons why respondents did not take the vaccine. Vertical axis represents number*

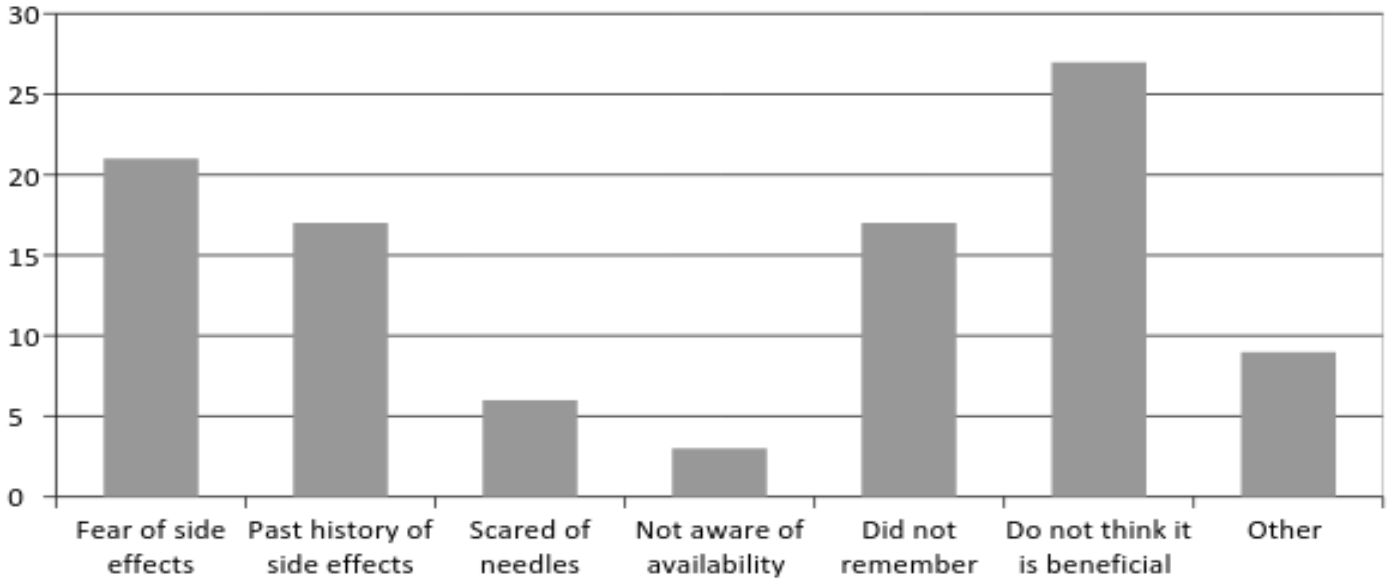


***Table 3**: Percentage of respondents who thought the vaccine is not beneficial*

Grade	Number of respondents thinking vaccine is not beneficial	Total of respondents at that grade	Percentage compared to total of grade
RS/Consultant/HST	3	15	20%
BST	4	13	30.8%
FY	3	15	20%
Senior staff nurse	1	6	16.7%
Staff nurse	14	37	37.8%

