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Knowledge about COVID-19 and vaccine acceptability among priority groups defined for vaccination: A cross-sectional study in Araba/Alava, Spain, before the vaccination against SARS-CoV-2

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ABSTRACT

Background: The acceptability of COVID-19 vaccine varies depending on the time, place, type of vaccine and information available at the time. Knowledge of attitudes and practices towards COVID-19 among the population at high risk of developing the disease would help to tailor the strategy to improve adherence to vaccination recommendations.
Aim: To analyze the willingness, knowledge and risk perception of patients and health care workers (HCW) to get the vaccines against SARS-CoV-2.
Methods: Cross-sectional survey in Araba/Álava province (Spain). Subjects who met the criteria for the influenza vaccination in 2019 and HCWS from the Basque Public Health Service were included. The participants answered a questionnaire on the knowledge, attitudes and practices towards COVID-19 before starting vaccination against SARS-CoV-2. The intention to vaccinate was compared using the chi-squared test.
Results: 316 HCWs and 389 patients responded to the survey. Around 90% of the patients and 80% of HCW would accept vaccination in all scenarios according to the questionnaire ($p < 0.001$). Only 3–12% hesitated about the COVID-19 vaccines. Compared to 40–70% of patients, 60–80% of HCWs perceived a high risk of COVID-19 ($p < 0.001$). Statistically significant differences were found in 10 of the 17 questions regarding the mechanism of transmission and symptoms.
Conclusion: HCWs had a better knowledge and risk perception of COVID-19 than the surveyed patients. They had a higher proportion of hesitancy to get COVID-19 vaccine, probably related to doubts about the effectiveness of the new vaccines and the scientific evidence.

Introduction

On the 31st of December 2019, a new coronavirus was identified as the etiological agent of pneumonia cases reported in Wuhan (China). The new virus was named severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) and caused the coronavirus disease 2019 (COVID-19). The World Health Organization (WHO) declared COVID-19 a Public Health Emergency of International Concern on the 30th of January 2020 and a pandemic on the 11th of March 2020. The COVID-19 has rapidly become a major global public health crisis, affecting 524 million people around the world and causing 6 million deaths [1]. A systematic review of 53,000 hospitalized patients indicated that 20.2% of COVID-19

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cases developed severe disease with a mortality rate of 3.1% [2]. Older adults and those with underlying health conditions are at greatest risk for severe infection and death due to COVID-19 [3]. Health care workers (HCWs) are also extremely vulnerable to SARS-CoV-2 infection since they are frequently in contact with COVID-19 patients. According to a recent report, in some countries nearly 10–20% of HCWs are been infected with SARS-CoV-2 [4].

During the initial few pandemic waves several drugs were used to treat severe COVID-19 patients, but with very limited success. Social distancing strategies are effective for mitigating the COVID-19, but such measures are very costly due to their impact on the economic activity. Besides, the durability of the immunity against SARS-CoV-2 has not yet been fully established [5]. Therefore, increasing the proportion of immune individuals among HCWs and the general population by an efficacious vaccination program is essential to mitigate both, the disease and the resulting deaths.

However, vaccine availability does not guarantee sufficient vaccination coverage due to vaccine hesitancy [6]. The rise of vaccine hesitancy, including the delay or total refusal to immunization, poses a real threat to the fight against vaccine-preventable disease outbreaks, and is being increasingly recognized as a barrier to the success of immunization programs. Indeed, in 2019 the WHO listed vaccine hesitancy as one of the top ten threats to global health [7]. Vaccine hesitancy is complex and context-specific varying across time, place and type of vaccine. Factors such as complacency, convenience and confidence play an important role in vaccine hesitancy [8]. Furthermore, vaccine hesitancy can have effects for both, the individual and potentially the community.

On the 6th of January 2021, two COVID-19 vaccines with efficacy to reduce symptomatic infection risk greater than 90% were approved, and 16 candidate vaccines were in phase 3 trials. Vaccine acceptance-rates varies substantially across countries and is generally lower in the working-age population than in older people [9]. In HCWs, vaccination intention-rates range from 40% to 70% [9]. This is relevant because clinicians are a trustworthy and creditable source of vaccine-related information for patients and, therefore, can improve adherence to vaccination recommendations.

According to a systematic review of 126 surveys on COVID-19 published before November 2020, COVID-19 vaccine hesitancy was increasing worldwide [10]. COVID-19 vaccine hesitancy might represent an important hurdle to achieving herd immunity [11,12].

