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Uptake of COVISHIELD vaccine and post-vaccination symptoms among healthcare workers at an academic primary care facility in Ghana

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Abstract

Background: The emergence of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has affected health systems globally. Although a safe, effective, and widely accessible vaccine is crucial to ending the pandemic, the results of studies on the acceptability of vaccines among healthcare workers (HCWs) globally have been conflicting. Documented post-vaccination experiences are also limited. This study describes the uptake of the first dose of the COVISHIELD vaccine and analyses the pattern of post-vaccination symptoms among HCWs in Ghana.

Objective: This study sought to assess the uptake of the first dose of the COVISHIELD vaccine and analyse the pattern of post-vaccination symptoms among HCWs.

Methods: A cross-sectional survey was conducted at the Korle Bu Polyclinic/ Family Medicine Department (KPFMD) of the Korle Bu Teaching Hospital, Accra, in March 2021. Survey participants (n = 188) were staff of the department who completed a structured questionnaire within one week of receiving their first dose of the vaccine. The vaccine uptake rate was estimated from those who received the vaccine (n = 255) as a percentage of the total staff number at the department (n = 314).

Results: The uptake rate of the first dose of the COVISHIELD vaccine among HCWs was 81.2% (n = 255/314). The most frequently occurring post-vaccination symptoms were general malaise, headache, injection site pain and swelling, tiredness, muscle aches and fever. These symptoms were largely mild to moderate in severity and occurred mostly within 24 hours after vaccination. Of the 84.6% (n = 159) respondents who reported at least one post-vaccination symptom, 77.4% (n = 123) took analgesics to manage their symptoms. There was no significant association between age, sex, chronic health condition, a previous positive test for COVID-19 and experiencing post-vaccination symptoms.

Conclusion: A high proportion of HCWs received the COVISHIELD vaccine in this study. The study's findings are comparable with prior studies that indicated that the vaccine is generally safe and well-tolerated. Various stakeholders in Ghana should continue to educate, reassure and encourage the population to accept the vaccine as a key intervention towards containing the pandemic.

Keywords: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), COVISHIELD, post-vaccination symptoms, healthcare workers, primary care, Ghana

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INTRODUCTION

Emergence of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has affected health systems globally. According to data reported to the World Health Organization (WHO), there have been 170,894 confirmed cases of coronavirus disease 2019 (COVID-19), with 1,460 deaths in Ghana between 3 January 2020 to 10 November 2022 and a total of 20,359,448 vaccine doses have been administered as of 30 October 2022 [1]. Despite the relatively low mortality in Ghana, the social disruptions and economic implications of the pandemic in Ghana have been enormous [2]. A safe,

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effective and widely accessible vaccine will be instrumental in ending the pandemic and returning the world to normalcy [3]. On 24 February 2021, Ghana became the first country to receive the COVID-19 vaccines through the COVID-19 Vaccines Global Access (COVAX) facility, an initiative co-led by the Coalition for Epidemic Preparedness Innovations (CEPI), Global Alliance for Vaccines and Immunisation (GAVI) and the WHO, with the United Nations Children's Fund (UNICEF) being a key delivery partner [4,5]. The facility aims to accelerate the development and manufacture of COVID-19 vaccines and guarantee fair and equitable access for all countries globally [5]. An initial total of 600,000 doses of the AstraZeneca/Oxford COVISHIELD (ChAdOx1 nCoV-19) vaccines were made available to Ghana through this arrangement to kick-start the COVID-19 vaccination in the country [4]. Ghana rolled out the first phase of the COVID-19 mass vaccination on 1 March 2021 in a comprehensive plan to vaccinate at least 20 million of the population by the end of the year [6]. HCWs were among the priority groups earmarked to receive the vaccine. While receiving the vaccine was not compulsory, various stakeholders encouraged all Ghanaians to demonstrate high patronage for the vaccine in due course [6]. Results of studies on the acceptability of the COVID-19 vaccines among health workers in various countries before the actual rollout have been mixed. In a survey of over 12,000 employees in two large hospitals in Philadelphia, 63.7% indicated they planned to receive a COVID-19 vaccine when available under an emergency use authorisation (EUA) in the US [7]. Another survey among 340 health professionals in Greece reported a high acceptance of the COVID-19 vaccine (78.5%) [8]. Also, in a study completed by 673 HCWs in the Kingdom of Saudi Arabia, 50.52% were willing to have the COVID-19 vaccine [9]. However, a study in the Democratic Republic of the Congo recorded only 27.7% of HCWs willing to get vaccinated if the COVID-19 vaccine was available [10]. In Ghana, one study found that 39.3% out of 234 HCWs intended to receive the COVID-19 vaccine [11]. In contrast, another survey involving 305 junior doctors in Ghana reported that 66.9% were willing to take the vaccine when available [12].

