

Assessment of Internal Hazards and Disaster Preparedness in a Tertiary Care Facility

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INTRODUCTION

The healthcare facilities, especially hospitals, are the first responders towards any disaster/emergency/incident situation. Both internal and external disasters are not mutually exclusive i.e., can occur at same time but both are independent of each other. Similarly internal hazards are very common in healthcare facilities which when causes destruction changes into a disaster.

Having a written plan does not guarantee that a healthcare facility is prepared; preparedness is fluid and dependent on ongoing processes. A right method of educating hospital staff on emergency preparedness is a need of an hour.

The role of hospital staff is important in providing medical support to the disaster affected population. The affected population's life and health depends on the availability of medical professionals in terms of experience, expertise, and services.

Despite the vital role of hospitals in saving disaster victim's lives, there has been very little research on disaster preparedness in Indian hospitals.

REVIEW OF LITERATURE

Twenty previously published research papers were studied from various websites and out of those twenty, ten papers were included in the study. The general findings which were observed were:

Unavailability of essential supplies and equipment, lesser number of participation in disaster drills.

Knowledge and attitude of staff towards disaster and its preparedness was less in majority of the reviewed researches.

Respondents were not aware about the disaster response plan of their facility.

Role and responsibilities which are to be performed at the time of disaster were not known by staff of various facilities.

Clinical staff was more aware about procedures to be carried out during mass casualty.

Staff associated with facilities for longer durations were more aware about different procedures and situations.

All the doctors including nursing staff, expressed a desire to learn more about management of disaster.

STUDY METHODOLOGY

Research questions:

- What are the elements leading to flaws in disaster preparedness?
- How much is the staff knowledge and readiness towards internal and external disasters?

Research objectives:

- To identify the undesired event in a facility through Hazard identification and risk assessment (HIRA) tool.
- To assess and compare the knowledge and readiness of clinical and non-clinical staff towards disasters and its preparedness using structured questionnaire tool.

Research design: Descriptive Cross-sectional study.

Study setting: Shri Mata Vaishno Devi Narayana super speciality Hospital, Katra, Jammu and Kashmir.

Study population:

- **Inclusion criteria-** HIRA for non-COVID departments & Staff from all other departments are considered for assessment of readiness, willingness to participate in the study.
- **Exclusion criteria-** Staff working in COVID ward, staff who are ill from COVID, staff exposed to any education program related to disaster management recently, non-cooperative participants, ICU and COVID ward staff.

Research procedure/approaches: Quantitative assessment.

Study approach:

Study duration: March 22nd, 2021, to June 19th, 2021

Sampling technique: Stratified Sampling

Sample size: 82 (41 clinical and 41 nonclinical staff)

