Original Article

The Effect of CBAHIon Knowledge and Practice of Standard Precautions among Healthcare Workers in Medina

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Abstract

Background: Standard precautions (SPs) establish the essential procedure for nosocomial disease control in primary health care centers. CBAHI's Mission is to help all healthcare services, through accreditation, to constantly consent to quality and patient wellbeing guidelines on hospital infection control. **Objectives:** This research was therefore innovated to assess the effect of CBAHI accreditation on information and practice of infection control standard precautions among these health care staff. **Methods:** This research was conducted as a comparative cross-sectional study in primary health care centers (PHCCs) in Medinah in KSA, during the period from June 2019 to March 2020, including 322 randomly selected HCWs (162 HCWs from CBAHI accredit PHCCs and 160 HCWs CBAHI non-accredit PHCCs). They were asked to fill a self-administrated survey evaluating their information and practice of standard precautions. **Results:** With a response rate of 68.2%, it is clear that the almost of participants in both groups have moderate and high knowledge level (66.8% and 26.7%, respectively) with regard to SPs. There is not any statistically significant distinction between both groups the total information score or knowledge score regarding most SPs items except for environmental cleaning and waste disposal that were significantly higher among CBAHI accredit group. Significantly, good compliance to the practice of IC standard precautions was identified between both groups (99.4% and 86.3%, respectively). **Conclusion:** CBAHI accreditation has a significantly positive effect upon health care staff compliance to perform infection control standard precautions, but with limited effect on their knowledge level. There remains a clear need for continuing CBAHI accreditation programs to promote awareness and encourage adherence with best practice towards reducing nosocomial infections.

Keywords: Effect, Accreditation, Healthcare, Institutions, Knowledge, Practice, Standard, Precautions, Healthcare

INTRODUCTION

Healthcare-related infections (HRIs) stay as the majority common unfavorable occasion in any healthcare provider and affect millions of human beings every year, leading to increased illnesses and death [1-3]. It has been confirmed through the literature that a massive share of healthcare companies and customers had received infections inside healthcare settings [4-6]. In a few studies, a mortality rate of as much as 49% has been fundamentally documented related to HAIs [7]. These contaminations, aside from presenting intense and existence-threatening situations on healthcare employees and patients, are answerable for deterioration quality of healthcare and rise expenses in medical clinic costs [8-10]. Information from American hospitals showed that HAIs alone record for an expected 1.7 million contaminations inside a year. Similar information additionally demonstrated 98,987 HAIs-related mortality; of these, 36.3% were for pneumonia, 31% for circulatory system contaminations, 13.2% for urinary lot diseases, 8.3% for careful site contaminations, and 11.2% for diseases of different area[11].

Standard safeguards (SPs) comprise the essential system for nosocomial disease control in the hospital. As indicated by the latest rule distributed by the Healthcare Infection Control Practices Advisory Committee (HICPAC) in 2007, it has been prescribed to apply standard safeguards (SPs) for all individuals during human services regardless of their illness condition. These SPs incorporate applying the fundamental standards of disease control through hand

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washing, usage of suitable personal protective equipment, for example, gloves, covers, gowns, and eye shields, safe taking care of and removal of needles, and safe disinfecting of instruments and different sullied hardware [12]. Standard precautions are used to save patients and caregivers from infection caused by health personnel and vice versa. This is an important issue that needs attention. When health professionals do not follow infection control measures, then the health care settings will be a source for infections and at times it may also be a cause for outbreaks in the community [13]. The term standard safety measures is supplanting universal precautions, as it extends the inclusion of all inclusive precautionary measures by perceiving that anyone liquid may contain infectious and dangerous infectious [14]. Standard precautionary measures are significant in light of the fact that health care organization has an obligation to shield its staff from expected perils and itself from loss of staff because of related injuries or disease.[8]

HCWs' low attention[15]. The nonappearance of an empowering environment in the health institution, loss of suitable legislation, absence of IC preparing, absence of assets, for example, an absence of consistent running water or a lack of personal protective equipment (PPE), can prompt helpless consistency with standard precautions.[14] The resultant contamination drags out the patient's time of hospitalization, influences consideration regarding family matters, and extra monetary weight, which is now and then hard to get together by numerous patients.[16] Hospital Accreditation (HA) framework is one of the most present-day and favored strategies for assessing and additionally improving the nature of quality of health.[17, 18] Generally, accreditation has been created to improve hospitals; however, with time, it was considered essential by primary care institutions, laboratory services, and other healthcare sectors.[19] The Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) has risen out of the Saudi Health Council as a non-benefit association. The chief capacity of CBAHI is to set the social insurance quality and patient security principles against which healthcare facilities are assessed for proof of consistency. CBAHI's mission is to help all healthcare offices, through accreditation, to consistently consent to quality and patient safety principles with center around hospital infection control (IC) programs. [20] Accreditation has a wonderful impact on the organization and on the administration of hospitals, just as on the usage of good practice.[21] Despite a critical development in the office of health establishments, HAIs continue to be of excessively high weight. Then again, only a few researches with restricted evidence are to the effect of healthcare as to the effect of services organizations accreditation on information and practice of contamination control standard insurances about health care employees on in the world and in the KSA in specifically. Hence, this research was conducted.

Aim of the study

To study the effect of CBAHI accreditation on knowledge and practice of infectivity control regular protections about health care staff in primary health care centers in Medinah, KSA. Therefore, this study was conducted to achieve the following objectives:

Objectives

1. To assess the effect of CBAHI accreditation on information and exercise of infection control regular protections between these health care employees
2. To assess the information of health care staff in primary health care centers at Medina about infection control standard precaution.
3. To determine the health care workers' compliance to the practices of contamination control accepted protections in primary health care centers at Medina.

Research Questions

1. What is the effect of CBAHI accreditation on information and practice of disease control standard safety precautions among these health care workers?
2. Is the knowledge level of health care workers in primary health care centers in Medina about standard precaution satisfactory?
3. Are health care workers in primary health care centers in Medina on compliance to the practices of standard precautions?

