



COVID 19 PREPAREDNESS - A SURVEY ON THE PREPAREDNESS OF EMERGENCY MEDICINE DEPARTMENTS ACROSS COVID 19 IN ONE LINE IF POSSIBLE

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ABSTRACT

Background: COVID 19 pandemic had affected human lives globally and hospitals were overwhelmed by the abundance of cases. This study aims to understand the preparedness of emergency medicine departments across India in managing COVID 19 pandemic and the evolution of preparedness over the course of time. **Methods:** This is an online cross sectional multi centric survey based on a questionnaire completed by the head of the departments of the secondary and tertiary care centre emergency medicine departments across India during a period of May – July 2020 (three months). The questionnaire had 59 questions divided into nine headings. The questionnaire was repeated after a period of one year in October – December 2021 (three months). The results were scored for comparison. **Results:** A total of 65 hospitals responded to the questionnaire of which 59 were included in the study in Survey 1 conducted during May – July 2020. In survey 2, the same questionnaire was sent to all those 59 hospitals, of which only 28 hospitals responded. Comparison showed an increase in the availability of dedicated space for COVID cases in survey 2 ($p= 0.05$) and a decline in safety measures adopted by hospitals in survey 2 compared to survey 1 ($p= 0.023$). Questions on parameters like planning, education, personal protective equipment, liaison, and cleaning protocols had better scores in survey 2, although not statistically significant. Questions on other parameters like teleconsultation facility, hospital safety measures and management of non-COVID cases did not show satisfactory improvement in survey 2. **Conclusion:** Presence of a well written down and practiced protocol for any major infectious outbreak would help in uniform preparation across the health care settings and thereby improving patient care.

KEYWORDS : Pandemic, COVID 19, Emergency Preparedness, Emergency Medicine

INTRODUCTION

COVID-19 pandemic was an international health crisis that had impacted the lives of everyone around the globe in unmeasurable ways. The crisis was undoubtedly “the biggest” of our times and we are still battling against it. As of today, the number of cases in India exceeds 44 million with more than 0.53 million deaths.¹

India, being a resource limited country, with around one sixth of the world population, played a major role in the containment and prevention of transmission of the disease. The disease posed a major threat to the people working in the department of emergency medicine (ED) who acted as frontline warriors in the fight against this pandemic.²

Emergency preparedness is the most important step in responding to any health crisis and it refers to the knowledge and capacity to effectively anticipate, respond to, and recover from the impacts of a likely crisis.³ Non-uniform and insufficient preparation will result in exposure of the health care worker and other hospital staffs to infection. This may not only compromise the efficacy of health care system at an institution, but also result in converting the hospital into an epidemic hotspot. Within healthcare, it is crucial that the emergency department, as the entry point to hospital care, is prepared to manage any epidemic in an efficient and safe way, from triage to final disposition.² The primary objective of this survey was to understand the preparedness of the EDs across India in managing COVID-19 pandemic. This will help as a pointer towards building up a response strategy for infectious disease emergencies in the future.

Methodology

Survey method was used as the research tool in this study to assess the level of preparedness of the emergency medicine departments in the secondary and tertiary care centres across the country since it seemed appropriate in gathering qualitative and quantitative data from a large geographically distributed target group effectively.⁴

Setting and Design:

This was an online cross sectional multicentric survey using questionnaire method. Survey 1 was conducted between May 2020 to July 2020 and Survey 2 was conducted between October 2021 to December 2021

Inclusion And Exclusion Criteria For The Survey:

- We included secondary and tertiary care treatment centres with at least 1000 patients attending ED per month. Primary health care centres and clinics and centres with no in patient management were excluded.

Sample Collection:

According to a study by Mosayeb et al, hospital preparedness in a disaster was calculated at mean of 56%.⁵ Using this, the minimum calculated sample size for this research was set at 81 with 20% allowable error. A convenience sampling was done to select hospitals from different regions of the country and to minimise non response.