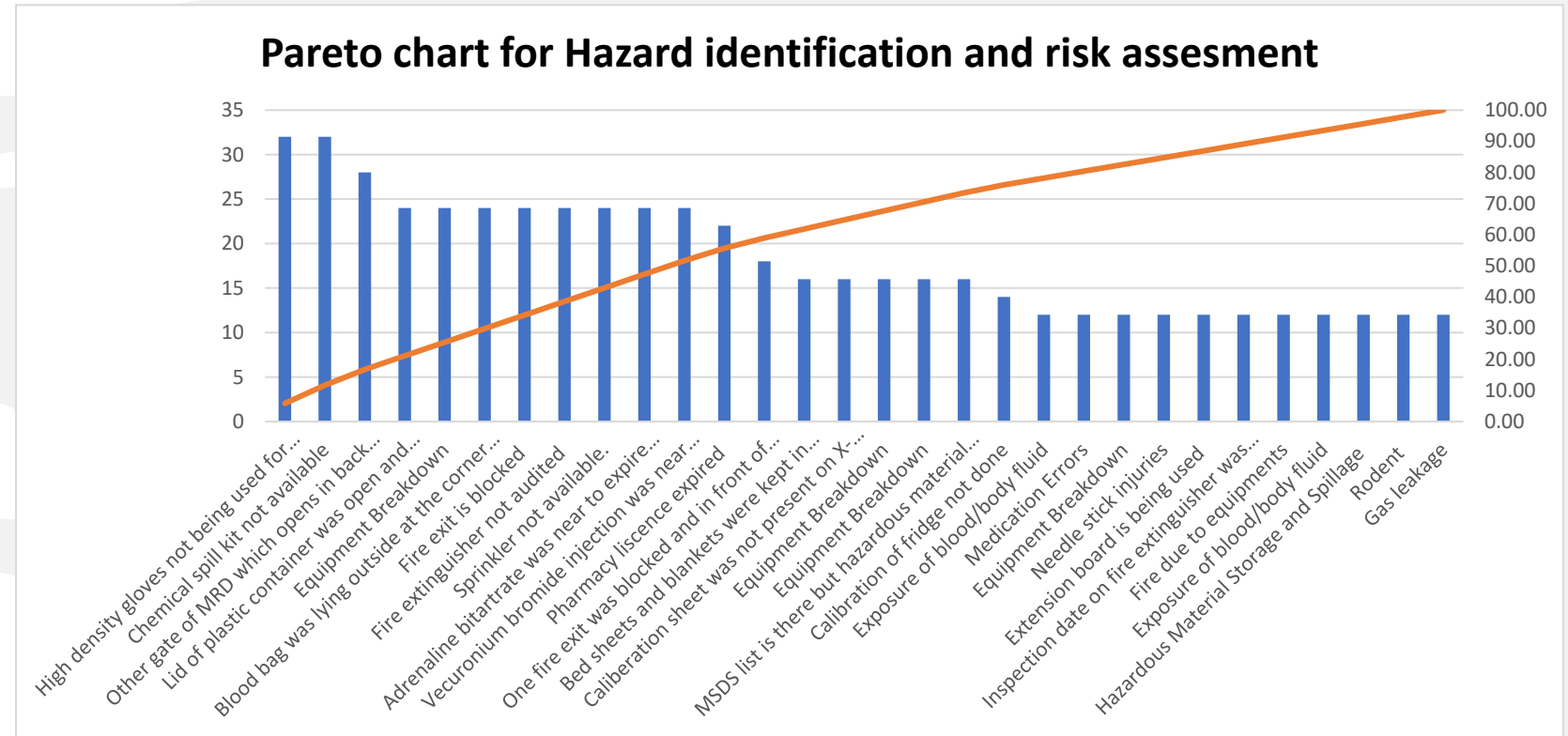
Study instrument: HIRA to check disaster preparedness of facility and a structured questionnaire to assess staff readiness towards internal and external disasters. The questionnaire included questions on socio demographic characteristics, past experiences of staff, knowledge on emergency codes and triage, staff attitude.

Data Management: Data cleaning and Data analysis on Microsoft excel.

STUDY FINDINGS AND DISCUSSION

1) Hazard Identification and Risk Assessment (HIRA):

- Hazard identification and risk assessment is done to identify failure modes for different departments to check facility preparedness. A total of twenty-seven (n=27) departments were assessed and one thirty (n=130) observations were recorded. After calculating severity (consequences) and probability (likelihood of occurrence) for these observation the risk rating for each observation was done by multiplying both severity and probability. The risk rating was further divided into three categories (often referred to as priority of action) i.e., high, medium, and low. Observation for which the risk rating was between 1-9 was categorised as low, the observation for which the risk rating was between 10-15 was categorised as medium and the risk rating ranging from 16-25 was categorised as high.
- Further, a pareto analysis was done for top 30 observations for which the risk rating was higher than other observations. Pareto analysis demonstrates that 80 percent of the problems are due to 20 percent of the reasons.



Here three departments constituted 20 percent of the reasons which includes unavailability of chemical spill kit in laboratory, unavailability of high-density gloves in the chemo department and unlocked medical records department gate.

Apart from this, the departments for which the risk rating was observed to be more and there is a need of focus were radiation oncology where near expiry drugs were found, pharmacy where the license was expired, main store pharmacy where the sprinklers need to be installed.

