

# **DISSERTATION**

## **P. D. HINDUJA HOSPITAL** **MUMBAI**

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# **EVALUATION OF HOSPITAL SAFETY STATUS**

**(A) Hospital Safety Index Assessment**

**(B) Hospital Safety Culture Survey**

# CONTEXT

- The condition of being protected from harm or other non-desirable outcomes.
- The control of recognised hazards in order to achieve an acceptable level of risk.



- 70 year old construction
- Peculiar shape
- Close to the sea
- HVA analysis by an older method
- High Employee retention
- Strong sense of culture

# IMPORTANCE

|               |                                                                                                                 |
|---------------|-----------------------------------------------------------------------------------------------------------------|
| POLITICAL     | Occupied round-the-clock by the most vulnerable population. Safe hospitals act passed in the USA in Jan 2019    |
| ECONOMIC      | High density of expensive equipment, remain functional to stimulate economic recovery and encourage investment. |
| SOCIAL        | Hospitals have a unique symbolic value for communities.                                                         |
| TECHNOLOGICAL | The right technology can make the hospital structurally and functionally more equipped to deal with disasters.  |
| ENVIRONMENTAL | Hospitals are essential for the surveillance and control of potential outbreaks of disease.                     |
| LEGAL         | National hospital safety programs for awareness and initiative can help in making hospitals a more safe place   |

## **AIM**

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

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

**(A)**

**ASSESSMENT OF  
HOSPITAL SAFETY INDEX  
(HSI)**

# **OBJECTIVES**

- 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

## HSI TOOL

- Rapid and low-cost diagnostic tool for making technical assessments
- Focus on prevention and preparedness
- Used by more than 3500 facilities across countries
- Overcomes the shortcomings of the traditional evaluation methods
- Allows comparison with hospitals across countries

# 150 ITEM CHECKLIST SPREAD OVER 4 MODULES

|   | Module                            | Nature       | Assessment                         |
|---|-----------------------------------|--------------|------------------------------------|
| 0 | External Environmental Hazards    | Qualitative  | Not Considered for the Final Index |
| 1 | Structural Safety                 | Quantitative | Considered for the Final Index     |
| 2 | Non - Structural Safety           |              |                                    |
| 3 | Emergency and Disaster Management |              |                                    |

# **METHODOLOGY / APPROACH**

**Study Design:** Descriptive Observational Study

**Data collection :**

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

**Data analysis :** HSI Calculator workbook

| Elements                                           | Primary Resopondent                         |
|----------------------------------------------------|---------------------------------------------|
| Building integrity                                 | Mr. Umesh Sawant /<br>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                              |                                             |

| Module                                         | Safety Elements                                                  | Number of items | Section weight (%) | Module Weight |
|------------------------------------------------|------------------------------------------------------------------|-----------------|--------------------|---------------|
| MODULE 1:<br>Structural Safety                 | 2.1 Prior events and hazards affecting building safety           | 3               | 25                 | 50%           |
|                                                | 2.2 Building integrity                                           | 15              | 75                 |               |
| MODULE 2:<br>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                  |               |
|                                                | <b>3.3.3 Water supply system</b>                                 | <b>6</b>        | <b>10</b>          |               |
|                                                | 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:<br>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%          |

| Module                                               | Safety Elements                                                  | Number of items |         |      | Weighted contribution to module |             |          |
|------------------------------------------------------|------------------------------------------------------------------|-----------------|---------|------|---------------------------------|-------------|----------|
|                                                      |                                                                  | Low             | Average | High | Low (%)                         | Average (%) | High (%) |
| MODULE 1:<br>Structural<br>Safety                    | 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     |
| MODULE 2:<br>Non-<br>Structural<br>safety            | 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     |
| MODULE 3:<br>Emergency<br>and disaster<br>management | 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     |

## RESULT - SUMMARY OF SCORES

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

|                       | Low Safety | Average Safety | High Safety |
|-----------------------|------------|----------------|-------------|
| 1 - Structural safety | 6          | 65.2           | 28.8        |
| Horizontal weight     | 0.25       | 0.5            | 1           |

$$\begin{aligned}
 \text{Range} &= \text{Upper Horizontal Weight} - \text{Lower Horizontal Weight} \\
 &= 1 - 0.25 \\
 &= 0.75
 \end{aligned}$$

$$\begin{aligned}
 \text{Crude Safety index (structural)} &= \frac{(6 \times 0.25) + (65.2 \times 0.5) + (28.8 \times 1)}{100} \\
 &= 0.63
 \end{aligned}$$

| MODULE                          | Crude safety index | Safety index | Vulnerability index | Safety Grade |
|---------------------------------|--------------------|--------------|---------------------|--------------|
| Structural safety               | 0.63               | 0.51         | 0.49                | B            |
| Non-structural safety           | 0.71               | 0.61         | 0.39                | B            |
| Emergency / disaster management | 0.68               | 0.58         | 0.42                | B            |

