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Analyzing the Role of Health Messages in Strengthening Community Response to Epidemics: Assessing the Effectiveness of Risk Management Strategies”

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ABSTRACT

Background: The Epidemics led to significant healthcare challenges worldwide. Healthcare workers (HCWs) are critical in managing the pandemic, and their knowledge, attitudes, and perceptions of risk play a key role in effective public health responses. Effective risk communication is essential for influencing HCWs' adherence to preventive measures and improving their understanding of EPIDEMICS .

Methods: A cross-sectional, survey-based study was conducted to assess the knowledge, attitudes, and perceived risks of HCWs regarding EPIDEMICS . The study also explored the impact of risk communication strategies on HCWs' behavior and practices. A total of 1691 HCWs participated in the online survey, which included questions on demographics, knowledge of EPIDEMICS , attitudes toward managing

EPIDEMICS cases, and perceptions of risk communication. Descriptive and inferential statistical analyses were performed to evaluate the data.

Results: The majority of HCWs demonstrated strong knowledge of EPIDEMICS , with 84.8% scoring above 0.75, indicating good knowledge. Regarding attitudes, 64.5% of participants had a positive attitude toward managing the pandemic. Risk communication significantly influenced HCWs' behavior, with 93.4% reporting changes in their practices, including stricter infection control and increased self-education. . Predictors of good knowledge and attitude levels included higher education, physician or pharmacist roles, male gender, and ICU experience.

Conclusion: The study highlights the significant impact of risk communication on HCWs' knowledge, attitudes, and practices regarding EPIDEMICS . Continued educational efforts are essential to keep HCWs updated on infection control and preventive measures, particularly for those in lower-level roles or non-governmental healthcare sectors. Although HCWs demonstrated strong knowledge and attitudes, there is still a need to enhance their understanding of the clinical manifestations of EPIDEMICS and the role of age in disease outcomes.

Introduction:

The novel coronavirus disease 2019 (COVID-19) rapidly spread across the globe and was officially declared a global pandemic by the World Health Organization (WHO) on March 11, 2020 (1). This pandemic caused significant disruptions to healthcare and economic systems (2). In the absence of effective treatment, preventive measures remain crucial for controlling the spread of the disease. These measures include wearing masks, maintaining social distancing, hand hygiene (3–5), and self-isolation for suspected cases (6).

Health messaging plays a vital role in enhancing community response during epidemics by influencing risk perception and promoting adherence to essential preventive measures to curb the spread of infection. Such measures include the use of masks, social distancing, and proper hand hygiene. Effective health messages can significantly shape community behavior, ensuring compliance with preventive actions while reducing misinformation and panic-driven reactions.

The success of preventive strategies largely depends on public compliance, which is influenced by how communities perceive the risk and understand these measures (7). Several studies have explored public knowledge and attitudes toward epidemics, reporting varied results based on geographic, demographic, and occupational factors (8,9).

The goal of this study shifts its focus from solely healthcare workers (HCWs) to a broader target: the general community. The revised objective is: *"This study aims to evaluate how communities respond to health messages during epidemics, analyzing the role of these messages in improving adherence to preventive measures and reducing health risks."*

Risk communication, as defined by WHO, is the "exchange of real-time information, advice, and opinions between experts and people facing threats to their health, economic, or social well-being" (21). Effective risk communication during pandemics

enhances understanding of preventive measures, fosters compliance, and minimizes panic-driven behaviors such as hoarding (11,22). This study investigates the effectiveness of health messaging in shaping community responses, with a focus on improving public adherence to preventive measures during the COVID-19 pandemic.

Methodology

Participants

The study targeted a broad sample of the general community, including individuals from various age groups, occupations, and educational levels. Participants were randomly selected and invited to complete an online questionnaire designed to evaluate their perception of health messages and their responses to them during the pandemic. Individuals below 18 years of age or those unable to provide informed consent were excluded from the study.

Tools

A self-administered, online questionnaire was developed to assess the impact of health messages on community responses during the pandemic. The questionnaire included questions addressing:

- The clarity and comprehensibility of health messages.
- Trust in message sources (e.g., the Ministry of Health, media outlets, international organizations).
- Behavioral changes attributed to health messages (e.g., increased hand hygiene, adherence to social distancing).