Characteristics	Clinical		Non-Clinical	
	Frequency	Percent	Frequency	Percent
Gender				
Female	19	46.3	6	14.6
Male	22	53.7	35	85.4
Total	41	100.0	41	100.0
Age (in completed years)				
21-26 years	14	34.1	14	34.1
27-32 years	17	41.5	18	43.9
33-38 years	9	22.0	6	14.6
39-44 years	1	2.4	2	4.9
45 years and above	0	0.0	1	2.4
Total	41	100.0	41	100.0
Level of education				
Attended school, did not finish.	0	0.0	8	19.5
Finished school	1	2.4	4	9.8
Finished college, graduate	33	80.5	15	36.6
Post-graduate or higher	7	17.1	14	34.1
Total	41	100.0	41	100.0
Total years of experience				
Less than 1 year	3	7.3	6	14.6
1-2 years	5	12.2	6	14.6
2-3 years	7	17.1	5	12.2
3-4 years	3	7.3	3	7.3
4-5 years	3	7.3	3	7.3
More than 5 years	20	48.8	18	43.9
Total	41	100.0	41	100.0
Total years of experience in Shri Mata Vaishno Devi Superspeciality Hospital				
Less than 1 year	4	9.8	7	17.1
1-2 years	8	19.5	11	26.8
More than 2 years	29	70.7	23	56.1
Total	41	100.0	41	100.0

2) A structured questionnaire tool was used to assess the knowledge of staff towards disasters and its preparedness.

A) Participants Characteristics:

- Participation was more from the side of male respondents for both the categories as compared to females.

- Average age of clinical staff was observed to be 29 years whereas for non-clinical staff it was 28 years.

- In clinical staff 80.5 percent (n=33) participants completed their college education and were graduate and among the other remaining 17.1 percent (n=7) completed post-graduation. In non-clinical staff the percentage of graduates and postgraduates were almost same (graduates: n=15; 36.6%, post-graduates: n=14; 34.1%).

- 48.8 percent (n=20) of clinical staff had overall experience more than 5 years and in non-clinical 43.9 percent (n=18) were there who had experience of more than 5 years. Percentage of staff employed in this facility was more among clinical as compared to non-clinical (n=29; 70.7% Vs n=23; 56.1%).

- Majority of respondents in non-clinical staff were from Management (n=26; 63.4%). In clinical 39 percent (n=16) was nursing staff whereas 24.4 percent (n=10) were technicians.

B) Past experience of staff:

Characteristics	Frequency	Percent	Frequency	Percent
Have you heard the term disaster/emergency/incident				
Yes	41	100.0	38	92.7
No	0	0.0	3	7.3
Total	41	100.0	41	100.0
When was the last time an emergency disaster happened in the facility				
2-4 Weeks back	31	75.6	31	75.6
6 months back	2	4.9	3	7.3
More than 1 year back	6	14.6	3	7.3
More than 2 years back	2	4.9	4	9.8
Total	41	100.0	41	100.0
Which code was raised at that time				
Code pink	8	19.5	2	4.9
Code purple	3	7.3	4	9.8
Code orange	1	2.4	6	14.6
Code red	14	34.1	19	46.3
Code blue	15	36.6	10	24.4
Total	41	100.0	41	100.0

- All the clinical staff was aware of the term disaster/emergency/incident whereas 92.7 percent (n=38) non-clinical staff heard these terms. Equal number of respondents (n=31; 75.6% Vs n=31; 75.6%) among both the categories of staff were aware that some emergency/incident/disaster happened 2-4 weeks back but only 14 (34.1%) clinical and 19 (46.3%) non-clinical staff knew the correct code which was raised at that time.
- A study of Korea also shows that staff was more aware about the codes which are generally raised i.e., code pink, blue and code red. Whereas lack of training sessions was given as the reason behind insufficient knowledge, also the staff had not gone through the code of conduct.