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

Vulnerability index =  $1 - \text{Safety Index}$

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

**Overall Hospital Safety Index = 0.55**

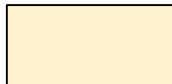
**Overall Hospital Safety Grade = B**

| 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. |

# RECOMMENDATIONS

- 13 / 150 items scored Low

| ITEM                                     | CURRENT                                                             | STANDARD                                                                                           |
|------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Internal communications systems          | only 1 alternative communication                                    | More than 2 alternative communication sysstem, including a wireless and and additional PAS         |
| Medical gases                            | own oxygen plant not available                                      | Ensure supply for at least 15 days                                                                 |
| Disaster management Cell                 | no dedicated space                                                  | Atleast 1 room with enough sapce to accomodate 5 individuals with access to all emergency controls |
| Financial resources for emergencies      | no ear marked budget / funds                                        | Sufficient budget to cover atleast 72 hours                                                        |
| Conditions outside the hospital building | dedicated triage space not available                                | Dedicated triage space                                                                             |
| Hospital access routes                   | width allows 1 ambulances and pedestrains to enter at the same time | Enough width to allow 2 ambulances and pedestrains to enter at the same time                       |



Low to High



Low to Average

# POST IMPLEMENTATION PROJECTION

| 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    |

**(B)**

**SURVEY OF  
HOSPITAL SAFETY  
CULTRE**

# **OBJECTIVES**

- 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.

# TOOL

- Standardized pre-validated AHRQ tool was used after obtaining the required permission from the agency.
- AHRQ Database that has results from 630 hospitals across nations as of 2018.
- The tool is a 5 point Likert scale of 44 items that have been grouped into 12 composite measures.
- Asked to express level of agreement / disagreement to statements.

# **APPROACH**

**Study Design:** Descriptive Observational Study

## **DATA COLLECTION**

- Web plus paper based survey
- English and Marathi versions
- Convenience (quota) sampling across clinicians, managers, technicians, attendants of various departments.
- Study Sample Size of 300

## **SAMPLING**

- Margin of error: 5%
- Confidence interval: 95%
- Hinduja staff : 2500
- Response distribution: 50%
- Ideal sample size: 333

# DATA ANALYSIS

- In Microsoft Excel 2018
- Negatively worded questions were reverse coded.
- Composite analysis in terms of average percent positive response
- Compared with AHRQ Database
- Departmental analysis in terms of weighted average

