Study on Evaluation of Hospital Safety Status

By

Rajasi Chetan Dharia

Dissertation submitted in partial fulfillment of the requirements of the degree

MBA Hospital and Health Management

Academic year, 2017-2019

The IIHMR University, Jaipur

1, Prabhu Dayal Marg, Sanganer, Airport
Jaipur 302029, Rajasthan
Ph: 0141 3924700, Fax: 3924738
Website: **www.iihmr.edu.in**

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IIHMR UNIVERSITY

TO WHOMSOEVER MAY CONCERN

This is to certify that **Dr. Rajasi Dharia**, student of **MBA Hospital and Health Management** from The IIHMR University, Jaipur has undergone dissertation internship training at **P. D. Hinduja Hospital, Mumbai** from **4th February 2019 to 3rd May 2019.**

The Candidate has successfully carried out the study assigned to him during internship training and his approach to the study has been sincere, scientific and analytical.
The Internship is in fulfillment of the course requirements.

I wish him all success in all his future endeavors.

Dean, Academics and Student Affairs
The IIHMR University, Jaipur
16 May 19

Dean - Research and Professor
The IIHMR University, Jaipur

1, Prabhu Dayal Marg, Near Sanganer Airport, Jaipur- 302029, Rajasthan, India.
Ph.: 0141- 3924700, 2791431- 32, Fax: 0141 3924738, E-mail: iihmr@iihmr.edu.in, Web.: www.iihmr.edu.in

P. D. HINDUJA NATIONAL HOSPITAL
& MEDICAL RESEARCH CENTRE
(Established and managed by the National Health & Education Society)

VEER SAVARKAR MARG, MAHIM, MUMBAI - 400 016, INDIA
PHONE : 2445 1515, 2445 2222, 2444 9199 FAX : 2444 9151

03rd May 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Rajasi Chetan Dharia** a student of Master in Business Administration – Hospital and Health Management from the Indian Institute of Health Management and Research University, Jaipur did her project in our Hospital from 04th Feb 2019 to 3rd May 2019.

During this period her assignment was as follows:

- Hospital Safety Index Assessment
- Hospital Safety Culture Survey
- Audit of protocol for self-administration of medication
- Audit of fire mock drill
- Audit of blood donation camp

I wish her all the success in future endeavours.

Mr. Joy Chakraborty
Chief Operating Officer

Dr. Preeti Goraksha
Senior Manager
Clinical Care Units and
Accreditation & Compliance

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled
'A Study on Evaluation of Hospital Safety Status' and
submitted by **Dr.Rajasi Chetan Dharia,**
Enrollment number **IIHMR-U/01/2017-2109/0636** under the supervision of
Dr. Anoop Khanna for award of **MBA in Hospital and Health Management** of the University, carried out during the period from **4th Feb 2019** to **3rd May 2019**
embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or
any other institute or other similar institution of higher learning.

R Dharia

Signature
DR. RAJASI DHARIA

ABSTRACT

The evaluation of hospital safety objectively alone, using a checklist, doesn't paint a complete picture of hospital safety. As hospitals continually strive to improve patient safety and quality, hospital leadership increasingly recognizes the importance of establishing a culture of safety.

The standardized 'Hospital Safety Index Assessment' checklist by the World Health Organization (WHO) was used. The 'Safe Hospitals Checklist' is divided into four modules: Hazards affecting the safety of the hospital, Structural safety, Non-structural safety and Functional capacity

The second, third and the fourth modules together comprise of a 150 item checklist that is quantitative in nature and considered for the purpose of calculating the hospital safety index. Each item has three levels of safety (high, average and low) and each item and module is weighted differently according to its importance to the overall safety of the hospital.

Modules were evaluated individually (to generate a module-specific safety index) and also together (to obtain an overall hospital safety index). The sum of the weighted results of the three modules gives a hospital safety rating expressed as the probability (percentage) that a facility will be able to function in an emergency or disaster situation. The overall Hospital Safety Index was calculated at 0.55. As the overall hospital safety index was between 0.36 and 0.65, the hospital was awarded a safety grade of 'B'.

The entire simulation was ran again in the HSI calculator, scoring the low scoring six items as suggested in the recommendations, keeping the scores of the other items same. The overall safety index for the hospital can change only from 0.55 to 0.59, not changing the safety grade. However, the safety index for non-structural safety can change from 0.61 to 0.67 and that for emergency management from 0.58 to 0.68, implying an upgradation from 'B' to 'A' for each of the module.

The Hospital Safety Culture Survey by Agency Of Health Research And Quality (AHRQ) is designed to ask the hospital staff for their opinions about the culture of safety at their hospitals. The tool had 44 questions grouped into 12 composites for evaluation namely; teamwork within units, teamwork across units, feedback communication, management support, manager expectations and actions, non-punitive error response, frequency of event reporting, safety perception, handoffs, communication openness, staffing, organizational learning.

This descriptive observational study had a sample size of 300 across various departments and various strata of employees. The data was collected through paper and web survey and was made available in both English and Marathi languages. The overall hospital analysis was done on the basis of these 12 composites and the average was also compared to that of the database of 630 hospitals available with AHRQ. Further, the various participating departments of Hinduja Hospital were analysed individually so as to identify the weaker safety composites in each department and to compare the departments with each other.

The comparison revealed that, Hinduja hospital scores poorly in comparison to the average of the database for punitive response, events reporting and staffing, making them the weaker dimensions of the safety culture. However, Hinduja Hospital exceeds the database average for the safety composites of manager expectations, handoffs, management support, teamwork within units and organisational learning, making these the stronger elements of the safety culture that should be banked upon.

The departmental analysis was done on the basis of weighted average to reveal that the departments of CSSD, housekeeping, stores, emergency, engineering and OT scored less than the hospital average of 3.6. a detailed composite analysis for every department disclosed that the departments of housekeeping, emergency and stores scored consistently low across multiple composites.

Creating a positive patient safety culture by implementing actions that support all dimensions of safety culture is inevitable. Implementing a centralized online anonymous event reporting system is the call of the hour along with fostering a ‘no blame’ culture and positive reinforcement.

ACKNOWLEDGEMENTS

I convey my heartfelt gratitude to, Mr. Joy Chakraborty, Chief Operating Officer, P.D. Hinduja Hospital, Mumbai, for giving me the opportunity to work with Hinduja Hospital during the Dissertation Internship Program.

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I would like to thank my college mentor, Dr. Anoop Khanna Sir for his contribution in stimulating suggestions and providing encouragement during my Dissertation Internship.

Last but not the least, I would like to place on record my best regards profound sense of gratitude to my parents for all the love and support always.

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LIST OF ABBREVIATIONS

PAHO	Pan American Health Organisation
WHO	World Health Organisation
AHRQ	Agency For Health Research Quality
OPD	Out Patient Department
IPD	In Patient Department
HVAC	Heating Ventilation And Air Conditioning
NDMA	National Disaster Management Authority
HSI	Hospital Safety Index
NEPHRO	Nephrology
CC	Customer Care
LAB	Laboratory Medicine
MGMT	Management
JMS	Junior Medical Staff
PHARM	Pharmacy
MRD	Medical Records Department
IMG	Imaging
ICU	Intensive Care Unit
CSSD	Central Sterile Supply Department
HKS	House Keeping Services
OT	Operation Theatre
ENGG	Engineering
EMEG	Emergency

LIST OF APPENDICES

1. INTRODUCTION

The importance of hospitals goes far beyond the role they play in saving lives after disasters. They are powerful symbols of social progress and a prerequisite for economic development, and as such, special attention must be given to reducing their physical vulnerability.[1] The vulnerability of a hospital is more than a medical issue. It is critical that hospitals continue to work during emergencies and disasters since people immediately go to the nearest hospital for medical assistance when emergencies occur, without considering whether the facilities might not be functional.[2]

Traditional evaluation methods include Hazard and Vulnerability Analysis, Equipment and Critical Lines Studies, Organizational/Functional Evaluation but each has its own shortcomings. The Hospital Safety Index is not only a tool for making technical assessments, but also provides a critical approach to emergency and disaster risk management for the health sector, with a focus on prevention, mitigation and preparedness.[2]