***Figure 4:** Percentage of respondents who thought the vaccine is not beneficial*

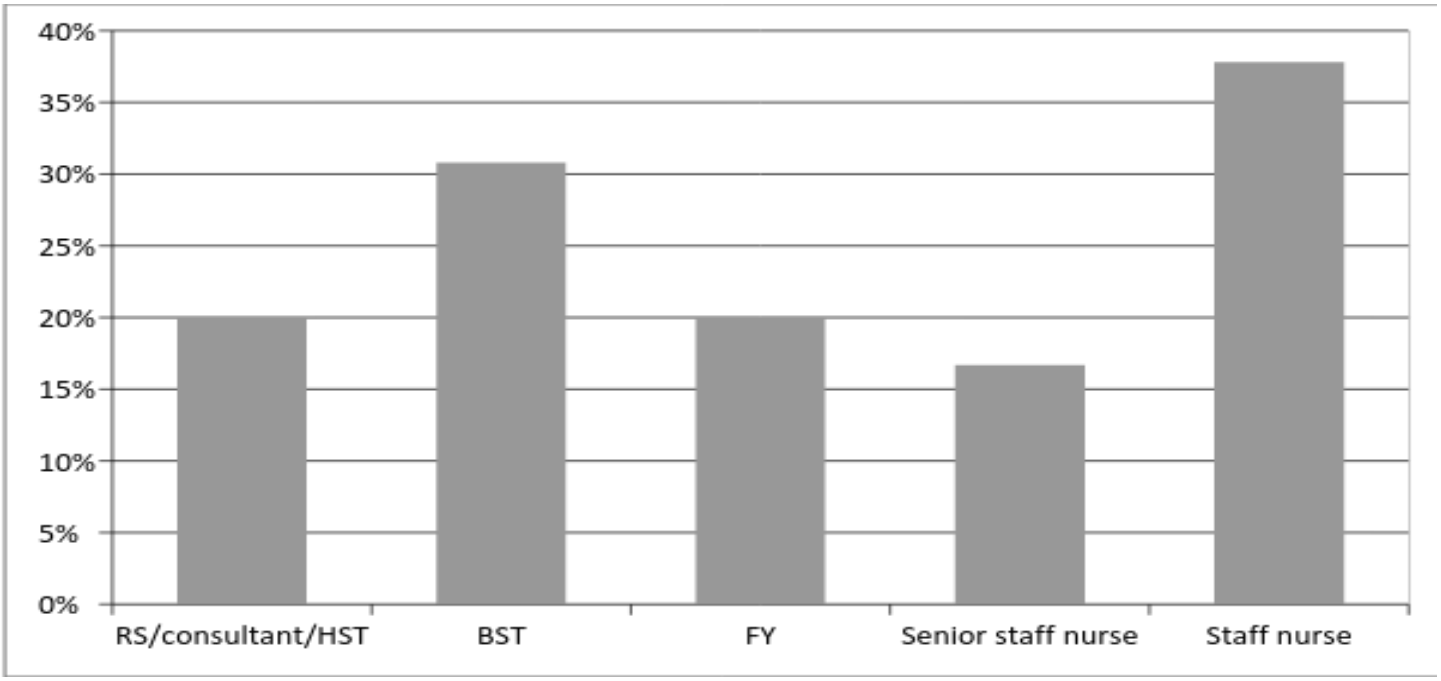
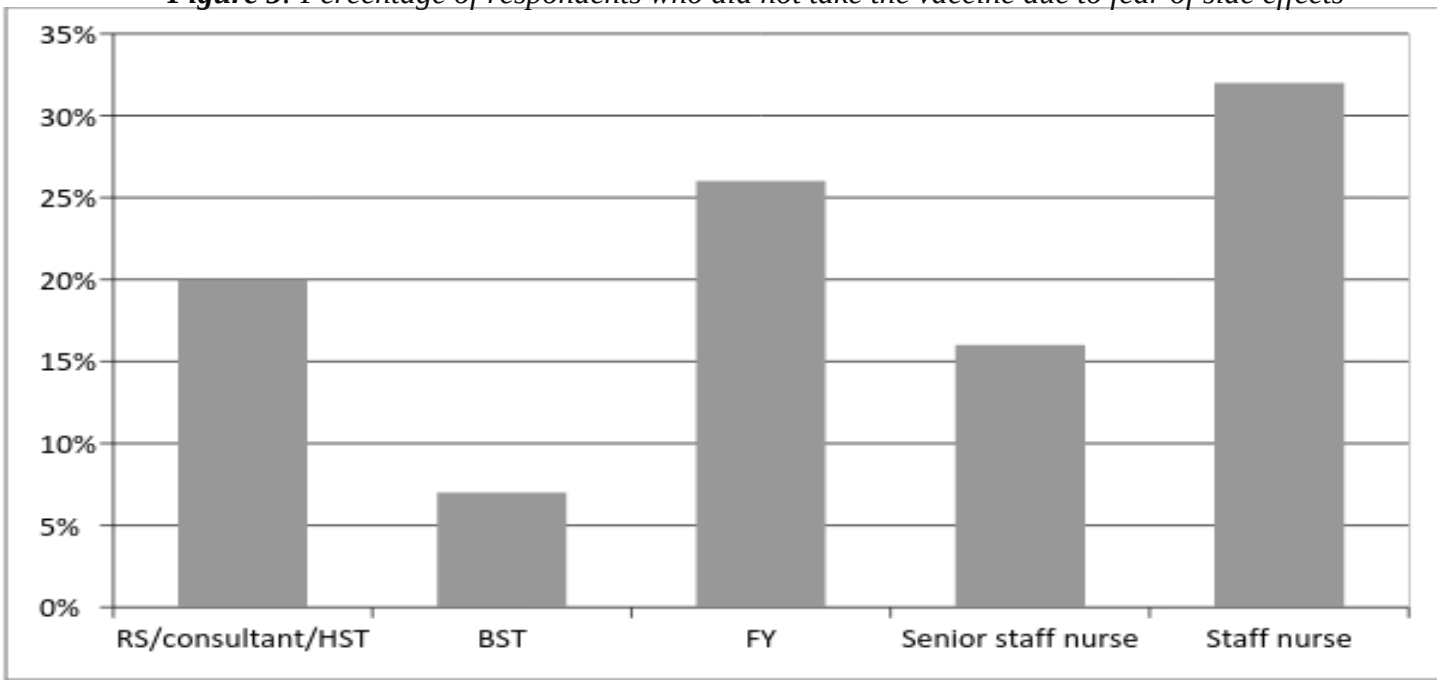