The questionnaire was distributed via an online platform, ensuring one response per participant. Each participant received an email detailing the study objectives and a link to the survey. The questionnaire was available in both English and Arabic and was developed by reviewing existing tools and WHO recommendations (8, 13, 34, 35). It underwent validation by two public health experts for content accuracy.

The survey was divided into four sections:

1. **Demographics and Background Information**: Included age, gender, education level, and occupation.
2. **Knowledge of the Pandemic**: Assessed through questions about the disease, its transmission, and prevention measures.
3. **Attitudes and Behavioral Changes**: Explored participants' willingness to comply with precautionary measures and their confidence in the effectiveness of health messages.
4. **Health Communication Evaluation**: Examined the perceived clarity, reliability, and impact of health messages on behavior.

A scoring system was applied to evaluate participants' knowledge and attitudes. Correct responses were awarded 1 point, while incorrect responses received 0 points.

For questions with multiple correct answers, each correct response earned 1 point. Scores were normalized to range from 0 to 1, and participants were categorized as poor (<0.25), below average (0.25 ≤ score < 0.50), above average (0.50 ≤ score < 0.75), or good (≥0.75).

Statistical Analysis

Descriptive statistics, including frequencies and percentages, summarized categorical variables, while means ± standard deviations (SD) represented continuous variables. The association between categorical variables was analyzed using Chi-square or Fisher's exact tests. For continuous variables, the Independent t-test or One-way ANOVA was employed.

To identify factors influencing community responses, bivariate and multivariate logistic regression analyses were conducted, examining variables such as age, gender, education level, and trust in message sources. All statistical tests were two-tailed, with a significance level set at $p < 0.05$. Data analysis was performed using IBM SPSS Statistics version 25.0.

Results

The study received 1691 responses, with an average age of 36.94 ± 9.21 years, and a predominance of female participants (53.6%). Around 55.4% of the healthcare workers (HCWs) were employed in the Ministry of Health (MOH)-affiliated sector. The sample mostly consisted of physicians (35%) and nurses (26.4%). Nearly half of the participants had already handled one or more suspected or confirmed EPIDEMICS cases.

HCWs demonstrated strong knowledge of EPIDEMICS transmission, diagnosis methods, and preventive measures. The overall mean knowledge score was 0.9 ± 0.1, with 84.8% of participants scoring above 0.75, indicating good knowledge.

Regarding attitudes, HCWs displayed a positive outlook towards their readiness to handle EPIDEMICS cases and their belief in being adequately trained. The mean attitude score was 0.8 ± 0.2, with 64.5% scoring above 0.75, reflecting a good attitude toward managing the pandemic.

Almost all participants (97.9%) received health communication messages about EPIDEMICS and agreed on the importance of taking actions to prevent its spread within healthcare settings. A significant majority (94.1%) felt there was a risk of contracting EPIDEMICS during their duties.

Health messages had a notable impact on HCWs' attitudes, with 93.4% reporting changes in their behavior, such as stricter infection control practices (78.8%) and increased self-education (76.5%). Additionally, preventive measures were influenced by the received messages. When asked about information needs, most HCWs (77.3%) expressed interest in learning more about therapeutic options. Overall, 89.4% felt there was a gap in information they needed.

The most trusted sources of information were the MOH (96.2%) and the WHO (56.4%).

HCWs with higher education levels and those in roles such as physicians and pharmacists had higher knowledge scores ($p < 0.001$). Multivariate analysis revealed that nurse occupation, radiotherapy, and public health roles were associated with lower knowledge levels.

