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Infection Prevention Control: First Cycle Audit Regarding Safe Fitting and Removal of Personal Protective Equipment among Health-Care Workers in Infectious Diseases Wards at Soba University Hospital

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Abstract

In the recent years the frequency of health emergences increased highlighted the importance of infection prevention control (IPC) measures especially personal protective equipment (PPE). This study assessed the compliance of the healthcare providers at Soba university hospital to IPC\PPE and assessed the effectiveness of the IPC training center at the hospital. This descriptive cross-sectional, hospital-based study, used self-administered questionnaire to gather the data, and statistical program for social science (SPSS) version 28 to analyze it, frequency tables were used to show the results. The overall knowledge of healthcare providers was good, but only 69.6% agreed that they changed gloves between patients. They mentioned reasons for their poor adherence to PPE: PPE interference with work (69.6%), brought discomfort to the patient (50%), brought discomfort to them (47.8%). This result dictated the effectiveness of theoretical part of the training while the practical and supervision section needs improvement.

Keywords: Infection; Prevention; Control; Personal Protective Equipment; Sudan

Abbreviations: PPE: Personal protective equipment; OSHA: Occupational Safety and Health Administration; IPC: Infection Prevention Control.

Introduction

Infection prevention and control is a practical, evidence-based approach preventing patients and health workers from being harmed by avoidable infections [1].

Personal protective equipment (PPE), as defined by the Occupational Safety and Health Administration (OSHA), is "specialized clothing or equipment, worn by an employee for protection against infectious materials"[2,3], in the last decades the frequency of health emergences increased highlighted the importance of IPC measures especially PPE [4].

OSHA issued regulations for workplace health and safety, which requires use of PPE in healthcare settings to protect healthcare providers from exposure to blood borne pathogens and Mycobacterium tuberculosis. However, under OSHA's General Duty Clause PPE is required for any potential infectious disease exposure. Employers must provide their employees with appropriate PPE and ensure that PPE is disposed or, if reusable, that it is properly cleaned or laundered, repaired and stored after use [2].

PPE includes gloves, medical/surgical face masks - thereafter referred as "medical masks", goggles, face shield, and gowns, as well as items for specific procedures filtering face piece respirators (i.e. N95 or FFP2 or FFP3 standard or equivalent) - thereafter referred to as "respirators" - and aprons [5]. Hand hygiene should be performed immediately after removal of PPE [6].

Commonest reported PPE adherence defects related to improper hand hygiene and mask removal [7-10], Other factors are a clear understanding of the guidelines, positive role of supervisors, communication about guidelines, sufficient resources, the perceived value of following guidance, the comfort of personal protective equipment (PPE), and availability of resources [11-15].

This study assessed the compliance of the healthcare providers at Soba university hospital to IPC\PPE and assessed the effectiveness of the IPC training center at the hospital.

Material and Methods

Study Design

A cross-sectional hospital-based study was conducted at Soba Teaching Hospital in Khartoum, Sudan, to assess the efficiency of Infection Prevention Control (IPC) Training among healthcare workers at Soba University Teaching Hospital. The study was the first cycle of a clinical audit. The guidelines on standard of IPC/ PPE usage, developed by Federal Ministry of Health, SD and Standard of IPC policy of the Hospital were used as references.

Study Population

The population of the present study includes healthcare workers who had direct contact with patients with potentially infectious diseases "Number 46".

Study Area

Soba University Hospital is a Teaching Hospital belongs to University of Khartoum, consists of different departments and education and research centers. One of the centers is IPC training center in which regular training about IPC measures for the healthcare workers is held.

The first phase was observation of confirmed cases of COVID-19 among those who worked in contact with Confirmed and Suspected cases of COVID-19, despite the availability of Personal Protective Equipment, and the existence of IPC training center at the hospital as well as the availability of regular training programs for the healthcare workers.

Then, a questionnaire was developed and data was collected from all healthcare workers working in contacts with cases of potentially infectious diseases.

Total coverage of healthcare providers who were working in the wards and units of infectious diseases was chosen as sampling technique. Healthcare providers who unwilling to participate were excluded. Because the working shifts in the hospital were distributed by days, all the available healthcare providers were covered during the data collection period.

The efficiency of the training center was assessed using questionnaire developed by the authors for the presence of the following items:

Data were collected using questionnaire, filled out by healthcare providers. Data were analyzed using SPSS 28 version. Descriptive statistics such as percentages and frequencies describing the practice of the healthcare providers were used, and the results were illustrated in forms of figures and tables.

Ethical approval was obtained from the Research and Training Administration at Soba University Teaching Hospital. Informed consent was taken from each healthcare worker.