It is a rapid and low-cost diagnostic tool that helps authorities to determine quickly what actions and measures can improve safety and what capacity the hospital has to respond to emergencies and disasters. [2] A checklist helps to assess different items and safety ratings for a hospital. A scoring system assigns the relative importance of each item which, when calculated, gives a numeric value to the probability that a hospital can survive and continue to function in an emergency or disaster.[3]

The original Hospital Safety Index was developed by PAHO and WHO with contributions from national experts in a variety of fields and was released in 2008. Subsequently, the Hospital Safety Index tool has been used to assess the safety of more than 3500 facilities and has been adopted and implemented by many countries.[2]

The Index is expected to continue to play a vital role in action on safe hospitals at local and national levels, and through international commitments to support national safe hospitals programs and the last global framework for disaster risk reduction that was agreed by Member States of the United Nations at the Third World Conference on Disaster Risk Reduction in Sendai in March 2015.[4]

However, when understanding the definition of safety that goes as, 'the condition of being protected from harm or other non-desirable outcomes' or 'the control of recognised hazards in order to achieve an acceptable level of risk',[5] it is apparent that safety is just as much a subjective matter, as it is objective. Thus evaluation of hospital safety objectively alone, using a checklist, doesn't paint a complete picture of hospital safety. Realising this, it was essential to supplement the objective assessment with a subjective 'safety culture' tool that would make the safety evaluation more holistic.

As hospitals continually strive to improve patient safety and quality, hospital leadership increasingly recognizes the importance of establishing a culture of safety. Achieving such a culture requires leadership, physicians, and staff to understand their organizational values, beliefs, and norms about what is important and what attitudes and behaviours are expected and appropriate.[6]

It was deemed appropriate to do a safety evaluation at Hinduja Hospital due to the following reasons:

- 70 years old construction
- Peculiar shape of the building
- Close to the sea
- Lies in Seismic zone III
- HVA analysis by an older method
- High Employee retention
- Strong sense of culture

2. AIM

To assess the status of Hospital Safety, both subjectively and objectively, at Hinduja Hospital

- Objective assessment – Hospital safety Index tool by WHO
- Subjective assessment – Hospital Safety Culture tool by AHRQ

3. OBJECTIVES

1. Objective assessment – Hospital safety Index tool by WHO

- To determine the hospital's capacity to continue providing services following an adverse event
- To identify elements that need improvement in terms of hospital safety
- To prioritize interventions by promoting low-cost/high-impact measures

2. Subjective assessment – Hospital Safety Culture tool by AHRQ

- to evaluate the current status of patient safety culture,
- to identify strengths and areas for patient safety culture improvement
- to conduct comparisons within and across organizations.

4. LITERATURE REVIEW

Sr. No.	Year	Author	Location	Salient features	Main findings
1	2016	Katayoun Jahangiri Et Al [3]	Iran	The different hospital sections were given priorities on a scale of 0 to 5 and were assessed accordingly. Level of vulnerability was also calculated in terms of total property loss and total life safety for non-structural elements.	The under examined hospital was categorized in classification "c", which means that the vulnerability level of this hospital is high. And hence the resident's life and safety are exposed to danger during and after a disaster. Therefore, interventional urgent actions were needed.
2	2015	Ali Ardalan Et Al [7]	Middle East	421 hospitals were analysed. The average score of all safety components were 43.0 out of 100 (± 11.0).	Eighty-two hospitals (19.4%) were classified as not safe, and 339 hospitals (80.6%) were classified in the average safety category. No hospital was placed in the high safety category. Average safety scores were 41.0, 47.0, and 42.0 for functional capacity, non-structural safety, and structural safety respectively.
3	2017	Djalali A Et Al [8]	Sweden	This study compares hospital preparedness, as measured by functional capacity, between Iran and Sweden.	A lack of contingency plans and the availability of resources were weaknesses of hospital preparedness. There was no association between the level of hospital preparedness and hospital affiliation or size for either country.

Sr. No.	Year	Author	Location	Salient features	Main findings
4	2013	S J Singer et al [9]	California	Responses to each question overall were recorded according to hospital, job class, and clinician status.	The mean overall problematic response was 18% and a further 18% of respondents gave neutral responses. Problematic responses varied widely between participating institutions. Clinicians, especially nurses, gave more problematic responses than non-clinicians, and front line workers gave more than senior managers.
5	2014	Murray, Elizabeth J. et al [10]	Virginia	Randomized sample of 500 registered nurses with active and clear licenses in a South Eastern state in the united states using the Dillman tailored design method (2000). The estimated sample size was calculated using g* power 3	Among the unit-level aspects of patient safety culture, *teamwork within units* had the highest average positive response (76.5%) and *nonpunitive response to errors* had the lowest average response (25.5%). Among the organizational-level aspects of patient safety culture, *management support for patient safety* had the highest average positive response (52%) and *handoffs & transitions* had the lowest average positive response (33.75%)
6	2016	Soo-Hoon Lee, et al [11]	Turkey	The study was performed with hierarchical multiple linear regression on data from the 2010 survey to examine the statistical relationships between perceptions of handoffs and transitions to safety culture	The main findings were that the effective handoff of information, responsibility, and accountability were necessary to positive perceptions of patient safety. Feedback and communication about errors were positively related to the transfer of patient information; teamwork within units and the frequency of events reported were positively related during shift changes

Sr. No.	Year	Author	Location	Salient features	Main findings
7	2018	Hayfaa Ali, et al [12]	Kuwait	Conduct an assessment of patient safety culture in public hospitals in Kuwait and benchmark against regional and international studies that utilized the same tool. This objective of this study is to examine the association between the predictors and outcomes of patient safety culture.	Total of 12,092 employees from 16 public hospitals in Kuwait. Areas of strength were teamwork within units, organizational learning, management support , supervisor/manager expectations & actions and feedback and communication about error.
8	2017	Ahmed Mohamed Elsheikh, et al [13]	Saudi Arabia	This study compares responses of physicians and nurses to patient safety culture assessment in Saudi Arabia	Composite-level results compared to AHRQ database hospitals show values below minimum positive in “staffing” and “non-punitive response to error” to have decreased values in nursing answers than physician ones. The average percentage positive concerning “staffing” items is below the average percentage positive of database hospitals; in nursing,

5. HOSPITAL SAFETY INDEX ASSESSMENT

5.1 METHODOLOGY

5.1.1 Study Design

- Study Setting: OPD and IPD building of P.D. Hinduja National Hospital and Medical Research Centre, Mahim, Mumbai
- Type of Study: Descriptive Observational Study Design
- Study method: Both qualitative and quantitative methods
- Duration of study: 2 weeks

5.1.2 Study instrument [2]

The standardized 'Hospital Safety Index Assessment' checklist by the World Health Organization/Pan American Health Organization (WHO/PAHO) was used. The 'Safe Hospitals Checklist' has 150 variables, each with three safety levels: low, moderate, and high. It is divided into four modules:

1. Hazards affecting the safety of the hospital
2. Structural safety
3. Non-structural safety
4. Functional capacity

The first module is the qualitative part of the study where different types of hazards were analysed (geological, hydro-meteorological, social, environmental, chemical and technical) which are related to the location of the hospital. The extent of hospital exposure is considered to be directly proportional to the probability of the occurrence of a hazard and its magnitude. The results of this module are subjective and are not considered in the calculation of the hospital safety index.

The second, third and the fourth modules together comprise of a 150 item checklist that is quantitative in nature and considered for the purpose of calculating the hospital safety index.