Vaccines, just like medicines, can cause adverse reactions after their administration, referred to as adverse events following immunisation (AEFI) [13,14]. The WHO defines an AEFI as "any untoward medical occurrence which follows immunisation and which does not necessarily have a causal relationship with the usage of the vaccine" [14]. These are mostly mild and of short duration, and importantly, many people do not experience any adverse effects after receiving a vaccine [13]. The COVISHIELD vaccine is a 2-dose vaccination regimen with a dosing interval of up to 12 weeks. According to the WHO's Strategic Advisory Group of Experts (SAGE) on Immunization Working Group on COVID-19 Vaccines, the majority of the adverse reactions of the COVISHIELD vaccine in subjects were mild to moderate in severity and usually resolved within a few days of vaccination [15]. The reported incidence of adverse events was highest on day one following vaccination. Also, adverse reactions reported after the second dose were milder and less frequent than after the first. The most frequently reported adverse reactions were injection site tenderness, injection site pain, headache, fatigue, myalgia, malaise, pyrexia (including feverishness and fever > 38°C), chills, arthralgia and nausea [15]. In addition, enlarged lymph nodes, abdominal pain and excessive sweating were some uncommon side effects of COVISHIELD reported during trials [16].

In a report from Nepal after the first dose of the COVISHIELD vaccine, some frontline HCWs complained about irritability in mood four hours after vaccination, while others reported myalgia, nausea, tenderness at the injection site and feverishness six hours after receiving the vaccine. Fever with chills developed in some HCWs after 12 hours and required paracetamol to resolve. Other common symptoms included headache, early morning awakening and head heaviness. Notably, no one developed severe side effects or died after the vaccination [17]. Although HCWs are generally expected to have a better insight into the benefits of vaccines, the COVID-19 vaccine, in particular, has courted much controversy and concerns even among HCWs [18]. The rate of acceptability of the vaccine among HCWs in pre-vaccination surveys may differ from the actual uptake during vaccination exercises. Also, there is a paucity of information on the COVID-19 vaccine experience globally since these are new vaccines. Although there are documented post-vaccination adverse effects from clinical trials and few reports on mass vaccination exercises, these may not be exhaustive. Actively looking out for post-vaccination adverse effects can lead to the detection of symptoms or adverse effects that are not usually reported, and this could lead to further research and actions by appropriate stakeholders. This study describes the uptake of the first dose of the COVISHIELD vaccine and analyses the pattern of post-vaccination symptoms among HCWs.

MATERIALS AND METHODS

Study design and sites

A cross-sectional survey was conducted at the Korle-Bu Polyclinic/ Family Medicine Department (KPFMD) of the Korle-Bu Teaching Hospital (KBTH), Accra, in March 2021. The department served as one of the vaccination centres in KBTH during the first phase of COVID-19 vaccination for staff of the hospital, which started on 2 March 2021.