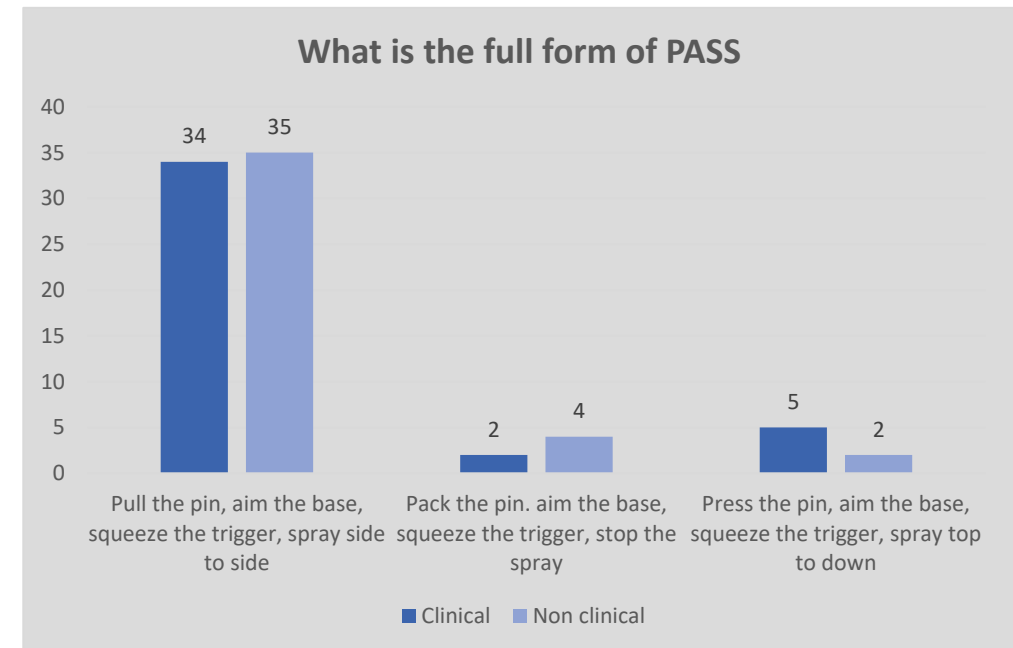
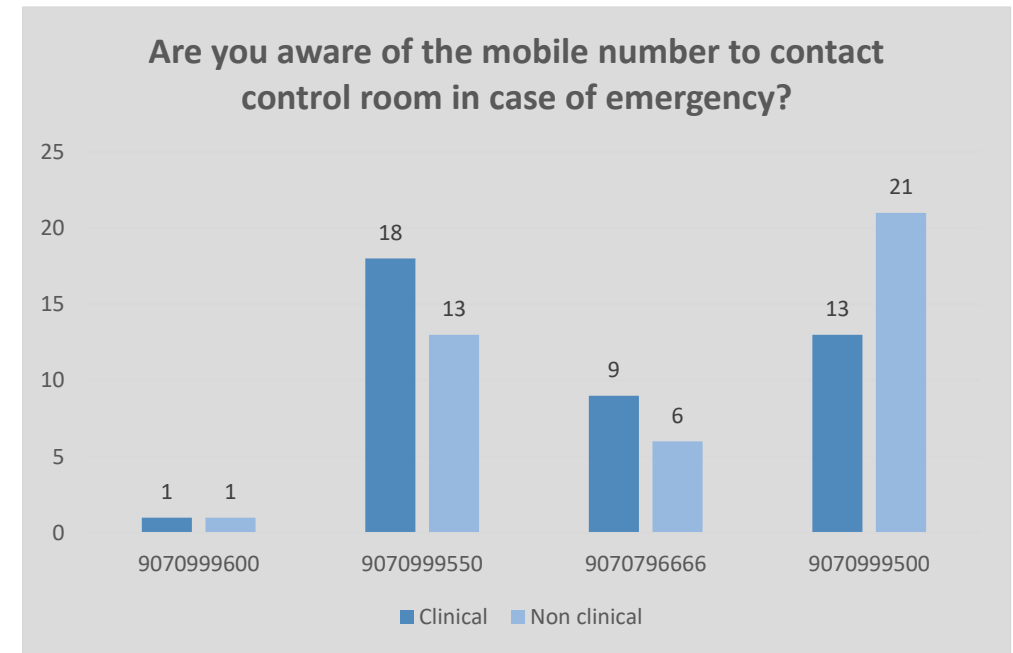
C) Staff knowledge and readiness

