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Influenza and COVID-19 vaccine hesitancy in pharmacists and pharmacy students

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Background

In the COVID-19 pandemic, vaccination was identified as being of significant importance to prevent virus spread and to move towards re-introducing normality in everyday life. As the influenza season approached in autumn 2020, the importance of the influenza vaccine was highlighted as a mitigation strategy to limit the consequences and risk of co-infection with the influenza virus and COVID-19. The aim of the study was to evaluate the degree of hesitancy of pharmacists and pharmacy students towards influenza and COVID-19 vaccines in autumn 2020.

Methods

A questionnaire was developed and disseminated online to Maltese pharmacists and pharmacy students to evaluate influenza and COVID-19 vaccine hesitancy.

Results and Conclusion

A total of 136 participants took part in the study where 54% (*n*=73) were pharmacists and 46% (*n*=63) were students. A statistically significant increase in the number of participants who intended to take the influenza vaccine in the current year compared to the number of participants who took the vaccine in the previous year was observed in both student and pharmacist cohorts. Fifty-seven percent (*n*=78) of participants were likely to take the COVID-19 vaccine once available. Reasons for COVID-19 vaccine hesitancy at baseline (prior to COVID-19 vaccines being available) included potential long term side-effects (77%), lack of knowledge (54%) and accelerated process used for the approval of the vaccine (69%).

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Introduction

The COVID-19 vaccine development process is being accelerated by regulatory bodies such as the EMA and the FDA in the US, to address this global pandemic while still meeting safety and efficacy requirements.[14-15] Measures adopted by the EMA to fast-track the approval of the COVID-19 vaccine include rolling review, whereby the EMA starts assessing data as soon as it is available, in parallel to ongoing trials, and accelerated assessment which seeks to conduct a review within 150 days instead of 210 days.[16]

The first country in the world to grant emergency approval for a vaccination for use against COVID-19 was the UK, with the authorisation of the Pfizer-BioNTech vaccine.[3] The vaccine was later approved by the US Food and Drug Administration (FDA)[4] and the European Medicines Agency (EMA).[5] Moderna,[6-7] AstraZeneca[8-9] and Janssen[10] vaccines were later approved in Europe and added to the armamentarium against COVID-19. The Moderna and Pfizer-BioNTech COVID-19 vaccinations showed an efficacy of 95% or more.[11-12] The Oxford Vaccine Trial reported an efficacy of circa 90% for the AstraZeneca vaccine.[13] The Johnson & Johnson vaccine announced that their single dose vaccination showed an overall 66% effectiveness in the prevention of moderate to severe disease and 85% effectiveness in the prevention of severe COVID-19.[14]

At the same time that pharmaceutical industry and regulatory bodies were approaching the development and evaluation of novel COVID-19 vaccines, the dilemma of how vaccine hesitancy will impact on the success of regional and international vaccination strategies to address the pandemic gained momentum. Vaccine hesitancy is ubiquitous,[15] with scepticism towards vaccination prevailing since 1853[16] and fuelled with modern day phenomena such as the world wide web[16] and via social media.[17] COVID-19 vaccine general public hesitancy levels ranged from 2–6% in China to 44% in Turkey as reported in literature.[18] Even healthcare workers are prone to vaccine hesitancy. A study found that hesitancy amongst healthcare workers worldwide for the COVID-19 vaccination ranges between 4.3% to 72%.[19] The administration of influenza vaccine is recommended for all healthcare workers. Pharmacists and pharmacy students are perceived to be hesitant about the influenza vaccine.[20-23] Vaccine hesitancy within the pharmaceutical workforce may impact on advocacy with patients on relevance of vaccines. Pharmacists play vital roles in vaccine distribution and administration in most countries, and serve as role models in their own health behaviours.[24] Pharmacists contribute to patient outreach in immunisation campaigns and are highly trusted sources of information on this topic.[24]

This study was carried out to evaluate the degree of vaccine hesitancy of Maltese pharmacists and pharmacy students vis-à-vis influenza vaccination within the context of the pandemic and of the COVID-19 vaccines in development. The study was undertaken before the authorisation of the first COVID-19 vaccine.

Materials and Methods

A questionnaire was developed to evaluate the perception of pharmacists and pharmacy students about the influenza vaccine and potential COVID-19 vaccination. The questionnaire was divided into three sections. In the first section, demographic data of participants was collected. The second section evaluated whether participants took the influenza vaccine last year and whether they intend to take it during the months of October/November 2020. Participants were asked to rate from 1 to 5

(where 1 meant that they will not and 5 that they will take the vaccine) how likely they were going to take the COVID-19 vaccine once available.

