



DELIVERING INTENSIVE CARE TO COVID-19 PATIENTS WHILE PROTECTING THEMSELVES: CHALLENGES FACED BY FRONT LINE ANAESTHESIOLOGISTS

Anaesthesiology

Monica Chhikara	Assistant Professor, Department of Anesthesiology, Postgraduate Institute of Medical Sciences, Rohtak, India.
Prashant Kumar	Professor of Anesthesiology, and critical care, Department of Anesthesiology, Postgraduate Institute of Medical Sciences, Rohtak, India.
Priyanka Bansal	Assistant Professor, Department of Anesthesiology, Postgraduate Institute of Medical Sciences, Rohtak, India.
Reena Mahajan*	Associate Professor, Department of Anesthesiology, SHKM Government Medical College, Mewat, India. *Corresponding Author
Preeti Gehlaut	Associate Professor, Department of Anesthesiology, Postgraduate Institute of Medical Sciences, Rohtak, India.
Deepika	Assistant Professor, Department of Anesthesiology, Postgraduate Institute of Medical Sciences, Rohtak, India.

ABSTRACT

Background and Objectives: Frontline anaesthesiologist working in Covid 19 Intensive care units are the key to the management and containment of this infectious disease. Hence, their protection is of utmost importance in managing this epidemic. The equipment used for this purpose, pose technical difficulties. This study is a survey of these challenges faced by anaesthesiologists.

Material and Methods: This is a descriptive, cross sectional questionnaire based study which included 67 Anesthesiologist junior residents, senior residents and consultants. A valid Google form Questionnaire regarding technical difficulties due to use of personal protective equipment was prepared and sent online to all participants. The responses were recorded and tabulated.

Results: Physical fatigue due to PPE was experienced by 36(53.7%) residents and difficulties in airway management by 66(98.5%) residents. Fogging of goggles was the major difficulty (52.2%) during airway management. Intubation while using only PPE (71.6%) was a preferred method of intubation rather than using acrylic box (4.5%) or transparent sheet (23.9%). Apart from managing airway, other procedures like central venous cannulation was found to be always difficult (23.9%). Training program for managing pandemic was found to be helpful and 70.1% residents expressed the need for its conduct before every posting.

Conclusion: Managing Covid 19 patients in a highly demanding area like intensive care units while using personal protective equipment has unveiled special challenges and concerns for frontline anaesthesiologists. Addressing them appropriately is the need of hour for the wellbeing of healthcare workers and effective patient management.

KEYWORDS

Covid 19, PPE (Personal Protective Equipment), Frontline Anaesthesiologist

INTRODUCTION

Novel virus requires novel techniques of patient management so as to ensure the protection of front line doctors without compromising on the healthcare delivered to the patients. The challenges associated with the methods, equipment and techniques used for protection of healthcare workers in tropical climates and developing countries should be acknowledged for efficient healthcare delivery system.

The role of personal protective equipment in prevention of Covid 19 transmission is well established. Healthcare workers are advised to use it till effective vaccination or treatment is available for this highly contagious disease.^{1,2} PPE used for protection from Covid 19 consists of gloves, N95 or higher rating mask, fluid resistant gown and face shield and/or goggles.

Healthcare workers are not acclimatised to wear this equipment and working for long hours specially in highly demanding area like intensive care units. Problems faced by them includes inherent problems with PPE like sweating and allergies or problems in carrying out various procedures. Training program and simulations can be of immense help in combating these challenges

MATERIAL AND METHODS:

This descriptive, cross sectional questionnaire based study was conducted in Pt B.D. Sharma PGIMS, Rohtak, after approval from the Institutional Ethics Committee. Practicing frontline anaesthesiologists from 25 to 35 years of age (junior residents, senior residents and consultants) working in Covid-19 intensive care unit for a single shift of 6 hours were included in the study. A detailed structured questionnaire was prepared using google forms. This included inbuilt difficulties due to wearing PPE for 6 long hours like sweating, allergies and physical fatigue. Pain or discomfort due to goggles or mask. Various technical difficulties faced due to Personal Protective Equipment, transparent sheet or acrylic box while performing procedures like endotracheal intubation, central venous cannulation

were recorded. Importance of training program and suggestions if any were also noted. It was validated by face validity, content validity, item distribution analysis and pre-testing, further sent to three experienced anaesthesiologist and two non-anesthesiology consultants to verify the correctness and validity. The link of proforma was distributed amongst 300 participants through an email or the link of same. Participant information sheet was sent by e-mail to all participants. Informed Consent was obtained at the beginning of the questionnaire and only after giving the consent the participant were allowed to fill the rest of the form. Anonymity was maintained throughout the study and submitting completed questionnaire was implied consent to participate in the study. One reminder notice was sent in 2 weeks interval for those who did not respond. An option to opt out of the survey was also provided to all the participants.