	Clinical		Non-clinical	
Characteristics	Frequency	Percent	Frequency	Percent
Which code will be raised if the ceiling falls				
Code black	2	4.9	1	2.4
Code purple	8	19.5	10	24.4
Code red	21	51.2	23	56.1
Code pink	6	14.6	2	4.9
Code blue	1	2.4	2	4.9
Code orange	3	7.3	3	7.3
Total	41	100.0	41	100.0
What is the correct order for code announcement				
code-location-area x 3	36	87.8	35	85.4
area-location-code x 2	2	4.9	3	7.3
location-code-area x 3	3	7.3	2	4.9
code-location- area x 4	41	100.0	1	2.4
Total			41	100.0
Can you activate code orange				
Yes	16	39.0	20	48.8
No	25	61.0	21	51.2
Total	41	100.0	41	100.0

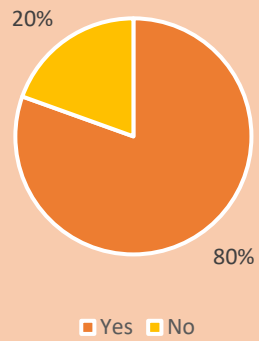
Almost half of the clinical staff was not aware of the correct code which will be raised if the ceiling falls whereas the awareness was somewhat higher in case of non-clinical staff. Most of the clinical and non-clinical staff had the knowledge of correct order of code announcement (n=36; 87.8% Vs n=35; 85.4%) and 60 percent (n=25) clinical and 51.2 percent (n=21) non-clinical staff answered the question correctly and selected no as an option when asked that whether they can activate code orange or not.

Less than one third (n=13; 31.7%) of the clinical staff was aware of the correct mobile number to contact the control room in case of emergency. Awareness among non-clinical was more (n=21; 51.2%).

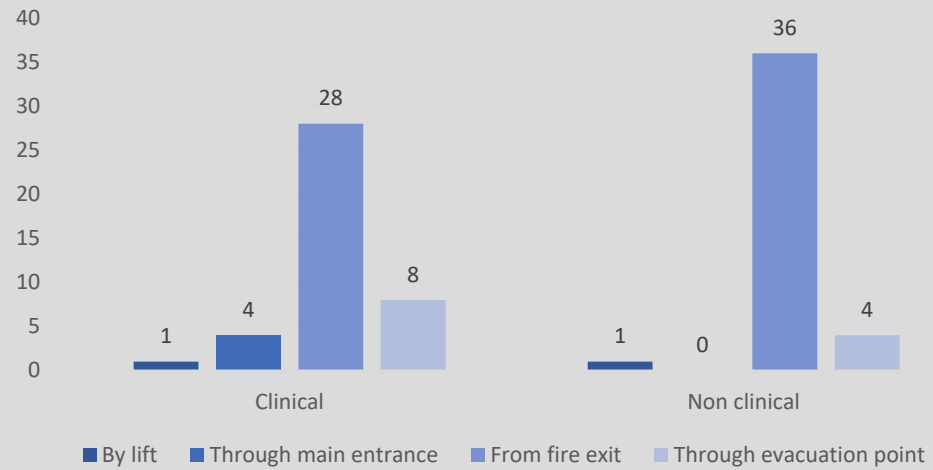
More than 80 percent of staff in both the categories had the knowledge of correct procedure for using the fire extinguisher in case of fire situation.



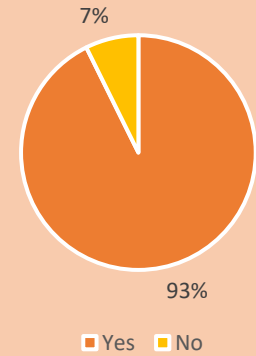
Awareness on nearest fire exit
(CLINICAL)



In case of fire what should be the direction of
evacuation of patients from their respective areas?