Research Hypothesis

1. CBAHI accreditation has a significant positive effect on health care workers data and compliance to the practices of disease control standard precautions
2. Health care workers in primary health care centers in Medina have un-satisfactory knowledge levels about standard precautions.
3. Health care workers in primary health care centers in Medina have poor compliance to the practices of standard precautions.
4. There is a significant association between training on infection control standard precaution, working experience and supply of protective materials, and increased knowledge level and improved practice of standard precautions.

Literature Review

Infection

Contamination management prevents or stops the spread of diseases in healthcare services settings. The infection spread by germs, it is a piece of regular daily existence and is found in air, soil, water, and in and on our bodies.[22] Infectious agents allude to an infection, microscopic organisms, or other microorganisms. In human service settings, germs are found in numerous spots. Individuals are one wellspring of germs including patients, health care workers, and guests and family members.[23] Transmission is a way germ is

moved to a susceptible person. It alludes to the manner in which germs are moved to the powerless individual.[24]

Infection Prevention and Control

Another IPC unit has thus been set up inside the WHO Service Delivery and Safety (SDS) division to give a far-reaching, coordinated IPC work concentrated on reinforcing national and global IPC limit and executing safe practices at the purpose of care. This unit will expand upon the establishments and accomplishments of the Clean Care is Safer Care program (2005-2015) and the solid initiative and specialized ability shown by the current WHO contamination avoidance group. The IPC worldwide unit will lead WHO's take a shot at IPC and will work cooperatively with related units in SDS, specifically the Patient Safety and Quality unit and the recently made unit managing Quality Universal Health Coverage, just as with other related divisions and units at the three degrees of WHO.[24]

Health Care Workers Occupational Health

The 2006 World Health Report Working Together for Health on human resources said HR gave an account of a worldwide deficiency of health staff, which had arrived at the emergency level in fifty-seven nations. What's more, it required the help and assurance of the health workforce.[25] The WHO Global Plan of Action on workers' health approaches all part states to create national projects for health specialist worker occupational health. Among health care workers tainted with hepatitis B, the WHO worldwide indicated that 37% of the hepatitis B among health workers was the consequence of word related exposure.[26]

Standard Precautions

There are 2 levels of prescribed safety measures to forestall the spread of contaminations in the health care area, Standard Precautions and Transmission-Based Precautions. Transmission-based safety measures are used similarly to Standard Precautions for sufferers with regarded or suspected infections.[27] The United States Centers for Disease Control (CDC) has proposed a progression of strategies that Health care workers (HCWs) have to use with all sufferers.[28]

Widespread safety measures are intended to forestall health care staff being uncovered to blood and body liquids by applying the essential rule of disease control through hand washing, use of personal protective equipment, for example, gloves, cover, outfit and eyewear, and safe treatment of needles.[29]Standard or universal precautions are a set of measures formulated to forestall the transmission of blood-borne pathogens when providing health care.[30]

The essential focal point of standard and Transmission-Based Precautions are the anticipation of patient introduction to microbes, which may bring about colonization and contamination. Patients are the populace at most noteworthy danger of contamination procurement in the healthcare area; be that as it may, health care workers (HCWs) are powerless to diseases in the clinical condition as well. [31]

As per the research, health care-associated infections (HAIs) stay as the majority of continuous unfavorable occasion in any healthcare delivery system and influence great millions of individuals every year, prompting huge morbidity and mortality.[32]

Standard Precautions Consist of:

The standards of SP include: hand cleanliness; the utilization of personal protective equipment, for example, gloves; careful covers; eye insurance; management of healthcare waste; right dealing with and removal of needles and sharps; successful cleaning; purification and sanitization of hardware; instruments and condition; and utilization of fitting disinfectants.[33]

Standard Precautions rules accept that all patients convey contagious small scale living beings, despite the fact that patients might be asymptomatic. Standard Precautions have been received worldwide.[34]

1. Hand hygiene:

The importance of hand hygiene: The microbes that reason healthcare-related infections (HAIs) may be transmitted at the palms of healthcare staff • Hand cleanliness is one of the MOST significant approaches to forestall the spread of contamination • Chances for hand cleanliness can be as high as 50%.[35]

There are 5 types of hand cleanliness: 1. Prior to contacting a patient. Before giving a clean/aseptic method 3.After direct contact with body liquid 4.In the wake of contacting a patient 5.Subsequent to contacting surfaces around a patient. Healthcare personnel force ought to support patients, families, and guests to clean their hands. Minutes for patients to perform hand cleanliness are: – Before or in the wake of contacting obtrusive gadgets or wraps - for example IV, careful site, taking care of cylinder – before eating – after utilizing the bathroom or dealing with a chamber pot – When going into or leaving their room.[36]

2. Individual Protective Equipment (PPE):

Personal protective equipment generally alluded to as "PPE", is hardware worn to limit the presentation to perils that cause genuine work environment wounds and illnesses. [26, 36]

Gloves:

Before wearing gloves, wash and dry your hands well. Cover cuts, scratches, or scratches with bandages. [35, 37]

2.1. Facial insurance (eyes, nose, and mouth):

Wear a careful or strategy cover and eye security (eye visor, goggles) or a face shield to ensure mucous films of the eyes, nose, and mouth during activities that are probably going to produce sprinkles or showers of blood, body-liquids, discharges, and excretions.[38]

2.2. Gown:

Outfits are instances of personal protective equipment utilized in health care settings. They are utilized to secure the wearer and forestall dirtying of dress during activities that are probably going to produce sprinkles or splashes of blood, body liquids, discharges, or excretions. [39]

2.3. Environmental cleaning:

Utilize satisfactory systems for the standard cleaning and sanitization of ecological and other habitually contacted surfaces.[40]

2.4. Waste disposal:

- Garbage removal organizations authorized with the EPA will gather all clinical and pharmaceutical waste for removal in particular garbage removal facilities, which are additionally authorized by the EPA.[41]
- General waste disposal
- Clinical waste disposal
- Pharmaceutical waste disposal

2.5. Prevention of needle stick and sharp injuries:

Healthcare workers can be at risk for needle stick or sharp injuries when they: [30]

EMPLOYERS SHOULD.[35]

EMPLOYEES SHOULD.