***Table 4**: Percentage of respondents who did not take the vaccine due to fear of side effects*

Grade	Number of respondents who had a fear of side effects	Total of respondents at that grade who did not take the vaccine	Percentage compared to total of grade
RS/Consultant/HST	3	15	20%
BST	1	13	7%
FY	4	15	26%
Senior staff nurse	1	6	16%
Staff nurse	12	37	32%

***Figure 5**: Percentage of respondents who did not take the vaccine due to fear of side effects*



Reasons why respondents took the vaccine

There were five different reasons for taking the vaccine. Of the respondents who took the vaccine, 66% took it of their own accord (*n*=29); 18% were influenced by senior staff (*n*=8); 7% were encouraged by propaganda (*n*=3); 14% were encouraged by nurses handing out vaccine on site (*n*=6). There was a significantly small proportion of health care staff who admitted to taking the vaccine due to external influence (i.e. infection control propaganda or senior influence) at *p*=0.003 using "N-1" Chi Squared test at 95% confidence intervals.

Reasons why respondents did not take the vaccine

Of the 86 respondents who did not take the vaccine, 24% said it was due to the fear of side effects (*n*=21), while 20% reported a past history of side effects (*n*=17). 7% reported a fear of needles (*n*=6), 3.4% were not aware of its availability (*n*=3), and 19.7% did not remember to take it (*n*=17). 31.4% did not think the vaccine is beneficial (*n*=27). The larger proportion of this group including staff nurses (37.8%) and the BST middle grade doctors (30.8%). See Table 3 and Fig 3.

Reported side effects

Seventeen respondents reported past history of side effects. These included: pain (11%, *n*=2), erythema (17.6%, *n*=3), nausea/vomiting (5.8%, *n*=1), diarrhea (5.8%, *n*=1), upper respiratory tract symptoms (76.4%, *n*=13), allergy (5.8%, *n*=1) and other (5.8%, *n*=1, not specified).

Respondents planning on taking the vaccine in Autumn 2016

Seventy one respondents (54.6%) would like

to take the vaccine in 2016, while 59 respondents (45.4%) were not keen on taking the vaccine in 2016. 75% of respondents who were planning on taking the vaccine in 2016 were doctors. 74.1% of respondents who were not planning on taking the vaccine in 2016 were nurses.

Effective ways of promoting the influenza vaccine

5 methods of promoting the influenza vaccine were looked into. These included posters at MDH, nurses handing out the vaccine on site, KURA notice, email memos and word of mouth. The overall preferred method was that of nurses handing out the vaccine on site, with a total of 59 respondents (45%) choosing this method.

In addition, nurses also recommended promotional posters at MDH as a useful incentive. Doctors found on-site distribution of the vaccine to be the most effective way to encourage compliance to the vaccination. Both groups seem to give little importance to notices on KURA.