Results

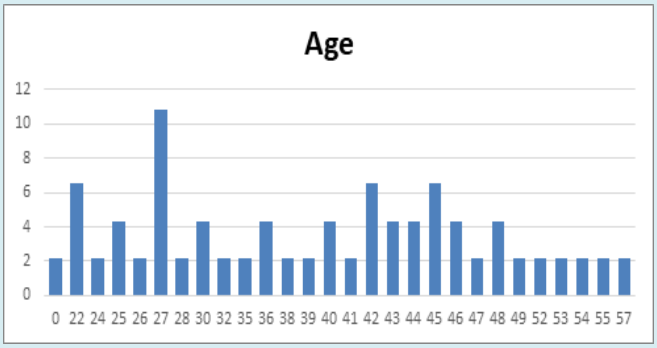

Figure 1: Age of health-care providers (n=46).

The Mean±SD (37±11.5) years

27 years had been the most frequent age among the healthcare providers in the study.

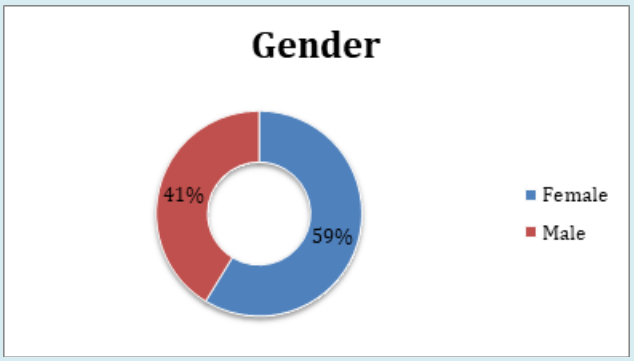

Figure 2: The gender (n=46).

The majority of the healthcare providers were females this is matching with the recent study in medical sector statistics that concluded nearly two thirds of the medical staff in Sudan were females.

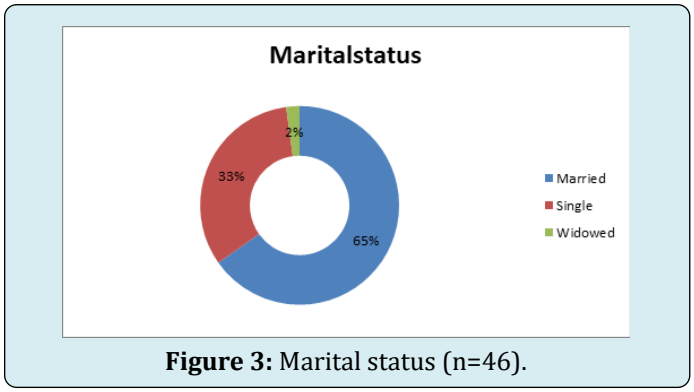

Figure 3: Marital status (n=46).

The majority (65%) were married.

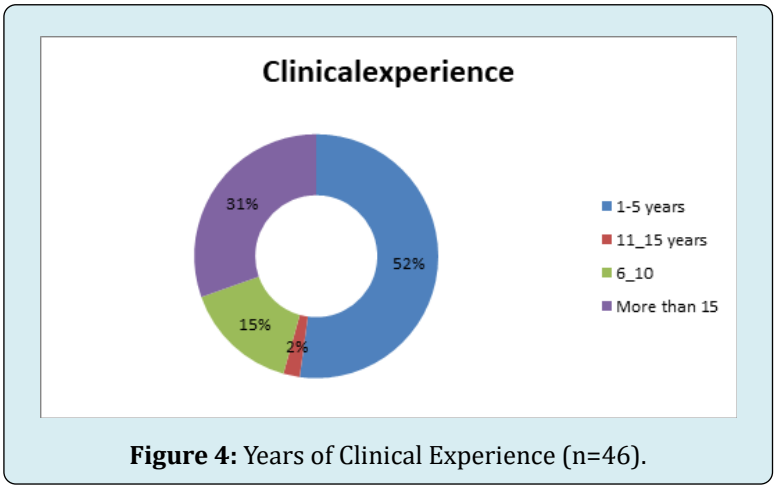

Figure 4: Years of Clinical Experience (n=46).

An appreciated percentage of the healthcare providers had experience of more than 15 years, 52% had experience (1-5) years.

	Frequency	Percentage
Exposure to training		
Yes	26	56.50%
No	20	43.50%
Exposure to guidelines		
Yes	21	45.70%
No	25	54.30%
IPC policy of the hospital:		
Yes		
No	39	84.80%
I do not know	3	6.50%
	4	4.80%
Supervisor criticism when not use proper precautions:		

Yes		
No		
I do not know	37	80.40%
	6	13%
	3	6.50%
Colleagues criticism when not use proper precautions:		
Yes		
No		
I do not know	32	69.60%
	11	23.90%
	3	6.50%
Availability of recommended PPE		
Yes		
No	31	67.40%
I do not know	12	26.10%
	3	6.50%

Table 1: Exposure to PPE\IPC training and guides (n=46).