Sample size and sampling technique

The study participants were all staff of the department who received their first dose of the COVID-19 vaccine during the vaccination exercise. The sample population for the survey was 255. The department's clinical and non-clinical

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staff were included in the study. Study participants included permanent and temporary staff, such as national service personnel. Staff excluded from this survey were those who did not participate in the vaccination exercise, students on clinical rotations at the department and retired staff. Study participants were recruited by convenience sampling method, and questionnaires were distributed to consenting and eligible participants. Data collected from the questionnaire included HCW category, presence of a chronic medical condition, previous COVID-19 test results and respondent demographics. Regarding post-vaccination symptoms, the questionnaire obtained responses about the kind, severity, time of onset, antipyretic or analgesic use and willingness to accept a future second dose of the vaccine. Questions were formatted in a binary fashion as much as possible. However, a provision was granted for study participants to document post-vaccination symptoms not included in the list. Post-vaccination symptoms included in the questionnaire were from the vaccine information sheet, symptoms identified by the WHO's Strategic Advisory Group of Experts (SAGE) on Immunization Working Group on COVID-19 Vaccines, and feedback from the piloting of the questionnaire. Data were collected over one week and within one week of staff receiving their vaccine using self-administered structured questionnaires. Completed questionnaires were picked up directly from staff by two departmental COVID-19 team members.

Measurement of vaccine uptake rate

The total staff list at the KPFMD was obtained from the Human Resources unit of the department. The various unit heads in the department were asked by the head of the department to prepare their staff list and days preferred by staff for the vaccination. These staff lists were used to prepare an accurate and up-to-date staff register and used by the vaccination team at the department administering the vaccines. On each day of vaccination, every staff who received the vaccine was recorded as such. Staff who received the vaccine at different departments or outside the hospital during the period but were able to provide evidence of having received the vaccine were equally counted as having received the vaccine. The vaccine uptake rate was estimated from those who received the vaccine (n = 255) as a percentage of the total eligible staff number at the department (n = 314).

Data analysis

Data collected were entered in Microsoft Excel and analysed using the IBM Statistical Package for Social Sciences (SPSS) Statistics for Windows, Version 25.0. Descriptive statistics of mean, standard deviation, frequencies, and percentages were used to describe the baseline characteristics of the data and calculate the incidence of post-vaccination symptoms. A Chi-square test was used to analyse the association between experiencing post-vaccination symptoms and age, sex, chronic health condition and a previous positive test for COVID-19. A p-value of 0.05 was considered significant.

RESULTS

The total number of staff on nominal roll at the department at the time of the vaccination was 314. Of this number, 255 received the first dose of the COVID-19 vaccine, resulting in an uptake rate of 81.2%. This post-vaccination symptoms survey had a response rate of 73.7% (n = 188/255). The units with the highest proportion of respondents were Nursing (30.3%, n = 57), Doctors (23.9%, n = 45) and Pharmacy (10.6%, n = 20) (Table 1). The age of respondents ranged from 18 – 58, with a mean age (± SD) of 36.1 (± 8.4) years. Of the total respondents, 62.2% (n =

Table 1. Demographic characteristics of study participants

Variable	Frequency (n and %)
Sex	
Male	71 (37.8)
Female	117 (62.2)
Age	
18-30	46 (24.5)
31-40	95 (50.5)
41-50	28 (14.9)
51-60	19 (10.1)
Staff Unit	
Doctors	45 (23.9)
Nursing	57 (30.3)
Pharmacy	20 (10.6)
Administrative	11 (5.9)
Hospitality	15 (8.0)
Records	9 (4.8)
Accounts	8 (4.3)
Laboratory	7 (3.7)
Others*	16 (8.5)
Comorbid conditions	
None	161 (85.6)
Hypertension	14 (7.4)
Diabetes mellitus	2 (1.1)
Asthma	5 (2.7)
Sickle cell disease	2 (1.1)
Others**	4 (2.1)

*Included units with the number of respondents being 5 or less, and included IT staff, ECG technicians, clinical psychologists, public relations staff, radiographers, and security.
**Included arthritis, low back pain and allergic rhinitis.