In the event that you experience a needle stick or sharps injury or are presented to the blood or other body liquid of a customer throughout your work, quickly follow these means:

- Wash needle sticks and cuts with cleanser and water.
- Report the occurrence to your supervisor.[42]

Safe Injection Practices

- Use of another needle and needle each time a drug vial or IV sack is gotten to.
- Use of another needle and needle with every infusion of a customer.
- Safe infusion rehearses packet.[43]

Exposed people:

Health care workers such as physicians, nurses, and other providers are at risk of exposure to bloodborne infections.[44]

Standard Precautions Guidelines:

Standard Precautions include the following strategies (Public Health Agency of Canada 2012; Siegel 2007).

- Appropriate hand hygiene.
- Use of appropriate facial protection.

Each of these procedures ensures patients in the setting and health care workers, or both, from exposure to infectious agents.[45]

Factors affecting the practice of SP:

The practice of occupational SPs is mainly influenced by the use of protective equipment, information on SPs, attitudes for SPs, and by both internal and external factors.[46]

- Lack of proper information on SP, absence of personal protective equipment (PPE), generally safe discernment, and low impression of institutional wellbeing condition were visit factors related to non-adherence to SP.[20] Changing current conduct requires information on the variables that may impact staff consistency with Standard Precautions.[47]
- Availability of PPE: Lighter and more hearty PPE will offer better assurance and expanded compliance.[48]
- Training: Education and preparing are basic components of Standard Precautions since they assist health with caring expert make proper decisions.[49]
- Work over-burden: Workload negatively affects the utilization of SPs identified with word related exposures.[50]
- Lack of appropriate knowledge of SP: SP knowledge has the greatest positive effect.[51]
- Attitude: Positive attitudes can promote active behaviors.[46]

Central Board for Accreditation of Healthcare Institutions (CBAHI):

Central Board for Accreditation of Healthcare Institutions (CBAHI) is the Saudi professional organization legal to supply accreditation certificate to all governmental and personal healthcare centers offices present today in Saudi Arabia.[52]

CBAHI Standards

A standard is an announcement of excellence, or a specific foreordained desire that characterizes the important functions, activities, and strategies and systems required healthcare centers to guarantee the arrangement of protected and quality consideration and administrations. National norms set the best quantifiable, feasible and assessable performance.[53]

CBAHI's standards are of three major types: [54]

Structure standards deal with the system's inputs, inclusive of the sanatorium beds accessible, the manpower, the layout of the sanatorium building, the supply of personal protective equipmentfor health workers, inclusive of gloves and masks, and the supply of equipment and supplies.

CBAHI Accreditation

Healthcare accreditation is an appraisal procedure that includes a thorough, straightforward, and exhaustive assessment by outside impartial accreditation body.[52]

Benefits of Accreditation:

1. Provides a framework for organizational shape and management.

2. Helps enhance affected person protection and decrease the chance of close to misses, detrimental outcomes.
3. Enhances people group trust in the quality and health of care gave.
4. Will fulfill the guidelines of the Ministry of Health, being the health authority, which is presently considering connecting the national accreditation by CBAHI with the authorizing of the private healthcare facilities.[53]

Previous Studies

Al-Hammar et al. in Saudi Arabia (2016), conducted a cross-sectional survey in six hospitals in Al-Ahsa. A structured, self-administered questionnaire was used as a study tool to assess the knowledge of Standard Precautions among Healthcare Professionals. A total of 201 HCP were surveyed. They concluded that there is a gap in the understanding of a few aspects of SP among HCP including duration of handwashing, sharp disposal and recapping of used needles, use of PPE and post-exposure prophylaxis.[55]

Salehet al. in Saudi Arabia (2014), led a cross-sectional study among HCWs specialists and attendants for ICU of King FahadHofuf Hospital (KFHH), to inspect HCWs information, perspectives and practices (KAP) towards HAIs the executives. 78.9% of members reacted to the overview and 63.4% had staff in the hospital for two to five years.[56]

Another cross-sectional study was conducted by Batran et al. in Saudi Arabia (2017), to assess the standard precautionary measures' information and practice levels among the medical attendants in the Saudi Arabia non-public hospitals. There was a moderate relationship among information and practice of standard safety measures. They suggested updating information, improvement of explicit operational rules/arrangements on the act of standard safeguard, normal deliver of contamination prevention materials, and routine immunization and screening for the of workers against Hepatitis B.[57]

Alotaibiet al. in Saudi Arabia (2016) directed a cross-sectional overview at Prince Sattam Bin Abdulaziz University in Al‑Kharj Governorate to assess the information and consistence with SIPs among baccalaureate undergrad health sciences understudy. They inferred that, despite the weakness generally created by the current curriculum, their samples appeared better than expected in general methods for information and consistence with SIPs.[58]

Almasabi& Thomas in their study in Saudi Arabia (2016), studied the effect of CBAHI on quality of care. They utilized a blended techniques approach including reviews, documentary examinations, and semi-structure interviews. Their examination outlines a need to preserve upgrades through overtime in the accreditation.[59]

Almasabiin his other study in Saudi Arabia (2017), studied the effect of accreditation on quality of care in 3 accredited government hospitals in Saudi Arabia. In this study, he involved a documentary statistical analysis of quality indicators from existing Ministry of Health reports for the period of 2009-2013.[60]

Alameeret al. in Saudi Arabia (2018), evaluated the implementation of infection control standards for CBAHI program in dental clinics in primary health care centers in holy capital and full commitment to the proper use of personal protective equipment and how to sterilize materials used inside clinics in safety. The study randomly selected 16 of 57 PHCs. They concluded that applying quality standards will help to develop safe health services, provided in all PHCsin the holy capital.[61]

Alshammari and colleagues in Saudi Arabia (2015), studied the nurses' belief closer to the effect of Hospital's Accreditation on patients' protection associated with nursing documentation, patients' medicinal drug information, and healthcare-related infections. Additionally, it inspired each public and personal healthcare corporations to grow and be approved to attain better popularity and secure healthcare services.[62]

Subjects and Methods

I) Study Design and Setting:

This study was conducted as a comparative cross-sectional study in primary health care centers in Medinah in KSA, during the period from June 2019 to March 2020.

II) Study Subjects:

A total of 322 health care staff, from the selected primary health care centers, were included in our study. Participants in this study were divided into two groups according to CBAHI accreditation. Respondents were taken from different disciplines as follows: doctors, nurses, dentists, laboratory scientists, and pharmacists. Both groups were matched as regard age, gender, profession, and experience.