Questionnaire Design:

The questionnaire for the survey was adapted from “Comprehensive Hospital Preparedness Checklist for COVID-

19" by CDC.⁶ The questionnaire was distributed amongst peers to check for comprehensibility and face validity prior to its release. There was a total of 59 questions divided under the nine headings of planning, education, personal protective equipment, physical space, liaison, cleaning protocols, safety measures, staff and non COVID-19 services (Addendum 1). The same questionnaire was given in survey 1 and survey 2. For comparison, the questionnaire was cut short and only 40 questions were included.

Survey Administration:

For Survey 1, authors of the study approached the head of the department of selected ED in the secondary and tertiary care hospitals in India via telephone and informed them regarding the study. They were asked for their willingness to participate and those who agreed to partake were given a questionnaire as a Google® Form to be filled online, along with an informed consent form. It was pre decided that a maximum of only three attempts would be made to remind those centres who did not respond after agreeing to partake.

The name of the hospital and the designation of the person filling the proforma were sought to confirm there was no duplication of data, but the analysis was strictly anonymised. The question mostly contained trichotomous response ('yes' 'no' 'maybe/ don't know/ not applicable') and select questions were open ended with a space for giving comments. Survey 2 was performed following the same guidelines and was sent to those hospitals who had responded to Survey 1. The department heads were approached and requested to re do the survey based on the available resources and practices in the emergency medicine department at that time. The completed forms were downloaded, filtered for incomplete and incorrect entries, and analysed for results. No incentives (financial or other) were given to the study participants.

Scoring Methods:

For scoring and comparison, the authors selected 40 questions from the total 59 questions and except for one question, all were scored as 0 for No, May be/ Don't know/ Not applicable and 1 for Yes. The question on frequency of surface cleaning in emergency department was scored from 0-5 based on the how frequently surface cleaning was done in ED with higher score for more frequent cleaning.

The data was analysed using statistical package for social sciences (IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp). Quantitative variables are expressed in percentages, mean and SD.

Ethical Approval :

Approved by Institutional Ethics Committee and Institutional review board

Manuscript Guidelines :

Checklist for Reporting Results of Internet E-Surveys (CHERRIES)

RESULTS

We approached eighty one hospitals and we received sixty four responses in Survey 1. Five responses were either inadequate or duplicate responses. So after removing them, a total of fifty nine responses were analysed. Response rate was 77%.

In Survey 2, those 59 hospitals were again approached of which only 28 hospitals responded. Response rate was 47%. The questionnaire and the response in both surveys are depicted in Table 1 -3.

RESULTS TABLE

Table 1. Questionnaire on planning, education and non COVID services

Sl. No.	Variable	Score	Survey 1 (n=59)	Survey 2 (n= 28)
1.	Hospital has set up team for disaster planning and management?			
	No	0	0(0%)	3(11%)
	May be / Don't know	0	2(3%)	0(0%)
	Yes	1	57(97%)	25(89%)
2.	Is ED part of the team?			
	No	0	1 (2%)	2 (7%)
	May be/ Don't know	0	3 (5%)	0 (0%)
	Yes	1	55 (93%)	26 (93%)
3.	Written protocol for management of COVID			
	No	0	5 (8%)	2 (7%)
	Yes	1	54 (92%)	26 (93%)
4.	Protocol accessible for all ED staff			
	No	0	8 (13%)	4 (14%)
	May be/ Don't know	0	4 (7%)	1 (4%)
	Yes	1	47 (80%)	23 (82%)
5.	Adequate signboards and Information centre for public			
	No	0	17 (29%)	8 (29%)
	May be/ Don't know	0	8 (14%)	4 (14%)
	Yes	1	34 (57%)	16 (57%)
6.	Availability of Teleconsultation Facility in ED			
	No	0	0 (0%)	19 (67%)
	Maybe/ don't know	0	34 (58%)	1 (4%)
	Yes	1	25 (42%)	8 (29%)
7.	Staff awareness classes on COVID			
	No	0	5 (8%)	2 (7%)
	May be/ Don't know	0	2 (3%)	1 (4%)
	Yes	1	52 (91%)	25 (89%)
8.	Staff and resident training on donning and doffing			
	No	0	5 (8%)	0 (0%)
	May be/ Don't know	0	2 (3%)	0 (0%)
	Yes	1	52 (91%)	28(100%)
9.	Mock drills in airway management for COVID suspected cases			
	No	0	22 (37%)	8 (29%)
	May be/ Don't know	0	2 (3%)	2 (7%)
	Yes	1	35 (60%)	18 (64%)
10.	Continuing services for non COVID cases			
	No	0	3 (5%)	1 (4%)
	Yes	1	56 (95%)	27 (96%)
11.	Compromise in non COVID patient care			
	No	1	22 (37%)	10 (36%)
	May be/ Don't Know	0	6 (10%)	3 (11%)
	Yes	0	31 (53%)	15 (53%)