Table 5.1 – Summary of the Modules

Module	Safety Elements	No. of items
Module 2: Structural Safety	2.1 Prior events and hazards affecting building safety	3
	2.2 Building integrity	15
Module 3: Non-Structural Safety	3.1 Architectural safety	14
	3.2 Infrastructure protection, access and physical security	4
	3.3 Critical systems	
	3.3.1 Electrical systems	10
	3.3.2 Telecommunication systems	8
	3.3.3 Water supply system	**6**
	3.3.4 Fire protection system	5
	3.3.5 Waste management systems	5
	3.3.6 Fuel storage systems	5
	3.3.7 Medical gases systems	6
	3.3.8 Heating, ventilation, and air-conditioning (HVAC) systems	8
	3.4 Equipment and supplies	
	3.4.1 Office and storeroom furnishings and equipment	2
	3.4.2 Medical and laboratory equipment and supplies	19
Module 4: Emergency And Disaster Management	4.1 Coordination of emergency and disaster management activities	8
	4.2 Hospital emergency and disaster response planning	5
	4.3 Communication and information management	4
	4.4 Human resources	5
	4.5 Logistics and finance	4
	4.6 Patient care and support services	9
	4.7 Evacuation, decontamination and security	5
Total		**150**

5.1.3 Ethical Considerations

- This study was initiated after taking ethical approval from the 'Hospital Ethics Committee' and the 'Hospital Disaster Management Committee.'
- Adequate measures were taken to ensure security of confidential data collected from the hospital manuals.
- Only voluntarily consenting employees were interviewed for the level of training and their confidentiality was maintained by keeping their identity undisclosed.

5.1.4 Operational definitions [2]

1. Critical systems (in hospitals)

Within a hospital, critical systems include the electrical, telecommunications, water supply, fire protection, waste management, fuel storage, and medical gasses, and heating, ventilation, and air conditioning (HVAC) systems. The failure or disruption of critical systems can stop or impede the functioning of the hospitals.

2. Disaster

A serious disruption of the functioning of a community or society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

3. Emergency

An actual or imminent event or threatening condition that requires urgent action.

4. Non-structural components

Elements that are not part of the load-bearing system of the building. They include architectural elements and the equipment and systems needed for operating the facility. Non-structural systems and components include lifelines; industrial, medical and laboratory equipment; furnishings; electrical distribution systems; heating, ventilation and air conditioning (HVAC) systems; and elevator/ escalator systems.

5. Risk (Related to hazard, vulnerability and capacity)

Risk is the result of the interaction between hazard, vulnerability and capacities. This is a dynamic and complex interaction that is modified over time according to the changes in the probability that a certain phenomenon may occur in a given time and place with an identified intensity, magnitude and duration and the exposure and susceptibility of people, infrastructure, services and goods that can be affected by that phenomenon.

6. Safe Hospital

A health facility whose services remain accessible and functioning at maximum capacity and with the same infrastructure, before, during and after the impact of emergencies and disasters.

7. Structural components

Elements that are part of the resistant system of the structure, such as columns, beams, walls, foundations and slabs.

5.1.5 Data collection [2]

Methods

- Direct Observation
- Inspection
- Interview with Departmental Head/ Staff
- Review of Documents
- Review of Department Manuals

a) Module 1 - The preliminary inspection of the area where the hospital is located was done that provided an overview of the architectural and construction features of the area and the type of damage that hazards could have caused. The areas of the city and of the hospital that would have been probably most affected were studied using hazard maps from google, NDMA and Indian meteorology department.

b) Module 2 – The exterior of the hospital was inspected to describe the building and type of structure, construction quality, irregularities and general condition, including the condition of facings, balconies, ledges etc.

c) Module 3 – The critical systems and non-structural elements of the hospitals were evaluated with guidance from the concerned technicians and mangers. For completing the checklist, observations, survey and interviews were also used. Value judgments expressed by individuals and employees were not considered a part of the evaluation.

d) Module 4 – The hospital manuals on disaster management, hospital safety and infection control were studied to complete the checklist.

Table 5.2 – Primary Respondents of Respective Sections for Data Collection

Elements	Primary Resopondent
Building integrity	Mr. Umesh Sawant / Mr. Hrishikesh Mhatre
Architectural safety	
Electrical systems	Mr. Gunwant
Telecommunication systems	Mr. Deepak Tiwari
Water supply system	Mr. Shyam
Fire protection system	Mr. Vishwajit Sawant
Waste management systems	Mr. Alkesh
Fuel storage systems	Mr. Shiv Shankar
Medical gases systems	
Heating, ventilation, and air-conditioning systems	
Emergency and disaster management activities	Dr. Swapnil Kharnare
Hospital emergency and disaster response planning	
Logistics and finance	

5.1.6 Data analysis [2]

For determining the amount of risk in different sections of the hospital, the occurring probability of each risk was scored based on the section status, previous records and events according to the Likert scale.

Given that each item has three levels of safety (high, average and low), and to avoid any distortion at the time of evaluation, a constant value is applied to each level of safety. Values are standardized to enable comparisons between hospitals for each module and for the overall hospital safety index. The safety index has a maximum value of 1 (one) and a minimum of 0 (zero).

Each item and module is weighted differently according to its importance to the overall safety of the hospital. Modules can be evaluated individually (to generate a module-specific safety index) or together (to obtain an overall hospital safety index in which the scores from each module are integrated to give a single measurement).

There are two models for the weighting of the modules to calculate the safety index:

Model 1: (where there is a higher risk of earthquake and/or cyclones)

- structural safety has a weighted value of 50% of the index;
- the non-structural module has a weighted value of 30%; and
- emergency and disaster management is weighted at 20%.

Model 2: all the modules are given equal weight, so that

- structural safety has a weighted value of 33.3% of the index;
- the non-structural module has a weighted value of 33.3%; and
- emergency and disaster management is weighted at 33.3%.

As Mumbai lies in the seismic zone III, model 1 was used for calculating the safety index.

Table 5.3 – Number of Items in Each Module with Section Weightage

Module	Safety Elements	Number of items	Section weight (%)	Module Weight
MODULE 1: Structural Safety	2.1 Prior events and hazards affecting building safety	3	25	50%
	2.2 Building integrity	15	75	
MODULE 2: Non-Structural safety	3.1 Architectural safety	14	23	30%
	3.2 Infrastructure protection, access and physical security	4	10	
	3.3 Critical systems			
	3.3.1 Electrical systems	10	10	
	3.3.2 Telecommunication systems	8	5	
	3.3.3 Water supply system	**6**	**10**	
	3.3.4 Fire protection system	5	7.5	
	3.3.5 Waste management systems	5	2.5	
	3.3.6 Fuel storage systems	5	5	
	3.3.7 Medical gases systems	6	5	
	3.3.8 Heating, ventilation, and air-conditioning (HVAC) systems	8	5	
	3.4 Equipment and supplies			
	3.4.1 Office and storeroom furnishings and equipment	2	1.7	
	3.4.2 Medical and laboratory equipment and supplies	19	15.3	
MODULE 3: Emergency and disaster management	4.1 Coordination of emergency and disaster management activities	8	15	20%
	4.2 Hospital emergency and disaster response planning	5	18	
	4.3 Communication and information management	4	7	
	4.4 Human resources	5	20	
	4.5 Logistics and finance	4	8	
	4.6 Patient care and support services	9	25	
	4.7 Evacuation, decontamination and security	5	7	
Total		150	300	100%

The observations were entered in the HSI Calculator workbook to score the individual items of the modules. The sum of the weighted results of the three modules gives a hospital safety rating expressed as the probability (percentage) that a facility will be able to function in an emergency or disaster situation.

Hospitals and healthcare facilities are classified with regards to safety as below: [(2)]

- Classification A: Those centres, which are considered to be able to protect their residents safely and can continue their activities in disasters are in this group (safety index 0.66-1).
- Classification B: In this group, there are centres that can resist against a crisis, but their equipment and vital services are exposed to danger (safety index 0.36-0.65).
- Classification C: Centres whose resident's life and safety are exposed to danger in crisis and urgent intervention measures are needed (safety index 0-0.35).

5.2 RESULTS

5.2.1 Module 1

The areas of the city and of the hospital that would have been probably most affected were studied using hazard maps from google, NDMA and Indian meteorology department.