The third section evaluated the reasons why participants are unlikely to take the COVID-19 vaccine. Participants were asked to rate five statements from 1 to 5, where 1 corresponded to "not concerned at all" and 5 corresponded to "extremely concerned". The statements about the COVID-19 vaccine evaluated concerns related to not knowing enough about the vaccine, possible short-term and long-term side effects, vaccine effectiveness and due to an approval granted through an accelerated process. Participants were also asked to rate, using a five-point Likert scale, whether they are against vaccines in general.

The protocol followed the University of Malta's Research Ethics Review Procedures and abided by the University's Research Code of Practice. A self-assessment ethics form was filed in accordance with GDPR with the Faculty Research and Ethics Committee. The questionnaire was disseminated electronically using Google Forms, via social media, to a private group for Maltese pharmacists and pharmacy student, and via email to all pharmacy students at the Department of Pharmacy of the University of Malta. Data collection was conducted over a period of one week during end of October and beginning of November 2020. Participation in the study was voluntary and the responses were anonymous.

Data analysis was conducted using Microsoft Excel. Chi-squared test, chi-squared test for trend and Fischer exact test were used for statistical analysis. A p-value ≤0.05 was taken to represent a statistically significant result.

RESULTS

A total of 136 participants took part in the study where 54% (*n*=73) were pharmacists (response rate 10% from 735 pharmacists) and 46% (*n*=63) were students (response rate 41% from 155 pharmacy students). The female to male ratio was 3:1 which is a reflection of the gender distribution in the pharmacy profession. The age of students ranged between 18 to 34, where 95% (*n*=60) students were 18-24 years old and 5% (*n*=3) were 25-34 years old. The majority of the pharmacists taking part in the study were 25-34 years old (*n*=31, 42%), had 5-10 years (*n*=18, 25%) of experience, and the principal position occupied was in community pharmacy (*n*=37, 53%) (Table 1).

Influenza vaccination

When participants were asked whether they took the influenza vaccine in the previous year, only 41% (*n*=56) of the respondents answered in the affirmative, while 59% (*n*=80) did not take the influenza vaccine. However, 74% (*n*=101) of participants stated that they intend to take the influenza vaccine during October/November 2020. Table 2 shows the percentage of students and pharmacists who took the influenza vaccine the previous year, and those who will be taking it during the current year. A statistically significant increase in the number of participants who will be taking the influenza vaccine was observed in both student and pharmacist cohorts. When the number of participants taking the influenza vaccine the previous year and intending to take the influenza vaccine during the current year was correlated with age, the projected increase in vaccination rate was statistically significant for the 18-24 years, 25-34 years and the 35-44 years age groups (Table 3). When the number of participants taking the influenza vaccine the previous year was correlated to the age of participants, a statistically significant

difference (chi for trend=6.15, *p*=0.013) was observed, where older participants tend to take the influenza vaccine more than younger ones. No statistically significant difference was observed when the likelihood of taking the influenza vaccine during the current year was correlated against age (chi for trend=3.75, *p*=0.053).

Table 1: Demographics of pharmacists taking part in the study (*n*=73)

Demographic	Category	Frequency (n)	Percentage (%)
Age	18-24 years	2	3
	25-34 years	31	42
	35-44 years	24	33
	45-54 years	7	10
	55-64 years	8	11
	>65 years	1	1
Years of experience	Up to 5 years	13	18
	5-10 years	18	25
	10-15 years	14	19
	15-20 years	11	15
	>20 years	17	23
Principal position occupied	Community pharmacy	37	53
	Pharmaceutical administration	7	10
	Pharmaceutical policy and regulation	6	9
	Academics	5	7
	Industry	5	7
	Medical representatives	5	7
	Hospital pharmacy	3	4
	Positions unrelated to pharmacy	2	3

Table 2: Percentage who took the influenza vaccine last year, who will take it this year (p value indicates statistical significance in percentage changes), and likelihood of taking the COVID-19 vaccine by role (*N*=136)

	Influenza vaccine				COVID-19 vaccine		
	Took%	Will take%	Chi	p	Unlikely%	Undecided%	Likely%
Pharmacist	49.3	82.2	17.5	<0.0001	16.4	20.5	63.0
Student	31.7	65.1	14.0	<0.0001	15.9	33.3	50.8
Total	41.2	74.3	30.5	<0.0001	16.2	26.5	57.4

Table 3: Percentage who took the influenza vaccine last year, who will take it this year (p value indicates statistical significance in percentage changes), and likelihood of taking the COVID-19 vaccine by age (*N*=136)