# Summary of the Composites for the Hospital

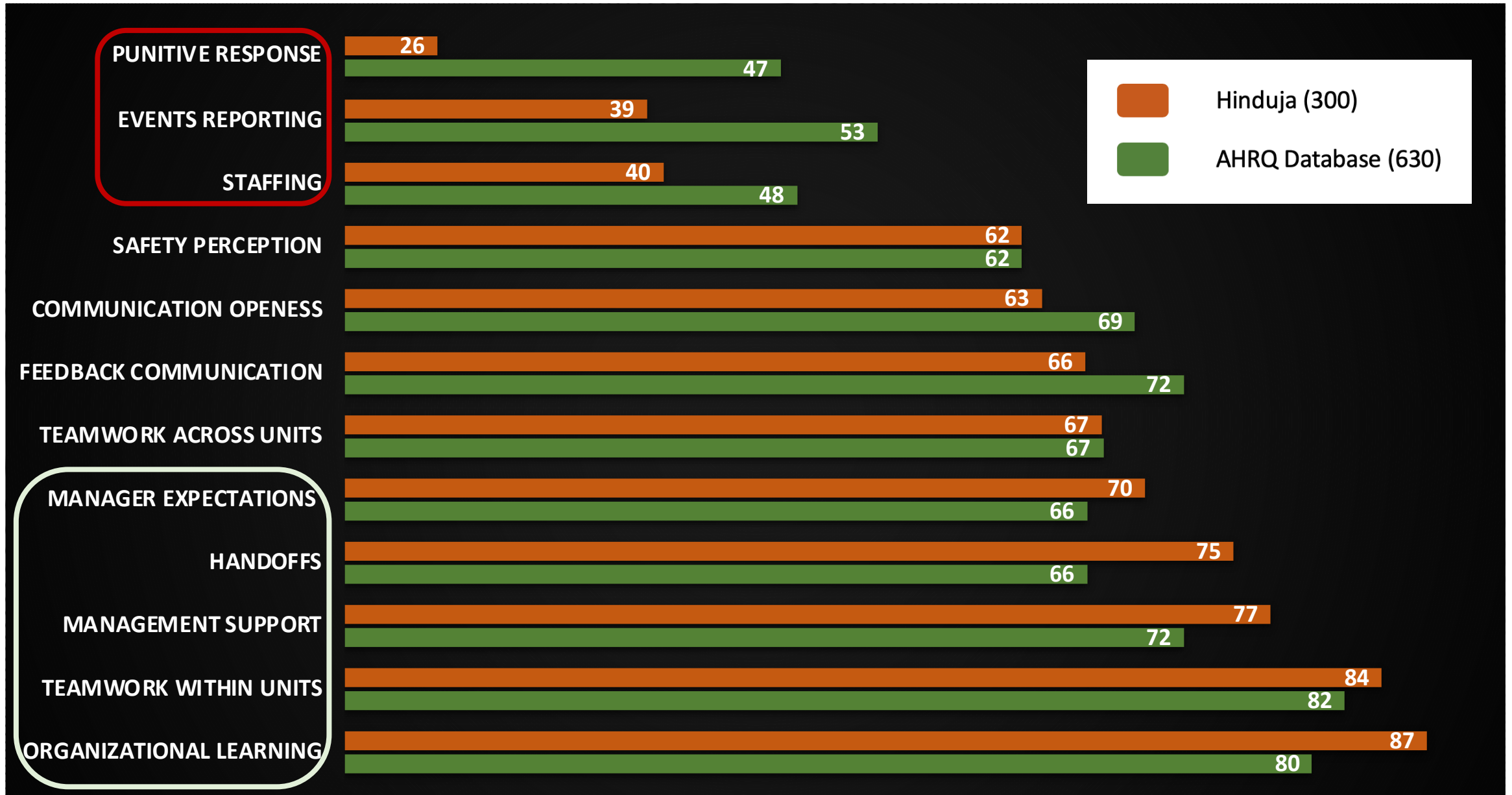
| COMPOSITES                        | Positive (%) | Neutral (%) | Negative (%) | GUIDELINE        | Recommendation                     |
|-----------------------------------|--------------|-------------|--------------|------------------|------------------------------------|
| <b>PUNITIVE RESPONSE</b>          | <b>26</b>    | <b>27</b>   | <b>48</b>    | <b>&lt; 50 %</b> | prompt action<br>required          |
| <b>EVENTS REPORTING FREQUENCY</b> | <b>39</b>    | <b>20</b>   | <b>41</b>    |                  |                                    |
| <b>STAFFING</b>                   | <b>40</b>    | <b>13</b>   | <b>47</b>    |                  |                                    |
| SAFETY PERCEPTION                 | 62           | 13          | 25           | 51- 75%          | actions required<br>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<br>actions        |
| MANAGEMENT SUPPORT                | 77           | 13          | 10           |                  |                                    |
| TEAMWORK WITHIN UNITS             | 84           | 8           | 7            |                  |                                    |
| ORGANIZATIONAL LEARNING           | 87           | 7           | 5            |                  |                                    |

Note : Percent Responses range from 1 (least) to 100 (highest)