Group I (CBAHI accredit group):

162health care workers from CBAHI accredit primary health care centers in Medina in KSA.

Group II (CBAHI non-accredit group):

160health care workers from primary health care centers in Medina in KSA, which do not have CBAHI accreditation.

Sampling technique:

Medinah city and its entire jurisdictions in KSA compose of six clusters. Each cluster contains approximately 8 primary health care centers. A multistage sampling technique was used for the selection of study subjects. In the first stage, we prepared a list of primary health care centers in each cluster in Medinah and classified them into two categories according to CBAHI accreditation. Then, we randomly

selected two CBAHI accredited and two CBAHI non-accredited primary health care centers from each cluster with a total number of 24 PHCCs. In the second stage, we included all subjects in the selected PHCCs as a convenience sample.

Sample size determination:

From a total of nearly 1200 HCWs in primary health care centers in Medinah, the sample size was calculated to be 292 using Open EPI statistical program at the significance level of 95% and power of the test of 80% and an average level of 50% good response in knowledge and practice. So, we included more than that number in our study.

Inclusion criteria:

All health care workers, from the selected primary health care centers and accepting to participate in the study, were included regardless of their department, specialty, career, nationality, age, or gender.

Exclusion criteria:

Only health care workers from the administration staff, infection control committee, and quality committee, were excluded as this may affect their responses, therefore, threatening internal validity.

Ethical issue:

Firstly, a letter of authority and approval to conduct our study was obtained from the relevant governmental authorities and research ethics committees. Then, we contacted the selected PHCCs administrators and described our study, its aim and tools. In addition, verbal informed consent was obtained from all participants in this study.

III) Data collection:

The data were collected using a carefully designed, self-administered structured questionnaire, which was developed from previously published literature and studies that assess the knowledge and practice of infection control standard precautions after the researcher modified. The questionnaire took an average time of 20 min for filling.

The questionnaire consisted of five parts containing questions about:

1. Demographic characteristics: age, sex, nationality, profession, work experience, and level of education.
2. Four general questions: first one asking about the availability of written IC policy in the health care facility; second one asking about the availability of hospital IC committee in the health care facility; third one asking about the vaccination against Hepatitis B Virus (HBV); fourth one asking about if HCWs had obtained previous training on IC standard precautions.
3. Questions to assess their knowledge level about standard precautions. This part included a total of 36 questions: 5 questions for general IC knowledge; 6 questions for knowledge about hand hygiene and hand rub; 6 questions for knowledge about the use of personal protective equipment and fresh gloves; 5 questions for knowledge about respiratory hygiene protocol; 3 questions for knowledge about safe injection; 3 questions for knowledge about sharps disposal; 2 questions for knowledge about environmental cleaning; 2 questions for knowledge about instruments sterilization and disinfection; and 4 questions for knowledge about waste disposal.
4. Questions to assess their compliance with practices of standard precautions. This part included a total of 25 questions: 2 questions about the availability of IC operational guidelines and observance; 4 questions about the supply of IC equipment; 4 questions about the practice of hand hygiene and hand rub; 5 questions about the practice of personal protective equipment and fresh gloves; 3 questions about respiratory hygiene protocol; 2 questions about the practice of safe injection; 4 questions about the practice of environmental cleaning and proper wastes disposal; and one question about the practice of instruments sterilization and disinfection.

Validation and reliability of the questionnaire:

A pilot study was conducted on 30 subjects and the questionnaire results were analyzed using Cronbach's alpha coefficient, which is an index of reliability associated with the variation accounted for by the true score of the underlying construct. Construct is the hypothetical variable that is being measured. The Alpha coefficient for our questionnaire in rate is 0.854, which is a higher score than the cut off rate for being satisfactory (0.70), and this scale shows good reliability of our questionnaire. **(Table 1)**

The questionnaire was reviewed by two professional reviewers and their recommendations were applied. Moreover, the internal consistency for the items of the questionnaire was assessed by estimating the correlation between each point score and the overall mark of its section using the correlation coefficient (r).

Scoring of the questionnaire:

Knowledge section:

Each question was answered by true or false. If the subject's answer was correct, it was given score 1, while 0 was given for wrong answers. Then, a total score for each section was calculated. Finally, the total knowledge score for all sections was calculated and transmuted to 100%. The information marks reflected poor knowledge (≤50%), fair knowledge (51%–80%), and (>80) good knowledge.[57]

Practice compliance section:

Each question was answered with a five-point Likert scale measuring its frequency in the past month ranging from 1 to 5 (1 = never, 5 = always) with a cut-off point of 3 scores. Then, the total score for each section was calculated. Finally, the total practice score for all sections was calculated and then converted to a percentage. The practice

scores were considered poor compliance (≤60%), and (>60) good compliance.

IV) Statistical analysis:

The collected data was analyzed by SPSS software version 18 and the results were summarized, presented, and displayed in suitable tables and graphs as frequencies and percentages for qualitative variables and mean ± SD for quantitative variables. Detecting a statistical difference between proportions was performed using the Chi-square test, while comparison between means was done using a t-test. For ordinal scale and non-parametric data, the Mann Whitney U test was used to test the difference between two groups while the Kruskal Wallis test was used to test the difference between more than two groups. Reliability was tested using Cronbach's alpha coefficient. The results were accepted as significant when ($p < 0.05$).

Table 1: Reliability analysis of the questionnaire using Cronbach's alpha coefficient on a pilot study conducted on 30 subjects

	Cronbach's Alpha	N of Items	N of Cases
Knowledge	0.8112	36	30
Practice	0.845	25	30

Results

Five hundred questionnaires were distributed to all HCWs of different professions among the selected Primary health care centers in Madinah in Saudi Arabia to assess their knowledge and adherence to the practice of infection control standard precautions guidelines in their workplace. 341 responses were received out of all participants, giving a response rate of 68.2%, among which, 322 were analyzed, as 19 questionnaires were canceled for non-conformity with the conditions as there were incomplete filling of some parts of the questionnaire (non-conformity rate of 5.57%).