People who are at increased risk of becoming severely ill from COVID-19 and HCWs are priority targets for vaccination and are, therefore, affected by vaccine hesitancy. Thus, we analyzed the acceptability of the vaccines against SARS-CoV-2 in the population targeted for both SARS-CoV-2 and influenza vaccination (people older than 65, pregnant women, HCWs, people with chronic diseases). Additionally, we assessed the knowledge and risk perception of COVID-19.

Methods

We performed a cross-sectional survey study in 81.423 subjects who met the criteria for influenza vaccination in 2019 (patients henceforth) in Araba/Alava (northern region of Spain). Before starting vaccination against SARS-CoV-2, a sample of patients was surveyed over the telephone and an electronic form was sent to the HCWs of Basque Public Health Service of the Alava province. All subjects signed an informed consent prior to their participation in the study. HCWs were surveyed between the 14th of December 2020 and the 11th of January of 2021. And patients between the 7th of January of 2021 and the 23th February of 2021.

Sample and procedure

Under the worst-case assumption that q = p = 0.5 and with a sampling error of ± 5%, we estimated that 385 subjects would need to be surveyed. Considering a refusal rate of 40%, the total number of subjects to be surveyed was 539 [13].

Patients were selected, amongst influenza vaccination target groups, by random cluster sampling according to gender, age (over/under 65 years), influenza vaccination, and COVID-19 infection. In December 2020, an invitation letter was sent to 517 subjects, the remaining 22 did not have a postal address (first round). At the end of January 2021 vaccination had not yet begun in the group of patients in the study (except for those in nursing homes), so we performed a second round to reach the estimated sample size and we invited 279 more subjects. In any case, participants were asked whether they had received the COVID-19 vaccine and if so, this was considered an exclusion criterion. Those subjects with a severe cognitive or hearing impairment, HCWs, children and deceased subjects who were not recorded by the system were also excluded from the study. Several calls were made to patients in different time slots until the subjects were contacted and the survey completed. The reason for non-inclusion in the study was also recorded.

HCWs from the Basque Public Health Service of Araba/Alava (including medical doctors, nurses and administrative staff from hospital and primary care) were invited to participate by electronic mailing and the surveys were completed using an online form.

The study was approved by the Ethics Committee for Clinical Research of Araba/Alava (Expte. 2020-048) and the data management was approved by the Data Protection Officer in accordance with the General Data Protection Regulation of the Basque Public Health Service.

Measurement tool

Data were collected with a self-administered questionnaire, which was developed based on the COVID-19 Behaviour Insights-tool- from WHO Regional Office for Europe [14] and a survey used by Apiñaniz et al. [15]. Two new questions were added to the survey (Q10 and Q18) in the part 1 of questionnaire.

The questionnaire had 34 items divided into four parts: demographics (Q1-Q9), attitudes towards COVID-19 vaccines (Q10-Q18), questions on COVID-19-related knowledge (Q19-Q23) and questions related to risk perception and severity of the disease (Q24-Q34) (Anex I). Response categories included "yes," "no," and "don't know/no answer" (hesitant/undecided). The items related to the COVID-19 symptoms and SARS-CoV-2 virus transmission were multiple-choice questions.

The Electronic Health Record information register was used to collect patient information on comorbidities (diabetes mellitus, heart disease, COPD), previous SARS-CoV-2 infection, influenza vaccination in 2019, resident patient and MEDEA deprivation index [16].

Statistical analysis

The main characteristics of the sample were described. The primary endpoint was determined by calculating the absolute and relative frequencies of HCWs and remaining study subjects who intended to get a COVID-19 vaccine. Finally, the intention to get vaccinated in patients and HCWs was compared using the chi-squared test.

A statistical significance level of p = 0.05 was considered in the analysis. Statistical analysis was performed with IBP SPSS Statistics, version 23 for Windows.

Results

Study population

We contacted 796 participants by telephone and 389 of them (48.9%) completed the survey. Regarding the remaining 407, we could not reach 217 people (53.3%) (incorrect telephone number/-did not pick up), 159 (38.8%) refused to answer, 12 (2.9%) did not meet the inclusion criteria and 19 were dead (Fig. 1). Additionally, 8.9% of the 3,558 HCWs of the Basque Public Health System of Araba/Alava answered the electronic survey (75 doctors, 124 nurses and 117 classified as other professionals).

