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Background:

During the COVID-19 pandemic, vaccination of healthcare workers (HCWs) has a critical role, because of their high-risk exposure and priority in protection and being a role model. The vaccination is the most effective preventive measure against COVID-19 [1,2]. However, the Centers for Disease Control (CDC) reported that as of 15 September 2021, 30% of HCWs in more than 2000 U.S. hospitals are vaccine-hesitant against COVID-19 vaccines [3] and the WHO announced that this rate can be raised to 73 % on 25 November 2021 [4].

The objectives of this study were to examine the rate of COVID-19 vaccination among HCWs, assess the effectiveness of three different interventions (weekly PCR testing, face-to-face group education about COVID-19 vaccines, PCR testing every 48 hours), and explore the reasons of vaccine-hesitancy among HCWs in hospital settings.

Methods:

This is a two phased descriptive and sequential designed mixed-methods study, including quantitative and qualitative sections consecutively (Figure 1). The study was conducted between 15 September 2021 and 1 March 2022.

Phase I (descriptive) was conducted by using the hospital's Occupational Health and Safety Department (OHSD) records. In Phase I, we obtained the information regarding age, gender, profession, department, COVID-19 vaccine status of all HCWs working in two hospitals from the OHSD. After the COVID-19 vaccination campaign has begun and completed in the hospital there were vaccine hesitant HCWs, for whom the hospital administration planned and implemented three consecutive interventions to increase the COVID-19 vaccination rate among HCWs. First intervention was weekly PCR test submission, the second intervention was mandatory health education regarding COVID-19 vaccines for unvaccinated HCWs followed by an increase in the frequency of PCR test submissions to every 48 hours as third intervention.

Phase II (mixed method) of the study began before the hospital administration's intervention. In this phase, the study population was the unvaccinated HCWs who were >18 years of age and did not get infected with SARS-CoV-2 within the last six months.

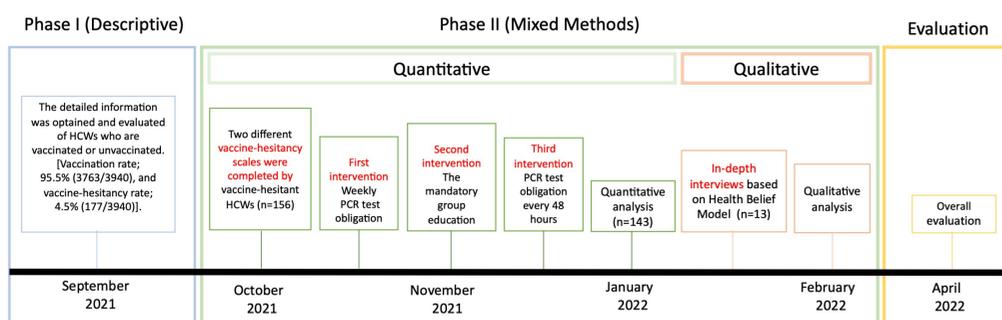


Figure 1: The descriptive and sequential designed mixed-methods study

Results: The characteristics of 3940 HCWs were compared according to their vaccination status (3763 vaccinated versus 177 unvaccinated). The overall vaccination rate was 95.5%. The rate of vaccine-hesitancy was higher among males than females (6% vs 3.6%, $p=0.009$) and staff in ancillary workers than in other health professions (10% vs 5-1%, $p<0.001$) (Table 1). At the end of in-depth interviews ($n=13$), the most common vaccine-hesitancy determinants were conflicting explanations about vaccines, suspicion, fear, self-confidence, feeling the pressure the media effect, and obstinacy.

Table 1: Baseline characteristics of vaccinated and unvaccinated HCWs in study centers.