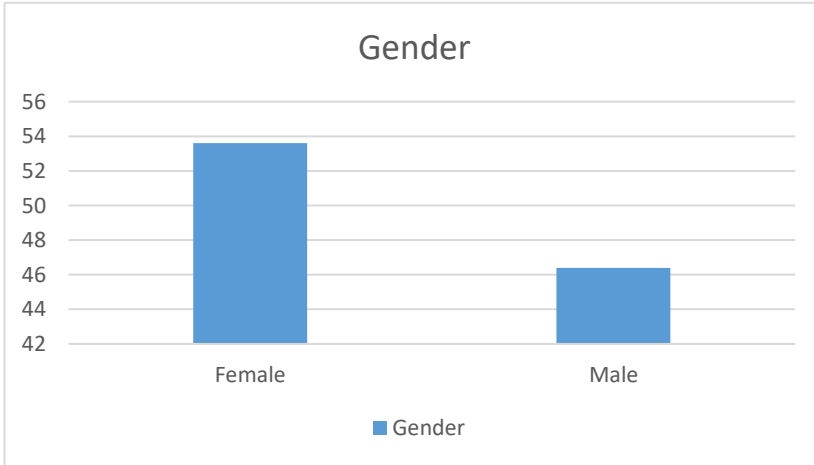
Attitude scores were higher among males ($p < 0.001$), older age groups ($p = 0.008$), HCWs in non-MOH governmental sectors ($p = 0.014$), nurses ($p < 0.0001$), HCWs working in ICUs ($p < 0.0001$), and those who had treated EPIDEMICS patients ($p < 0.0001$). Multivariate analysis showed that being male (OR 2, $p < 0.001$), a nurse (OR 1.6, $p = 0.006$), or stationed in ICU (OR 2.9, $p = 0.001$), and having dealt with EPIDEMICS cases (OR 2.6, $p < 0.001$) were independent positive predictors of good attitude scores. Working in sectors other than the MOH was a negative predictor (OR 0.6, $p = 0.003$).

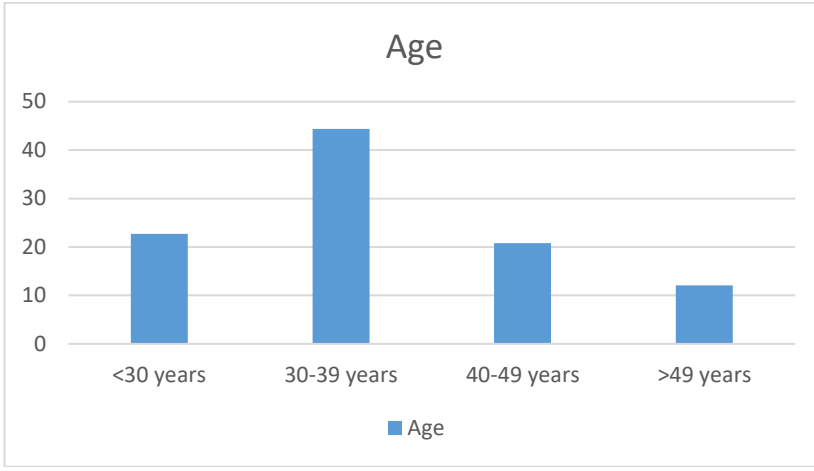
A statistically significant positive correlation was found between knowledge and attitude ($p < 0.0001$).

Table 1 Demographic and Professional Characteristics of the Study Population

Variable	Number	Percentage (%)
Study enrolled	1691	-
Gender		
Female	906	53.6
Age Group	1690	
<30 years	384	22.7
30-39 years	750	44.4
40-49 years	351	20.8
>49 years	205	12.1
Nationality	1669	
Non-Saudi	642	38.5
Saudi	1027	61.5
Highest level of education	1690	
Diploma	339	20.0
Bachelor	892	52.7
Masters/Ph.D	400	23.7
Other	59	3.5
Employer	1691	
Governmental - Ministry of Health	937	55.4
Governmental (Other than MoH)	346	20.5
Private sector	398	23.5
Work location	1646	
Hospital	1366	83.0
PHC (Primary Healthcare Center)	280	17.0
Occupation	1687	
Laboratory staff	137	8.1

Nurse	445	26.4
Other	328	19.4
Pharmacist	99	5.9
Physician	590	35.0
Public Health	16	0.9
Radiotherapist	72	4.3
Ward stationed in	1498	
Medical ward	220	14.7
O&G ward (Obstetrics and Gynecology)	62	18.8
Pediatric ward	97	25.3
ICU	88	31.2
ER	202	44.7
Laboratory	110	52.0
Pharmacy	64	56.3
Isolation ward	34	58.5
Optometrists	3	85.7
Other	404	86.7
OPD (Outpatient Department)	15	89.1
Radiology	36	97.7
Dentist	128	98.5
Nutrition	12	14.7
Physiotherapy	23	18.8
Dealt with a COVID-19 case	1689	
Yes	846	50.1