	HAZARDS	HAZARD LEVEL
1.1	**Hazards**	
1.1.1	Geological Phenomena	
	Earthquakes	Moderate
	Volcanic Eruptions	None
	Landslides	Low
	Tsunamis	Moderate
	Others	None
1.1.2	Hydro-Meteorological Phenomena	
	Hurricanes	None
	Torrential Rains	Low
	Storm Surge/ River Flooding	Low
	Landslides	Low
	Others	Moderate
1.1.3	Social Phenomena	
	Population Gatherings	Low
	Displaced Populations	Moderate
	Others - Explosion, Terrorism	Moderate
1.1.4	Environmental Phenomena	
	Epidemics	Low
	Contamination	Moderate
	Infestations	Moderate
	Others	Low
1.1.5	Chemical / Technological Phenomena	
	Explosions	Moderate
	Fires	Low
	Hazardous Material Spill	Low
	Others	Low
1.2	**Geotechnical Properties Of Soil**	
	Liquefaction	Low
	Clay Soils	Low
	Unstable Slopes	Low

5.2.2 Module 2,3,4

Step 1 – Item Wise Weighted Average Calculation

Each item was scored as per the criteria to yield a weighted average for each section of the module. The figures in yellow indicate the weighted average for the specific module.

For instance, in structural safety module, there were a total of 15 items for building integrity section. Out of those 15 items, 2 scored low on the scale, 8 scored average and 5 scored high. These results were consequently converted into weighted average by virtue of the tool which came out to be 6% for low safety, 46.5% for average safety and 22.5% for high safety of the building integrity section alone.

The weighted averages of each of the sections are added to get a combined weighted average for the respective module. Likewise, the weighted averages for structural safety are 6%, 65.2% and 28.8% for low, average and high respectively.

Table 5.4 – Scoring for Structural Safety Module

Safety Elements	Number of items			Weighted contribution to module		
	Low	Average	High	Low (%)	Average (%)	High (%)
2.1 Prior events and hazards affecting building safety	0	2	1	0	18.8	6.3
2.2 Building integrity	2	8	5	6	46.5	22.5
Total	2	10	6	**6**	**65.2**	**28.8**

The calculations for other two modules were done similarly and are indicated in yellow bold figures.

Table 5.5 – Scoring for Non-Structural Safety Module

Safety Elements	Number of items			Weighted contribution to module		
	Low	Average	High	Low (%)	Average (%)	High (%)
3.1 Architectural safety	1	8	5	1.2	16.1	5.8
3.2 Infrastructure protection, access and physical security	1	3	0	2.5	7.5	0.0
3.3 Critical systems						
3.3.1 Electrical systems	0	3	7	0.0	3.8	6.2
3.3.2 Telecommunication systems	1	3	4	1.5	1.5	2.0
3.3.3 Water supply system	**0**	**1**	**5**	**0.0**	**0.5**	**9.5**
3.3.4 Fire protection system	0	1	4	0.0	0.4	7.1
3.3.5 Waste management systems	0	2	3	0.0	0.6	1.9
3.3.6 Fuel storage systems	1	1	3	1.5	1.5	2.0
3.3.7 Medical gases systems	1	0	5	1.0	0.0	4.0
3.3.8 Heating, ventilation, and air-conditioning (HVAC)	0	3	5	0.0	1.8	3.3
3.4 Equipment and supplies						
3.4.1 Office and storeroom furnishings and equipment	0	2	0	0.0	1.7	0.0
3.4.2 Medical and laboratory equipment and supplies	0	12	7	0.0	11.3	4.0
Total	5	39	48	**8.5**	**45.8**	**45.7**

Table 5.6 – Scoring for Emergency Management Module

Safety Elements	Number of items			Weighted contribution to module		
	Low	Average	High	Low (%)	Average (%)	High (%)
4.1 Coordination of emergency and disaster management activities	1	6	1	1.8	12	1.2
4.2 Hospital emergency and disaster response planning	0	2	3	0	7.7	10.3
4.3 Communication and information management	0	1	3	0	1.4	5.6
4.4 Human resources	1	2	2	1	11	8
4.5 Logistics and finance	1	2	1	2.4	4	1.6
4.6 Patient care and support services	2	5	2	5	11.3	8.8
4.7 Evacuation, decontamination and security	1	0	4	0.4	0	6.7
Total	6	18	16	**10.6**	**47.4**	**42.0**

Step 2 – Module Wise Weighted Average Calculation

The combined weighted average of each module, obtained from the previous table had been carry forwarded for further calculations. High safety is assigned a horizontal weight of 1, and average and low safety are horizontally weighted at 0.5 and 0.25 respectively. While the horizontal weights are assigned as default by virtue of the tool, the weighted averages for the safety levels of each module are calculated at actual.

Table 5.7 –Weighted Average of Each Safety Level for Each Module

MODULE	WEIGHTED AVERAGES		
	Unlikely to function (Low Safety)	Likely to function (Average Safety)	Highly likely to function (High Safety)
Structural safety (MODULE 2)	6	65.2	28.8
Non-structural safety (MODULE 3)	8.5	45.8	45.7
Emergency and disaster management (MODULE 4)	10.6	47.4	42.0
Horizontal weight	0.25	0.5	1

Step 3 – Range and Crude Safety Index Calculation

The range and crude safety index for modules are calculated as below:

Range = Upper Horizontal Weight - Lower Horizontal Weight

= 1 – 0.25

= 0.75

The range remains the same for all the three modules.

The crude safety index for a module is the ratio of the sum of the product of horizontal weights of the safety level and their respective weighted averages to the sum of weighted averages of that module.

$$\text{Crude Safety index (structural)} = \frac{(6 \times 0.25) + (65.2 \times 0.5) + (28.8 \times 1)}{6 + 65.2 + 28.8} = 0.63$$

$$\text{Crude Safety index (non -structural)} = \frac{(8.5 \times 0.25) + (45.8 \times 0.5) + (45.7 \times 1)}{8.5 + 45.8 + 45.7} = 0.71$$

$$\text{Crude Safety index (management)} = \frac{(10.6 \times 0.25) + (47.4 \times 0.5) + (42.0 \times 1)}{10.6 + 47.4 + 42.0} = 0.68$$

Table 5.8 – Crude Safety Index of Modules

MODULE	Crude safety index
Structural safety	0.63
Non-structural safety	0.71
Emergency / disaster management	0.68

Step 4 – Safety Index and Vulnerability Index Calculation

The safety index is calculated from the crude safety index and the range by the formula given below,

$$\text{Safety index} = \frac{\text{Crude safety index - Lower range limit}}{\text{Range (0.75)}}$$

Subsequently, the vulnerability index is calculated as,

Vulnerability index = 1 – Safety Index

Table 5.9 – Safety Index and Vulnerability Index of Modules

MODULE	Safety index	Vulnerability index
Structural safety	0.51	0.49
Non-structural safety	0.61	0.39
Emergency / disaster management	0.58	0.42

Step 5 – Assignment Of Safety Grade

Safety grade is assigned on the basis of the range of the safety index as given in the table below:

Table 5.10 – Safety Grade as per Safety Index

Safety index	Grade
0 – 0.35	C
0.36 – 0.65	B
0.66 – 1	A

As the safety index was between the range of 0.36 – 0.65 for each of the module, they were assigned a safety grade 'B' as determined by the table given above.

Table 5.11 –Safety Index and Safety Grade of Modules

MODULE	Safety index	Safety Grade
Structural safety	0.51	B
Non-structural safety	0.61	B
Emergency / disaster management	0.58	B

Step 6 – Overall Hospital Safety Index and Grade Calculation

- Overall Hospital Safety Index is the average of the safety index of the three modules.

Overall hospital safety index = (0.51+ 0.61 + 0.58) / 3 = 0.55

- As the overall hospital safety index was again between 0.36 and 0.65,

Overall Hospital Safety Grade = B

HOSPITAL SAFETY INDEX = 0.55

HOSPITAL SAFETY GRADE = B

5.3 DISCUSSION

5.3.1 Interpretation

As the Overall Hospital Safety was assigned 'B' grade, the following is implied [2] :

Table 5.12 –Recommendations by WHO as per Safety Index

Safety index	Category	What should be done?
0 – 0.35	C	Urgent intervention measures are needed. The hospital is unlikely to function during and after emergencies and disasters.
0.36 – 0.65	B	Intervention measures are needed in the short term. The hospital's current levels of safety and emergency and disaster management are potentially at risk.
0.66 – 1	A	It is likely that the hospital will function in emergencies and disasters. However, it is necessary to continue with the measures to improve emergency and disaster management response.

5.3.2 Limitations

- Limited access to confidential documents
- Rely on respondent's information when permission for visual inspection was denied

5.4 CONCLUSION

- Protecting hospitals from the avoidable consequences of disasters, is not only essential to meeting the Millennium Development Goals set by the United Nations, but also a social and political necessity.