RESULTS

Out of 300 proformas sent, 67 Anesthesiologists participated in the study. The data was analysed and results are tabulated in the following tables. Number of participants are denoted by N and percentage is denoted by %

Table 1: Demography

	Demographic Characteristics	N(%)
1)	Gender	
	Male	22(32.8)
	Female	45(67.2)
2)	Age	
	25-30 years	55(82.1)
	31-35 years	12(17.5)
4)	Designation	
	Consultant	3(4.5)
	Junior Resident	49(73.1)
	Senior Resident	15(22.4)

Table 2: Problems faced due to PPE size and material

Problems Faced	Yes N (%)	No N (%)
Problem in donning and doffing of PPE due to discrepancies in size	48(71.6)	19(28.4)
Breach in PPE due to tear or damage	37(55.2)	30(44.8)

Table 3: Difficulties due to wearing PPE and working for 6 hours

Difficulties with PPE	1(never) N (%)	2(rarely) N (%)	3(sometimes) N (%)	4(often) N (%)	5(always) N (%)
Excessive sweating or allergies	0	0	6(9.0)	31(46.3)	30(44.8)
Pain/discomfort to nose and ears due to wearing mask and goggles	0	0	6(9.0)	31(46.3)	30(44.8)
Physical fatigue	1(1.5)	2(3.0)	9(13.4)	19(28.4)	36(53.7)

Table 4: Difficulties in airway management due to protective equipment used

Difficulties faced during airway management	Yes N (%)	No N (%)
Difficulty in airway management (mask ventilation, laryngoscopy or intubation) with protective equipment	66(98.5)	1(1.5)
Difficulty through acrylic box	41(61.1)	26(38.9)
Difficulty in visualisation through goggles	58(86.5)	9(13.5)
Difficulty due to transparent sheet	13(19.4)	54(80.6)
Difficulty in manoeuvres/ movements related to airway management due to wearing PPE	24(35.8)	43(64.2)

Table 5: Best method of intubation for Covid-19 patients in terms of ease and success

Method of intubation considered best	Frequency(N)	Percent(%)
Only PPE with goggles and/or head shield, without transparent sheet or acrylic box	48	71.6
use of acrylic or aerosol box	3	4.5
use of transparent sheet	16	23.9
Total	67	100.0

Table 6: Frequency of procedural difficulties while using protective equipment

Difficulty faced while conducting different procedures	1=never difficult	2=rarely difficult	3=sometimes difficult	4=often difficult	5= always difficult
Difficulty in positioning or manipulating head and neck during intubation using acrylic box	0	0	10(14.9)	30(44.8)	27(40.3)
Difficulty in visualizing the glottis and inserting endotracheal tube	0	3(4.5)	24(35.8)	29(43.3)	11(16.4)
Difficulty in intubation due to fogging of goggles	0	1(1.5)	12(17.9)	19(28.4)	35(52.2)
Difficulty in central venous catheter insertion while wearing PPE	0	8(11.9)	23(34.3)	20(29.9)	16(23.9)

Table 7: Conduct of training Program

Training Program training program conducted in view of uniqueness of disease and regarding use of PPE	Yes N(%)	No N(%)
Were you offered training program conducted in view of uniqueness of disease and regarding use of PPE (Personal Protective Equipment) ?	58(86.6)	9(13.4)
If yes, Did you make it to attend ?	53(79.1)	14(20.9)

Table 8: Importance of training program

Importance of training program conducted in view of uniqueness of disease and regarding use of PPE	Frequency (N)	Percent (%)
unimportant	0	0
slightly important	1	1.5
moderately important	3	4.5
important	15	22.4
very important	48	71.6
Total	67	100.0

Table 9: Suggestions for conduct of training program

How frequently you want this training or briefing regarding the disease and its management to be conducted?	Frequency (N)	Percent (%)
before each covid posting	47	70.1
only once	20	29.9
Total	67	100.0

DISCUSSION:

During the beginning of Covid 19 pandemic, immediate care providers of sick patients mostly got infected.⁴ Since anaesthesiologists constituted the majority of doctors working in intensive care units on frontline, they were at the greatest risk of acquiring infection.⁵ Frontline anaesthesiologists should be protected from getting infected at all cost, in order to provide services in their specialised area and to contain the spread of pandemic.^{6,7} PPE reduced this rate of infection to almost negligible.^{8,9}

PPE use in developing countries like India was rare before this pandemic and anaesthesiologists are not adequately trained for using this equipment in highly demanding areas like intensive care units.¹⁰

There are many challenges associated with the use of PPE. Initial shortage of supply and lack of quality assurance has caused discrepancies in size of PPE and tear or breach during its usage.

Working for six hours per shift in hot and humid climate in tropical countries has caused sweating and allergies. Physical fatigue resulted from dehydration at the end of shift. There were pressure injuries due to the mask, goggles and face shields which resulted in pain and discomfort while working.^{11,12}

Working in intensive care units require airway management of patients. Components of PPE like goggles and face shields resulted in difficulty in visualisation of glottis during intubation. Fogging caused in goggles lead to further deterioration of the vision. Accessories used for aerosol protection like acrylic box and transparent sheets caused difficulty in visualisation of glottis, manipulation of head and neck and insertion of endo tracheal tube.^{13,14} Other procedures like central venous cannulation was also found to be difficult while using PPE.