Table 2. Questionnaire on PPE, physical space and cleaning protocols

Sl. No.	Variable	Score	Survey 1 (n=59)	Survey 2 (n= 28)
1.	Institute providing adequate PPE			
	No	0	9 (15%)	1 (4%)
	May be/ Don't know	0	3 (5%)	0 (0%)
	Yes	1	47 (80%)	27 (96%)
2.	Face mask reused			
	No	1	36 (61%)	12 (43%)
	May be/ Don't know	0	1 (2%)	0 (0%)
	Yes	0	22 (37%)	16 (57%)

3.	Availability of hand sanitiser in ED			
	No	0	2 (3%)	1 (4%)
	May be/ don't know	0	1 (2%)	0 (0%)
	Yes	1	56 (95%)	27 (96%)
4.	Dedicated isolation area for COVID suspect cases in ED			
	No	0	9 (15%)	1 (4%)
	May be/ Don't know	0	0 (0%)	1 (4%)
	Yes	1	50 (85%)	26 (92%)
5.	Isolation area adequately sealed off from general ED			
	No	0	13 (22%)	6 (22%)
	May be/ Don't know	0	2 (3%)	4 (14%)
	Yes	1	44 (75%)	18 (64%)
6.	Separate donning and doffing area			
	No	0	22 (38%)	3 (11%)
	Yes	1	37 (62%)	25 (89%)
7.	Separate area for shower in ED			1
	No	0	44 (75%)	6 (57%)
	May be/ Don't know	0	1 (2%)	0 (0%)
	Yes	1	14 (23%)	12 (43%)
8.	Separate area for fever clinic in the department			
	No	0	12 (20%)	7 (25%)
	Yes	1	47 (80%)	21 (75%)
9.	Separate isolation wards for COVID 19 cases/ suspected cases			
	No	0	2 (3%)	0 (0%)
	May be/ Don't know	0	1 (2%)	0 (0%)
	Yes	1	56 (95%)	28(100%)
10.	Dedicated isolation area in ICU for COVID 19 cases/ suspected cases			
	No	0	6 (10%)	1 (4%)
	Yes	1	53 (90%)	27 (96%)
11.	Separate surgical suite for COVID 19 cases/ suspected cases			
	No	0	18 (30%)	8 (29%)
	May be/ Don't know	0	7 (12%)	0 (0%)
	Yes	1	34 (58%)	20 (71%)
12.	Surge capacity plan			
	No	0	20 (34%)	9 (32%)
	May be/ Don't know	0	7 (12%)	2 (7%)
	Yes	1	32 (54%)	16 (51%)
13.	Protocol for cleaning isolation rooms			
	No	0	1 (2%)	0 (0%)
	May be/ Don't know	0	4 (7%)	2 (7%)
	Yes	1	54 (91%)	26 (93%)
14.	Protocol for cleaning hospital ambulance			
	No	0	2 (3%)	0 (0%)
	May be/ Don't know	0	6 (10%)	2 (7%)
	Yes	1	51 (87%)	26 (93%)
15.	Protocol for regular surface cleaning			
	No	0	2 (3%)	3 (11%)
	May be/ Don't know	0	3 (5%)	0 (0%)
	Yes	1	54 (92%)	25 (89%)