- It has been proved time and again that disaster mitigation measures pay off when health facilities are able to withstand the effects of devastating disasters and continue to offer their services.

- Although the financial investment can be high (and it is not always possible to protect an installation against all kinds of disasters), the cost of ignoring the risks can be much higher, not only in terms of money, but more importantly on the loss of human life.

5.5 RECOMMENDATIONS

A total of 13 items out of 150 scored low on the scale, across all the three modules. Of those 13 items, 6 items were identified after discussion with department experts, that should score better, in a succeeding evaluation. These 6 items were sought for preliminary recommendations

It was suggested that 4 of those 6 items can be converted from low scoring to high scoring by meeting the 'high' standards.

Table 5.13 –Recommendations to Convert Low Scoring Items into High Scoring Items

ITEM	CURRENT	STANDARD
Internal communications systems	only 1 alternative communication	More than 2 alternative communication system, including a wireless and an additional PAS
Medical gases	own oxygen plant not available	Ensure supply for at least 15 days
Disaster management Cell	no dedicated space	At least 1 room with enough space to accommodate 5 individuals with access to all emergency controls
Financial resources for emergencies	no ear marked budget / funds	Sufficient budget to cover at least 72 hours

The other 2 items could have only scored an average from their previous low ranking, as meeting the 'high' standards would not have been feasible in the current set up.

Table 5.14 –Recommendations to Convert Low Scoring Items into Average Scoring Items

ITEM	CURRENT	STANDARD
Conditions outside the hospital building	dedicated triage space not available	Dedicated triage space
Hospital access routes	width allows 1 ambulances and pedestrians to enter at the same time	Enough width to allow 2 ambulances and pedestrians to enter at the same time

Post Implementation Projection

The entire simulation was ran again in the HSI calculator, scoring the six items as high and average as suggested in the recommendations, keeping the scores of the other items same, to see the magnitude of difference in the safety index if the recommendations were implemented.

The safety index for structural safety module remained unchanged as no items were selected for recommendations.

The overall safety index for the hospital can change only from 0.55 to 0.59, not changing the safety grade. However, the safety index for non-structural safety can change from 0.61 to 0.67 and that for emergency management from 0.58 to 0.68, implying an upgradation from 'B' to 'A' for each of the module.

Table 5.15 –Recommendations to Convert Low Scoring Items into High Scoring Items

MODULE	Safety Index			Safety Grade	
	Pre	**Post**	**Difference**	**Pre**	**Post**
Structural safety	0.51	0.51	0	B	B
Non-structural safety	0.61	0.67	0.06	B	A
Emergency / disaster management	0.58	0.68	0.10	B	A
Overall Safety Status of the hospital	0.55	0.59	0.04	B	B

As structural safety items cannot be retrofitted easily, recommendations for those items lie outside the scope of this study. However, working on only six of the thirteen low scoring items, in the preliminary phase, can change the safety status of two of the three modules of safety index assessment. The remaining 7 low scoring items can be targeted in the following phases, that can potentially further increase the overall safety grade of the hospital.

6. HOSPITAL SAFETY CULTURE SURVEY

6.1 METHODOLOGY

6.1.1 Study Design

- Study Setting: P.D. Hinduja National Hospital and Medical Research Centre, Mahim, Mumbai
- Type of Study: Descriptive Cross-sectional Study Design
- Study method: Quantitative method – Likert Scale
- Duration of study: 3 weeks

6.1.2 Study instrument [6]

The Agency for Healthcare Research and Quality (AHRQ) and Medical Errors Workgroup of the Quality Interagency Coordination Task Force (QuIC) sponsored the development of the Hospital Survey on Safety Culture. The hospital survey is designed specifically for hospital staff and asks for their opinions about the culture of patient safety at their hospitals.

The standardized pre-validated AHRQ tool was used after obtaining the required permission from the agency. The tool is a five-point Likert scale where participants are asked to express their level of agreement / disagreement to the statements which are across six categories as below,

Table 6.1 –Sections of The Questionnaire Tool

Section		Questions
A	Department	18
B	Manager	4
C	Communication	6
D	Event Reporting	3
E	Safety Grade	1
F	Hospital	11
G	No. Of Events Reported	1
Total		44

The AHRQ Database has results from 630 hospitals across nations as of 2018 which facilitates benchmarking best practices.

The Hospital Survey on Safety Culture emphasizes patient safety and error and event reporting. There are 44 items grouped into 12 composites. In addition to the composites, the survey includes two questions that ask respondents to provide an overall grade on patient safety for their work area/unit and to indicate the number of events they reported over the past 12 months.

Table 6.2 –Composites for Analysis

COMPOSITE		QUESTIONS
1	Teamwork Within Units	4
2	Supervisor/Manager Expectations & Actions Promoting Safety	4
3	Organizational Learning	3
4	Management Support for Safety	3
5	Overall Perceptions of Safety	4
6	Feedback and Communication About Error	3
7	Communication Openness	3
8	Frequency of Events Reported	3
9	Teamwork Across Units	4
10	Staffing	4
11	Handoffs & Transitions	4
12	Nonpunitive Response to Error	3
OUTCOME MEASURES		2
TOTAL		44

6.1.3 Ethical Considerations

- This study was initiated after taking ethical approval from the 'Hospital Ethics Committee' and the 'Hospital Safety Committee.'
- Only voluntarily consenting staff were asked to fill out the survey form.
- The confidentiality of the participating staff was maintained as they filled out the survey forms anonymously.

6.1.4 Operational definitions [6]

Safety Culture

The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's health and safety management. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures.

The 12 safety culture composites are defined as the extent of the following characteristics:

1. Communication Openness : Staff freely speak up if they see something that may negatively affect the organisation and feel free to question those with more authority.

2. Feedback and Communication About Error : Staff are informed about errors that happen, are given feedback about changes implemented, and discuss ways to prevent errors.

3. Frequency of Events Reported : Mistakes of the following types are reported: (1) mistakes caught and corrected before causing an impact, (2) mistakes with no potential to harm, and (3) mistakes that could harm but do not.

4. Handoffs and Transitions : Important information is transferred across hospital units and during shift changes

5. Management Support for Safety : Hospital management provides a work climate that promotes safety and shows that safety is a top priority.

6. Nonpunitive Response to Error : Staff feel that their mistakes and event reports are not held against them and that mistakes are not kept in their personnel file.

7. Organizational Learning : Mistakes have led to positive changes and changes are evaluated for effectiveness.

8. Overall Perceptions of Safety : Procedures and systems are good at preventing errors and there is a lack of safety problems.

9. Staffing : There are enough staff to handle the workload and work hours are appropriate to provide the best care for patients

10. Supervisor/Manager Expectations and Actions Promoting Safety : Supervisors / managers consider staff suggestions for improving safety, praise staff for following safety procedures, and do not overlook safety problems.

11. Teamwork Across Units : Hospital units cooperate and coordinate with one another to provide the best care for patients.

12. Teamwork Within Units : Staff support each other, treat each other with respect, and work together as a team.

6.1.5 **Data collection**

(A) Method

- The survey was administered in two formats – web link and a downloadable paper version, each of which was available in Marathi and English language.
- Both these formats in both the languages were emailed as attachments to all the departmental heads from the clinical administrator's official mail address.
- Follow up mails and personal reminders were sent to encourage maximum participation from the departments.
- The responses from the web link were received directly and the paper based responses were collected from the respective departments over a period of two weeks.

(B) Sampling

Method: Purposive sampling of 10% per department, across clinicians, managers, technicians and attendants of various departments.