Conduct of training program before each Covid ICU posting was found to be immensely useful to deal with the difficulties related to managing patients with PPE.¹⁵ Residents suggested simulation based training for various procedures.

CONCLUSION:

Managing Covid 19 patients in a highly demanding area like intensive care units while using personal protective equipment has unveiled special challenges and concerns in frontline anesthesiologists. Addressing them appropriately is the need of hour for the wellbeing of healthcare workers and effective patient management.

REFERENCES:

1. Khalil MM, Alam MM, Arefin MK, Chowdhury MR, Huq MR, Chowdhury JA, Khan AM. Role of Personal Protective Measures in Prevention of COVID-19 Spread Among Physicians in Bangladesh: a Multicenter Cross-Sectional Comparative Study. SN Compr Clin Med. 2020 Aug 28;1-7. doi: 10.1007/s42399-020-00471-1.

2. Liu M, Cheng SZ, Xu KW, Yang Y, Zhu QT, Zhang H, Yang DY, Cheng SY, Xiao H, Wang JW, Yao HR, Cong YT, Zhou YQ, Peng S, Kuang M, Hou FF, Cheng KK, Xiao HP. Use of personal protective equipment against coronavirus disease 2019 by healthcare professionals in Wuhan, China: cross sectional study. *BMJ*. 2020 Jun 10;369:m2195. doi: 10.1136/bmj.m2195.
3. Ortega R, Gonzalez M, Nozari A, Canelli R. Personal Protective Equipment and Covid-19. *N Engl J Med*. 2020 Jun 25;382(26):e105. doi: 10.1056/NEJMc2014809. Epub 2020 May 19. PMID: 32427435.
4. Wang D, Hu B, Hu C et al. Clinical characteristics of 138 hospitalised patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA*. 2020; 323: 1061-1069.
5. Daniel N Maxwell, Trish M Perl, James B Cutrell, "The Art of War" in the Era of Coronavirus Disease 2019 (COVID-19), *Clinical Infectious Diseases*, Volume 71, Issue 16, 15 October 2020, Pages 2215–2217, <https://doi.org/10.1093/cid/ciaa229>
6. Phua J, Weng L, Ling L et al. Intensive care management of coronavirus disease 2019 (COVID-19): challenges and recommendations. *Lancet Respir Med*. 2020; 8: 506-517.
7. Qiu H, Tong Z, Ma P et al. Intensive care during the coronavirus epidemic. *Intensive Care Med*. 2020; 46: 576-578.
8. Schwartz J, King CC, Yen MY. Protecting healthcare workers during the coronavirus disease 2019 (COVID-19) outbreak: lessons from Taiwan's severe acute respiratory syndrome response. *Clinical Infectious Diseases*. 2020.
9. Verbeek JH, Rajamaki B, Ijaz S et al. Personal protective equipment for preventing highly infectious diseases due to exposure to contaminated body fluids in healthcare staff. *Cochrane Database Syst Rev*. 2020; 4: CD011621.
10. Sharma N, Hasan Z, Velayudhan A, M. A. E, Mangal DK, Gupta SD. Personal Protective Equipment: Challenges and Strategies to Combat COVID-19 in India: A Narrative Review. *Journal of Health Management*. 2020;22(2):157-168. doi:10.1177/ 0972063420935540
11. Hu K, Fan J, Li X, Gou X, Li X, Zhou X. The adverse skin reactions of health care workers using personal protective equipment for COVID-19. *Medicine (Baltimore)*. 2020;99(24):e20603. doi:10.1097/MD.0000000000002060
12. Zhou NY, Yang L, Dong LY, et al. Prevention and Treatment of Skin Damage Caused by Personal Protective Equipment: Experience of the First-Line Clinicians Treating 2019-nCoV Infection. *International Journal of Dermatology and Venereology*. 2020;10.1097/JD9.0000000000000085. Published 2020 Mar 13. doi:10.1097/Jd9.0000000000000085
13. Ansari U Dr, Mendonca C Prof, Danha R Dr, Robley R Dr, Davies T Dr. The effects of personal protective equipment on airway management: An in-situ simulation. *Trends in Anaesthesia & Critical Care*. 2020;34:23-27. doi:10.1016/j.tacc.2020.07.003
14. Alex Koo, MC, USA, Ryan Walsh, MC, USA, Tristan Knutson, MC, USA, Scott Young, MC, USA, Karen McGrane, MC, USA, Jason Bothwell, MC, USA, Lindsay Grubish, MC, USA, Comparison of Intubation Using Personal Protective Equipment and Standard Uniform in Simulated Cadaveric Models, *Military Medicine*. 2018;183 (1): 216-8.
15. Li L, Xv Q, Yan J. COVID-19: the need for continuous medical education and training. *Lancet Respir Med*. 2020 Apr;8(4):e23. doi: 10.1016/S2213-2600(20)30125-9. Epub 2020 Mar 17. PMID: 32192586; PMCID: PMC7104229.