

Compliance with Occupational Health and Safety Practices Among Healthcare Workers in Vaccination Units: A Cross-Sectional Study in Basra, Iraq

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ABSTRACT

Objective: Healthcare workers (HCWs) in vaccination units are exposed to various occupational hazards, making adherence to occupational health and safety (OHS) measures essential. Therefore, this study aimed to assess OHS practices among HCWs in primary healthcare vaccination units in Basra Governorate, Iraq. **Method:** A descriptive cross-sectional study was conducted in 11 health sectors in Basra Governorate, Iraq, using a multistage stratified sampling approach with 228 HCWs. It depended on a questionnaire, which was designed based on a comprehensive review of relevant literature. Then, practice levels were categorized based on scores (poor and good). **Results:** Most HCWs demonstrated the highest compliance was observed for safe disposal of contaminated waste and sharps (93.0%), regular hand hygiene (89.0%), avoiding needle recapping (84.2%), post-exposure management (78.1%), and wearing protective gowns (55.7%). Lower compliance was identified for ergonomic practices (2.2%), safe lifting techniques (1.3%), consistent face mask use (3.5%), and regular glove replacement for each patient (7.5%). **Novelty** HCWs showed good OHS practices influenced by their residence and medical field.

INTRODUCTION

Occupational Health and Safety (OHS) is an essential interdisciplinary domain dedicated to safeguarding the physical, mental, and social well-being of workers [1]. Globally, of the approximately 3.5 billion employed individuals, around 140 million contribute to the health and social sectors [2]. However, the healthcare environment is fraught with severe risks. The International Labour Organization estimates that over 2.3 million individuals worldwide succumb annually to work-related illnesses or accidents [3]. Moreover, according to the World Health Organization (WHO), occupational hazards are responsible for 2.1% of deaths all over the world and about 3% of global disease burden [4].

These hazards have a profound concentration in Primary Health Care (PHC) centers and their vaccination units. During the continuous delivery of immunization services, healthcare workers (HCWs) in these settings are frequently confronted with exposure to biological, chemical, physical, and ergonomic threats [5]. One area for concern is needlestick injury and occupational exposure to blood-borne pathogens. Globally, WHO estimates more than 3 million percutaneous exposures to blood pathogens occur among HCWs each year, with over 90% of these occurring in developing countries [6]. These types of exposures often occur in the course of normal medical practices and allow for the spread of serious infections such as Hepatitis B, Hepatitis C and HIV [7].

To mitigate these alarming statistics, the strict execution of OHS practices and standard precautions is paramount. Effective safety practices in vaccination units encompass continuous hand hygiene, safe injection techniques – such as avoiding needle recapping and ensuring immediate disposal into puncture-resistant containers – and the appropriate application of personal protective equipment (PPE) [8, 9]. Adherence to these operational practices serves as the primary physical barrier against hazard exposure [10].

Nevertheless, safe practices such as these are hard to implement in Iraq. Many factors related to the long-term effects of instability, lack of resources, and a decaying health system continue to plague Iraq [11,12]. These systemic weaknesses are directly implicated in the day-to-day implementation of OHS measures. The absence of wide-scale implementation frameworks, along with inconsistent adherence to/monitoring of safety standards has created significant breaches in safe practice provisions for frontline HCWs, exposing them to risks that could have been averted [11,13]. Therefore, assessing the actual, daily practices of OHS measures among HCWs in Iraqi vaccination units is urgently needed to identify operational vulnerabilities and ensure a secure healthcare environment.

METHODOLOGY

Study design and period:

It is a descriptive (cross-sectional) study designed to evaluate OHS practise in vaccination units in primary healthcare centers (PHCs) in Basra Governorate, Iraq. The investigation began on October 1, 2025, and concluded on February 28, 2026.

Population source:

The sample population comprises HCWs (aged 20 years and above) who work in vaccination units in PHCs in Basra Governorate, Iraq.

Inclusion criteria:

HCWs who work in vaccination units in PHCs in Basra. Eligible HCWs include health technicians, nurses, vaccinators, and other supporting healthcare staff directly involved in immunization services

Exclusion criteria:

HCWs working in other units within PHCs. HCWs with less than one year of experience in the vaccination units. HCWs who were absent during the data collection period.