		Influenza vaccine				COVID-19 vaccine		
Age	**n**	**Took%**	**Will take%**	**Chi**	**p**	**Unlikely%**	**Undecided%**	**Likely%**
18-24	62	33.9	66.1	12.9	<0.0001	16.1	35.5	48.4
25-34	34	44.1	79.4	9.0	0.003	14.7	23.5	61.8
35-44	24	41.7	83.3	8.9	0.003	20.8	12.5	66.7
45-54	7	14.3	57.1	Fisher	NS	14.3	14.3	71.4
55-64	8	100.0	100.0	-	-	12.5	25.0	62.5
>65	1	100.0	100.0	-	-	0.0	0.0	100.0

COVID-19 vaccination and associated perception

When asked how likely they are to take the COVID-19 vaccine once it is available, the majority of participants (*n*=78, 57%; 95% CI 49-66%) stated that they will be taking the vaccine. Table 2 shows the percentage of participants who are likely to take the COVID-19 vaccine. There was no statistically significant difference in the projected uptake of COVID-19 vaccination of students compared to pharmacists (chi 0.9). When the likelihood of taking the vaccine was correlated with age, there was no statistically significant trend in the proportion of vaccine uptake with age (chi for trend=0.4).

When the likelihood of taking the influenza vaccine was correlated to the likelihood of taking the COVID-19 vaccine, a strong statistically significant association was observed (chi=8.5, *p*=0.004; Likert scale and proportions – 1 (0.8) unlikely, 2 (1.7), 3 (3.0) neutral, 4 (3.3), 5 (5.0) likely). Participants who take the influenza vaccination are more likely to take the COVID-19 vaccine once it is available. When the likelihood of taking the COVID-19 vaccine was correlated with the years of experience of pharmacists, no statistically significant correlation was observed.

Reasons why participants are unlikely to take the COVID-19 vaccine were evaluated (Table 4). Participants expressed concerns about the COVID-19 vaccine due to having insufficient knowledge regarding this novel inoculation (*n*=52, 54%; 95% CI 43-64%), potential long-term side effects (*n*=74, 77%) and because the vaccine has been developed through an accelerated process (*n*=65, 69%). When participants who are unlikely to take the COVID-19 vaccine were asked what their perception about vaccines is in general, the majority of participants (*n*=90, 96%) were in favour.

Other reasons provided by participants regarding why they are hesitant to take the COVID-19 vaccine included concerns related to teratogenicity or fertility issues in the future (*n*=1, 0.7%), the wish to wait for feedback from people they know before taking the vaccine (*n*=1, 0.7%) and that they would like the vaccine to be ethically produced without making use of stem cell lines (n=1, 0.7%).

Table 4: Concerns and misgivings pertaining to a COVID-19 vaccine as percentages of those expressing concerns

		Participants' responses (%)				
Concern	**n**	**Not concerned at all 1**	**2**	**Neutral 3**	**4**	**Extremely concerned 5**
Insufficient knowledge	97	6.3	16.7	22.9	32.3	21.9
Short term side effects	95	26.6	37.2	16.0	5.3	14.9
Long term side effects	97	3.1	6.3	13.5	28.1	49.0
Vaccine effectiveness	95	14.9	26.6	35.1	11.7	11.7
Accelerated process	95	1.1	13.8	16.0	34.0	35.1
Generally against vaccines	95	83.0	12.8	3.2	1.1	0.0

Discussion

The uptake of the influenza vaccine by healthcare workers in Europe was reported to be low, despite suggestions for healthcare workers to take vaccine.[25-28] The percentage of pharmacists who took the influenza vaccine last year (49%) is higher compared to the percentage of healthcare workers taking up the influenza vaccine in Malta (40%)[26] in 2010 and within Europe (4% to 40%).[25,27-28] The uptake of influenza vaccine by pharmacists last year within our study is comparable to the percentage uptake amongst healthcare workers in The Netherlands (50%) and Romania (51%) and lower than in Hungary (68%).[26] In this study, a correlation was observed between the age of participants and uptake of the influenza vaccine last year, with older participants tending to be more likely to take the influenza vaccine. This study is in accordance with other studies which found age to be a contributing reason why healthcare professionals choose not to take the influenza vaccine.[21-22] Other reasons why healthcare workers may opt not to take the influenza vaccine include vaccine effectiveness, side-effects, fear of needles and perceived risk of infection and implications of infection.[22-23,28-30]