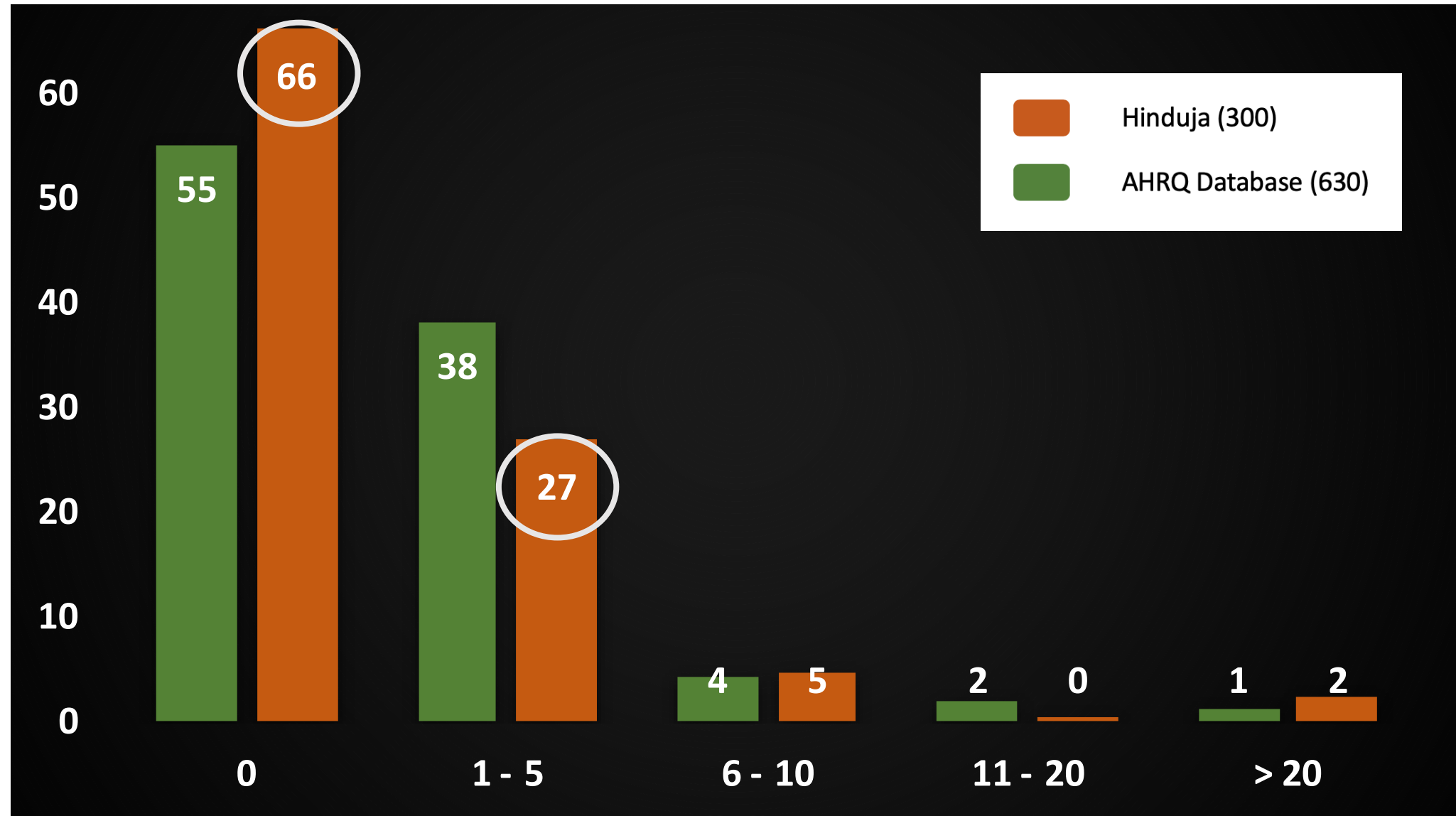
# Concern Areas

| COMPOSITES                      | QUESTIONS                                                         |
|---------------------------------|-------------------------------------------------------------------|
| Punitive<br>Response to Error   | It feels like the person is being written up, not the problem     |
|                                 | Staff feel like their mistakes are held against them / remembered |
| Frequency of<br>Events Reported | A mistake is caught and corrected before affecting the patient    |
|                                 | A mistake that has no potential to harm the patient               |
|                                 | A mistake that could harm the patient, but does not               |
| Staffing                        | Not enough staff to handle the workload                           |
|                                 | Trying to do too much, too quickly                                |
|                                 | Staff work longer hours than is best for them                     |