***Table 5**: Respondents' opinions on best ways of promoting the vaccine*

	Posters at MDH	Nurses handing out the vaccine on site	KURA notice	Email memos	Word of mouth
Doctors	10	41	3	7	15
Nurses	21	18	2	3	10
Total	31	59	5	10	25

Discussion

Our study population included a total of 130 subjects. Out of the respondents, 33.8% took the vaccine while 66.2% did not take the vaccine during the distribution period of 2015, representing a relative underutilization of the vaccine, especially amongst nurses. Professional category is a significant and independent predictor of vaccination and this has been reported in a meta-analysis, which showed that being a physician increased the chances of being vaccinated whilst being a nurse was associated with lower vaccination rates.[3] Our results also showed that there was a higher vaccination compliance amongst Senior staff nurses and RS/Consultant/HST when compared to general staff nurses and middle grade/junior doctors. The number of years of healthcare service has been shown to be another significant determinant in vaccination uptake, with a lower adherence in healthcare workers with less than 5 working-years experience.[4] In our audit, the junior doctors seemed to have a higher compliance rate to the vaccine, when compared to the middle grades and general staff nurses.

In December 2009, the EU Council of Ministers agreed to take action in order to mitigate the impact of seasonal influenza by encouraging vaccination amongst the elderly or people with chronic conditions, pregnant women and in health care workers. The main objective was to increase the vaccination coverage rates to a minimum of 75% amongst this group of at-risk people. The European Centre for Disease prevention and Control (ECDC) issued a technical report on the influenza immunization situation in Europe during the 2011-2012 and the 2012-2013 influenza season.[5]

Evidence from the report illustrated that vaccination coverage rates in most EU countries remains lower than that targeted by national governments in the Council Recommendation. A wide range of coverage rates amongst healthcare workers has been reported by the ECDC in 13 EU countries, varying from 9.5% to 75% with a median of 28.6%.[5] The highest vaccination rate was reported by the United Kingdom, Romania, Lithuania and the Netherlands. The ability to monitor vaccination coverage rates is a key component of any vaccination program and aids in identifying gaps and weaknesses.

Influenza vaccination coverage rates in the United States in the general adult population has been quoted by the Centre for Disease Control and Prevention as having ranged between 40.4% in 2009 and 41.7% in 2016 (CDC, 2016). Among Health Care Personnel the coverage rates were quoted as 77.3% during the 2014-15 season and 79.0% (CDC, 2015) during the 2015-16 season (CDC, 2016b).[6-8] This is a much higher percentage than that found in our audit. Similarly, the percentage of health care workers taking the vaccine in the United States was higher in physicians than in nurses or other health care workers.

66% of those who took the vaccination in Autumn 2015, took it of their own accord. Only 44% of those who took the vaccine appeared to have been encouraged by senior staff or infection control propaganda. It is of prime importance to establish whether this stark difference is due to the This could be a combination of lack of promotional encouragement and lack of interest or disregard by health care staff. However other determinants could not have specified in our audit; such as knowledge and awareness of the risk of exposure to seasonal influenza within the hospital setting as well as responsibility towards patients regarding the risk of influenza transmission.

Misconceptions about the severity of influenza and lack of knowledge on the benefits of the vaccine play a role in the refusal of the vaccine. In our audit, the main reasons reported for not taking the vaccine were that subjects did not think of it as beneficial and the fear of possible side effects. This was especially true amongst general staff nurses and the middle grade BST doctors.

The main barriers to vaccination as described by the ECDC include a low perception of risk particularly in healthcare settings, fear of possible or perceived side effects from vaccination, questions about the effectiveness of the vaccine, issues of cost, availability and convenience, misleading reports in the mainstream media, and a general lack of accurate information about the influenza and vaccination.[5]

The commonest reported side effect was that of upper respiratory tract symptoms. According to the CDC, the influenza vaccine does not cause influenza since the vaccination is made from the inactivated virus, or in the case of the recombinant vaccine, with no virus at all. Mild, short lasting side effects of the influenza vaccine do however exist: low grade fever; pain and/or erythema located to the injection site; myalgia. Out of the 17 respondents who reported not taking the vaccination in view of side effects, 76.5% stated these side effects were in the form of upper respiratory tract symptoms. As reported by the CDC, there is no correlation between influenza-like symptoms and the influenza vaccine.[6-8]

It appears that any increase in the uptake of the influenza vaccination in our local hospital would primarily require investing in educational programs tailored for our health care workers. Such programs should emphasize the significant morbidity and mortality associated with influenza, the proven effectiveness of the vaccine in the prevention of such morbidity and mortality, as well as the paucity of severe side effects to be expected.