A significant increase was observed in the number of participants willing to take the influenza vaccine this year compared to last year. Studies indicated that there is the possibility of coinfection by contracting influenza with COVID-19[31-35] and that it may increase the severity of the illness and double the mortality rate.[32-33] Remdesivir was recognised as the first treatment to be approved by the FDA for COVID-19.[36] The drug remdesivir was authorised in Europe, by the EMA, for the treatment of COVID-19 patients with pneumonia requiring supplemental oxygen, in July 2020.[37] In November 2020, FDA granted fast track designation to the small recombinant fusion protein, AB201, a potential treatment of COVID-19 by ARCA biopharma.[38] The Randomised Evaluation of COVID-19 Therapy (RECOVERY) trial showed that tocilizumab and corticosteroids improved the survival and clinical outcomes of patients with hypoxia and systemic inflammation.[39] Multiple treatments were

investigated, such as the use of lopinavir with ritonavir and hydroxychloroquine sulfate.[31] Other strategies investigated include the formulation of a nasal spray which coats the virus to facilitate its elimination and prevent its propagation in the body.[40] Considering this situation, administration of the flu vaccine is of additional importance, to prevent coinfection with the influenza and COVID-19 virus and decrease associated complications and mortality.[32] The uptake of the flu vaccine by healthcare workers can also be of benefit to patients by contributing to a decrease in the transmission of the influenza virus to patients who may come in close contact, should the healthcare worker be asymptomatic or ill.[25,27-29,41] The perception of healthcare professionals towards vaccination can have an impact on the uptake of vaccines by the public due to their role as educators.[23,27,42] The uptake of the flu vaccine during a pandemic, such as the COVID-19 pandemic, is of additional importance as it decreases the need for hospitalisation and improves patient outcomes.[43-44] This decreases the burden on the healthcare system and ensures that hospitals have enough resources to address critically ill patients and decrease their risk of mortality.[45-46]

At the time of the study, when the COVID-19 vaccines were still in development, a high degree of hesitancy to take the potential COVID-19 vaccine, with 57% of the respondents willing to do so, was identified. This is in accordance with the degree of COVID-19 vaccine hesitancy experienced worldwide.[19] The main reasons why pharmacists and pharmacy students were unlikely to take the COVID-19 vaccine were lack of knowledge, potential side-effects and the accelerated process through which the vaccine will be authorised. This is in accordance with other studies which evaluated reasons why healthcare professionals and pharmacists choose not to take the influenza vaccine, whereby they found that the possibility of experiencing side-effects was one of the main reasons for their hesitancy.[22,29] It has to be emphasised that at the time of the study participants could not identify the science, the safety and efficacy of the vaccines which later became available.

It has been estimated that herd immunity for COVID-19 may be achieved when 84%-90% are immune to the virus, through full vaccination to obtain a reproduction number (R) of 0.5.[47] The severity and urgency of the pandemic situation led to the assumption that vaccine hesitancy would be overtaken by events, but substantial proportions of surveyed populations will still refuse vaccines that have passed phase 3 trials and were accepted and approved by the relevant regulators.[15,48,49] The reasons for this enduring hesitancy are multiple and vary with time and locale.[48] Key factors that positively correlate with vaccine acceptance include confidence, complacency, knowledge about COVID-19 disease, risk of COVID-19 infection, older age, history of influenza vaccination uptake, educational level and convenience.[48, 19]

Healthcare professionals serve as a role model for the general public and have a key role in addressing COVID-19 vaccine hesitancy amongst the public by recommending the administration of vaccines.[19] A high vaccine hesitancy amongst healthcare professionals can negatively affect the uptake of the COVID-19 vaccine by the public. A crucial part of the Public Health and Pharmaceutical Regulatory authorities is providing scientific information to healthcare professionals, through an educational campaign, to decrease vaccine hesitancy and aggressive planning to guarantee the readiness of both the public and the healthcare worker community for a COVID-19 vaccine.

Limitations of the study

The study was undertaken prior to the influenza and COVID-19 vaccine and did not subsequently evaluate the number of pharmacists and pharmacy students who eventually took the influenza and COVID-19 vaccine. The actual number of pharmacists and pharmacy students who eventually took the influenza and COVID-19 vaccine can be evaluated in a future study and compared to the results obtained in this study.

Conclusion

A rise in the number of pharmacists and pharmacy students intending to take the influenza vaccine during the current year was observed compared to the number of participants who took the vaccine in the previous year. There was hesitancy in the decision to take the potential COVID-19 vaccine, with concerns related to lack of knowledge, side-effects and the accelerated approval process being the main concern at the time when COVID-19 vaccines were still in development. This demonstrates the importance of empowering pharmacists with science and data of safety and efficacy, to be able to overcome hesitance and become advocates for vaccination programmes.

Summary Box

What is known about this subject?

- The uptake of the influenza vaccine by healthcare workers in Europe is low
- Age is a contributing reason why healthcare professionals choose not to take the influenza vaccine
- Flu vaccine uptake by healthcare workers can also be of benefit to patients

What are the new findings?

- Number of participants intending to take influenza vaccine this year increased compared to last year
- There was a high degree of hesitancy to take the potential COVID-19 vaccine amongst pharmacists and pharmacy students at the pre-launch phase
- Main reasons for COVID-19 vaccine hesitancy are lack of knowledge, potential side-effects and the accelerated process through which the vaccine is authorised

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