Age
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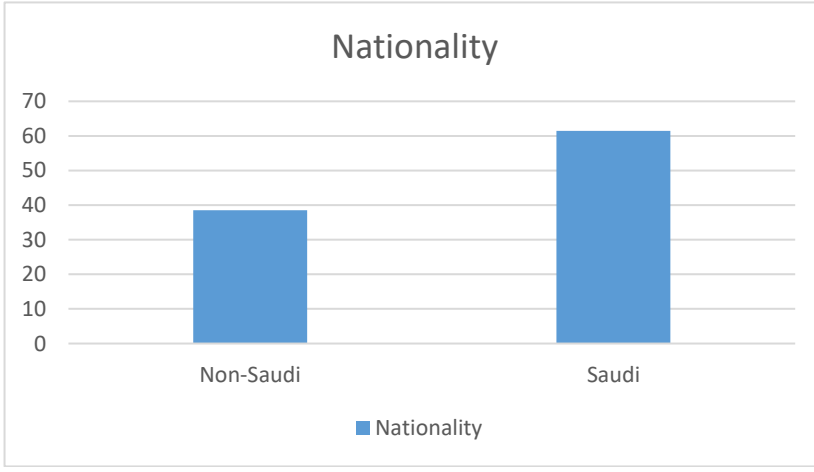
40
30
20
10
0
<30 years
30-39 years
40-49 years
>49 years
Age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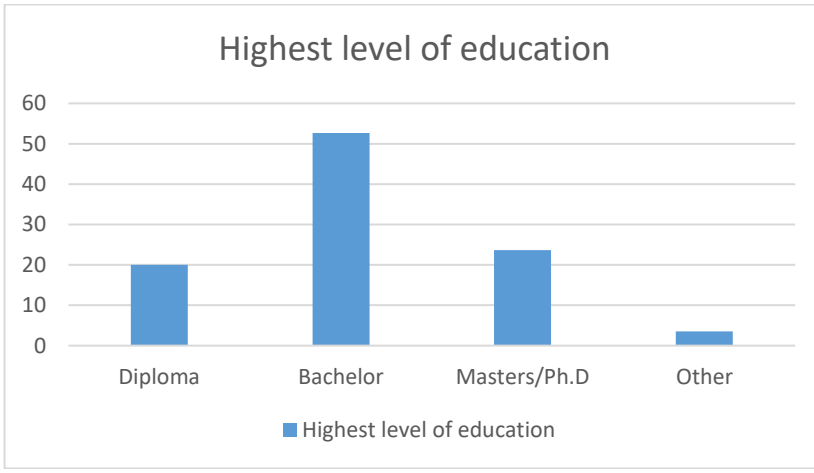
50
40
30
20
10
0
Non-Saudi
Saudi
Nationality