Sample size and sampling techniques:

The sample was calculated using Steven Thompson's formula for the calculation of sample size [14][15]. As a result, the minimum size of the sample for HCWs is 226;

$$n = \frac{N+P(1-P)}{[N-1(D2/Z2)+P(1-P)]}$$

rephrase 228 to improve the study, as shown below:

Where:

- N = Total HCWs size (550).
- n = the minimum sample size.
- Z = Z-score related to the confidence level (for a 95% confidence level, $Z \approx 1.96$)
- p = rate of property availability equal to 0.50 (50%)
- d = the error ratio equal to 0.05.

The Basra Governorate, which is divided into 11 different health sectors, used a multistage stratified sampling strategy for this study. First Provincial Center Sector, Second Provincial Center Sector, Third Provincial Center Sector, Abu Al-Khaseeb Sector, AL-Midaina Sector, AL-Zubair Sector, AL-Qurna Sector, Al-Hartha Sector, Shatt Al-Arab Sector, Al-Dair Sector, and Al-Sadiq Sector comprised the sampling frame in the first stage. A total of 228 HCWs were distributed proportionately across these sectors in the second stage based on the number of health centers in each region. Simple random selection was used to choose HCWs within each center, ensuring fair opportunities for all employees and reducing bias, which improved the accuracy of the findings.

Data collection method

After the survey with closed-ended questions was translated into Arabic, the data were collected through in-person interviews. The study's goals were explained to HCWs, and they were given the assurance that the information would be kept private. The structured questionnaire was completed by the researcher during the interview.

A thorough analysis of pertinent literature served as the foundation for the questionnaire's construction. It is divided into two sections. The first segment covers the sociodemographic traits of HCWs. The practice level of HCWs was covered in the second portion, which contained twelve items.

The questionnaire's validity and reliability

The results indicated that the questionnaire demonstrated a good level of reliability, with a Cronbach's alpha of 0.724. The questionnaire's content validity was determined by a committee of experts from different specializations. All expert comments were taken into account for slight modifications.

Data scoring

The Likert respondent scale was used to rate the five levels. A score of five was given for "Always," four for "Often," three for "Sometimes," two for "Rarely," and one for "Never." The scoring system was designed to reflect agreement. Twelve questions were asked in the practice assessment, for which a mean score of < 3 was considered poor practice, and > 3 was good practice.

Statistical Analysis

Each questionnaire item's data was transferred to code sheets, entered into a personal computer, and analyzed using the statistical program SPSS 27. Simple statistics of percentage, frequency, mean, range (lowest and greatest values), and the standard deviation (SD) values were used to present the data. For qualitative data, the chi-squared test (χ^2 test) was employed to ascertain the variation between various percentages. The

P-value was considered statistically significant when it was equal to or lower than 0.05 [16].

Ethical considerations

Official approval to conduct the study was obtained from the College of Health and Medical Techniques in Basra, as well as from the Basra Health Directorate (Human Development and Training Center). A Task Facilitation Letter (No. 896, dated 22/12/2025) was issued to authorize visits to the selected sectors in Basra City. The study was carried out in eleven sectors after securing the required administrative permissions. HCWs were interviewed after obtaining their informed consent, both verbally and through confirmation of their willingness to participate.

Study limitations

The cross-sectional nature of the study makes it more difficult to determine causal correlations between variables. The sample size and length of data collection may have been restricted by time and resource limitations. Additionally, some PHCs were chosen at random, while others were excluded because of time constraints and the PHCs' remote locations. Interviewer bias or social desirability bias may have been introduced by using an interview-based method since HCWs may have responded with what they believed to be appropriate rather than representing their actual behaviors.

RESULTS AND DISCUSSION

Demographic characteristics of study HCWs

In **Table 1**, the demographic characteristics of the 228 study participants show that the majority reside in rural areas (71.1%). The largest proportion falls within the 30-39 age group (34.2%) and holds a diploma (54.8%), with most working in community health (36.4%) and having 1 to 4 years of experience (34.2%). Additionally, while 57.5% of the participants have received OHS training, a slight majority (52.2%) reported lacking training in infection prevention and control

Table 1. Demographic characteristics of study HCWs (n=228).