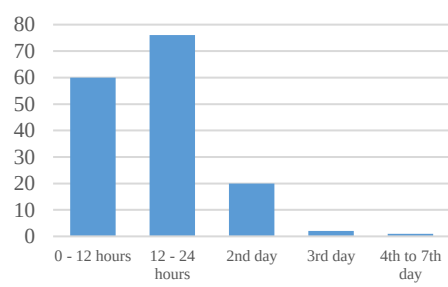

Figure 1. Time of onset of post-vaccination symptoms

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Table 2. Spectrum of post-vaccination symptoms summarized according to the WHO vaccine adverse events frequency categorization.

Very common (≥ 10%)	Common (≥ 1% and < 10%)	Uncommon (≥ 0.1% and < 1%)
Malaise	Palpitations	Chest pain
Headache	Abdominal pain/ discomfort	Constipation
Injection site pain/ swelling	Nausea and vomiting	Red eyes
Fatigue/ tiredness	Nasal congestion	Pain in the eyes
Muscle ache	Sore throat	Erectile dysfunction
Fever	Diarrhoea	
Chills	Runny nose	
Joint pains	Difficulty in breathing	
Light-headedness/Dizziness	Skin rash	
Loss of appetite	Swelling of face	
Increased sweating	Lymphadenopathy	
Bitterness in mouth	Paraesthesia in limbs	
Increased appetite	Excessive sleep	
	Increased thirst	

Table 3. Association of post-vaccination symptoms with sex, age, chronic health condition and previous positive test for COVID-19

	Post-vaccination symptoms			
Variable	Yes (%)	No (%)	$\chi 2$	P - value
Sex				
Female (117)	103 (88.0)	14 (12.0)	2.842	0.092
Male (71)	56 (78.9)	15 (21.1)		
Total	159	29		
Age Group (years)				
18-30	41 (89.1)	5 (10.9)	37.385	0.451
31-40	83 (87.4)	12 (12.6)		
41-50	21 (75.0)	7 (25.0)		
51-60	14 (73.7)	5 (26.3)		
Total	159	29		
Chronic health condition				
Yes	24 (88.9)	3 (11.1)	0.450	0.502
No	135 (83.9)	26 (16.1)		
Total	159	29		
Previous positive test for covid-19				
Yes	36 (87.8)	5 (12.2)	0.419	0.517
No	123 (83.7%)	24 (16.3)		
Total	159	29		

117) were females. Twenty-seven (14.4%) respondents had chronic medical conditions (Table 1), and hypertension was the most common chronic medical condition. Forty-one (21.8%) respondents had previously tested positive for COVID-19 before the vaccination exercise. One hundred and fifty-nine (84.6%) respondents reported at least one post-vaccination symptom. The total number of symptoms reported per participant in the vaccination exercise ranged from 0 to 16, with the mean number of symptoms experienced (± SD) by respondents being 5.6 (± 3.9). General malaise (55.9%, n = 105), headache (54.3%, n = 102), injection site pain and swelling (53.7%, n = 101), tiredness/ fatigue (46.8%, n = 88), muscle aches (35.1%, n = 66) and fever (33.0%, n = 62) were the most frequently reported post-vaccination symptoms. The full spectrum of post-vaccination symptoms in this survey has been summarised according to the WHO vaccine adverse events frequency categorisation [19] (Table 2). None of the respondents experienced anaphylactic shock or died from the vaccination. Among those who reported post-vaccination symptoms, 85.5% (n = 136) started experiencing them in the first 24 hours (Figure 1), 13.2% (n = 21) missed at least one day of work as a result, while 77.4% (n = 123) took analgesics to manage their symptoms. Regarding the perception of the severity of symptoms, 91.8% (n = 146) of respondents with post-vaccination symptoms ranked their symptoms as mild-moderate, while just 8.2% (n = 13) considered their symptoms severe. When asked about their willingness to take the 2nd dose of the vaccine, 86.2% (n = 162) of the total respondents for this survey expressed their readiness to receive it. A chi-square analysis did not show any association between age, sex, chronic health condition, previous positive test for COVID-19 and experiencing post-vaccination symptoms (Table 3).

