International Journal of Community Medicine and Public Health
Archana Lakshmi PA et al. Int J Community Med Public Health. 2018 May;5(5):1771-1774
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20181380

Original Research Article

A study on personal protective equipment use among health care providers, Tamil Nadu

Archana Lakshmi P. A.[1]*, Gladius Jennifer H.[1], Meriton Stanly A.[2], Christina Mary Paul[3]

Department of Community Medicine, [1]Karpaga Vinayaga Institute of Medical Sciences and Research Center, Madurantagam, [2]Sri Ramachandra Medical College and Research Institute, [3]ACS Medical College, Chennai, Tamil Nadu, India

Received: 03 March 2018
Accepted: 19 March 2018
Accepted: 20 March 2018

***Correspondence:**
Dr. Archana Lakshmi P. A.,
E-mail: archan_27@yahoo.com

ABSTRACT

Background: Personal protective equipment (PPE) limits the health care workers contact with all secretions or biological products. This study was planned to find gaps between use of PPE among the health care providers (HCPs). The objective of the study was to evaluate appropriate use of PPE among health care providers in tertiary centres Tamil Nadu.
Methods: A cross sectional study was done during November 2014 to October 2015 in two tertiary health care institutions. All health care providers (Doctors, nurses and technicians) who had more than one year experience and gave informed consent were included. Data collected by pretested structured questionnaire. Data analysis was done using SPSS 20v and summarized by descriptive statistics. Proportion and Chi-square was calculated at 5% α.
Results: HCPs included in the study were 1060. Among them, there were 412(38.9%) doctors, 550 (51.9%) nurses and 98 (9.2%) technicians. Among 862 HCPs who work outside the operation theatre (OT) and ICU, appropriate uses of PPE were only 156 (18.1%). It was high among doctors 109 (31.5%) followed by nurses 39 (9.3%) and technicians 8 (8.2%) which was statistically significant p=0.0001. HCPs working in OT and ICU were 423 and 183 respectively. Among HCPs working in OT, appropriate use of gloves, mask, apron, gown and hair cover was 100%. But the use of goggles and shoe cover was very low. The reasons for inappropriate use of PPE was non availability 562 (78%) followed by not aware of the importance 77 (11%).
Conclusions: The study showed inappropriate use and lack of adequate knowledge on infection control practices emphasizing that periodic re-training is needed.

Keywords: Personal protective equipment, Health care providers, Infection control

INTRODUCTION

Personal protective equipment are designed to protect health care providers from serious workplace injuries or illnesses.[1] Personal protective equipment provides a physical barrier between microorganism and wearer. It offers protection by preventing microorganism from contaminating hands, eyes, clothing, hair and shoes.[2] A breach in infection control practices facilitates transmission of infection from patients to health care workers, other patients and attendants.

Personal protective equipment (PPE) includes gloves, protective eye wear (goggles), mask, apron, gown, boots/shoe cover, hair cover. PPE should be used by all health care providers, supporting staffs, laboratory staffs, and family members who provide care to patients in situations where they have contact with blood, body fluids, secretions or excretions.[3]

The emergence of life-threatening infections such as severe acute respiratory syndrome (SARS) and re-emerging infectious diseases like plague and tuberculosis had highlighted the need for efficient infection control programs in all health care settings[3] and research into standard precautions has been carried out in many countries.[4,5]

Nosocomial infections transmitted by direct-contact can be prevented by adapting standard precautions guidelines. Appropriate use of PPE is the easiest way to prevent contact from secretions and transfer of pathogens. It's important to assess the level of compliance with use of PPE by the various HCWs who make direct contact with patients. Hence this study attempted.

The objective of this study was to evaluate the appropriate use of PPE among health care providers in tertiary care hospitals Tamil Nadu.