16.	Frequency of surface cleaning in ED			
	Don't know	0	3 (5%)	2 (7%)
	Less than 4h	5	10 (17%)	4 (14%)
	4 hourly	4	14 (24%)	6 (22%)
	6 hourly	3	13 (22%)	5 (18%)
	12 hourly	2	10 (17%)	4 (14%)
	Daily	1	9 (15%)	5 (18%)
	Later	0	0 (0%)	2 (7%)

Table 3. Questionnaire on liaison, staff and safety measures

Sl. No.	Variable	Score	Survey 1 (n=59)	Survey 2 (n = 28)
1.	Coordination with other departments			
	No	0	17 (29%)	9 (32%)
	May be/ Don't know	0	7 (12%)	2 (7%)
	Yes	1	35 (59%)	17 (61%)
2.	Liaison with Government Health Authorities			
	No	0	3 (5%)	0 (0%)
	May be/ Don't know	0	12 (20%)	0 (0%)
	Yes	1	44 (75%)	28(100%)
3.	Coordination with other local hospitals			
	No	0	13 (22%)	10 (35%)
	May be/ Don't know	0	10 (17%)	1 (4%)
	Yes	1	36 (61%)	17 (61%)
4.	Visitor access restriction			
	No	0	4 (7%)	2 (7%)
	Yes	1	55 (93%)	26 (93%)
5.	Changes in security protocols to control visitors			
	No	0	14 (24%)	10 (36%)
	May be/ Don't know	0	4 (7%)	2 (7%)
	Yes	1	41 (69%)	16 (57%)
6.	Measures to prevent overcrowding			
	No	0	5 (8%)	6 (22%)
	May be/ Don't know	0	2 (3%)	2 (7%)
	Yes	1	52 (89%)	20 (71%)
7.	Facemask provided to patients entering ED			
	No	0	10 (17%)	8 (29%)
	May be/ Don't know	0	3 (5%)	0 (0%)
	Yes	1	46 (78%)	20 (71%)
8.	Hand wash area before hospital entry			
	No	0	22 (37%)	9 (32%)
	May be/ Don't know	0	0 (0%)	1 (4%)
	Yes	1	37 (63%)	18 (64%)
9.	Temperature check before hospital entry			
	No	0	4 (7%)	7 (25%)
	May be/ Don't know	0	1 (2%)	0 (0%)
	Yes	1	54 (91%)	21 (75%)
10.	Staff hand hygiene during duty			
	No	0	0 (0%)	1 (4%)
	May be/ Don't know	0	2 (3%)	1 (4%)
	Yes	1	57 (97%)	26 (92%)
11.	Staff social distancing during duty			
	No	0	11 (19%)	11 (39%)
	May be/ Don't know	0	14 (24%)	5 (18%)
	Yes	1	34 (57%)	12 (43%)
12.	Presence of reserve group			
	No	0	16 (27%)	15 (54%)
	May be/ Don't know	0	4 (7%)	1 (4%)
	Yes	1	39 (66%)	12 (42%)

13.	Designated staff in case of surge in cases			
	No	0	20 (34%)	12 (43%)
	May be/ Don't know	0	8 (14%)	4 (14%)
	Yes	1	31 (52%)	12 (43%)

For comparison and assessment of statistically significant difference between two groups at two separate time frames, same 28 hospitals were considered in both the groups (Table 4). The scoring for the responses on the parameter - 'Physical space' was better in survey 2 compared to survey 1 (p=0.05) after applying Wilcoxon signed ranked tests, indicating that more dedicated space for COVID was allocated compared to the early phases of COVID pandemic. However, score for responses on the parameter - 'Safety measures' showed a lower score compared to survey 1 (p=0.023) which might be suggestive of laxity among health care workers due to familiarity with the disease. Although, score for Planning, Education, Personal protective equipment, liaison, and cleaning protocols showed an improving trend in the second survey, the difference was not statistically significant.