Highest level of education
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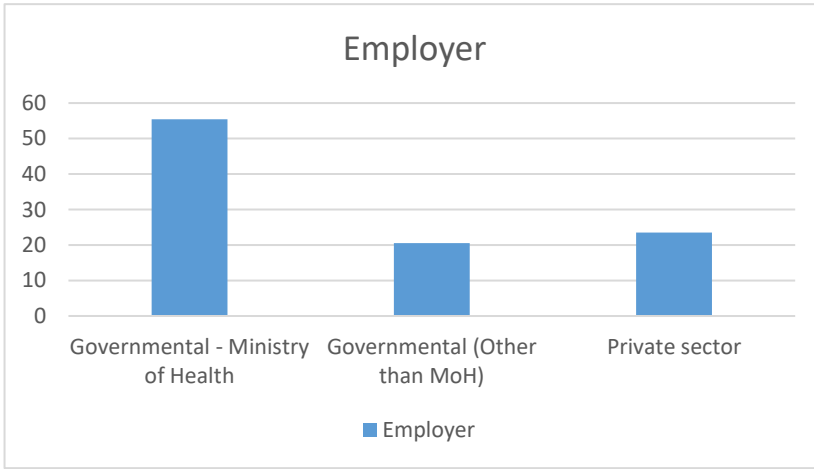
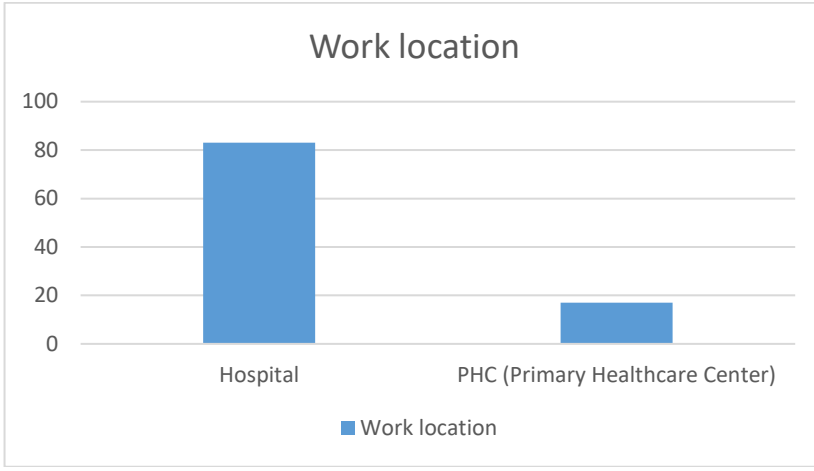
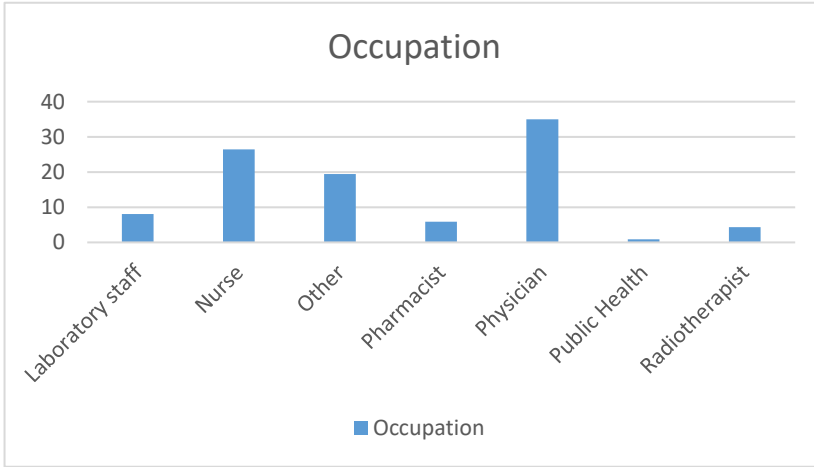
50
40
30
20
10
0
Diploma
Bachelor
Masters/Ph.D
Other
Highest level of education


Employer
60
50
40
30
20
10
0
Governmental - Ministry of Health
Governmental (Other than MoH)
Private sector
Employer


Work location
100
80
60
40
20
0
Hospital
PHC (Primary Healthcare Center)
Work location


Occupation
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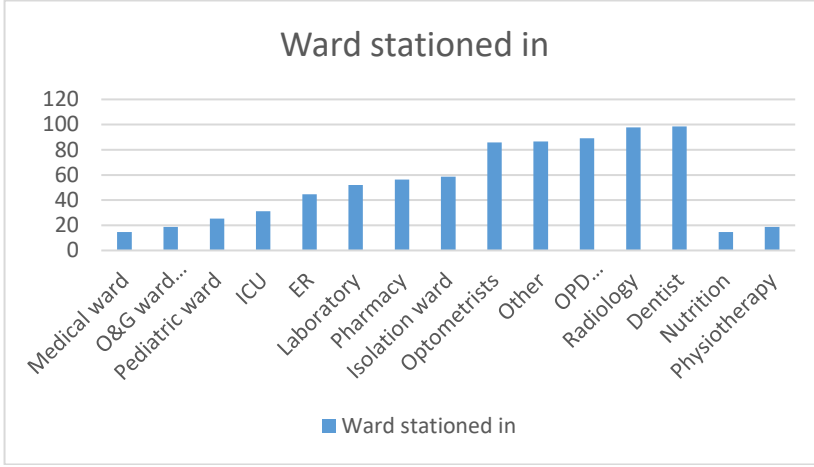
Laboratory staff
Nurse
Other
Pharmacist
Physician
Public Health
Radiotherapist
Occupation