The study included 316 HCWs and 389 patients who responded to the survey. Most of them were female (80% and 50% respectively) and they had a mean age of 45 and 71 years, respectively. In the previous year, 45% of the HCWs and 63% of the patients were vaccinated against influenza and around 80% had been vaccinated on previous occasions in both groups. Twenty per cent of the HCWs and 2% of patients had been infected by SARS-CoV-2 (Table 1).

Attitudes towards vaccines against SARS-CoV-2

When respondents were asked whether they would get a COVID-19 vaccine if it was offered for free (Q11) 93% (n = 363; 95% confidence interval 91–96%) of the patients and 81% (n = 256; 95% confidence interval 76–86%) of HCWs answered yes (Table 2). The response was similar if the price of the vaccine would be 10 euros (Q12), if the vaccine was recommended for them (Q10) or when they belonged to one of the risk groups (Q14). The differences between the two groups were statistically significant in all cases, reaching the lowest value in the latter case.

We found a 3–7% (n = 12–27) of vaccine hesitancy in all scenarios in the patient group, and 10–12% in the HCWs (n = 34–39). Only 4–8% of patients and 6–12% of HCWs would refuse to get a COVID-19 vaccine.

More than half of the respondents believed the vaccines were effective (Q16), 67% of patients (n = 263; 95% confidence interval 61–73%) and 54% of HCWs (n = 171; 95% confidence interval 47–62%). About 3% believed new COVID-19 vaccines were not effective in both groups and 30–40% were unclear. Furthermore, 58% (n = 226; 95% confidence interval 52–64%) of patients thought that the vaccines had been sufficiently investigated (Q17), compared to 40% (n = 127; 95% confidence interval 32–49%) of HCWs. Around 20–30% of respondents believed that there has not been sufficient research on the COVID-19 vaccines and 22–29% were undecided. In both groups of respondents, around 90% would prefer to get the COVID-19 vaccine later in time (Q18).

Knowledge about the COVID-19 and risk perception

We found statistically significant differences in the responses given by patients and HCWs in eight of the 11 questions on mechanisms of disease transmission (Q19-Q21) and in two of the six questions on symptoms (Q22) (Table 3a,b).

The most frequent transmission mechanisms selected by both patients and HCWs were: drops produced when coughing or talking, physical contact (reported by 80–100%), contaminated sur-