Inclusion criteria:

- Voluntarily participating employees from the respective departments t
- Staff hat submitted the response within the time frame.
- Staff working for 40 – 60 hours / week
- Staff on permanent pay roll

Exclusion criteria:

- staff not consenting to participate
- staff not submitting responses in the given time frame
- staff working for less than 40 hours / week (eg. Consultants)
- staff working for more than 60 hours / week
- hired / contracted staff

Sample size calculation :

- Margin of error - 5%
- Confidence interval - 95%
- No. of employees at Hinduja (target population) - 2500
- Response distribution - 50%

- Formula

$$\frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

- Ideal sample size - 333

Table 6.3 - Minimum Sample Size as Recommended by AHRQ

Population of Physicians and Staff	Minimum Sample Size*	Expected Response (Assuming 50% Response Rate)
500 or fewer	Census (all providers and staff)	At least 50%
501-999	500	250
1,000 -2,999	600	300
3,000 or more	800	400

*The target sample size is based on three assumptions: simple random or systematic random sampling, a response rate of 50 percent, and a confidence interval of +/− 5 percent. See http://www.gifted.uconn.edu/siegle/research/Samples/samsize.html.

- Study Sample Size - 300

6.1.6 Data analysis

1. Data entry

The responses from the web link as well as the paper survey were manually entered in Microsoft Excel 2018 for each of the respondent. Further to which, the statements that comprised a composite were categorized together.

2. Coding

The Likert scale responses were coded as

Response	Coding / Scoring	
	Positively Worded Statements	Negatively Worded Statements
Strongly Disagree	1	5
Disagree	2	4
Neutral	3	3
Agree	4	2
Strongly Agree	5	1

3. Composite analysis in terms of average percent positive response

The frequency of response for each survey item was calculated. The two lowest response categories (e.g., Strongly disagree/Disagree and Never/Rarely) and the two highest response categories (e.g., Strongly agree/Agree and Most of the time/Always) were combined together for calculating the frequencies. The midpoints of the scales were reported as a separate category (Neither or Sometimes).

These frequencies were then converted into percentages to get a percent positive, percent neutral and percent negative response for each survey item.

Responses	% Responses
Strongly Disagree	Positive Responses
Disagree	
Neutral	Neutral Responses
Agree	Negative Responses
Strongly Agree	

The percent positive responses of the individual items that formed a composite were aggregated to obtain the average percent positive response for the composite.

4. Comparing with the AHRQ Database

The AHRQ database has record of 630 hospitals across countries that allows comparison. The average percent positive responses for each of the 12 composites were compared against the database to identify the weaker composites. Likewise, the two overall safety outcomes were also compared with the database results for a comprehensive understanding of the safety culture.

5. Departmental analysis in terms of weighted average

The various participating departments of Hinduja Hospital were analysed individually so as to identify the weaker safety composites in each department and to compare the departments with each other.

The departmental analysis was done on the basis of weighted average as the number of respondents from each department was different.

The weighted average was calculated as the ratio of product sum of the frequency in each response category and the response category code to the total frequency of a particular department.

6.2 RESULTS

6.2.1 Hospital Wide Analysis

(A) Composite analysis

The average percent positive responses for the 12 composites were sorted in ascending order to identify the composites that scored the least. Percent Responses range from 1% (least) to 100% (highest).

The average percent positive response for ‘handoffs’(75%), ‘management support’(77%), ‘teamwork within units’ (84%) and ‘organisational learning’ (87%) were above 75%, indicating an exceptional performance on these parameters. Thus, the hospital only needs to continue its current protocols to sustain these cultural parameters.

The average percent positive response for ‘safety perception’(62%), ‘communication openness (63%), ‘feedback communication’ (66%), ‘teamwork across unit’s (67%) and ‘manager expectations’ (70%) lies between 51-75%, implying that these safety culture composites are moderately strong and can be focussed on in latter phase of recommendations.

The average percent positive response for ‘punitive response’(26%), ‘events reporting frequency’ (39%), and ‘staffing’ (40%) is less than 50%, indicating a poor performance on these parameters, thus calling for prompt action.

Table 6.4 –Average Percent Responses of The Composites for The Hospital

COMPOSITES	Positive (%)	Neutral (%)	Negative (%)	GUIDELINE	Recommendation
PUNITIVE RESPONSE	**26**	**27**	**48**	**< 50 %**	prompt action required
EVENTS REPORTING FREQUENCY	**39**	**20**	**41**		
STAFFING	**40**	**13**	**47**		
SAFETY PERCEPTION	62	13	25	51- 75%	actions required in near future
COMMUNICATION OPENESS	63	18	19		
FEEDBACK COMMUNICATION	66	20	14		
TEAMWORK ACROSS UNITS	67	20	13		
MANAGER EXPECTATIONS	70	12	18		
HANDOFFS	75	18	7	> 75%	continue current actions
MANAGEMENT SUPPORT	77	13	10		
TEAMWORK WITHIN UNITS	84	8	7		
ORGANIZATIONAL LEARNING	87	7	5		

(B) Overall Outcome Measures

The respondents were asked to provide an overall grade on safety for their work area/unit. The result graph below shows that only one fourth of the respondents consider their departments as ‘excellent’ in terms of safety, whereas almost half of them consider their departments as only ‘good’ in terms of safety, giving a scope of improvement for the overall safety grade.

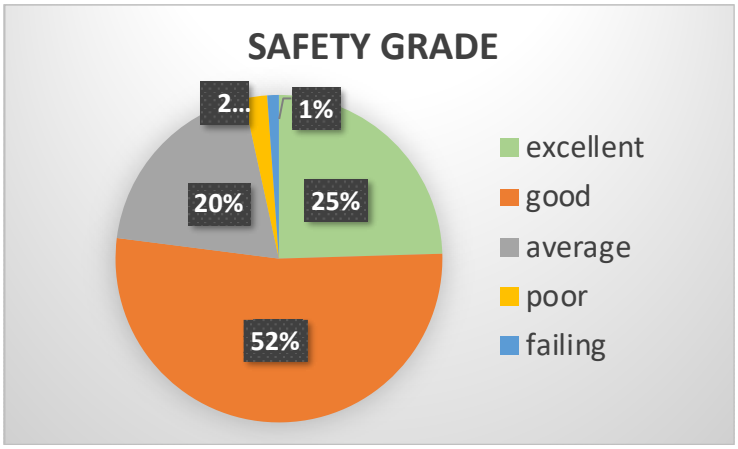

Figure 6.1 – Safety Grade Allotted by Respondents to Their Respective Departments (%)

The respondents were also asked to indicate the number of events they reported over the past 12 months, and about two-thirds have not reported an event ever in the last year, whereas, only a fourth of the respondents have reported one to five events in the last year.

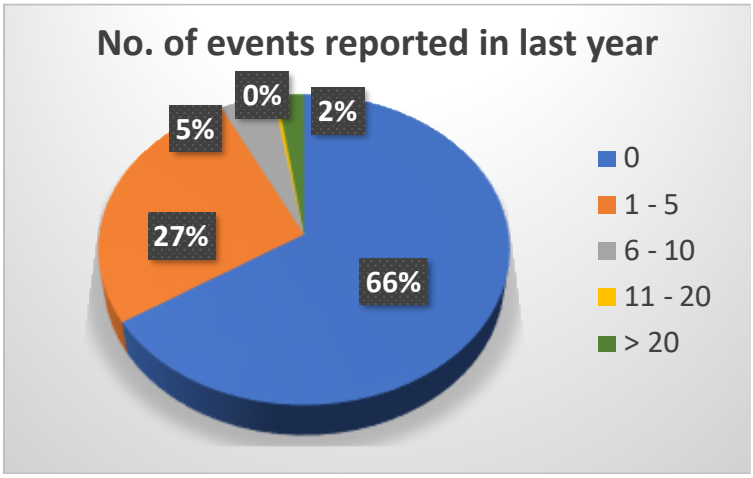

Figure 6.2 – No. of Safety Events Reported in Last Year by the Respondents (%)

6.2.2 Comparing with the AHRQ Database

The average percent positive responses of Hinduja Hospital (n = 300 participants) was compared with that of the AHRQ database that has an average of 630 hospitals.

The comparison revealed that, Hinduja hospital scores poorly in comparison to the average of the database for punitive response, events reporting and staffing, making them the weaker dimensions of the safety culture.

However, Hinduja Hospital exceeds the database average for the safety composites of manager expectations, handoffs, management support, teamwork within units and organisational learning, making these the stronger elements of the safety culture that should be banked upon.

Similar results were apparent from the hospital wide composite analysis.