Baseline Characteristic	Vaccine Hesitant HCWs (n=177) (n,%)	Vaccinated HCWs (n= 3763) (n,%)	Total (n=3940) (n,%)	P
Gender				0.009
Female	91 (3.6)	2399 (96.3)	2490	
Male	86 (6)	1364 (94)	1450	
Profession				$P<0.001$
Physician	2 (1)	405 (99)	407	
Nurse	38 (3)	1112 (97)	1150	
Technician	22 (4)	601 (96)	623	
Administration	35 (4)	756 (96)	791	
Staff in ancillary [†]	64 (10)	571 (90)	635	
Other professionals [‡]	16 (5)	318 (95)	334	
Department				$P<0.001$
Emergency	4 (3)	122 (97)	126	
Adult ICUs	8 (5)	168 (95)	176	
Operation Room	9 (4)	231 (96)	240	
Surgical Departments	11 (2)	699 (98)	710	
Internal Medicine Departments	17 (3)	632 (97)	649	
Pediatric Departments	7 (5)	136 (95)	143	
Other Medical Departments [§]	32 (5)	681 (95)	713	
Administration	15 (6)	227 (94)	242	
Nonmedical Departments [¶]	74 (8)	867 (92)	941	

Abbreviations.

Staff in ancillary[†]: Porter, cleaner, cafeteria employee, security, valet
Other professionals[‡]: Pharmacists, physiotherapists, biologists, information technologies workers, translators, call center workers etc.
Other Medical Departments[§]: Pharmacy, laboratory, pathology, radiology, checkup, home health, sterilization unit
Nonmedical Departments[¶]: Housekeeping, refectory, maintenance, information technologies, security and parking, communications, accounting, logistic etc.

After the first intervention, 83.33% (130/156) vaccine-hesitant HCWs were vaccinated (CoronaVac/BioNTech), and 8.3% (13/156) after the second intervention. Finally, the rate of COVID-19 vaccination was raised from 95.5% to 99.67% (3927/3940) in two hospitals (Figure 2).

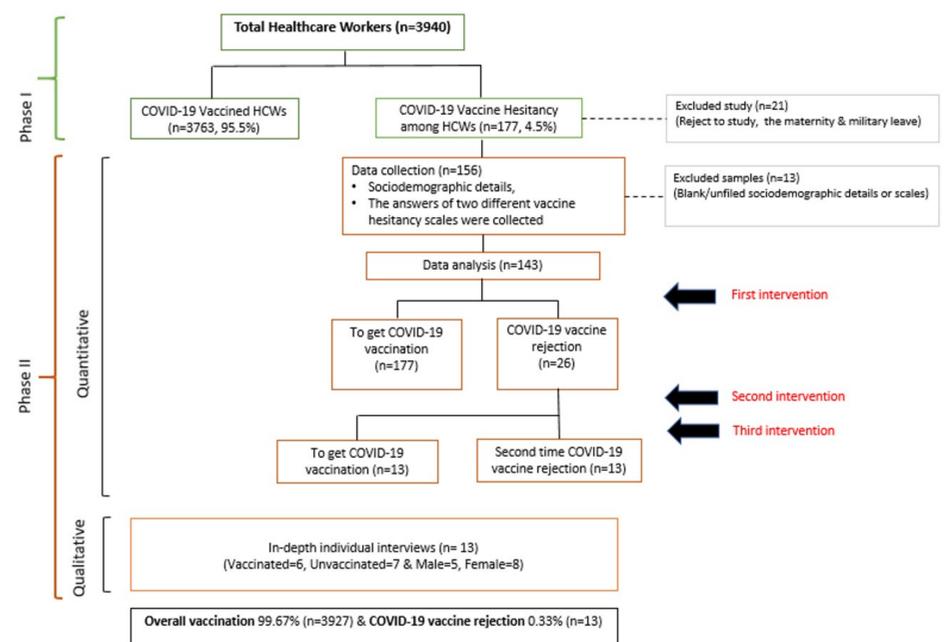


Figure 2: Study procedure and overall vaccination rate

Conclusions: The initial vaccination rate was high (95.5%), however obligatory testing for unvaccinated HCWs was highly effective. Our multi-dimensional efforts such as obligatory PCR testing, group seminars, and dissemination of updated information were helpful to raise the rate of COVID-19 vaccination to 99%.

References

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- 4)WHO. Only 1 in 4 African health workers fully vaccinated against COVID-19. 2021 November 25, 2021