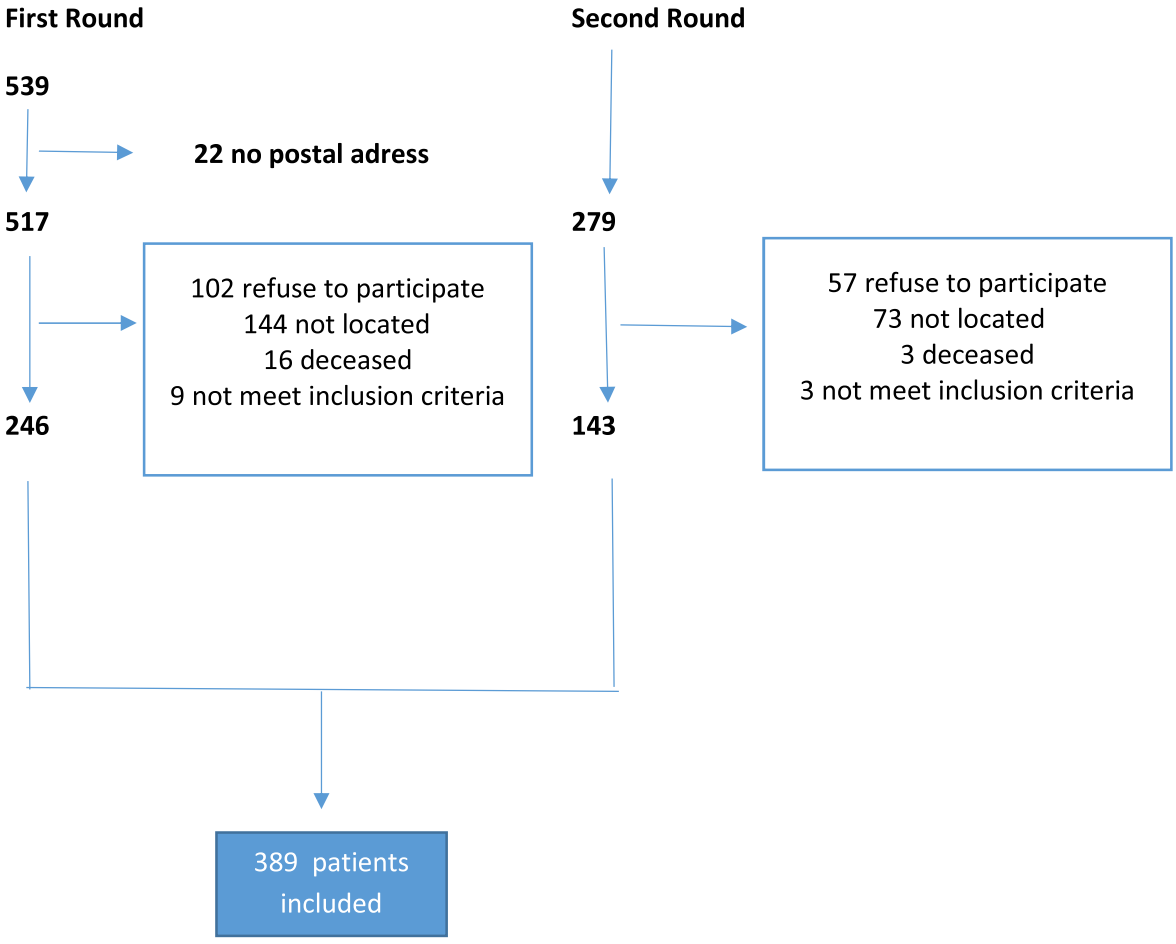

Fig. 1. Flow chart of subjects included in the study.

Table 1
Characteristics of the study subjects.

	Patients (n=389)		Professionals (n=316)		TOTAL (n=705)	
	n	%	n	%	n	%
Age						
< 65 years old	69	17.7	307	97.2	376	53.3
≥ 65 años	315	81.0	2	0.6	317	45.0
DK/DA	5	1.3	7	2.2	12	1.7
Sex						
Man	190	48.8	58	18.4	248	35.2
Woman	194	49.9	252	79.7	446	63.3
DK/DA	5	1.3	6	1.9	11	1.6
Education						
No education	125	32.1				
Basic/Middle	196	50.4				
University	66	17.0				
DK/DA	2	0.3				
Employment status						
Worker	44	11.3	316	100	360	51.1
Not working (retired/unemployed)	251	64.5	-	-	251	35.7
DK/DA	94	24.3	-	-	94	13.3
Marital status						
Single	61	15.6	94	29.7	155	21.9
Married/Couple	267	68.6	201	63.6%	468	66.4
Widowed	54	13.9			54	7.7
DK/DA	7	1.8%	21	6.6%	28	4
Flu vaccinated 2019						‘
Yes	245	63.0	144	45.6	389	55.2
No	144	37.0	170	53.8	314	44.5
DK/DA	-	-	2	0.6	2	0.3
On some occasion						
Yes	335	86.1	241	76.3	576	81.7
No	54	13.9	72	22.8	126	17.9
DK/DA			3	0.9	3	0.4
COVID-19 infection						
Yes	9	2.3	64	20.3	73	10.4
No	380	97.7	242	76.6	622	88.2
DK/DA			10	3.2	10	3.2
Resident	1	0.3				
DK/DA	5	1.3				
Diabetes Mellitus	86	22.1				
DK/DA	260	66.8				
Heart disease	24	6.2				
DK/DA	260	66.8				
COPD	26	6.7				
DK/DA	260	66.8				
MEDEA deprivation index		2.84 ± 1.35				
Quintil 1	84	21.6				
Quintil 2	68	17.5				
Quintil 3	77	19.8				
Quintil 4	87	22.4				
Quintil 5	45	11.6				
Missing	27	7.0				

DK = Do not Know.
DA = Do not Answer.
COPD = Chronic Obstructive Pulmonary Disease.

faces, air and public transport (reported by 70%). A higher proportion of HCWs believed they could be contagious at work (95% versus 47%, p < 0.001) and that people without fever could be contagious (98% versus 75%, p < 0,001), as compared to patients.

Regarding knowledge of COVID-19 risk groups (Q13), 96% of HCWs reported they had knowledge of such risk groups, compared to 70% of patients (p < 0.001). Fever, cough, shortness of breath and tiredness were the most frequent symptoms reported by 80–100% of patients and HCWs (Q22).

The Ministry of Health and the media were the main sources of information for HCWs, with percentages of 85% and 67%, respectively (Q23). While 90% of patients reported getting the information through the media.