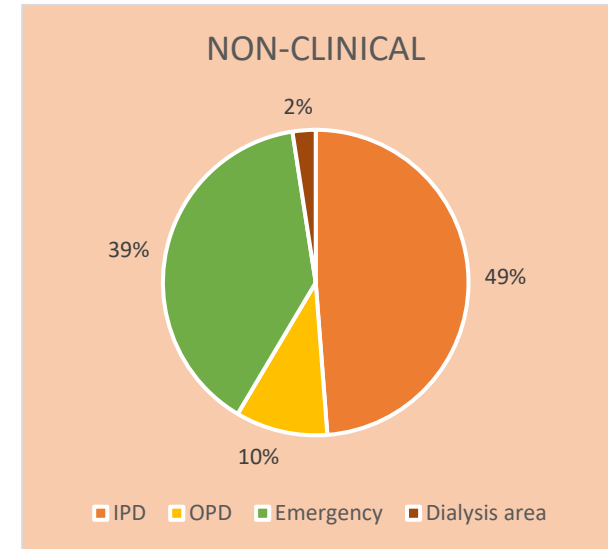
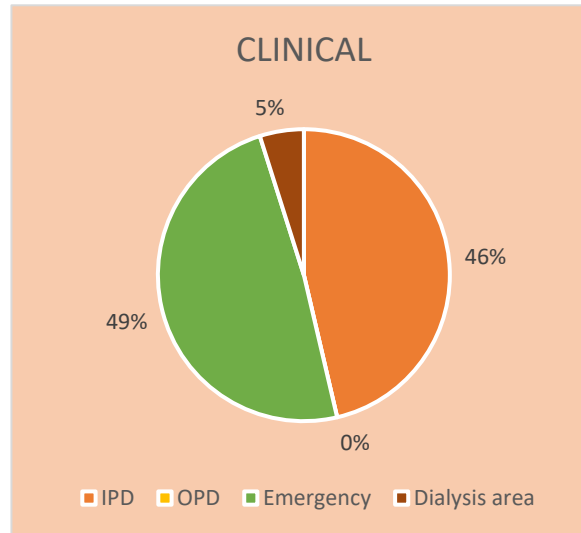
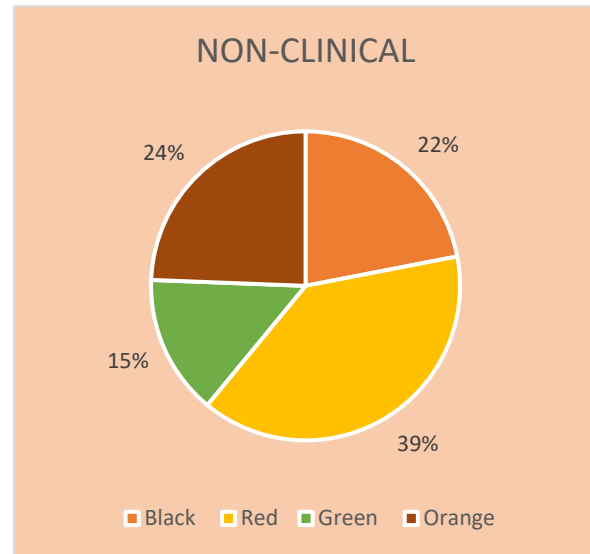
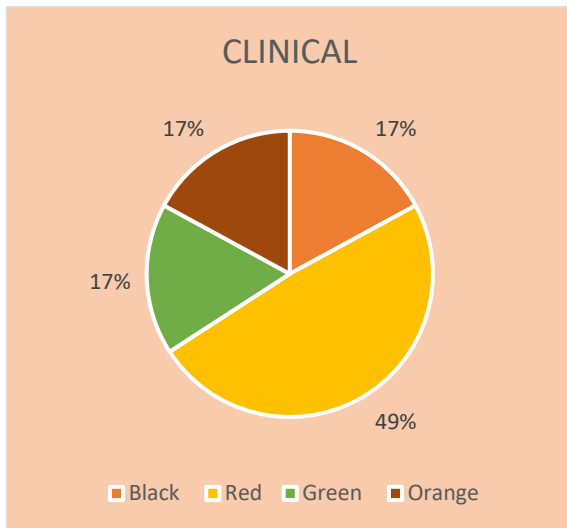


Awareness on nearest fire exit
(NON-CLINICAL)



- Clinical staff was observed to have less knowledge about patient evacuation during fire incidents as compared to non-clinical staff (n=28; 68.3%, n=36; 87.8%). The nearest fire exit was known by more than 80 percent (n=33) of clinical staff but for respondents from non-clinical category, the number was higher (n=38; 92.7%).
- Work which was done prior also suggests that more than 50 percent of employees had the knowledge regarding entry and exit routes and security and registration officers were more aware.