Table 4 – Comparison of score between two surveys

Sl No	Parameters	Survey 1 (n=28)			Survey 2 (n=28)			P value
		Median, IQR	Min	Max	Median, IQR	Min	Max	
1	Planning	5 (4-5)	2.0	6.0	5 (4-5)	2.0	6.0	0.903
2	Education	3 (2-4)	1.0	4.0	4 (2-4)	1.0	4.0	0.156
3	PPE	2 (2-3)	1.0	3.0	2.5 (2-3)	2.0	3.0	0.225
4	Physical space	7 (5-8)	2.0	9.0	7 (6-8)	4.0	9.0	0.052
5	Liaison	2 (2-3)	0.0	3.0	3 (1.25-3)	1.0	3.0	1.000
6	Cleaning protocols	5.5 (4-7)	1.0	8.0	6 (4-7)	2.0	8.0	0.390
7	Safety measures	5 (5-6)	3.0	6.0	5 (4-5)	1.0	6.0	0.023
8	Staff	2 (2-3)	0.0	3.0	2 (1-2.75)	0.0	3.0	0.185
9	Non COVID services	1 (1-2)	0.0	2.0	1 (1-2)	1.0	2.0	0.405

DISCUSSION

This study provides a snapshot of the preparedness of emergency medicine departments against COVID-19 pandemic at two different time frames. First survey was conducted within four months after the outbreak in the country and the second survey after around eighteen months of onset of COVID pandemic.

Disaster preparedness is one of the most important steps in successfully managing it and emergency departments have a major role in this⁷. The emergency department serves as the frontline for patients acutely entering the health care system. The demand surge faced by ED during a pandemic is high resulting in overcrowding and overburdening of the facilities due to lack of physical space and personnel.⁸ The impact will be increased manifold if there is no adequate preparation and planning.⁸ According to our study, most of the hospitals had a team for disaster planning and ED was a part of the team and most of them had written down policies for COVID management accessible to staffs and adequate sign boards for public. Majority of the departments (88%) have also conducted awareness classes to their clinical and non clinical staffs regarding triage, diagnosis, swab collection and treatment of COVID patients. Donning and doffing personal protective equipment requires training and supervision and providing a single training session may not be enough and it requires regular revision.⁹

Studies have reported incorrect use of PPE among doctors and nurses due to inadequate training which may be hazardous in a pandemic scenario.¹⁰ Survey 2 showed an increase in the number of hospitals conducting mock drills in COVID airway management and cardiac arrest management. This number

was comparable to the study by Hui et al.¹¹ There was no uniformity in the use of PPE among different institutions and varying combinations of N95 mask, surgical mask, gloves, gown and face shield were used for patient care in normal area and COVID isolation area. Barring few, majority of the hospitals provided PPE for their staffs. Around 40% of the institutions were re using the mask in the first survey, which has increased to about 60% in the second survey. Only a small minority reused them for more than five times. Masks were disinfected using either sunlight, ETO, air dry or UV. This was found to be a strategy to conserve the resources in pandemic. However, we do not have any ways to assess the effectiveness of the filtering capacity of the reused mask in our study, nor we do have any method to assess the effectiveness of disinfection. Most of the centres had separate isolation area for suspect cases and most of them were adequately sealed off from the general area. Availability of negative pressure room was very low in both surveys (<15%) and was comparable to European ED.² The facility for separate COVID wards and ICU were present in most of the centres and availability of separate physical space has increased in second survey.

Study by Morton et al, specifically on the preparedness of ED in major outbreak and pandemic, pointed that the major barriers to preparedness as per the study were lack of local administration support, challenges in funding, need for dedicated disaster preparedness personnel, staffing shortages, and a lack of communication among disaster response agencies.¹² However, in our study, it was found that ED and the respective hospital had good liaison with the government authorities. The coordination between ED and other departments in the hospital were also good in half of the centres resulting in smooth functioning and management of COVID cases. They had imaging and management protocols in place for patients with COVID 19/ COVID-19 suspects presenting with myocardial infarction, stroke in window period and trauma. About half of the hospitals had standard operating protocols (SOP) in place in case of referrals.