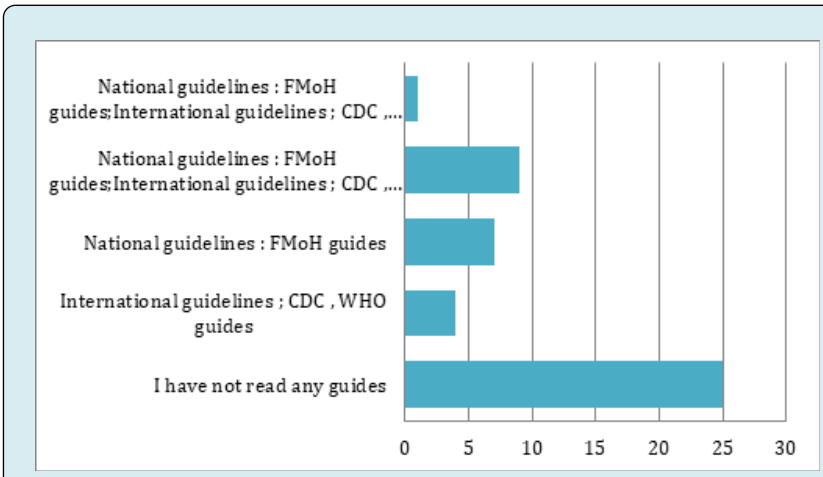

Figure 5: Exposure to Guides (n=46).

Only 45.7% of healthcare providers agreed that they read guides for safe donning and doffing of PPE

	Frequency	Percentage
Knowledge of how to use PPE:		
Yes		
No	44	95.70%
	2	4.30%
PPE includes:		
Face shield	45	97.80%
Gowns	45	97.80%

Goggles	45	97.80%
Gloves	45	97.80%
Aprons	45	97.80%
Surgical mask	46	100%
Surgical mask protective period\hours:		
Less than 2		
02-Apr		
05-Jun	4	8.70%
07-Oct	32	69.60%
I do not know	6	13%
	2	4.30%
	2	4.30%
Hand-washing is mandatory when manipulating PPE:		
Yes		
No		
I do not know	41	89.10%
	2	4.30%
	3	6.50%
Usage and elimination of PPE need hand hygiene;		
Yes		
No		
	44	95.70%
	2	4.30%
Change PPE when get out and back again:		
Yes		
No		
	44	95.70%
	2	4.30%

Table 2: Knowledge of healthcare providers regarding PPE\IPC (n=46).

	Frequency	Percentage
Remove PPE immediately after end:		
Yes		
No	44	95.70%
	2	4.30%
Change gloves between patients;		
Yes		
No	32	69.90%
I do not know	11	23.90%

	3	6.50%
Ability to wear and remove PPE:		
Yes		
No	45	97.80%
	1	2.20%
PPE interfere with your work:		
Yes		
No	32	69.60%
I do not know	10	21.70%
	4	8.70%
Work with equipped PPE:		
Yes		
No	43	93.40%
I do not know	2	4.30%
	1	2.10%
PPE brings discomfort to patient		
Yes		
No	23	50%
I do not know	22	47.80%
	1	2.20%
Wearing PPE brings discomfort for you:		
Yes		
No	22	47.80%
	24	52.20%

Table 3: Healthcare providers practice regarding PPE\IPC (n=46).

Discussion

This study was cross-sectional, hospital-based study to assess the compliance of healthcare workers to IPC\PPE standards at Soba University Hospital, as well as to assess the efficiency of IPC training center at the hospital.

The healthcare workers in the study were ranged between 25.5 to 48.5 years and 59% of them were females, in contrary to Chinese study, where HCW age ranged from 25 to 33 and 76.3 were females Hu X, et al. Self-Reported Use of Personal Protective Equipment among Chinese Critical Care Clinicians during 2009 H1N1 Influenza Pandemic. PLoS ONE 7 [9]: e44723. doi:10.1371/journal.pone.0044723). One third of them had experience more than 15 years in clinical practice while 52% were less than 5 years' experience, but different study found that 56.5% of the healthcare workers reported previous exposure to IPC\PPE training; Shigayeva, et al. found that recent infection prevention control training was a significant predictor of adherence to IPC measures [16]. Only 45.7% in our study reported exposure to IPC\PPE guidelines, three studies found that Knowledge of current guidelines was related to adherence to IPC measures [16-19].

84.8% agreed that there is IPC policy at the hospital, in this study, 80.4% agreed upon supervisor role about their compliance to IPC\PPE practice at the hospital while only 69.5% agreed upon colleagues a positive role of their colleagues.

67.4% agreed that PPE were available, and this was the second unexpected result due to the availability of all recommended PPE.

97.8% named PPE components: face shield gowns, goggles, gloves, aprons, surgical mask. 69.6% agreed that protective period of surgical mask is 2-4 hours.

Healthcare workers mentioned some causes for their poor compliance: PPE interference with work (69.6%), brought discomfort to the patient (50%), brought discomfort to them (47.8%).

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