In response to whether subjects were interested in taking the vaccine during the distribution period in 2017, 55% of respondents claimed to be planning on taking the vaccine. This was a significant improvement from the original 33.8%, who took it during 2015. This encouraging finding requires re-enforcement by means of ongoing education that would then reach its culmination during the distribution phase of the vaccine.

According to our results, the most effective way of promoting the influenza vaccine was through the infection control nurses freely handing out the vaccine on site. This likely makes the vaccine readily available and reduces the effort involved in seeking out the vaccine. Equally important and effective methods seem to be promotional posters distributed at Mater Dei Hospital. These audit results provide important information on where to focus promotional resources to encourage compliance.

The main limitation of this audit was the small sample size. A re-audit with a larger sample size may help provide a better representation of the hospital cohort. Our audit results depended exclusively on respondents returning the questionnaires to us, therefore allowing for significant selection bias. Although there was an apparent low compliance rate amongst health care workers at Mater Dei Hospital, this may still have been an over-representation - the respondents who completed and returned the questionnaire, are more to have taken the vaccine. The actual compliance to the vaccination may indeed be lower.

Conclusion

The data which was collected has shown that there is still relative underutilization of the influenza vaccine among doctors and nurses, despite persistent efforts at promoting its use and despite its availability to health care workers. Further education about the benefits versus side effects of the influenza vaccine is suggested, with promotional posters and increased availability via on-site distribution of the vaccine to all health care workers at Mater Dei Hospital.

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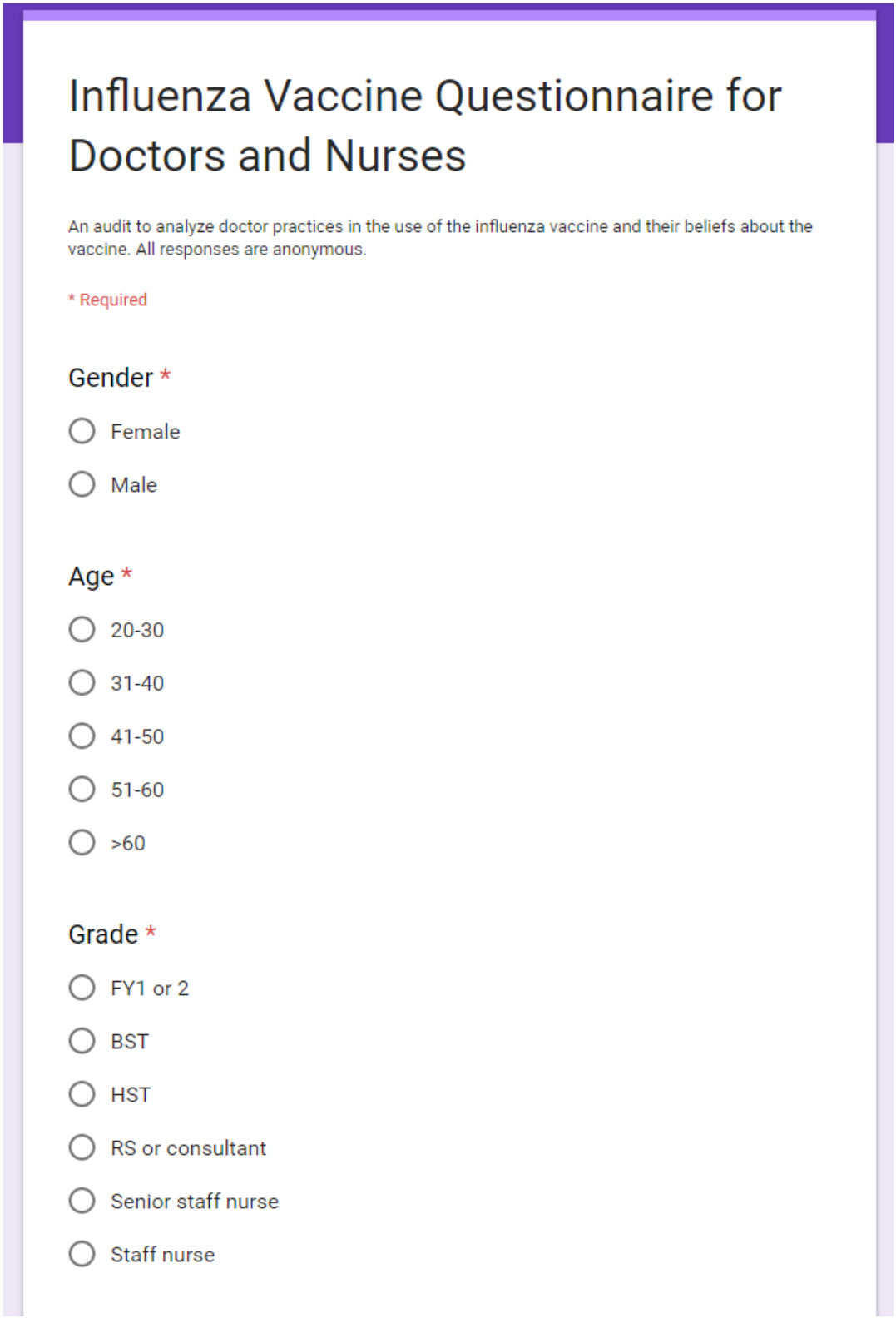
Appendix 1: *Questionnaire (screen shots of the electronic version). Note that the paper version was an exact copy of the electronic version*