In our study, about 90% of the hospitals had protocol for cleaning rooms and ambulance in place. A recent review of 22 studies revealed that human coronaviruses such as SARS-CoV-2, Middle East Respiratory Syndrome (MERS) coronavirus, or endemic human coronaviruses can persist on inanimate surfaces such as metal, glass, or plastic for up to nine days but can be efficiently inactivated by surface disinfection procedures. So frequent cleaning of the surfaces is of paramount importance.¹³ Surface cleaning was done every four to six hours in majority of hospitals in both the surveys. Specific question regarding the disinfectant used for cleaning was not included in the questionnaire.

Similarly, almost all hospitals have taken measures to decrease overcrowding in ED and to restrict visitor access. Procedures like intubation were done with custom made intubation boxes and polythene covers in initial survey, but these were either abandoned or used only rarely as per second survey. Also locally made face shields were used in some institutes. Provision of facemask, temperature check and hand wash for bystanders before entering the hospital has gone down in the second survey.

Novel methods to register attendance was practised in half of the hospitals to prevent fomite transmission of virus like face recognition punching, online attendance submission, ID card punching and telephonic registration of attendance during the first survey, but this was found to be replaced by conventional methods during second survey. The number of reserve staffs was found to be lower in second survey.

Although nearly all the hospitals (95%) were continuing non COVID services, around half of the respondents felt that the care for non COVID cases have been compromised in both the

surveys. The reasons mentioned were lack of space, inadequacy of staff, lack of adequate doctors, unwillingness from other departments to see cases without COVID report and unwillingness from other departments to admit cases.

A comparison between different time frame was helpful to find out the change in the level of preparedness. Although statistically insignificant, most of the parameters showed an improving trend in the second survey, though not very substantially. There are some aspects which still lag behind or do not show major improvement like teleconsultation facility, improved safety measures in the hospital like visitor access restriction, measures to prevent overcrowding, provision of mask, hand wash area and temperature check before hospital entry, assigning staff reserve group and management of non COVID cases

Among the literature we reviewed for the purpose of this study, we found varied level of preparedness among different countries. Almost all of them had emergency plans in place but availability of human resource, its training and availability of equipment varied greatly among different groups.^{2,5,10,14,15,16} There are multiple studies addressing the issues of managing a pandemic in a low income country. Few domains that we have already discussed were assessed in these studies and have highlighted against the need of short term interventions from the government to tackle the current crisis and long term plan to strengthen health system to mitigate the effect of future pandemics.¹⁷⁻¹⁹

Study limitations:

Only 59 centres across the country responded to Survey 1, most of which are from the southern states of India. The representation of hospitals in Survey 2 was only 28. This limits us in assessing the level of preparedness in the country. Secondly, we have only assessed the preparedness of secondary and tertiary care centres across the country and nearly three fourth of the hospitals are from the private sector. We have not included primary care centres in this study and we do not have data from the government hospitals and government medical colleges which serve a vast majority of the country's population. Also, there are many domains not included in the study like availability of essential support services like oxygen, food and water, transport facilities etc. and functioning of allied specialities like radiology and laboratory services etc. There is a possibility for response bias as the questionnaire is answered by the head of the emergency department of the respective hospital.

CONCLUSION:

The preparedness and response to COVID pandemic by the emergency departments across the country appears to be commendable but requires improvement at multiple levels. Both central and state government and the hospital management must work together hand – in –hand to effectively prepare, prevent, and respond to any major infectious outbreak in the future.

Source Of Support And Funding : Nil

Conflict Of Interests : Nil

Consent To Participate:

Consent from the participants were collected at the start of the questionnaire. They were informed regarding publishing of information related to the study in medical journals and associated publications. It was informed that no personal details or details of the study hospitals will be shared during this process and the participants can revoke consent at any time before publication.

Ethical Approval

Ethical approval obtained from Institutional Ethics Committee

and Institutional review board of Malabar Institute of Medical Sciences, Calicut, Kerala, India (IEC number: EC/NEW/INST/2019/406 & ECR/301/Inst/KL/2013/RR-19).

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