ORIGINAL ARTICLE

Impact of Biosafety Measures in Health Care Facilities on Transmission of NCOVID-19 in Healthcare Workers

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ABSTRACT

Objective: To assess the knowledge, attitude and routine practices of biosafety and waste disposal measures in healthcare facilities and its impact on transmission of COVID-19 in healthcare workers.

Study Design: Cross-sectional study

Place and Duration of Study:Dow University of Health Sciences, Karachi, Pakistan 1st April 2020 to 30thJune 2020.

Methodology:Four hundred research participants were enrolled from tertiary care hospitals across the capital cities of all provinces of Pakistan. The survey was composed of 25 questions that were formulated in accordance with the information specified by WHO for NCOVID-19 and biosafety measures.

Results:74% of health care workers had proper knowledge about NCOVID-19 whereas, only 32.62% of health care workers had proper biosafety measures in their health care facilities and 42.81% of healthcare facilities were with proper waste disposal measures.

Conclusion:Healthcare workers have sufficient basic awareness about current pandemic whereas, they have inadequate practice of biosafety and waste disposal measures which is alarming situation. The higher authorities should take initiatives on priority basis to improve the practice of biosafety and hospital waste management among the healthcare workers, so that the drastic situations can be avoided in Pakistan.

Keywords: Pandemic, COVID-19, Biosafety, Waste management, Healthcare workers

INTRODUCTION

Biosafety is referred to a group of studies planned to prevent, minimize or eliminate hazard produced by activities of research, education, production, supplying of service and development of technology. These steps have an aim to promote health and care of animal and human and also for the safety of surroundings.¹Related to the biosafety steps in medical institutes, laboratories and hospitals, it is essential to focus on its practices performed by healthcare workers primarily during professional development and routine performance at their work place. While considering the daily work in medical setups, professional development, the clinicians must be acknowledged about biosafety risks to ensure the protection of health care workers.² Biosafety principles followed by healthcare staff in everyday practice are essential to minimize the transmission of infections from hospitals and laboratories.³

It is now a well-known fact that COVID-19 disease spread through droplets in the persons in close contact with the infected persons through sneezing, coughing, personal interaction and touching the body parts like mouth, nose or eyes.⁴⁻⁶Evennon-symptomatic persons may also spread the infection.⁷

Several vaccines are under trial but up till now no such vaccine or treatment is available for the said virus but it can be prevented by few preventive measures like washing hands with alcohol based sanitizers, avoid touching the surfaces and social distancing.^{8,9}Healthcare workers need to be aware of basic knowledgeof biosafety and all techniques with regards to prevention of and protection from ncovid-19 because healthcare workers, are supposed to be at more risk as they have to treat the infected persons and they may be a source of transmission of infection if biosafety measures are not being followed by them properly.¹⁰ So, for health workers, it is important to possess proper knowledge of biosafety, because the virus can spread out due to improper supervision in the hospitals and misleading of the waste material created in hospitals particularly while treating the covid-19 patients. Improper biosafety measure in hospitals can be drastic for health works as well as society. This research was conducted to assess the fundamental way of HCW towards basic principle of biosafety and hospital waste management measures so that possible prevention of viral infection could be made practicable in the hospitals.

PARTICIPANTS & METHODS

This cross-sectional study was conducted atDow University of Health Sciences, Karachi, Pakistanfrom 1st April 2020 to 30thJune 2020. A total of 400 research participants were enrolled from tertiary care hospitals across the capital cities of all provinces of Pakistan. The survey was composed of 25 questions that were formulated in accordance with the information specified by WHO for NCOVID-19.The study was questionnaire based, which was comprised of three portions to evaluate the basic knowledge of NCOVID-19, biosafety measures and waste management in the hospitals. (See supplementary file for questioner) Consent was also taken over before participating in the study. Medical doctors and nurses employed at tertiary care hospitals who were handling COVID-19 or suspected COVID-19 patients were included in this study.

RESULTS

The participants included 154 (38.5%) medical doctors and 246 (61.5%) nurses. The results regarding basic knowledge of CIVID-19 concluded that of most of participants i.e. 348 (87%) were of idea that COVID-19 is contagious.338 (84.5%) and 391 (95.75%) participants were well aware with the route of transmission and symptoms of the disease respectively. More than one third of the participants (83.75%) were of idea that corona virus has capability to stay on surfaces from several hours to days while 194 (48.50%) were aware with the incubation period of virus. Correct global mortality rate i.e. 2% was opted by 47.75% participants, while 370 (92.50%) knew the preventive measures. Only 188 (46.5%) healthcare workers were of the idea that recovered patients cannot transmit or spread the disease. When asked about population at higher risk, more than two third healthcare workers i.e. 322 (80.5%) gave correct answer that people having age more than 60 years are at higher risk to be infected with corona virus (Fig.1).