1. Socio-demographic Data:

Table (2) shows that the majority of participants (51.6%) were females and 48.4% were males and most of them (92.5%) were of Saudi nationality. Age of 30-39 years was the most prevalent age (63.4%) and the majority of HCWs' experience (34.2%) ranged from 6- 10 years ($p< 0.001$). The majority of studied HCWs among CBAHI accredit group were females (51.6%) while the majority of studied HCWs among CBAHI non-accredit group were males (52.5%). The majority of studied HCWs were of Saudi nationality (92.5%), which was statistically significant ($p< 0.001$). The majority of studied HCWs (34.2%) had 6 to 10 years of experience, which was statistically significant ($p< 0.001$). About half of the study population was nurses (53.7%), which was statistically significant ($p< 0.001$). More than half of the study population had diploma (60.9%), which is statistically significant ($p< 0.001$). Also, the level of education of the studied HCWs was significantly higher among CBAHI accredit group than that among CBAHI non-accredit group ($p= 0.008$).

2. IC Policy, Committee, Training, and HBVVaccination:

Table (3) shows that the majority of the surveyed sample (88.2%) reported that their work provides a clear written infection control policy and the infection control committee had $p = 0.001$. About (85.4%) of the studied HCWs had received previous training on infection control standard precautions and most of them were vaccinated against HBV (90.1%), while only 9.9% were not immune and had $p = 0.001$. Moreover, CBAHI accredit group reported significantly higher levels of provision of IC policy, IC committee, IC training and vaccination against HBV than that reported by the CBAHI non-accredit group, which was significant ($P = 0.001$).

3. Assessment of IC Knowledge

As shown in Table (4), the majority of the studied HCWs showed moderate and high knowledge levels about infection control standard precautions (62.9% and 31.5%, respectively). However, there was no statistically significant difference between both groups in the total knowledge score or knowledge score regarding most of the items of standard percussions. There was a statistically significant difference between both groups in environmental cleaning and waste management. Also, Knowledge of HCWs was high only about PPE, injection safety, and sharp disposal (74.70%, 54.30%, and 50.60%, respectively), while in both groups, most of the respondents showed the lowest knowledge level regarding disinfection and waste management (20.60% and 73.10%, respectively).

Table 2: Distribution of the socio-demographic of health care workers based on the (age, gender, nationality, years of experiences, career, and specialty)

		Accreditation by CBAHI						Chi-square	
		Not-accredit by CBAHI		Accredit by CBAHI		Total			
		N	%	N	%	N	%	X^2	P-value
Age	18 - 29 years	19	11.90%	32	19.40%	51	15.80%	5.11	0.164
	30 - 39 years	103	64.30%	101	62.30%	204	63.4% *		
	40 - 49 years	27	16.90%	23	14.20%	50	15.50%		
	50 years or more	11	6.90%	6	3.70%	17	5.30%		

Sex	Male	84	52.50%	72	44.40%	156	48.40%	2.09	0.148
	Female	76	47.50%	90	55.60%	166	51.60%		
Nationality	Saudi	146	91.30%	152	93.80%	298	92.5% *	0.755	0.252
	Non- Saudi	14	8.80%	10	6.20%	24	7.50%		
Experience	1-5YEARS	27	16.90%	35	21.60%	62	19.30%	7.16	0.067
	6-10YEARS	65	40.60%	45	27.80%	110	34.2% *		
	11-15YEARS	36	22.50%	36	22.20%	72	22.40%		
	> 15YEARS	32	20.00%	46	28.40%	78	24.20%		
HCW Profession	DOCTOR	44	27.50%	36	22.20%	80	24.80%	9.32	0.054
	NURSE	73	45.60%	100	61.70%	173	53.7% *		
	LABORATORY SCIENTISTS	21	13.10%	12	7.40%	33	10.20%		
	DENTIST	4	2.50%	2	1.20%	6	1.90%		
	PHARMACIST	18	11.30%	12	7.40%	30	9.30%		
Education	Bachelor	62	38.80%	43	26.50%	105	32.60%	11.82	0.008 #
	Diploma	94	58.80%	102	63.00%	196	60.9% *		
	Master Degree	3	1.90%	12	7.40%	15	4.70%		
	Ph.D.	1	0.60%	5	3.10%	6	1.90%		

Table 3: Distribution of the IC Policy, Committee, Training, and HBV vaccination.

		Accreditation by CBAHI						Chi-square	
		Not-accredit by CBAHI		Accredit by CBAHI		Total			
		N	%	N	%	N	%	X^2	P-value
Policy	No IC Policy	34	21.30%	4	2.50%	38	11.80%	27.28	< 0.001#
	IC Policy	126	78.80%	158	97.50%	284	88.2% *		
Infection Control Committee	No IC Committee	35	21.90%	3	1.90%	38	11.80%	31.01	< 0.001 #
	IC Committee	125	78.10%	159	98.10%	284	88.2% *		
Infection Control Training	NO Previous training on IC	37	23.10%	10	6.20%	47	14.60%	18.56	< 0.001 #
	Previous training on IC	123	76.90%	152	93.80%	275	85.4% *		
HB vaccine	Not vaccinated against HBV	24	15.00%	8	4.90%	32	9.90%	9.105	0.002 #
	Vaccinated against HBV	136	85.00%	154	95.10%	290	90.10%		

4. Assessment of Compliance with IC Practice:

A statistically significant good compliance to the practice of infection control standard precautions was identified among the studied HCWs in both accredit and non-accredit groups (99.4% and 86.3%, respectively). HCWs in CBAHI accredit group showed a statistically significant higher use of PPE standard precautions with total compliance score than that of the CBAHI non-accredit group (88.9% and 81.3%, respectively). However, there was no statistically significant difference between both groups in compliance to the practice of hand hygiene (93.80% and 89.40%, respectively). Also, both the in CBAHI accredit group showed a statistically higher Disinfection with total compliance score than that CBAHI non-accredit group (97.50% and 93.80%, respectively). However, there was no statistically significant difference between both groups in the supply of IC equipment (74.70% and 74.40%, respectively) (Table 5).