We found a higher proportion of HCWs perceiving a high-risk of COVID-19 as compared to patients (60–80% versus 40–70%, p < 0.001) (Table 4a,b) (Q29-Q31). In both groups, the perception of high-risk of COVID-19 in the general population was higher than the perception of high-risk among members of the family or for the person questioned. Over 50% believed the COVID-19 caused much more harm, many more infected persons and many more deaths than seasonal influenza (Q32-Q34).

Around 85% of patients and HCWs considered that COVID-19 could cause serious and irreversible effects (Q25). Sixty percent of both, HCWs and patients thought that by 2021 there would be more than 50 deaths from COVID-19 in their city of residence (Vitoria-Gasteiz, administrative capital of the Basque Country) (Q26). However, 50% of the enquired HCWs believed that mortality due to COVID-19 in the general population is 1–5% compared to 36% of patients (Q24).

Discussion

Before the beginning of the SARS-CoV-2 vaccination campaign in the province of Araba/Alava, the majority of the at-risk popula-

Table 2
Acceptability of the SARS-Cov2 vaccine.

	Yes		No		p[a]	Uncertain		p[b]
	n	%	n	%		n	%	
Q10- Would you get vaccinated if were recommended for you?								
Patients	355	91.3	17	4.4	0.213	17	4.4	<0.00
Professionals	259	82.0	20	6.3		37	11.7	1
Q11- Would you get vaccinated if the vaccine was free?								
Patients	363	93.3	14	3.6	0.006	12	3.1	<0.00
Professionals	256	81.0	26	8.2		34	10.8	1
Q12- Would you get vaccinated if the vaccine cost €10?								
Patients	330	84.8	32	8.2	0.054	27	6.9	0.011
Professionals	240	75.9	39	12.3		37	11.7	
Q14- Would you get vaccinated if you belonged to a risk group?								
Patients	346	88.9	16	4.1	0.178	27	6.9	0.016
Professionals	257	81.3	20	6.3		39	12.3	
Q16- Do you think the vaccine to prevent COVID-19 is effective?								
Patients	262	67.4	10	2.6	0.655	117	30.1	0.001
Professionals	171	54.1	9	2.9		136	43.0	
Q17- Do you think the vaccine to prevent COVID-19 has been sufficiently researched?								
Patients	225	57.8	78	20.1	<0.00	86	22.1	<0.00
Professionals	127	40.2	96	30.4	1	93	29.4	1
Q18- Would you get vaccinated later?								
Patients	366	94.1	9	2.3	0.299	14	3.6	0.020
Professionals	279	88.3	12	3.8		25	7.9	

[a] Calculated without taking into account undecideds.
[b] Adjusted for undecideds.

tion was willing to receive a COVID-19 vaccine. Specifically, 90% of patients and 80% of HCWs would agree to get vaccinated. These results were confirmed by current vaccination data [17]. Vaccination-rates against COVID-19 in our country are among the highest in the world. However, the intention of the population to get a COVID-19 vaccine changes depending on the time of the survey, among other factors. Thus, according to the results of cross-sectional internet surveys conducted in April and May 2020, 58 to 69% of adults intended to get a vaccine against COVID-19 [18,19]. From June to December 2020 other studies that surveyed more than 13,000 people in 19 countries found that 70% of the population was willing to receive COVID-19 vaccine [11,12,20]. Inter-country variability ranged from 90% (Vietnam, India, China, Denmark and South Korea) to 40% (Serbia, Croatia and France). Nevertheless, Szilagyi et al. [21] tracked the same subjects over time and reported that the willingness to get the COVID-19 vaccine decreased from 74% to 56% between April and December 2020.

Regarding HCWs, previous reports suggest that willingness to get a COVID-19 vaccine laid between 40% and 75% during the first infection wave [22,23] (43% February 2020 in Greece and 74% March-July 2020 in France), as well as during the second and third waves [24,25,26] (October-November 36% in Mexico and Texas and 70% in France, Italy and 60% November-December in Philadelphia and New York). In contrast to our study, other studies observed that self-reported willingness to receive vaccination against COVID-19 differs according to hospital roles [23,25], with physicians and research scientists showing the highest acceptance.

We found hesitancy vaccination-rates of 3–12%, with significantly lower percentages among patients than among HCWs. Such rates ranged between 20 and 30% in other studies and were similar to those reported by other authors for health professionals [22–26] and the general population [27,28].