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DISCUSSION

This study sought to describe the uptake rate and pattern of post-vaccination symptoms among HCWs following the administration of the first dose of the COVISHIELD vaccine. The uptake rate of 81.2% in our study was higher compared to two pre-vaccination surveys in Ghana, where the willingness to accept the vaccine was 39.3% and 66.9% among 234 HCWs and 305 junior doctors, respectively [11,12]. It was, however, comparable to a similar post-vaccination survey among 400 HCWs in Malawi, where the vaccine uptake rate was 82.5% [20]. Considering the widespread misinformation and conspiracy theories that circulated on social media at the time of the vaccination [21], as well as vaccine hesitancy reported in other jurisdictions [22], this uptake was quite commendable, considering experts' initial suggestion that between 70% and 85% of people needed to be vaccinated to achieve herd immunity [23]. More information about the safety and efficacy of the vaccines must be disseminated to the public if a similar uptake rate or even more is to be achieved nationwide. The comparatively higher representation of females than males and nurses and doctors more than other HCWs among the research participants reflects their actual numbers on the nominal staff role in the department. Over 85% of the respondents had no long-term or comorbid conditions. This could be due to the fact that the majority of the respondents were ≤ 40 years of age and hence were not affected by the established link between increasing age and the development of chronic conditions, especially noncommunicable diseases [24].

Our finding of 84.6% of respondents reporting at least one post-vaccination symptom was comparable to the 61 – 88% and 65 – 86% reported local and systemic symptoms, respectively, among participants in the clinical trials of the ChAdOx1 nCoV-19 vaccine following the first dose [25]. Similarly, a higher prevalence of at least one adverse event after vaccination among HCWs was also obtained in a study in Togo (71.6%) [26] and in another study in South Korea (93%) [27] following the first dose of ChAdOx1 nCoV-19 vaccine. Like all AEFIs, it is possible some of the post-vaccination symptoms were not due to the vaccine but rather the nocebo effect, a phenomenon where individuals experience adverse symptoms after administration of medical interventions such as drugs and vaccines, which, to a large extent, is driven by their expectation of negative outcomes [28]. This is more so because the novel vaccine has evoked some controversies and concerns even among HCWs [18]. Further, in a systematic review and meta-analysis of the frequency of adverse events in the placebo arms of COVID-19 vaccine trials among 45,380 trial participants, the nocebo effect accounted for 76% of systemic adverse events after the first COVID-19 vaccine dose, with headache and fatigue being the most common symptoms [29]. Over 77% of participants who developed post-vaccination symptoms in our study admitted to taking analgesics to manage their symptoms. This was lower than the observation in the study by Konu et al., where 89.5% of participants who experienced adverse events after the vaccination used either analgesics, antipyretics, or non-steroidal anti-inflammatory drugs (NSAIDs) [26]. The high usage of analgesics by participants in our study may have been partly influenced by a communique from the Public Health Unit of the hospital, advising that staff could take analgesics shortly before receiving the vaccine rather than opting out of the vaccination exercise. This was part of efforts to overcome vaccine hesitancy due to the fear of possible adverse effects among some staff of the hospital. It is not known what effect the use of these analgesics will have on the immunity of vaccine recipients since there is mixed evidence regarding the possibility of dampened immunological response due to analgesic use [30]. We were unable to determine those who took analgesics only after developing post-vaccination symptoms from those who took it prophylactically. The most frequently occurring post-vaccination symptoms in our study included general malaise, headache, injection site pain and swelling, tiredness, muscle aches and fever. These symptoms were mostly mild to moderate in severity and occurred mostly within 24 hours after vaccination. The overall frequency, profile and severity of adverse reactions reported among our study participants were similar to those reported in clinical trials and other mass vaccination exercises [15,17,27,31]. A common theme among these studies is the fact that the vaccine is generally safe and well-tolerated. This information can be effectively adopted in designing COVID-19 vaccination communication messages aimed at mitigating fear of possible side effects to increase uptake.