5. Factors affecting Knowledge and practice of standard precautions:

HCWs aged more than 50 years showed the highest Knowledge score, while the best compliance with practice was observed among those aged from 18 to 29 years. HCWs' female gender showed the highest Knowledge score than males, while the best compliance with practice was observed among males. Table 6 shows the knowledge and practice of infection control standard precautions about the studied health care staff by gender

Regarding the HCW Profession, both physicians and nurses showed the highest knowledge level, while the best compliance with practice was observed among nurses and

laboratory scientists. The level of HCWs education had a significant impact on their practice of SP, however only Ph.D. level had an effect on increasing their knowledge level.

Regarding years of experience, no significant difference was noticed either in knowledge level or in compliance with practice.

Regarding the knowledge and practice of infection control standard precautions about the studied health care staff by training, trained HCWs expressed a statistically significant higher knowledge level and better compliance with the best practice of standard precautions compared to those who were not trained.

Regarding Knowledge and practice of infection control standard precautions among the studied health care workers by the presence of infection control policy. The presence of infection control policy showed a statistically significant impact on compliance best practice of standard precautions about the studied HCWs. In PHCCs having infection control policy, HCWs showed a statistically significant higher knowledge about standard precautions, while, there was no statistically significant difference in knowledge about standard precautions among HCWs where infection control policy is present or not.

The knowledge and practice of infection control standard precautions among the studied health care staff by the presence of infection control Committee were considered. HCWs expressed statistically significant compliance with the best practice of standard precautions where the infection control committee is present.

Table 4: Knowledge level among both CBAHI accredit group and CBAHI non-accredit group regarding Overall Total Knowledge, General hand hygiene, PPE, Respiratory hygiene, Injection safety, Sharp disposal, Environmental cleaning, Disinfection, Waste management.

		Accreditation by CBAHI						Chi-square	
		Not-accredit by CBAHI		Accredit by CBAHI		Total			
		N	%	N	%	N	%	X^2	P-value
Overall Total Knowledge	Low	12	7.50%	9	5.60%	21	6.50%	3.956	0.138
	Moderate	113	70.60%	102	62.90%	215	66.80%		
	High	35	21.90%	51	31.50%	86	26.70%		
General	Low	59	36.90%	58	35.80%	117	36.30%	1.76	0.415
	Moderate	48	30.00%	40	24.70%	88	27.30%		
	High	53	33.10%	64	39.50%	117	36.30%		
Hand Hygiene	Low	31	19.40%	32	19.70%	63	19.60%	2.52	0.283
	Moderate	55	34.40%	43	26.50%	98	30.40%		
	High	74	46.20%	87	53.70%	161	50.00%		
PPE	Low	5	3.10%	8	4.90%	13	4.00%	1.75	0.416
	Moderate	41	25.60%	33	20.40%	74	23.00%		
	High	114	71.20%	121	74.70%	235	73.00%		
Respiratory Hygiene	Low	10	6.30%	3	1.90%	13	4.00%	5.16	0.076
	Moderate	58	36.30%	71	43.80%	129	40.10%		
	High	92	57.50%	88	54.30%	180	55.90%		
Injection safety	Low	27	16.90%	24	14.80%	51	15.80%	1.24	0.539
	Moderate	56	35.00%	50	30.90%	106	32.90%		
	High	77	48.10%	88	54.30%	165	51.20%		
Sharp disposal	Low	9	5.60%	4	2.50%	13	4.00%	2.36	0.307
	Moderate	68	42.50%	76	46.90%	144	44.70%		
	High	83	51.90%	82	50.60%	165	51.20%		

	Low	21	13.10%	18	11.10%	39	12.10%		
Environmental cleaning	Moderate	119	74.40%	103	63.60%	222	68.90%	8.61	0.013 *
	High	20	12.50%	41	25.30%	61	18.90%		
	Low	33	20.60%	29	17.90%	62	19.30%		
Disinfection	Moderate	99	61.90%	93	57.40%	192	59.60%	2.55	0.279
	High	28	17.50%	40	24.70%	68	21.10%		
	Low	117	73.10%	91	56.20%	208	64.60%		
Waste management	Moderate	41	25.60%	67	41.40%	108	33.50%	10.16	0.006 *
	High	2	1.30%	4	2.50%	6	1.90%		

Table 5: Compliance with the practice among both CBAHI accredit group and CBAHI non-accredit group regarding Overall total compliance, hand hygiene, use of PPE, respiratory hygiene, safety injection practices, environmental, disinfection, Availability of, Observance of and Supply of IC equipment

		Accreditation by CBAHI						Chi-square	
		Not-accredit by CBAHI		Accredit by CBAHI		Total			
		N	%	N	%	N	%	X^2	P-value
Overall Total Practice	Poor	22	13.80%	1	0.60%	23	7.10%	20.93	< 0.001*
	Good	138	86.30%	161	99.40%	299	92.90%		
Hand Hygiene	Poor	17	10.60%	10	6.20%	27	8.40%	2.07	0.107
	Good	143	89.40%	152	93.80%	295	91.60%		
Use of PPE	Poor	30	18.80%	18	11.10%	48	14.90%	3.12	0.038*
	Good	130	81.30%	144	88.90%	274	85.10%		
Respiratory Hygiene	Poor	28	17.50%	9	5.60%	37	11.50%	11.29	0.001*
	Good	132	82.50%	153	94.40%	285	88.50%		
Safe Injection Practices	Poor	31	19.40%	14	8.60%	45	14.00%	7.71	0.004*
	Good	129	80.60%	148	91.40%	277	86.00%		
Environmental Cleaning and Waste disposal	Poor	26	16.30%	9	5.60%	35	10.90%	9.51	0.002*
	Good	134	83.80%	153	94.40%	287	89.10%		
Disinfection	Poor	10	6.20%	4	2.50%	14	4.30%	2.76	0.048*
	Good	150	93.80%	158	97.50%	308	95.70%		
Availability of	Poor	53	33.10%	11	6.80%	64	19.90%	35.05	< 0.001*
	Good	107	66.90%	151	93.20%	258	80.10%		
Observance of	Poor	32	20.00%	5	3.10%	37	11.50%	22.64	< 0.001*
	Good	128	80.00%	157	96.90%	285	88.50%		
Supply of IC equipment	Poor	41	25.60%	41	25.30%	82	25.50%	0.004	0.525
	Good	119	74.40%	121	74.70%	240	74.50%		