Variable	Category	n (%)
Age group	20-29 years	43 (18.9%)
	30-39 years	78 (34.2%)
	40-49 years	56 (24.6%)
	≥50 years	51 (22.4%)
	Mean ± SD (Range)	39.37 ± 10.19 (22-59)
Residence	Male	64 (28.1%)
	Female	164 (71.9%)
	Rural	162 (71.1%)
Educational level	Urban	66 (28.9%)
	Secondary	52 (22.8%)
	Diploma	125 (54.8%)
Medical field	Bachelor's	51 (22.4%)
	Pharmacist	38 (16.7%)

	Community health	83 (36.4%)
	Nurse	70 (30.7%)
	Lab	17 (7.5%)
	Administrative staff	20 (8.8%)
Years of experience	1-4 years	78 (34.2%)
	5-9 years	51 (22.4%)
	10-14 years	38 (16.7%)
	15-19 years	20 (8.8%)
	≥20 years	41 (18%)
Occupational health and safety training	Yes	131 (57.5%)
	No	97 (42.5%)
Infection prevention and control training	Yes	109 (47.8%)
	No	119 (52.2%)

In **Table 1**, most HCWs were aged 30–39 years (34.2%), done previously likely to correspond with the possible structure of the workforce, where more senior staff are in stable employment and what is considered experienced, in alignment with Hussein et al. (2022) [17]. The predominance of female health workers (71.9%) is indicative of the socio-cultural compatibility with preferred use of females as vaccinators for community acceptance and facilitation in maternal communication [17, 18]. Diploma holders constituted the majority (54.8%), which suggests typical public health centres (PHC) staffing structures [20]. The other specialty with the highest proportion was community health at 36.4%, which is expected because of its relationship to preventive strategies, in contrast to lower rates reported by Sevinç et al. (2025) [21]. Moreover, a high proportion of staff with 1–4 years of experience (34.2%) indicates recent expansion of the workforce to strengthen immunization services [22]. Finally, 57.5% had received OHS training, which may reflect an increasing general awareness of safety [23]—while 52.2% did not receive any training on infection prevention and control: this indicates a high gap in training provision [24].

Practices of HCWs related to OHS measures

As observed in **Table 2**, most of the practices scored "Good" (8 out of a total of 12 items). Nonetheless, some of the practices were rated as "Poor" (4 out of 12 items), indicating clear areas for further focus and improvement.

Table 2. Practices of HCWs related to OHS measures.

Item	Never n(%)	Rarely n(%)	Sometimes n(%)	Often n(%)	Always n(%)	Mean
I wear gloves throughout working hours and change them for each patient.	24 (10.5%)	49 (21.5%)	105 (46.1%)	33 (14.5%)	17 (7.5%)	2.87
I wash my hands regularly with soap and water or use an alcohol-based hand rub after contact with blood, body fluids, or other body secretions.	1 (0.4%)	1 (0.4%)	7 (3.1%)	16 (7.0%)	203 (89.0%)	4.84
I follow safe work practices by avoiding recapping used needles.	7 (3.1%)	4 (1.8%)	11 (4.8%)	14 (6.1%)	192 (84.2%)	4.67
I wear a face mask throughout working hours.	14 (6.1%)	83 (36.4%)	98 (43.0%)	25 (11.0%)	8 (3.5%)	2.69
I wear a protective gown/lab coat throughout working hours.	20 (8.8%)	18 (7.9%)	21 (9.2%)	42 (18.4%)	127 (55.7%)	4.04
I handle waste appropriately and dispose of sharps and other contaminated materials safely to prevent infection.	1 (0.4%)	0 (0.0%)	3 (1.3%)	12 (5.3%)	212 (93.0%)	4.90
I receive appropriate post-exposure management or prophylaxis following occupational exposure to infection.	4 (1.8%)	1 (0.4%)	21 (9.2%)	178 (78.1%)	24 (10.5%)	3.95
I follow safety protocols during emergencies, such as fires or electrical hazards.	45 (19.7%)	20 (8.8%)	10 (4.4%)	101 (44.3%)	52 (22.8%)	3.42
I report any unsafe condition, such as needle-stick injuries or other workplace hazards, to my supervisor.	0 (0.0%)	1 (0.4%)	129 (56.6%)	46 (20.2%)	52 (22.8%)	3.65
I apply ergonomic practices, such as adjusting the height of my chair or workstation to reduce physical strain.	164 (71.9%)	49 (21.5%)	10 (4.4%)	0 (0.0%)	5 (2.2%)	1.39
I follow safe lifting and handling techniques when transporting vaccine boxes or supplies.	186 (81.6%)	29 (12.7%)	8 (3.5%)	2 (0.9%)	3 (1.3%)	1.28
I make sure to participate in regular occupational safety training sessions whenever they are organized.	11 (4.8%)	2 (0.9%)	131 (57.5%)	18 (7.9%)	66 (28.9%)	3.55
Poor: <3, Good: ≥3						