Influenza Vaccine Questionnaire for Doctors and Nurses

An audit to analyze doctor practices in the use of the influenza vaccine and their beliefs about the vaccine. All responses are anonymous.

* Required

Gender *

- ○ Female
- ○ Male

Age *

- ○ 20-30
- ○ 31-40
- ○ 41-50
- ○ 51-60
- ○ >60

Grade *

- ○ FY1 or 2
- ○ BST
- ○ HST
- ○ RS or consultant
- ○ Senior staff nurse
- ○ Staff nurse

Did you take the influenza vaccine in October/November 2015? *

- ○ Yes
- ○ No

Did you decide to take the vaccine due to any of the below? *

- ☐ I take it every year of my own accord
- ☐ Influenced by senior member of staff or other colleagues
- ☐ Encouraged by propaganda at MDH/KURA/email notices
- ☐ Encouraged by nurses handing out the vaccine on site
- ☐ N/A
- ☐ Other: _____

Did you decide not to take the vaccine due to any of the below? *

- ☐ Fear of side effects
- ☐ Past history of side effects
- ☐ Scared of needles
- ☐ Not aware of availability (influenza vaccine is free for health care staff)
- ☐ Did not remember
- ☐ Do not think it is beneficial
- ☐ N/A
- ☐ Other: _____

If your answer to the above question was 'past history of side effects', which side effects did you experience? *

- [ ] Pain
- [ ] Erythema
- [ ] Nausea
- [ ] Vomiting
- [ ] Diarrhoea
- [ ] Upper respiratory tract symptoms
- [ ] Allergy
- [ ] N/A
- [ ] Other: _____

If you took the vaccine, where did you take it? *

- ○ MDH
- ○ Health centre
- ○ Privately
- ○ N/A

Are you planning on taking the influenza vaccine in October/November 2016? *

- ○ Yes
- ○ No

Did you suffer from influenza in winter 2016? *

- ○ Yes
- ○ No

If you suffered from influenza in 2016, did you experience any of the symptoms below? *

- ☐ Fever
- ☐ Muscle aches
- ☐ Headahce
- ☐ Fatigue/lethargy
- ☐ Cough
- ☐ Sore throat
- ☐ Nasal congestion
- ☐ N/A
- ☐ Other: _____

Was the influenza confirmed by a respiratory screen? *

- ○ Yes
- ○ No
- ○ N/A

How many days did you take off work in view of the influenza? *

- None
- 1-2
- 3-5
- >5
- N/A

What do you think is th most effective way of publicizing the influenza vaccine? *

- Posters at MDH
- Nurses handing out he vaccine on site
- KURA notice
- Email memos
- Word of mouth

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