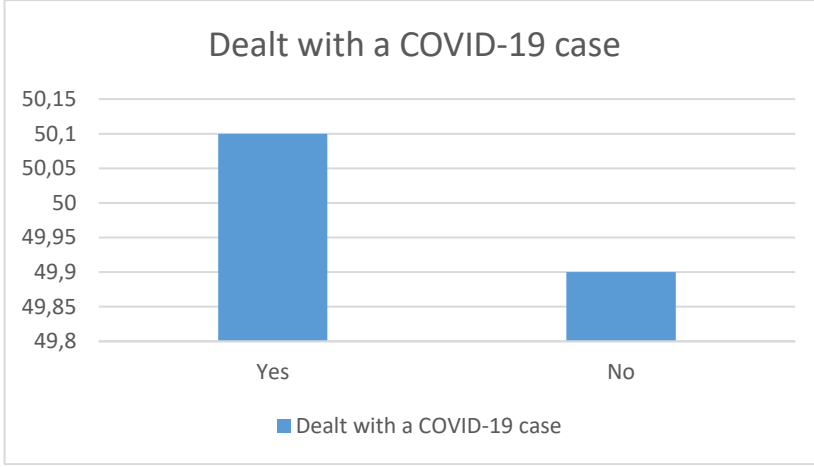


Table 2 The Knowledge and Attitude Scores of HCWs Regarding COVID-19

Variable	N	Minimum	Maximum	Mean	Std. Deviation
I. Knowledge Score					
1.1 What are the known modes of transmission so far for new COVID-19?	1687	0.17	0.82	0.16	-
1.2 Which of the following are the most common symptoms of new COVID-19 according to the WHO?	1689	0.17	0.74	0.17	-

1.3 What method of sample collection is the most useful for new COVID-19 diagnosis from the upper respiratory tract?	1686	0.33	1.00	0.98	0.08
1.4 Infected people without symptoms can spread new COVID-19?	1688	0.00	0.99	0.11	-
1.5 Seasonal flu vaccination protects the recipient from a new COVID-19?	1688	0.00	0.95	0.21	-
1.6 Only elderly people or those with underlying health conditions (e.g., diabetes, cardiovascular diseases) are at risk of developing severe illness due to new COVID-19?	1688	0.00	0.64	0.48	-
1.7 Antibiotics are effective against new COVID-19?	1688	0.00	0.83	0.38	-
II. Attitude Score					
2.1 I would be willing to deal with new COVID-19 patients?	1691	0.00	0.87	0.33	-
2.2 I find it important for all HCWs to educate themselves regarding the new coronavirus COVID-19 whether they come into direct contact with new COVID-19 patients or not.	1691	0.00	0.99	0.11	-
2.3 I feel I have the appropriate knowledge to deal with new COVID-19 patients.	1691	0.00	0.76	0.43	-
2.4 I feel I have the appropriate skills to deal with new COVID-19 patients.	1691	0.00	0.66	0.47	-
2.5 I feel I was provided with the appropriate	1691	0.00	0.53	0.50	-

equipment to deal with new COVID-19 patients.					
2.6 I feel that following the standard precautionary measures advised by MoH minimizes my risk of contracting new COVID-19.	1691	0.00	0.97	0.17	-

Discussion

The Epidemics has caused a dramatic shift in the healthcare landscape, with a significant surge in cases and associated mortality rates. During this time, adherence to preventive measures and the management of panic behaviors have become pivotal to controlling the spread of the virus (38). It is well-established that improper risk management strategies can undermine public compliance with self-protective measures, particularly when these measures disrupt daily routines or have socioeconomic consequences (39). Effective risk communication is a key element in such strategies, as it not only influences how the public perceives health risks but also affects their reactions to healthcare emergencies and their adherence to preventive practices (11, 40-42). In the context of the Epidemics , characterized by high transmission rates, morbidity, and mortality, inadequate communication can exacerbate panic, cause confusion, and negatively impact public perception of preventive measures (43). Healthcare workers (HCWs), as the frontline responders to the pandemic, are especially vulnerable, with some reports indicating that HCWs account for up to 24% of global EPIDEMICS cases (44). Insufficient information about EPIDEMICS transmission, incubation, and symptoms has contributed to their high risk of infection (45). Consequently, effective risk communication for HCWs is crucial, as they play an essential role in expert-public communication during the pandemic (46, 47), and their perceptions and practices can influence public compliance.