# Comparative Average % Positive Responses



# Comparative No. of Events Reported in Last Year (%)

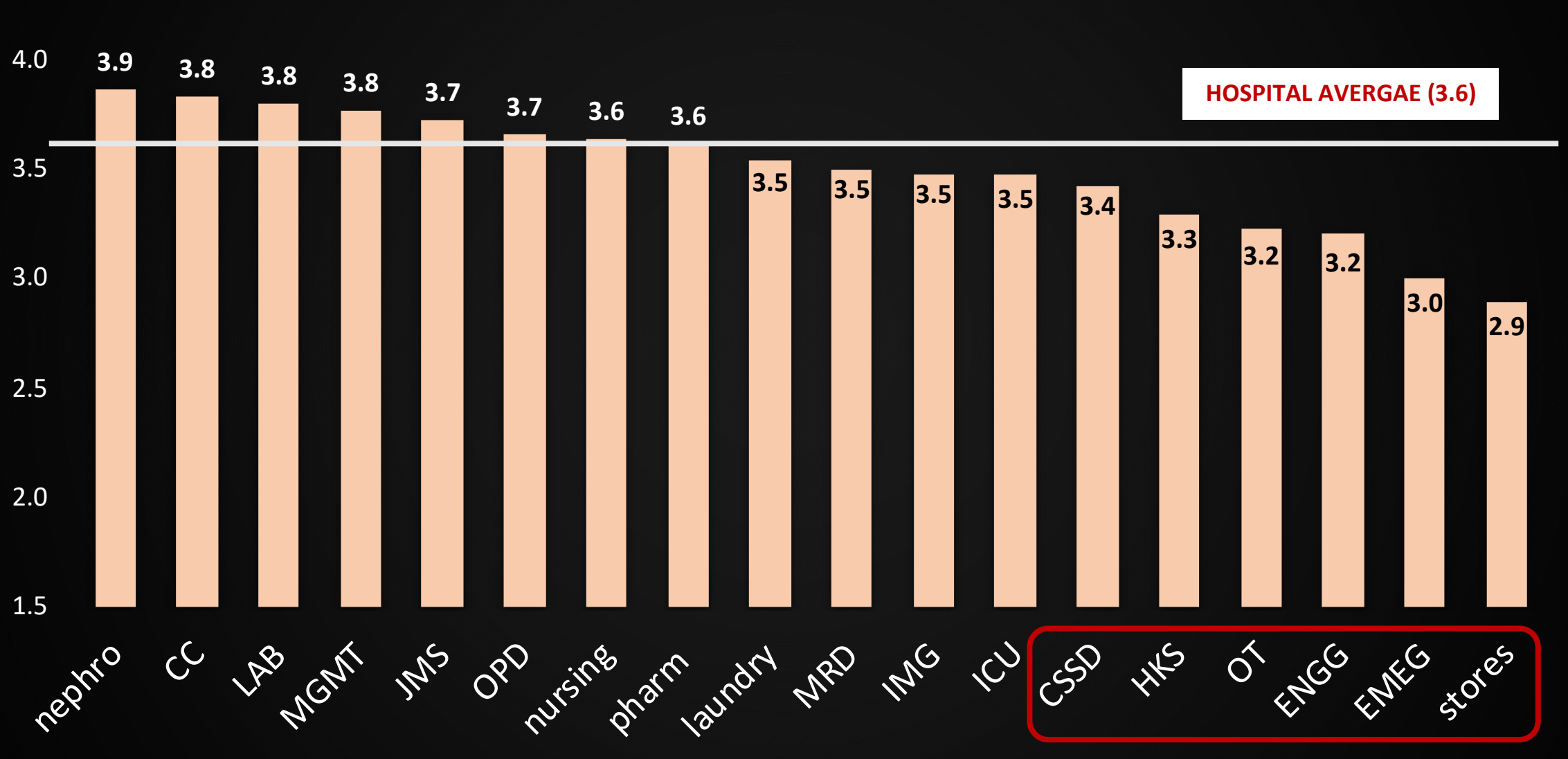


Note : Percent Responses range from 1 (least) to 100 (highest)

# HOSPITAL WIDE RECOMMENDATIONS

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

# Departmental Comparison on Weighted Average



Note : Weighted Average ranges from 1 (least) to 5 (highest)

# Departmental Performance on 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)            |

Note : Weighted Average ranges from 1 (least) to 5 (highest)

# DEPARTMENTAL RECOMMENDATIONS

|              | 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                   |
| ENG G (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                   |

 Weaker areas

Note : Weighted Average ranges from 1 (least) to 5 (highest)

# **LIMITATIONS**

- Limited access to confidential documents.
- Departments like Security and Food Services could not be included in the study, as response were not received in time.

# **CONCLUSION**

- Protecting hospitals from the avoidable consequences of disasters, is not only essential to meeting the Millennium Development Goals, but also a social and political necessity.
- Although the financial investment can be high, the cost of ignoring the risks can be much higher.
- Creating a positive patient safety culture by implementing actions that support all dimensions of safety culture is inevitable.

# REFERENCES

## 1. Hospital Safety Index

Hospital Safety Index: Guide For Evaluators, 2nd Edition, Switzerland, World Health Organization and Pan American Health Organization, 2015

[https://www.who.int/hac/techguidance/hospital\\_safety\\_index\\_evaluators.pdf](https://www.who.int/hac/techguidance/hospital_safety_index_evaluators.pdf)

## 2. Hospital Safety Culture Survey

Sorra J, Gray L, Streagle S, et al. AHRQ Hospital Survey on Patient Safety Culture: User's Guide. (Prepared by Westat, under Contract No. HHSA290201300003C). AHRQ Publication No. 18-0036-EF (Replaces 04-0041, 15(16)-0049-EF). Rockville, MD: Agency for Healthcare Research and Quality. July 2018.

<https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patientsafety/patientsafetyculture/hospital/userguide/hospcult.pdf>

**Better  
safe,**



**than  
sorry.**

**THANK  
YOU!!**