Despite the similarity between the post-vaccination symptoms in our study and prior studies, bitterness or change of taste in the mouth and increased appetite were very common post-vaccination symptoms in our study, which have not been widely identified in other studies. The few studies reporting similar findings include a retrospective analysis among the United States (US) population, which identified taste disorders as the most reported oral adverse events following COVID-19 vaccination [32], and a study in India that observed two reports of increased appetite as adverse events following vaccination with the COVISHIELD [31]. Further, Lechien et al. reported 6 cases of post-vaccine smell and taste disorders in 5 European hospitals [33]. The exact pathophysiological mechanisms underlying these post-vaccination symptoms, however, remain unclear. We did not find any significant association between age and sex and experiencing post-vaccination symptoms. A study in India also did not observe any significant differences between males and females regarding adverse events after vaccination [31]. However, some prior studies observed more pronounced adverse events after vaccination in women, which have been attributed to a stronger immune response influenced by oestrogen and some other

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unknown immunologic differences between the two sexes [26,27]. Further, severe adverse events believed to be due to exaggerated immune responses were found in younger age groups in some studies [25-27,31]. With the FDA approval and subsequent deployment of other COVID-19 vaccines such as Pfizer, Sputnik V, Johnson and Johnson and Moderna in Ghana, it will be important to conduct similar surveys to see how the post-vaccination symptoms compare among the various vaccines being used so far in the country. Findings from such a study could inform policy, such as recommending particular vaccines for specific groups of people. An example is the decision in France to exclusively recommend the ChAdOx1 nCoV-19 vaccine for subjects aged 55 years and older after it was observed that severe events following the ChAdOx1 nCoV-19 vaccine were observed more in subjects under 55 years of age [26].

The present study has some limitations. First, the sample size was small. Second, the study only estimated the incidence of adverse effects of the COVID-19 vaccine in the short term and did not measure the duration of post-vaccination symptoms. A cohort study will be better suited to follow up on long-term adverse events. Third, due to the survey nature of the study, response biases may skew results toward individuals who experienced adverse effects, potentially leading to an overestimation of postvaccination symptoms.

Conclusion

A high uptake of the COVISHIELD vaccine, as well as a high incidence of mild to moderate post-vaccination symptoms, was observed among HCWs in this study. The overall frequency, profile and severity of adverse reactions reported among our study participants were similar to those reported in clinical trials and other mass vaccination exercises. The study adds to data on post-vaccination symptoms following the COVISHIELD vaccine administration in Ghana and agrees with findings in prior studies that the vaccine is generally safe and well tolerated. This information is useful for various stakeholders in Ghana in reassuring and encouraging the population to accept the COVID-19 vaccine.

DECLARATIONS

Ethical considerations

Written informed consent was obtained from all study participants, and ethical approval (KBTH-ADM/00332/2021) for the study was obtained from the KBTH.

Consent to publish

All authors agreed to the content of the final paper.

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None

Competing Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Author contributions

GKAA conceived the research idea and designed the study with PV. GKAA, OKB and EA participated in data collection. GKAA, PV and GBN contributed to the data analysis and interpretation. GKAA wrote the initial draft of the manuscript. PV, GBN, OKB and EA provided critical revision of the manuscript. All authors contributed to and approved the final version to be published.

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Availability of data

The datasets used and analysed during the current study are available from the corresponding author upon reasonable request.

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