Knowledge on triaging



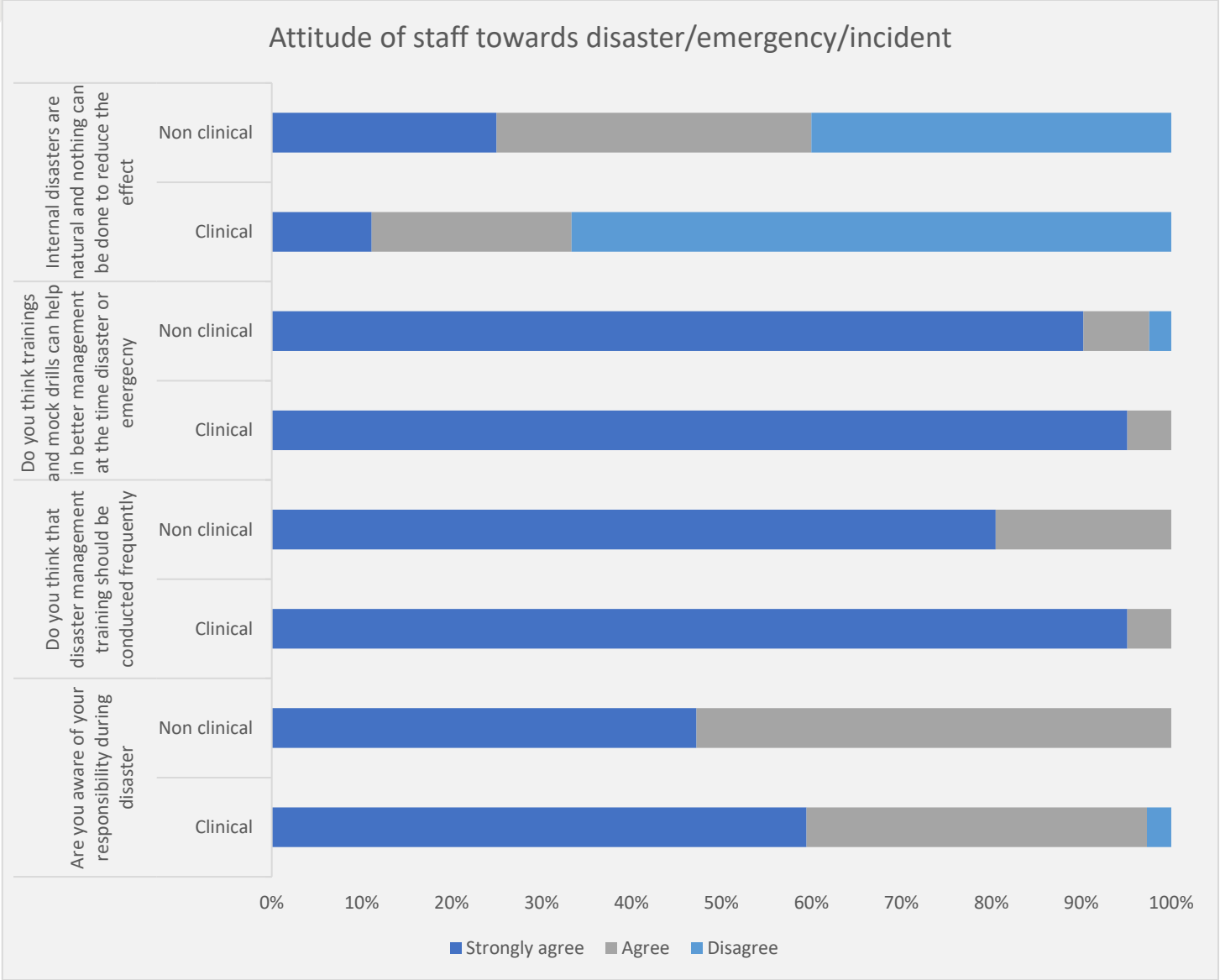


Two questions were asked about the knowledge and triage system, and it was observed that very less participants has the knowledge regarding the same. Less than 50 percent (n=20) clinical staff and less than 40 percent (n=16) non-clinical staff was aware of triage system and the colour codes used.