According to OHS practices in **Table 2**, half HCWs (46.1%) reported that they wear gloves only sometimes due to workload pressure, time constraints or low stocks of PPE, which is consistent with one study [25]. Hand hygiene compliance was high (89%), and it is a good indicator of safety awareness, similar to the previous survey [26]. Likewise, only 84.2% avoided recapping of needles owing to knowledge of needle-stick injury risk [27], and even fewer 55.7% always wore gowns to protect against body fluid splashes [28]. In the context of vaccination settings, inconsistent use of masks was associated with discomfort, communication barriers, or perception of lower risk [29]. Effective waste management was high (93%), agreeing with the study via Akkajit et al. (2020)[30].

Post-exposure protocol compliance reached 78.1% – exceeding findings of a study, though workload and fear of administrative consequences prevented full adherence [31]. Emergency protocol adherence (44.3%) and hazard reporting (56.6%) remained moderate, reflecting insufficient emergency training, consistent with other studies [32–33][34]. In addition, few participants complied with ergonomic workstation modifications (71.9%) and safe lifting practices (81.6%), due to the absence of adjustable equipment and manual handling training; perception of vaccine boxes as light weight compared to other box types; although this contrasts with the AzizAli & Sreedharan [35], it is consistent with recent evidence demonstrating that vaccine handling presents occupational ergonomic hazards [5, 36]. Lastly, participation in routine safety training was infrequent (57.5%) due to individual workload pressures and absence of institutional mandates despite the established role of routine safety training in improving safety behaviors [37].

Overall practice level

Figure 1: OHS measures scores in one seven HCWs except for five works done with practice level. The chart indicates that a high proportion of the participants (74%, n=168) have "Good" practice quality, while only 26% (n=60) have a good practice level.

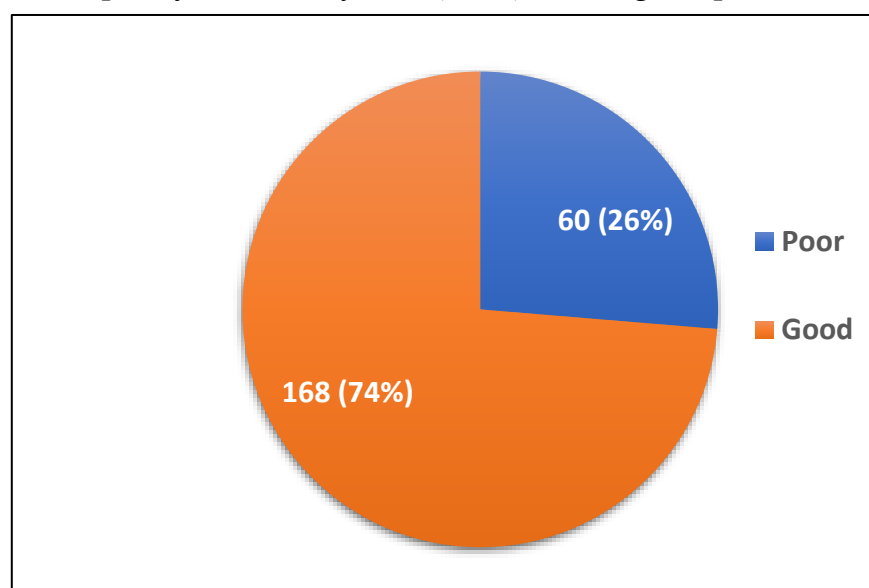


Figure 1. Overall practice level of HCWs towards OHS measures.