Hesitancy against vaccination was mostly influenced by the characteristics of the new vaccines, the clinical evidence on the efficacy and the potential side effects, as well as the national vaccination strategy, among various other factors [24,25,27]. Safety (69–85%), effectiveness (69%) and speed of development/approval (74%) were noted as the most common concerns regarding the COVID-19 vaccines in HCWs [25,29]. While the general population was more concerned about the effectiveness (81%) and the potential side effects of the vaccines (58%) [19]. In addition, trust towards scientific research and the attitude towards vaccines' efficacy decreased in the second wave compared to the first [30].

Focusing on the enquired high-risk population of developing COVID-19 severe disease in Araba/Alava, 30–40% hesitated about the effectiveness of the vaccine or did not answer and 3% believed it was not effective. Twenty to 30% thought there had not been sufficient research and 20–30% did not know or did not answer. Around 90% of both, patients and HCWs would have delayed vaccination compared to 66.5% of the health care workers participating in the survey conducted by Gadoth et al.[31].

Besides attitude and behavior, knowledge and risk perception of the people play an important role on the course of the SARS-CoV-2 pandemic, for both the infection management and the acceptability of vaccines. Our results showed that HCWs and patients responded significantly differently to 10 of the 17 questions on symptoms and routes of SARS-CoV-2 transmission. As reported in other studies [22,32,33,34], fever, cough, shortness of breath and tiredness were the most frequent symptoms reported by 80–100% of the subjects. The most frequent mechanisms of transmission are coughing, talking and physical contact. Furthermore, 97% of the HCWs in our study and 85% in the study carried out by Bashir at al. [35] believe that people without fever can be contagious. Among patients, this percentage was 75%.

Among the HCWs, 85% reported to use official sources for information about COVID-19, whereas 90% ‘‘patients used the media. Moreover, a systematic review by Sarria-Guzman et al. [32] in the general population and several studies in HCWs [22,29,35] reported the same findings.

Around 85% of patients and HCWs believed that COVID-19 can cause serious and irreversible effects and 60% thought that by 2021 there would be more than 50 deaths from COVID-19 in their place of residence. Moreover, over 50% of patients and HCWs believed that COVID-19 causes much more harm, many more cases of infection and many more deaths than seasonal influenza. However, a higher proportion of HCWs perceived a high risk of COVID-19 as compared to patients (60–80% versus 40–70%) and believed

Table 3a
Knowledge about COVID-19 (multiple choice questions).

	Yes		No		p
	n	%	n	%	
Q19- Indicate the most common ways in which COVID-19 is transmitted					
Drops produced when coughing or talking					
Patients	343	88.2	46	11.9	<0.001
Professionals	316	100	0	0	
Touching contaminated surfaces					
Patients	303	77.9	86	22.1	0.196
Professionals	232	73.4	84	26.6	
Physical contact with someone infected					
Patients	326	83.8	63	16.2	0.383
Professionals	256	81.0	60	19.0	
Through the air					
Patients	278	71.5	111	28.5	0.019
Professionals	251	79.4	65	20.6	
By blood transfusion					
Patients	124	31.9	265	68.1	<0.001
Professionals	13	4.1	303	95.9	
Through the pets					
Patients	71	18.3	318	81.7	<0.001
Professionals	7	2.2	309	97.8	
Through an insect bite					
Patients	102	26.2	287	73.8	<0.001
Professionals	1	0.32	315	99.7	
Q20- How do you think you could become infected?					
When you go shopping					
Patients	262	67.4	127	32.6	0.663
Professionals	207	65.5	109	34.5	
When using public transport					
Patients	296	76.1	93	23.9	<0.001
Professionals	275	87.0	41	13.0	
At work					
Patients	181	46.5	208	53.5	<0.001
Professionals	299	94.6	17	5.4	
Q22 – What are the most common symptoms of COVID-19?					
Fever					
Patients	366	94.1	23	5.9	0.001
Professionals	313	99.0	3	1.0	
Cough					
Patients	326	83.8	63	16.2	<0.001
Professionals	294	93.0	22	7.0	
Lack of air					
Patients	331	85.1	58	14.9	0.365
Professionals	260	82.3	56	17.7	
Fatigue					
Patients	309	79.4	80	20.6	0.522
Professionals	258	81.6	58	18.4	
Pain					
Patients	291	74.8	98	25.2	0.147
Professionals	220	69.6	96	30.4	
Diarrhoea					
Patients	224	57.6	165	42.4	0.397
Professionals	171	54.1	145	45.9	
Q23- How did you mainly find out about COVID-19?					
Ministry of Health or health care professionals					
Patients	117	30.1	272	69.9	<0.001
Professionals	267	84.5	49	15.5	
The media					
Patients	352	90.5	37	9.5	<0.001
Professionals	211	66.8	105	33.2	
Social media					
Patients	62	15.9	327	84.1	0.001
Professionals	82	25.9	234	74.1	
Other media					
Patients	65	16.7	324	83.3	<0.001
Professionals	95	30.1	221	69.9	
I am not looking for information					
Patients	4	1.0	385	99.0	0.047
Professionals	11	3.5	305	96.5	