METHODS

A cross sectional study was done during November 2014 to October 2015 in two tertiary health care institutions in Chennai and Madurai. Institutional ethics committee's approval was obtained. All health care providers (doctors, nurses and technicians), who had more than one year of experience been included. Those who were not willing to participate and who had experience lesser than a year were excluded. After getting informed consent, data collected by pretested structured questionnaire. Data analysis was done using SPSS 20v and summarized by descriptive statistics. Proportion and Chi-square was calculated at 5% α.

RESULTS

The health care providers included in the study was 1060. Among them, there were 412 (38.9%) doctors, 550 (51.9%) nurses and 98 (9.2%) technicians.

Among 862 health care providers who worked outside the operation theater (OT) and ICU, appropriate use of PPE among the HCPS were only 156 (18.1%).

Table 1: Appropriate PPE use among health care providers outside OT and ICU.

Health care providers	Appropriate use n (%)	Inappropriate use n (%)	Total
Doctors	109 (31.5)	237 (68.5)	346
Nurses	39 (9.3)	380 (90.7)	419
Technicians	8 (8.2)	89 (91.8)	97

Table 1 describes that, appropriate use of PPE was high among the doctors 109 (31.5%) followed by nurses 39 9.3%) and technicians 8 (8.2%) which was statistically significant ($\chi 2=56.82$, p=0.0001).

Table 2: Appropriate PPE use among health care providers inside OT and ICU.

PPE	OT (n=423) (%)	ICU (n=183) (%)
Gloves	423 (100)	183 (100)
Mask	423 (100)	175 (95.6)
Goggles	31 (7.3)	8 (4.4)
Apron	423 (100)	114 (62.3)
Gown	423 (100)	81 (44.3)
Hair cover	423 (100)	106 (57.9)
Shoe cover	35 (8.3)	50 (27.3)

Health care providers working in OT and ICU were 423 and 183 respectively. Among the HCPs working in OT, appropriate use of gloves, mask, apron, gown and hair cover was 100%. But the use of goggles and shoe cover was very low (Table 2). This was attributed to the fact that goggles and shoe cover was not available and the HCPs use OT slippers. According to the standard precaution guidelines, shoe cover should be used to avoid spill of blood and body fluids over leg.

While doing procedures in ICU, use of gloves was 100%, mask was 95.6%. but the use of other PPE was very less to the extent that the use of goggles 4.4%, apron 62.3%, gown 44.3%, hair cover 57.9% and shoe cover 27.3% (Table 2). This was attributed to the fact that the unavailability of PPE and unaware of the importance of goggles.

Table 3 explains that, Hair cover should completely cover the hair to avoid falling of loose hairs in procedure site, which may increase the chance of infection. Proper use of hair cover was high among technicians (95%) followed by doctors (91.6%) which was statistically significant (p=0.01). The gown should always be tied at the back to prevent clothes from getting soiled. Appropriate use was high among technicians (100%) followed by nurses (98.3%).

Gloves should be changed between two procedures on same patients to prevent cross infection. Gloves change was appropriate among nurses (99.3%) followed by doctors (99%) which was statistically significant (p=0.0001). Similarly, HCPs supposed to remove gloves before leaving the patient bedside to prevent spread of infection, which was done appropriately by nurses (100%) followed by doctors (99.5%) which was also statistically significant (p=0.0003). Correct size of gloves was worn by doctors (88.7%) followed by nurses (70.9%) which was significant (p=0.0001).

Upper end of the mask should fit under the glasses to prevent fogging of glasses. Among spectacle users, mask was correctly worn by nurses (97.9%) (Table 3).

Torn gloves were never used by 396 (96.1%) doctors and occasionally by 16 (3.9%) doctors, never by 540 (98.2%),

occasionally by 10 (1.8%) nurses and never by 94 (95.9%), occasionally by 4 (4.1%) technicians. The difference was not statistically significant (p=0.3). Among the doctors and nurses, the order of removal of the PPE was correctly answered only by 116 (12.1%), which shows the inadequate knowledge about the use of PPE.

Table 3: Comparison of practices among health care providers towards usage of PPE.