Figure 1 demonstrates that a significant majority of participants (74%) exhibited good overall OHS practices, driven by high safety awareness, prior protocol training, and accessible guidelines. This positive finding contrasts with Sevinç et al. (2025)[21] in Diyala, Iraq.

Relationship between demographic variable and practice level

Table 3 reveals a statistically significant association between the practice level and two variables: residence ($p = 0.002$) and medical field ($p = 0.035$). However, no significant relationships ($p > 0.05$) were found regarding other variables.

Table 3. Relationship between demographic variables and practice level.

Variable	Category	Poor n (%)	Good n (%)	p-value
Age group	20–29 years	14 (32.6%)	29 (67.4%)	0.269
	30–39 years	24 (30.8%)	54 (69.2%)	
	40–49 years	10 (17.9%)	46 (82.1%)	
	≥50 years	12 (23.5%)	39 (76.5%)	
Sex	Male	13 (20.3%)	51 (79.7%)	0.198
	Female	47 (28.7%)	117 (71.3%)	
Residence	Rural	52 (32.1%)	110 (67.9%)	0.002
	Urban	8 (12.1%)	58 (87.9%)	
Educational level	Secondary	9 (17.3%)	43 (82.7%)	0.069
	Diploma	32 (25.6%)	93 (74.4%)	
	Bachelor's	19 (37.3%)	32 (62.7%)	
Medical field	Pharmacist	13 (34.2%)	25 (65.8%)	0.035
	Community health	20 (24.1%)	63 (75.9%)	
	Nurse	12 (17.1%)	58 (82.9%)	
	Lab	5 (29.4%)	12 (70.6%)	
	Administrative staff	10 (50.0%)	10 (50.0%)	

Years of experience	1-4 years	25 (32.1%)	53 (67.9%)	0.649
	5-9 years	13 (25.5%)	38 (74.5%)	
	10-14 years	9 (23.7%)	29 (76.3%)	
	15-19 years	5 (25.0%)	15 (75.0%)	
	≥20 years	8 (19.5%)	33 (80.5%)	
Occupational health and safety training	Yes	34 (26.0%)	97 (74.0%)	0.885
	No	26 (26.8%)	71 (73.2%)	
Infection control training	Yes	24 (22.0%)	85 (78.0%)	0.158
	No	36 (30.3%)	83 (69.7%)	
p-values were calculated using the Chi-square test.				

Table 3 demonstrates clear associations between residence and practice level. The data also showed that OHS practices were more likely to be good among urban residents; this may be a consequence of improved access to training and health care services, in line with a study [38]. In addition, nurses showed higher adherence to the safety standards, as we found high compliance that was related to their direct responsibilities in both preparation and administration of vaccines, which required good infection prevention; this finding is consistent with some other studies [23, 39].

CONCLUSIONS

Fundamental Finding: The findings indicate that healthcare workers (HCWs) demonstrate high compliance with occupational health and safety (OHS) practices, including safe waste disposal, proper hand hygiene, avoidance of needle recapping, use of protective gowns, and appropriate post-exposure management. **Implication:** The results suggest that maintaining and strengthening OHS programs should consider contextual factors such as healthcare workers' place of residence and medical field, as these factors influence compliance with safe workplace practices. **Limitation:** This study focuses on selected OHS practices and identifies only place of residence and medical field as influencing factors, which may not fully explain variations in healthcare workers' occupational safety behaviors. **Future Research:** Future research should investigate additional determinants of OHS compliance, evaluate interventions to improve workplace safety practices, and examine healthcare workers across different healthcare settings and geographical regions to enhance the generalizability of the findings.

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