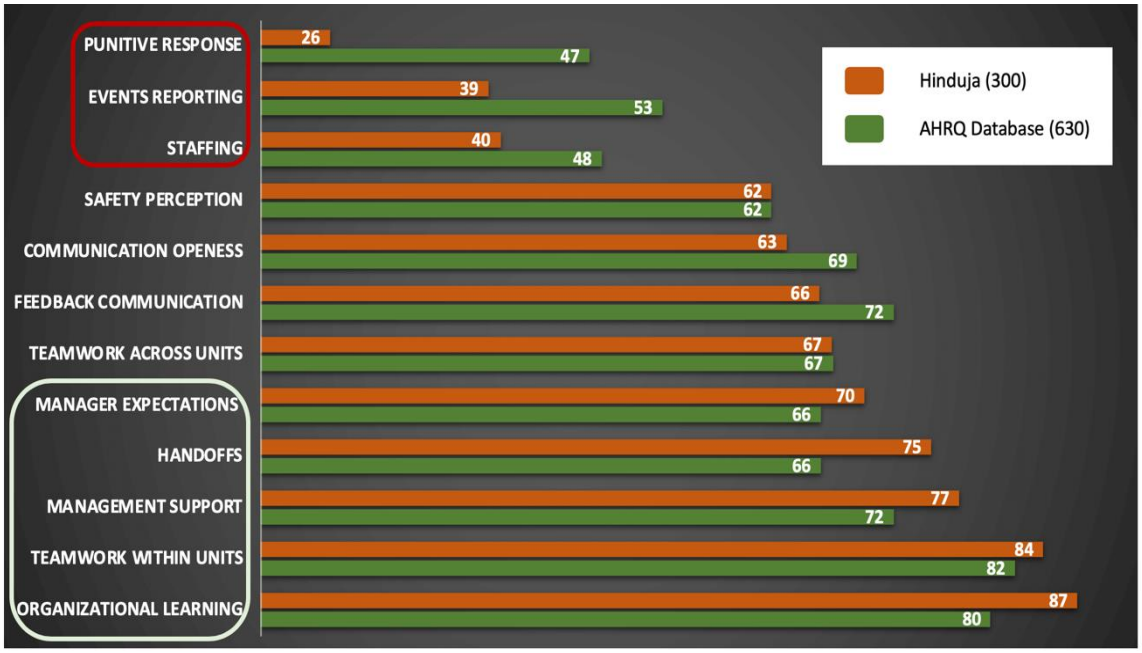

Figure 6.3 – Comparative Average Percent Positive Responses Of The Hospital To The Database

The overall outcome measures were also compared.

While only about a half of the database participants have recorded zero events, two thirds of participants of Hinduja have not registered a single event in the past one year. The number of participants registering one to five events in last year, were also less as compared to the database by about 10%.

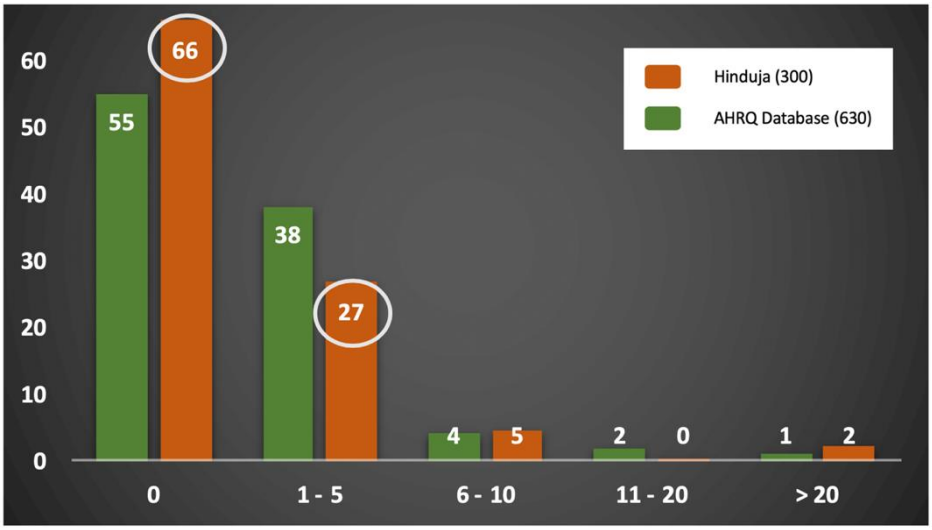

Figure 6.4 – Comparative No. of Events Reported in Last Year of the Hospital to the Database

When comparing the overall safety grade, Hinduja hospital lags behind by 10% for the 'excellent' grade as against the database, while exceeding the database for the 'good' and 'average' grades.

Figure 6.5 – Comparative Safety Grade of the Hospital to the Database

6.2.3 Departmental analysis

The weighted average for the hospital was calculated as an aggregate of the weighted averages of the 12 composites.

Weighted Average ranges from 1 (least) to 5 (highest), as the Likert scale is a five-point scale.

Table 6.5 – Weighted Average of Composites for The Hospital

COMPOSITES	WEIGHTED AVERAGE (OUT OF 5)	RECOMMENDATION
Teamwork Within Units	4.1	continue current actions
Organizational Learning	4.1	
Error Communication	3.9	actions needed in near future
Management Support	3.9	
Handoffs	3.9	
Communication Openness	3.8	
Manager Expectations & Actions	3.7	
Teamwork Across Units	3.7	
Safety Perception	3.5	
Events Reporting	3.0	prompt action
Staffing	2.8	
Error Response	2.7	
TOTAL	3.6	

Further, the weighted average for each department was calculated across all the 12 composites.

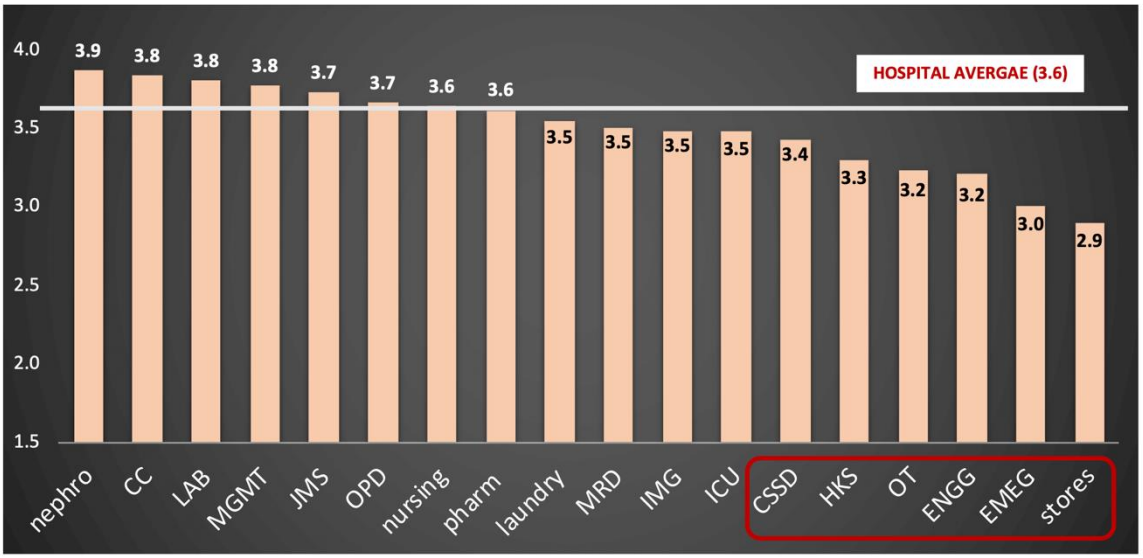

Figure 6.6 – Departmental Analysis on the Basis of Weighted Average

The dialysis department performed the best at 3.9, followed by customer care, lab medicine and management department at 3.8. the stores department score the least at 2.9, just preceded by emergency services department at 3.0.

The departments of laundry, medical records, imaging services and intensive care unit scored 3.5, just below the hospital average of 3.6. Thus, these departments also need to be addressed, although at a later stage of recommendations.

The departments that scored much lower than the hospital average were Central sterile supply (3.4), house-keeping (3.3), operation theatre (3.2), engineering (3.2), emergency services (3.0) and stores (2.9). These departments need immediate interventions to improve the safety culture.