The aim of this study was to assess how risk communication impacts HCWs' perceptions of risk and attitudes toward EPIDEMICS . Our findings revealed that only a third of HCWs perceived themselves to be at high risk of contracting the virus. Nevertheless, HCWs displayed a positive attitude toward preventive measures and health communication, which positively influenced their practices regarding EPIDEMICS -related precautions. Many HCWs also identified a significant information gap that needed to be addressed. While there are no prior studies on the impact of risk communication among HCWs in this region, a recent study found that HCWs expressed concerns about contracting EPIDEMICS and supported government actions to mitigate infection risks, though they also reported inadequate information on the virus in media channels (48). Similarly, a study across ten countries revealed that the information shared by government and health authorities was a significant factor influencing proper risk perception and attitude during the pandemic (49). This suggests that healthcare authorities should implement ongoing educational initiatives

that provide HCWs with up-to-date protocols and information on reducing the risk of EPIDEMICS transmission in hospital settings. Clear and effective guidelines for implementing preventive measures are essential to support HCWs in minimizing infection risks. Future research should explore how various risk communication strategies affect HCWs' knowledge and attitudes.

Proper knowledge is vital for controlling health emergencies. Previous studies have shown that high levels of knowledge are essential for the successful implementation of preventive measures during past outbreaks, such as SARS and H1N1 influenza (50, 51). The significance of knowledge among HCWs is especially high due to their increased risk of infection and their role as trusted information sources during a crisis. This study found that HCWs possessed good knowledge about EPIDEMICS 's transmission, symptoms, and care standards, which can be attributed to effective risk communication. These findings align with studies from China, Egypt, and Pakistan (12, 13, 15), although a study from the United Arab Emirates reported a lower level of knowledge among HCWs (16). Additionally, our study found that higher levels of knowledge were associated with older age, a higher educational level, and being a physician. This may be because older individuals are more aware of the risks of severe EPIDEMICS outcomes and are motivated to seek more information, while physicians are more likely to be in direct contact with EPIDEMICS patients. Our results align with those of Abdel Wahed et al (15), who found that physicians and HCWs with higher education levels had better knowledge scores. This is consistent with previous studies that highlight the impact of age and education on knowledge levels during past outbreaks (52). Thus, targeted educational campaigns are necessary for HCWs with lower educational levels, non-physician roles, and those not working in government hospitals.

Behavioral changes are essential for the successful adoption of precautionary measures and risk communication strategies. Past studies have shown that attitudes and perceptions are key drivers of behavioral changes during health crises (53). HCWs are particularly vulnerable to psychological stress, burnout, and occupational stigma during pandemics (15, 48), which may influence their attitudes toward the pandemic and impact their behaviors, such as self-protection practices and timely diagnosis (54, 55). Our study found that HCWs exhibited a positive attitude towards government actions, infection control measures, and their own preparedness to face the pandemic, which is consistent with findings from China, Egypt, and Pakistan (12, 13, 15). In our study, male gender, nurse occupation, working in high-risk departments such as ICUs or ERs, and direct interaction with EPIDEMICS patients were associated with better attitudes. This may be because these HCWs have more exposure to EPIDEMICS cases, which improves their knowledge, experience, and overall attitude towards the pandemic (57).

Challenges in Health Messaging

One significant challenge in health communication is addressing gaps in message dissemination across all community segments, particularly vulnerable populations. Additionally, misinformation in media can hinder the effectiveness of health communication, leading to confusion and lower compliance rates.

Recommendations

- **Strengthen collaboration** between governmental entities and media outlets to ensure effective dissemination of health messages.
- **Develop targeted campaigns** aimed at groups with lower compliance rates to encourage behavior change.
- Establish **digital platforms** dedicated to delivering health messages to the public.
- Implement **training programs** to prepare official spokespersons for impactful message delivery.
- Focus on **health messages tailored to at-risk age groups**, such as older adults or those with underlying health conditions.

Conclusion

This study found that proper risk communication significantly impacted HCWs' attitudes towards **Epidemics**, with clear information about the virus and preventive measures influencing their behaviors. The findings highlight the critical role of effective health messaging in improving compliance with preventive measures, ultimately contributing to the reduction of infection rates.

Healthcare authorities should continue to provide educational programs and training to keep HCWs updated on infection control protocols. Targeted efforts are particularly necessary to educate HCWs with lower educational levels, non-physician roles, and those working in non-government healthcare institutions. Although HCWs generally demonstrated good knowledge and attitudes, their understanding of the effects of age on **Epidemics** outcomes and some aspects of the disease's clinical manifestations requires further enhancement.

These results emphasize the pivotal role of clear and direct health messages in fostering community adherence to preventive measures. Strengthening community response through well-structured communication strategies is essential to control infection rates and manage future health crises effectively.

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