Practices of HCPs	Doctors frequency (%)	Nurses frequency (%)	Technicians frequency (%)	P value
Hair cover completely cover your hair	307 (91.6)	208 (82.2)	19 (95)	0.01
Tie gown at the back	345 (97.2)	340 (98.3)	21 (100)	0.2
Change gloves between procedure on same patient	388 (99.0)	544 (99.3)	55 (64.7)	0.0001
Remove gloves before leaving patient bedside	396 (99.5)	547 (100)	91 (93.8)	0.0003
Correct size gloves	353 (88.7)	388 (70.9)	68 (70.1)	0.0001
Upper end of the mask fit under your glasses	85 (97.7)	46 (97.9)	4 (80.0)	0.2

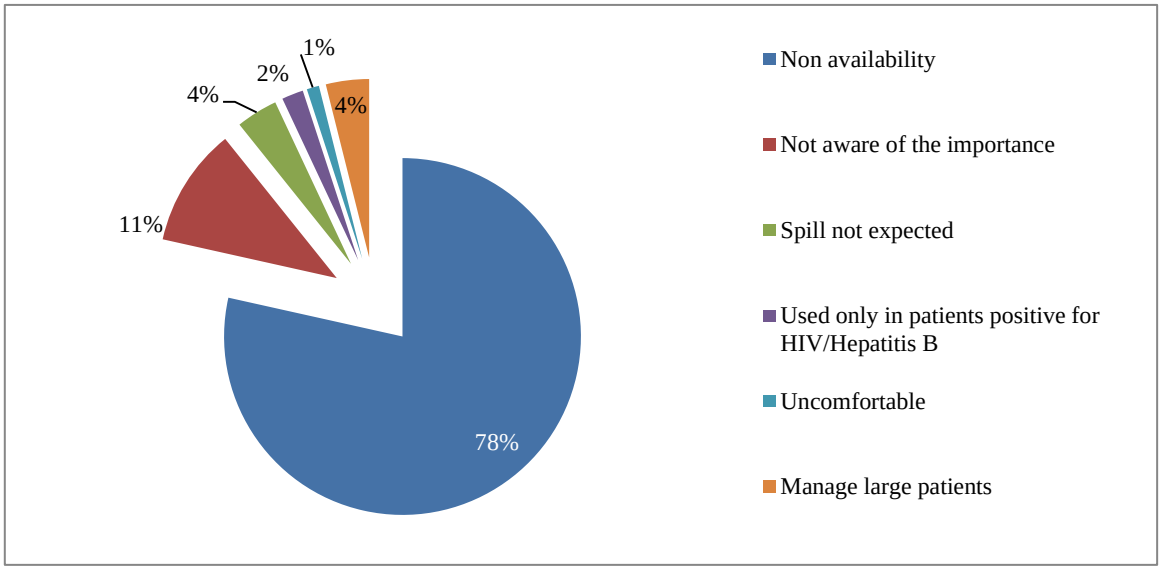

Figure 1: Reasons for inappropriate use of PPE among study participants.

The reason for inappropriate use of PPE was non availability 562 (78%) followed by not aware of the importance 77 (11%) (Figure 1).

DISCUSSION

In the present study, appropriate use of PPE among the HCPS were 18.1% which was similar to the study done by Hakim et al, 15.2% among health care workers, by Wilson et al 63.8% and Emmanuel et al 4.3%.[1,2,6]

The use of gloves in ICU was 100%, goggles 4.4%, apron 62.3%, gown 44.3% in our study, which was slightly differ with study done by Sangini et al where use of gloves (77%), protective eye gear and outer protective clothing was very low 22% and 28% respectively.[7]

The goggles use was 4.4% in this study which was comparable with the study done by Jeong et al 2% and much lower than the study done by Kermode (32%) and Wilson (43.5%).[6,8,9]

In this study gloves were changed in between two procedures by nurses (99.3%) and doctors (99%) which was differ from Asare et al where gloves were not changed between patients in 43.7% of high-risk contacts and 88.2% of low-risk contacts.[10]