The least and the highest scoring departments for each of the composites were identified.

The emergency department scored below 2 for staffing (1.8) and punitive response to error (1.2), which was the lowest score recorded. The only departments that appear frequently in the lowest column are stores, housekeeping and emergency services, making them the weakest departments in safety culture.

The lowest score for 'teamwork within unit's and 'handoffs' is 3.4, implying that all the other departments had scored more than 3.4 for the two composites. The score of 3.4 being very close to the hospital average of 3.6, makes them one of the stronger composites od safety culture.

Likewise, the highest score for staffing and punitive response to error is 3.5, implying that all the other departments had scored below 3.5 on these two composites, making them the critically weak composites of safety culture.

While the housekeeping department scored the highest possible score (5) for management support and teamwork across units, it scored the lowest on 5 out of the remaining 10 composites, making it one of the critically weak departments.

Table 6.6 – Lowest and Highest Scoring Departments in Composites as per Weighted Average

	LOWEST	HIGHEST
Teamwork Within Units	CSSD (3.4)	MRD, OPD (4.4)
Manager Expectations	HKS (2.9)	MGMT (4.1)
Organizational Learning	STORES (3.2)	MRD, NEPHRO (4.4)
Management Support	EMEG (3.1)	HKS (5.0)
Perception of Safety	HKS (2.7)	OPD (3.8)
Feedback Communication	HKS (2.3)	LAB (4.5)
Communication Openness	HKS (2.1)	LAB (4.3)
Frequency of Events Reported	HKS (1.8)	CC (3.9)
Teamwork Across Units	STORES (3.0)	HKS (5.0)
Staffing	EMEG (1.8)	MGMT (3.5)
Handoffs & Transitions	STORES (3.4)	NEPHRO, LAUNDRY (4.3)
Punitive Response to Error	EMEG (1.2)	MGMT (3.5)

The previous part of the analysis had revealed that handoffs, teamwork within units, organisational learning were the stronger composites for the entire hospital. Also, it was evident that the weaker composites were staffing, punitive response to error and frequency of error reporting.

Thus, the departments that scored much lower than the hospital average namely CSSD, HKS, OT, ENGG, EMEG, stores were analysed for each of the remaining six composites. The weaker composites for these departments are marked in yellow.

Table 6.7 – Weaker Composites of Departments Scoring Less Than the Hospital Average

	Manager Expectations	Management Support	Safety Perception	Feedback Communication	Communication Openness	Teamwork Across Units
STORES (2.9)	3.0	3.3	3.0	2.9	3.0	3.0
EMEG (3.0)	3.0	3.1	3.7	2.7	3.0	3.1
ENGG (3.2)	2.9	4.0	3.1	2.7	2.5	3.6
OT (3.2)	3.7	3.6	3.4	3.3	3.6	3.2
HKS (3.3)	2.9	5.0	2.7	2.3	2.1	5.0
CSSD (3.4)	3.2	3.3	3.5	4.0	3.9	3.4

The table reveals that the department of stores needs to work on nine of the twelve composites, emergency services department needs to work on eight composites and so on.

6.3 DISCUSSION

6.3.1 Interpretation

It is evident that punitive response, staffing and events reporting frequency score the least in terms of percent positive response as well as the weighted average, making them the weaker dimensions of the safety culture at Hinduja Hospital. Likewise, handoffs, management support, teamwork within units and organisational learning are the stronger dimensions of the safety culture at Hinduja Hospital. As organisational learning and teamwork within units are the stronger dimensions, they can be used to strengthen the weaker composites.

Table 6.8 –Summary of Composite Analysis for The Hospital

COMPOSITES	% POSITIVE RESPONSE	WEIGHTED AVERAGE (OUT OF 5)	COMPOSITE STRENGTH
Punitive Response	26	2.7	**Weak**
Staffing	40	2.8	
Events Reporting Frequency	39	3.0	
Safety Perception	62	3.5	**Moderate**
Communication Openness	63	3.8	
Teamwork Across Units	67	3.7	
Manager Expectations & Actions	70	3.7	
Feedback Communication	66	3.9	
Handoffs	75	3.9	**Strong**
Management Support	77	3.9	
Teamwork Within Units	84	4.1	
Organizational Learning	87	4.1	

6.3.2 Limitations

- Departments like Security and Food Services could not be included in the study, as responses were not received in time.

6.4 CONCLUSION

- Safety culture is not as strong as is desirable of a hospital.
- The safety culture differed significantly between departments of the hospital as well.
- The results provide the most complete available information on the attitudes and experiences of the staff about safety culture in hospitals.
- Creating a positive patient safety culture by implementing actions that support all dimensions of safety culture is inevitable.

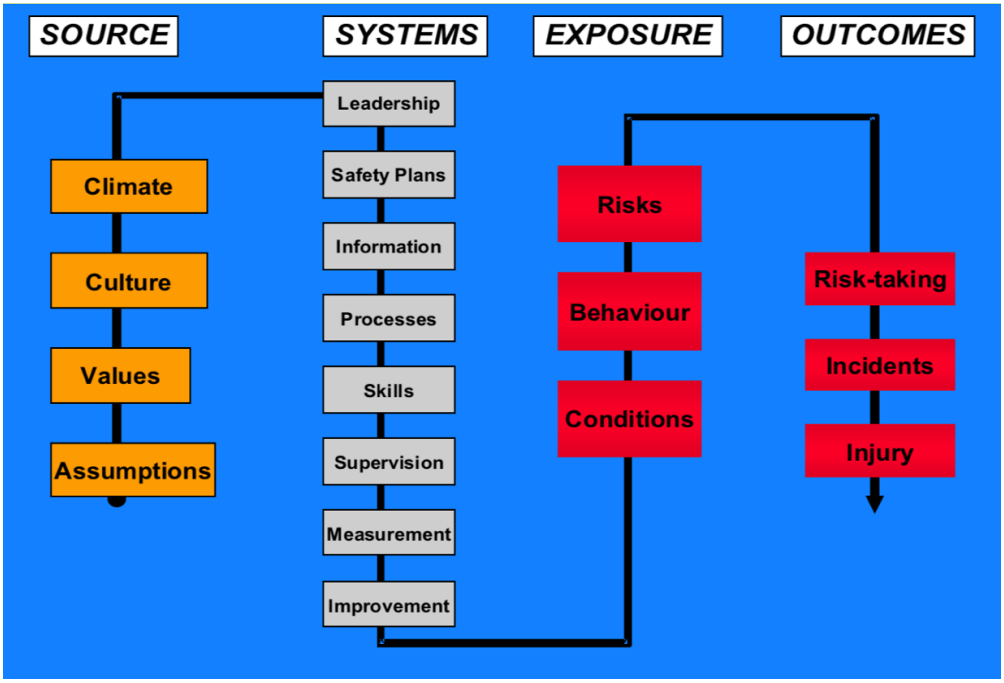

Figure 6.7 – Safety Culture Process

6.5 RECOMMENDATIONS

Table 6.9 –Recommendations for The Weaker Composites

Composites	Recommendations
Punitive Response to Error	Awareness and training of error handling Positive reinforcement No Blame Culture
Frequency of Events Reported	Anonymous system Completely online Central reporting
Staffing	Stress handling Overlapping shifts Skills training

Post implementation projection

Implementing the suggested recommendations can increase the weighted average of the three weaker composites, raising the overall hospital weighted average from 3.6 to 3.9 which is close to the acceptable level of 4.

Table 6.10 –Post Recommendation Implementation Projection for Composites

Composites	Pre	Post	Difference
Teamwork Within Units	4.1	4.1	0.0
Organizational Learning	4.1	4.1	0.0
Error Communication	3.9	3.9	0.0
Management Support	3.9	3.9	0.0
Handoffs	3.9	3.9	0.0
Communication Openness	3.8	3.8	0.0
Manager Expectations & Actions	3.7	3.7	0.0
Teamwork Across Units	3.7	3.7	0.0
Safety Perception	3.5	3.5	0.0
Events Reporting	**3.0**	**4**	**1.0**
Staffing	**2.8**	**4**	**1.2**
Error Response	**2.7**	**4**	**1.3**
Total	**3.6**	**3.9**	**0.3**

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