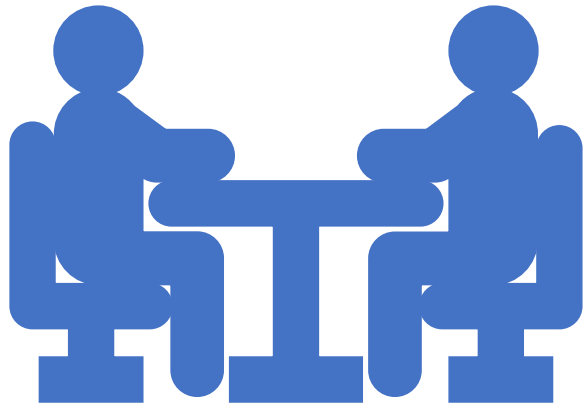


Previously conducted research also showed that at the time of code orange almost half of the staff could not identify the triage system used in emergency and were not aware of whom to contact during this situation.

D) Attitude towards disaster / emergency / incident:



- More than 60% clinical staff agreed that they know their roles and responsibilities if in case any event happens whereas this number was less than 50% for non-clinical staff.
- In the past a study was conducted in Italy that showed the on-duty staff had poor knowledge of the functions and responsibilities which are necessary during disaster when the hospital emergency plan is activated which was also supported by a study conducted in UK in which out of total participants which were interviewed, less than 5 percent of the physicians were aware of their responsibilities during such conditions.
- More than 80% of the staff in both the categories agreed that disaster management trainings should be conducted frequently which in turn will help in better management of disaster in future. A study was conducted in Sri Lanka in which almost all the doctors and nurses expressed a desire to learn more about management of disaster in order to help at the time of potential disasters. 6 Also a study done in Saudi Arabia showed that only a few respondents disagreed when asked whether there is a need for disaster simulation activity or not. Rest of them agreed that conducting drills and training in the emergency department will increase the knowledge which in turn will help in better management at the time of disaster.
- More than one fourth (n=12; 29.2%) of the non-clinical staff believe that internal disasters are natural, and nothing can be done to reduce their effect whereas this number was quite low in case of clinical staff (n=3; 7.3%).



An open-ended question was also asked for suggestions and comments on how the preparedness can be improved or increased. Majority of the staff in both the categories suggested that training and mock drills can be conducted, awareness material like booklets can be distributed, shift wise training should be done, training on triage system and training regarding signs and emergency codes can be given.

CONCLUSION

- In this study HIRA tool was used to identify events that could lead to hazard which can further change into disaster if not controlled on time. The major observations which were recorded using this tool was the lack of security and arrangement in the medical records department which was due to insufficient space. It can be overcome by making necessary arrangements for stocking up files and locking the gate of MRD. The other two observations were regarding the unavailability of high-density gloves in the chemotherapy department and chemical spill kit in the diagnostic laboratory since a year. These can be overcome by making these materials available.
- When a disaster strikes, healthcare personnel, in all the categories, play a key part in responding to that situation. Knowing how prepared a medical facility is, may help them to build and effectively implement policies and procedures for management of disaster, which in turn will lead to a better prepared healthcare system for the future. In this study the response of non-clinical staff was more positive as compared to clinical staff. Response was positive by clinical staff for questions related to triaging or which requires direct involvement of them. Nevertheless, all the staff expressed a readiness to learn more about management of disaster and to serve in future.

RECOMMENDATIONS

Supply chain department should coordinate with departments where the essential items are not available.

More racks can be provided in MRD, and doors should be locked properly.

Training on emergency codes can be conducted.

Training on emergency codes for staff which are permanently on evening and night duties can be conducted.

Training on Triaging can be given to staff of Emergency, Registration, Diagnostic, Radiology, ICU,OT and Housekeeping department.

Mock drills of code orange can be performed in a time bound manner.

Most of the staff are not aware of the public announcement system phone number, so they can be informed about the same.

Staff can be informed about their roles and responsibilities during an emergency.



LIMITATIONS

Sample size was less due to pandemic situation as most of the staff was busy with covid duty.

All the departments were not covered while performing hazard identification and risk assessment because way to some departments were blocked as they came under the areas which were assigned for treatment of only covid patients.

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THANK YOU