Table 3b
Knowledge about COVID-19 (yes or no questions).

	Yes		No		p[a]	Uncertain		p[b]
	n	%	n	%		n	%	
Q21- Do you think that people without fever can be contagious?								
Patients	291	74.8	26	6.7	<0.001	72	18.5	<0.001
Professionals	308	97.5	1	0.3		7	2.2	
Q13- Do you know the risk groups for SARS-Cov-2 infection?								
Patients	273	70.2	97	24.9	<0.001	19	4.9	<0.001
Professionals	304	96.2	5	1.6		7	2.2	
a Calculated without taking into account undecideds								
b Adjusted for undecideds								

[a] Calculated without taking into account undecideds.
[b] Adjusted for undecideds.

Table 4a
Perception of risk and severity (yes or no questions).

	Yes		No		p[a]	Uncertain		p[b]
	n	%	n	%		n	%	
Q29- Do you think you are at high risk for COVID-19 infection?								
Patients	159	40.9	201	51.7	<0.001	29	7.5	<0.001
Professionals	193	61.1	89	28.2		34	10.8	
Q30- Do you think there is a high risk for COVID-19 infection in your family?								
Patients	194	49.9	168	43.1	<0.001	27	6.9	<0.001
Professionals	220	69.6	59	18.7		37	11.7	
Q31- Do you think there is a high risk for COVID-19 infection in the general population?								
Patients	266	68.4	81	20.8	<0.001	42	10.8	0.001
Professionals	254	80.4	35	11.1		27	8.5	
Q25- Do you believe that COVID-19 can cause serious and irreversible effects in the general population?								
Patients	331	85.1	26	6.7	0.462	32	8.2	0.662
Professionals	273	86.4	16	5.1		27	8.5	
Q27- Do you think there are sick people who have been infected with COVID-19 and have not realized it?								
Patients	26	6.7	363	93.3	<0.001	0	0	<0.001
Professionals	1	0.3	306	96.8		9	2.8	
Q28- Do you think it is a disease that concerns the majority of the population in Vitoria-Gasteiz?								
Patients	177	45.5	171	44.0	0.007	41	10.5	0.006
Professionals	107	33.9	163	51.6		46	14.6	

[a] Calculated without taking into account undecideds.
[b] Adjusted for undecideds.

that mortality in the general population was around 1–5% (50% versus 36%). Our findings are consistent with those found in other studies [19,25,28,33,35].

Thus, according to the results of our survey, HCWs have more knowledge and risk perception of the COVID-19 than patients and tend to consult more reliable/official sources of information but are less willing to get a COVID-19 vaccine than patients and have a higher proportion of hesitancy.

The high acceptance of the COVID-19 vaccines in patients surveyed in the present study may be due to the high perception of risk of SARS-CoV-2 infection, as well as to the fact that this is a more vulnerable population to COVID-19 than the ones included in other studies. We have only found three other studies that focus on populations similar to ours but they only assessed knowledge and risk perception of COVID-19. However, the figure of 9.5% of patients with a high perception of risk found by Wolf et al. [34] is surprisingly low compared to the 85% found for our study population. The authors concluded that personal risk perception might be limited for people living below the poverty level (29%) or for those with low health literacy (50%). In this regard, it should be taken into account that 70% of the population of Araba/Alava is below the third quintile of the MEDEA deprivation index.

On the other hand, in the province of Araba/Alava SARS-CoV-2 infections began among HCWs and 20% of them became infected. Therefore, the surveyed HCWs could have a higher perception of protection against the new coronavirus and thus, might decide not to get the COVID-19 vaccine or have doubts about it. In addition, more HCWs than patients hesitated about the effectiveness of the newly developed vaccines and believed that the clinical research conducted so far was insufficient.