While dealing with current pandemic 236 (59%) of participants have received proper bio safety training before dealing with the situation. Only 136 (34%) were aware with the proper definition of "biosafety" and 38 (9.5%) participants confirmed presence of biosafety officers in their hospitals. Hospitals of 188(47%)participants had not proper SOPs of biosafetywhile 120 (30%) participants had no idea regarding that only 92(23%) confirmed of proper SOPs in their hospitals. Most of the participants, 279 (69.75%)were overusing the PPEs evaluated as per WHO criteria when asked about type of PPEs they use while providing direct care toNCOVID patient only 131 (30.75%) participants out of 400 were using proper PPEs. 254 (63.50%) HCW were using PPEs as per WHO criteria dealing with patients while aerosol generating procedure. While in triage or consultation room in routine, not dealing with COVID-19 patients or with patients without any respiratory symptoms, only 9 (2.75%) were using proper PPEs remaining 97.5% were using inappropriate PPEs. In triage or consultation room in routine, dealing with patients with any respiratory symptoms, 38.5% were using proper PPEs, while 288 (71.5%) were using inappropriate PPEs (Fig. 2).

The third portion of the questioner contained the information about waste management which revealed 125 (31.25%) of the participants had received waste disposal training, 194 (49.5%) were aware with the SOPs of waste management. 144 (36%) were aware with the idea that their hospitals had provided waste management training to waste handlers of their hospitals and only 94 (23.5%) were aware with proper donning and doffing practices of PPEs in their hospitals. 225 (56.25%) participants were of idea that proper segregation, labelling and packaging was being performed in their hospitals. Hospitals of only 150 (37.50%) participants had waste management committee. 214 (53.5%) participants were aware of proper storage and transport facilities of waste in their hospitals. 220 (55%) participants said their hospital provide enough waste disposal material like biohazard bags and sharp bins for waste disposal (Fig. 3).

Summary of the result showed 74% of HCW with proper knowledge about NCOVID-19 whereas, only 32.62% of HCW have proper biosafety measures in their health care facilities and 42.81% of healthcare facilities are with proper waste disposal measures (Fig. 4).



Fig 1: Percent of correct answers to 9 questions asked related to basic knowledge of NCOVID-19 to participants



Fig 2: Percent of properbiosafety measures at health care facilities against each question



Fig 3: Percent of properwaste disposal measures at health care facilities against each question.



Fig. 4: Summary of results

DISCUSSION

The presently discovered novel coronavirus (NCOVID-19) has initiated the epidemic in Wuhan the city of china, turned to be a pandemic outbreak.¹¹ The speedily rising number of incidents and evidence of person-to-personclose communication confirmed that the SARS-CoV and MERS-CoV are less contagious than NCOVID-19.¹²⁻¹⁴ A number of cases of medical workers have been reported and the particular reason is yet to be evaluated.¹⁴ Hence, it is a

need of the time that hospital employees must have enough knowledge about the spread of the virus, proper practice of biosafety and hospital waste management in their hospitals to stop the possible spread. Healthcare workers are the front line warriors of the current pandemic but can be the source of transmission. Though, it is not established so far; the percentage of confirmed or suspected healthcare workers with infection.

The study was questionnaire based, which was distributed into three main portions, included basic knowledge about NCOVID-19, infection control methods and waste disposal processes, its outcome showed that the most of the participants had sufficient awareness about the basic knowledge of NCOVID-19.Whereas, the results of biosafety measures were not satisfactory numerically. WHO has published appropriate guidelines and Standard operating protocols about proper usage of personal protective equipment to reduce transmission of infections from hospitals to healthcare workers. Those guidelines required minimal and proper utilization of PPEs as to minimize the PPE requirementand enhance PPE availability.¹⁵ Most of the hospitals were lacking biosafety officers and biosafety education programs which can be simply risky. Our study shows either misuse of the PPE which can be a reason of shortage of PPEs, or some of them are not using proper PPEs either because of unavailability or less knowledge of SOPs.

As WHO published, a doctors or paramedical staff have to follow proper PPE instructions while handling patients in triage or diagnosis room whether it could be with respiratory symptoms or not. This is mandatory to use surgical mask with gloves, gown and eye wear/ face shield while handling patient having respiratory symptoms, though in our results, either just N95 mask was being used or N95 mask along with gown were getting used showing inappropriate use of PPEs in OPDs/diagnosis areas. This improper use of PPEs which can lead to unavailability of the materials. Proper discard of wastes of the hospitals and laboratories is very essential but the most neglected side of health care settings. Our study was able to find that the majority of the hospitals have no SOPs regarding waste management. They need to conduct training sessions and improve facilities of waste management. Improper handling and discard of the wastes can be dangerous in spreading the infections like human immunodeficiency virus and viral hepatitis as Pakistan is already overburdened with these diseases.

Our results indicated the immense need of trainings within healthcare settings regarding biosafety measures and infection control with waste disposal managements. Keeping in view the severity of the disease and prevalence of other viral infectious disease in Pakistan, it is extremely essential to attain the basic Knowledge of infection control and biosafety which are the basic requirement for protection from infections. HCWs are at more risk because of lack of basic knowledge, poor practice of biosafety and improper handling of waste. In Pakistan, with this level of safety measure and waste disposal practices, hospitals can be a source of transmission of multiple infections like COVID-19 not only this but the many life-threatening virus (HIV, Hepatitis B,C).

CONCLUSION

Adequate basic knowledge and preventive measure are the most important way to minimize the transmission of any infection and promote healthy environment. HCWs have sufficient basic awareness about current pandemic whereas, they have inadequate practice of biosafety and waste disposal measures which can be dangerous. The higher authorities must take initiatives on priority basis to improve the practice of biosafety and hospital waste management among the healthcare workers, so that the drastic situations can be avoided in Pakistan.

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