Table 6: Knowledge and practice of infection control standard precautions among the studied health care workers. Age, Gender, HCW Profession, HCW Education, years of Experience, infection Control Training, infection Control Policy, infection Control Committee

Items		N	Total Knowledge Score	X^2 or Z	Kruskal Wallis Test or Mann-Whitney U Test		Total Practice Score	Kruskal Wallis Test or Mann-Whitney U Test	
			Mean Rank		test value	P-value	Mean Rank	X^2 or Z	P-value
Age	**18 - 29 years**	**51**	164.93	X^2	2.497	0.476	179.25	2.966	0.397
	30 - 39 years	**204**	155.96				159.87		
	40 - 49 years	**50**	173.64				157.41		
	50 years or more	**17**	181.97				139.85		

Gender	**Male**	**156**	142.74	**Z**	-3.528	<0.001	146.09	-2.897	0.004
	Female	**166**	179.13				175.98		
HCW Profession	**Physician**	**80**	168.52	**X^2**	8.47	0.076	143.59	6.571	0.16
	Nurse	**173**	169.34				172.1		
	Lab. Scientists	**33**	140.85				166.06		
	Dentist	**6**	141.08				129.25		
	Pharmacist	**30**	124.4				149.57		
HCW Education	**Bachelor**	**105**	165.7	**X^2**	0.994	0.803	144.82	9.095	0.028
	Diploma	**196**	158.57				169.39		
	Master Degree	**15**	159.03				145.6		
	Ph.D.	**6**	190				235.33		
Years of Experience	**1-5 years**	**62**	150.9	**X^2**	6.728	0.081	167.15	0.356	0.947
	6-10 years	**110**	148.21				159.4		
	11-15 years	**72**	172.65				162.72		
	>15 years	**78**	178.37				158.83		
Infection Control Training	**No training on IC**	**47**	125.2	**Z**	-2.912	0.004	133.57	-2.238	0.025
	Training on IC	**275**	167.7				166.27		
Infection Control Policy	**No IC policy**	**38**	149.05	**Z**	-0.884	0.377	117.84	3.096	0.002
	IC policy	**284**	163.17				167.34		
Infection Control Committee	**No IC Committee**	**38**	152.16	**Z**	-0.663	0.507	127.11	-2.439	0.015
	IC Committee	**284**	162.75				166.1		

Discussion

Assessment of IC Knowledge

This study showed that HCWs in Primary health care centers in Madinah have significantly moderate and high knowledge levels about IC standard precautions (62.9% and 31.5%) among CBAHI accredit group; and (70.6% and 21.9%) among CBAHI non-accredit group respectively. Waste management was significantly higher among CBAHI accredit group.

In our study, no significant effect was noticed in knowledge between both groups in relation to age, years of experience, and educational level. While, HCWs who were trained on IC standard precautions, expressed a statistically significant higher knowledge level about standard precautions than those who were not. Both physicians and nurses showed the highest knowledge level. Hospital-acquired contamination is a common typical issue, so nurses and physicians need to have updated knowledge about contamination management as a fundamental part of patients' care.

Likewise, in the research of Chalya et al. at Bugando Medical Center, health care workers utilized for longer periods had sufficient information on widespread safety measures than the individuals who served for shorter periods. Preparing and training have been seen as of principal significance to creating mindfulness among health care workers, just as improving adherence to great clinical practice. The more noteworthy information about health care workers utilized for a more drawn out period in this investigation may mirror their cooperation in a more prominent number of preparing and instructive meetings on all inclusive safety measures which supported more secure work rehearses as well as improved concordance with strategy and procedures.[50]In the research of Al-Hammar et al. in Saudi Arabia (2016), in six hospitals in Al-Ahsa, the majority of the respondents were females (78.4%) and between 20-40 years. Correct options were chosen by a majority of the HCP in most aspects of SP. However, a considerable number did not know about crucial SP measures. The knowledge score of surveyed HCP in that study was acceptable (74%). There was no significant deference in mean awareness among males and females or regards to years of experience and age of the patients. While physicians were more knowledgeable than other HCWs.[55]

Moreover, the respondents showed high consciousness of standard precautionary measures, which was in line with past research. The wellsprings of data for standard precautionary measures for the greater part of the respondents were workshops and seminars. This is not unexpected as the greater part of the health workers do go to different classes and workshops for hands-on preparation and retraining. Also, the greater part of the respondents showed great information on the standard precautionary measures. This finding is not quite the same as past research in Nigeria, which discovered a lower level of knowledge.[63]

In the present study, the majority of HCWs reported that their work provides a clear written infection control policy and IC committee. And most of the workers had received training on infection control standard precautions and were vaccinated against HBV. CBAHI accredit group reported significantly higher levels of provision of IC policy, IC committee, IC training, and vaccination against HBV than that reported by the CBAHI non-accredit group. There was no statistically significant positive effect on the availability of IC policy, availability IC committee on the total

knowledge score. While IC training showed a positive effect on increasing the total knowledge score among HCWs.

A study conducted in western Algeria observed that lack of adherence to SPs was primarily due to the lack of know-how.[64]Although nearly all nurses had heard of standard precautions, a good deal decrease proportion (62.2%). Another study in Brazil had similar finding with regard to know-how about standard precautions among nurses involved in pre-health center care.[30, 65]

Assessment of IC Practice:

Healthcare employees are exposed to a spread of activity exposures in clinical settings. The transmission of irresistible microbes is a significant concern and the most ideal method of forestalling obtained diseases in medicinal services settings is to agree to all inclusive insurance rehearses and to stay away from presentation to blood and other body liquids.[66, 67] In our study, a significantly good compliance to the practice of IC standard precautions was identified among the studied HCWs in both CBAHI accredit and CBAHI non-accredit groups. HCWs in CBAHI accredit group showed a significantly higher overall compliance to the practice of IC standard precautions with regard to most of the items except for compliance to the practice of hand hygiene, where no significant difference was observed between the groups. The best compliance with practice was observed among those aged from 18-29 years. Regarding age and years of experience, no significant effect was noticed in compliance with practice. Both nurses and laboratory scientists showed the best compliance with practice. Female gender, level of education, having IC policy, IC committee, and training on IC, had a significant impact on improving HCWs practice of SPs.