The above-mentioned reasons may explain the differences in vaccine acceptance between patients and HCWs.

Despite this, hesitancy rates were lower than those found in other studies (3–12% versus 20–30%). This could be due to the proximity of the start of the vaccination campaign in our study. However, the percentage of subjects unwilling to get a vaccine is similar to other studies (8–12%).

Finally, it is important to note that 45–60% of the subjects in our survey had received an influenza vaccine during the previous year indicating a generally favorable perception towards vaccination.

The results of our study provide baseline data about Knowledge, Attitudes and Practices (KAP) towards SARS-CoV-2 pandemic, which will help devise effective preventive strategies. However, the study has certain limitations. Patients were selected by random sampling but HCWs were enrolled using a non-probability convenience sampling technique. The survey was also voluntary, raising the possibility of selection bias among respondents opting to participate. Furthermore, the response-rate among HCWs in our study

Table 4b
Perception of risk and severity (more than two options questions).

	Patients		Professionals		p[a]	p[b]
	n	%	n	%		
Q24- What mortality rate do you think COVID-19 has in the general population?						
<1%	43	11.1	66	21.0	<0.001	<0.001
1-5%	140	36.0	169	53.8		
>5%	106	27.2	28	8.9		
Uncertain	100	25.7	51	16.2		
Q26- How many deaths do you think Covid-19 will cause in Vitoria-Gasteiz in 2021?						
None	3	0.8	0	0.0	<0.001	<0.001
1-10	21	5.4	2	0.6		
11-50	53	13.6	27	8.6		
>50	233	59.9	214	68.2		
Uncertain	79	20.3	71	22.6		
Q32- How many deaths do you think COVID-19 causes in relation to influenza?						
Many less	6	1.5	19	6.0	<0.001	0.001
A few less	18	4.6	22	7.0		
The same	38	9.8	13	4.1		
A few more	81	20.8	56	17.7		
Many more	203	52.2	174	55.1		
Uncertain	43	11.1	32	10.1		
Q33- How many people do you think get sick from COVID-19 compared to seasonal flu?						
Many less	3	0.8	24	7.6	<0.001	<0.001
A few less	24	6.2	19	6.0		
The same	36	9.3	18	5.7		
A few more	77	19.8	68	21.5		
Many more	206	53.0	153	48.4		
Uncertain	43	11.1	34	10.8		
Q34- How much harm do you think Covid-19 can do to you regarding seasonal flu?						
Many less	2	0.5	1	0.3	0.566	0.549
A few less	8	2.1	4	1.3		
The same	19	4.9	20	6.3		
A few more	74	19.0	50	15.8		
Many more	248	63.8	217	68.7		
Uncertain	38	9.8	24	7.6		

[a] Calculated without taking into account undecideds.
[b] Adjusted for undecideds.

is very low and may be unrepresentative. However, similar results were found in other studies with higher participation-rates.

Data were collected using a self-reported questionnaire, which can be a potential cause of reporting bias. Prior research on SARS-CoV-2 and H1N1 virus outbreaks guided our selection and creation of survey items, but we were unable to validate all questions. On the other hand, it is not possible to directly compare the results of all existing surveys due to differences in the countries included, as well as in the different questionnaires and methodologies used.

The present cross-sectional survey was conducted in a single public healthcare service and among a high-risk population of developing severe COVID-19 disease**.** Thus, generalizability to other regions of Spain and other countries may be limited. Nevertheless, we believe that there are likely lessons learned that can be more broadly applied. Moreover, conducting the same survey on both, HCWs and patients within the same health system minimizes the information bias that may be caused by contextual factors.

Finally, the survey was conducted at a single point in time amid a dynamic pandemic, where information, options and perceptions are rapidly changing and individualś willingness to get a COVID-19 vaccine may change over time, as vaccination decisions are multifactorial. However, we think that the time selected for the study was a particularly important one, since it was conducted almost immediately after the population perceived vaccine availability. Furthermore, the population selected for the study was also of great interest, since people at high-risk of developing severe COVID-19 were expected to be among the priority groups for vaccination.

The results of the study are useful for the design and planning of the vaccination strategy for the prevention and mitigation of the COVID-19. Although the study presented hereby is descriptive, the determinants of COVID-19 vaccine acceptance will be assessed in a subsequent study.

Declaration of Competing Interest

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jvacx.2022.100176.

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