The reason for inappropriate use of PPE was non availability 78% which was similar to the other studies.[1,11] But Sangwan et al described that the reasons were busy schedule (37.14%), non-use of PPE by co-workers (67.14%), emergencies (91.43%) risk that patients may get offended (27.14%), discomfort while using PPE (24.29%).[12]

In the present study, the order of removal of the PPE was correctly answered only by 12.1%, whereas the study done by Robyn showed higher results (54%) Further research is needed to explore into various reasons for non-availability of PPE.[13]

CONCLUSION

The present study showed appropriate use of PPE was very low. PPE use is vital in safeguarding the HCWs and spread of infection. Steps should be taken to ensure adequate availability and strict infection control guidelines should be followed to improve the same.

Recommendation

Periodic reinforcement and training programs are needed for all level of health care workers for adherence with appropriate use of personal care equipment.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Emmanuel N. Aguwa, Sussan U. Arinze-Onyia, Anne Ndu Use of Personal Protective Equipment among Health Workers in a Tertiary Health Institution, South East Nigeria: Pre-Ebola Period. IJHSR. 2016;6(8):12-8.
2. Hakim SA, Abouelezz NF, El Okda EM. Use of personal protective devices among health care workers in a teaching hospital in Cairo, Egypt. Egyptian J Occupational Med. 2016;40(2):287-300.
3. World Health Organization: Practical Guidelines for Infection Control in Health Care Facilities. SEARO and WPRO Publication No. 41. 2004.
4. Chia SE, Koh D, Fones C, Qian F, Ng V, Tan BH, et al. Appropriate use of personal protective equipment among healthcare workers in public sector hospitals and primary healthcare polyclinics during the SARS outbreak in Singapore. Occup Environ Med. 2005;62:473–7.
5. Yang Luo A, Guo-Ping He, Jijan-Wei Zhou, Ying Luo Factors impacting compliance with standard precautions in nursing, China. Int J Infect Dis. 2010;14:1106–14.
6. Sadoh WE, Fawole AO, Sadoh AE, Oladieji AO, Sotiloye OS. Practice of universal precautions among healthcare workers. J Natl Med Assoc. 2006;98(5):722–6.
7. Punia S, Nair S, Shetty RS. Health Care Workers and Standard Precautions: Perceptions and Determinants of Compliance in the Emergency and Trauma Triage of a Tertiary Care Hospital in South India. Int Scholarly Res Notices. 2014:1-5.
8. Jeong I, Cho J, Park S. Compliance with standard precautions among operating room nurses in South Korea. Am J Infect Control. 2008;36(10):739-42.
9. Kermode M, Jolley D, Langkham B, Thomas MS, Holmes W, Gifford SM. Compliance with Universal/Standard Precautions among health care workers in rural north India. Am J Infect Control. 2005;33(1):27-33.
10. Asare A, Enweronu-Laryea CC, Newman MJ. Hand hygiene practices in a neonatal intensive care unit in Ghana. J Infect Dev Ctries. 2009;3(5):352-6.
11. Jawaid M, Iqbal M, Shahbaz S. Compliance with Standard Precautions: A long way ahead. Iranian J Public Health. 2009;38(1):85-8.
12. Sangwan BR, Kotwal ASM, Verma AK. Occupational Exposure to Blood and Body Fluids amongst Health Care Workers in a Teaching Hospital of the Armed Forces. Volume 64. Gwalior, MP: IAP National Publication House; 2011: 21–24.
13. Mitchell R, Roth V, Gravel D, Astrakianakis G, Bryce E, Forgie S, et al. Are health care workers protected? An observational study of selection and removal of personal protective equipment in Canadian acute care hospitals. American J Infection Control. 2013;41(3):240-4.

Cite this article as: Archana Lakshmi PA, Gladius Jennifer H, Meriton Stanly A, Paul CM. A study on personal protective equipment use among health care providers, Tamil Nadu. Int J Community Med Public Health 2018;5:1771-4.