In agreement with our study, Batran et al. in Saudi Arabia (2017) in their study, demonstrated the majority of the participants (184, 92.9%) had a good level regarding the practice of SPs, while 13 (6.6%) had a fair level.[57, 63]On contrary to our study, Saleh et al. in Saudi Arabia (2014) in their cross-sectional survey among HCWs in ICU of King Fahad Hoff Hospital, concluded that even though members' information on different parts of SPs was commonly high, it did not relate to practices.[56, 61]

While in the study of Alotaibi et al. in Saudi Arabia (2016) who conducted a cross-sectional survey at Prince Sattam Bin Abdulaziz University in Al‑Kharj Governorate to assess the information and consistence with SIPs among baccalaureate undergrad health sciences understudy, the general methods for information and consistence with SIPs were accounted for inside most noteworthy ranges.[58]

Furthermore, in the study conducted in Nigeria (2017), the respondents rehearsed standard safeguards, which was like past studies in Nigeria.[63, 68]as far as explicit standard safety measure rehearses, there are a few varieties with past investigations. A portion of the respondents attested they don't recap the needle after utilization and withdraw needles from needle after use, which was like past investigation where the respondents conceded not to or never recap needle after use.[63]The pervasiveness of needle stick wounds from that review was like what was accounted for in Nigeria, Indonesia, and different studies.[51, 69]

In another study in Kabul, Afghanistan (2014), in spite of the fact that training was superior to information, helpless practice all in all was additionally revealed. They could not locate any noteworthy relationship between HCWs' information and practice of UPs. Their discoveries likewise showed a low degree of training of SPs among HCWs in Kabul; just 19.0% of respondents announced full practice with each of the 11 UPs. Nonetheless, it is of worry that 57.8% of the respondents revealed that they generally recapped utilized needles in their day by day rehearses, that 31.8% of the HCWs announced that they didn't generally change gloves in the middle of patients, and 40.7% of the HCWs detailed that they didn't generally wear an eye shield/goggles when they were presented to the sprinkling of blood release/liquids.[70, 71]

Impact of CBAHI Accreditation on IC Programs

Our study identified that HCWs in CBAHI accredits primary health care centers in Madinah have a nearly similar knowledge level about IC standard precautions like that among CBAHI non-accredit PHCs. There was no statistically significant difference between both groups in their knowledge score regarding most of the items of SPs except for their knowledge level about environmental cleaning and waste management, which was significantly higher among the CBAHI accredit group. On the other hand, our study revealed significantly better compliance with the practice of IC standard precautions with regard to most of the items among the CBAHI accredit group than the compliance among CBAHI non- accredit groups.

Health-care accreditation is frequently received as an instrument for administration improvement or as a vehicle for health change. There is restricted proof of the effect of accreditation. Health Care Organizations in the Kingdom of Saudi Arabia (KSA) are progressively mindful of the significance of accreditation and noteworthy extents of assets have been conveyed by each hospital to accomplish accreditation. It has been uncovered that certifies hospitals are performing better than non-authorized hospitals on a scope of quality markers. In any case, its effectiveness was very rarely addressed in the literature, especially in the Saudi Arabian context.[71]

Also, Devkaran and Patrick in the United Arab Emirates (2008) examined the effect of human services accreditation on hospital quality measures. The examination was directed in a 150-bed multispecialty hospital in Abu Dhabi. They established accreditation had a critical negative change in HAI's parameters.[72]Alsakkak et al did an investigation in Saudi Arabia to assess 93 PHC review visits in 20 locales,

during 2016-2017. It was demonstrated that surveys every month were multiplied with the one-day site visit. Both escalated preparing and mock visits indicated an incredible effect as the accreditation and contingent accreditation status were expanded by two overlaps because of better comprehension of the PHC staff about the principles, just as early distinguishing proof of execution hole which permitted the PHC to alleviate these holes adequately enough to stay away from zero scores.[71]However, Shaikh et al led a contextual analysis in Saudi Arabia to evaluate the effect of CBAHI Accreditation on the result proportions of basic consideration units in a tertiary consideration emergency clinic. They recommended that there was no measurably noteworthy distinction between pre-test and post-test results. Albeit various rates are fundamentally contrasted across units including death rate, normal average length of stay, compliance rate, and hospital-acquired pressure ulcer (HAPU) rate.

Hospital accreditation may have a positive impact on the performance of infection control program. Studies support that improvement in infection control infrastructure and performance were larger in the accredited hospitals than the others.[73]In addition, there is strong evidence that accreditation services enhance clinical performance in a wide variety of clinical conditions. Accreditation programs should be supported as an instrument for enhancing the quality of health care services.[2, 74]

Conclusion

The majority of studied HCW's were females (51.6%) of age 30-39 years (63.4%) and of Saudi nationality (92.5%). Most of them were nurses and physicians (53.7% and 24.8%) respectively, with 6 - 10 years of experience (34.2%) and had a diploma degree (60.9%). The majority of physicians (77.5%) were general practitioners. Both studied groups reported that their work provides a clear written infection control policy and infection control committee (88.2%). Moreover, (85.4%) of HCWs had received previous training on IC standard precautions and (90.1%) of them were vaccinated against HBV. However, the CBAHI accredit group reported significantly higher levels of provision of IC policy, IC committee, IC training, and vaccination against HBV than that reported by the CBAHI non-accredit group.

The level of HCWs education had a significant impact on their practice of SP, however, it had no significant effect on increasing their knowledge level. HCWs who were trained on IC standard precautions expressed a significantly higher knowledge level and better compliance with the best practice of standard precautions than those who were not. Moreover, HCWs in PHCCs having IC policy and IC committee expressed significantly better compliance with the best practice of standard precautions, While, there is no statistically significant difference in their knowledge level.

Recommendations

We encourage all healthcare organizations to become accredited to achieve higher standards of quality and a significant impact on hospitals' IC infrastructure and HCWs performance. Also, there is a strict need for sustainable improvements over time in the accreditation process as CBAHI does not monitor HCWs during health care delivery.

Limitations

There is was a restriction in the observation of the compliance of HCWs with SPs during their practice due to the cross-sectional design of our study and using a self-administrated questionnaire as a tool for data collection.

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