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Safety Climate Perceptions in Clinical Microsystems: Survey of Frontline Healthcare Providers in an Accredited Indian Hospital

Anupama Shetty
([)School of Health Systems Studies, Tata Institute of Social Sciences, India)

Abstract:*Safety climate, as a subset ofsafety culture, refers to the perceptions and attitudes about safety as an integral part of the work environment. Several studies and surveys have attempted to measure aspects of culture or climate in healthcare organizations and assess the extent to which safety was a strategic priority. In the Indian context, while studies have focused on clinical parameters as an index of patient safety, there has been lack of research on wider systemic issues such as the culture or climate of patient safety. This study is a baseline survey of frontline healthcare providers and administrative staff across multiple clinical units in an accredited hospital. Variations were found for the safety climate items across the clinical units, professions as well as based on experience. Staff nurses differed significantly in their perception of constant emphasis on safety in their units and belief in a nonpunitive culture. Staff with less than a year of experience showed lower perception of being encouraged to report safety concerns, belief in non-punitive systems as well as constant emphasis on safety. The areas of strength includedrespect for safety guidelines, importance of handovers and knowledge of reporting channels. Areas with potential for improvement included clinical leadership of consultants, multi-disciplinary briefings in units and the need for a non-punitive culture.*

Keywords: *Patient safety culture, Safety climate, Developing countries, Clinical microsystems,*

I. Introduction

The concept of safety culture has been embraced by a diverse range of high-risk industries such as aviation, nuclear power, and chemical engineering, wherein safety is a top priority and safety checks have been integrated into all organizational activities[1]. In healthcare, the relevance of safety culture in improving patient safety has been highlighted in several acclaimed reports[2, 3]. Patient safety culture is increasingly viewed as central to making hospitals high-reliability organizations[4].

Safety culture has been defined as 'a global phenomenon and encompasses the norms, values and basic assumptions of an entire organization'[5].Safety culture has also been hypothesized to operate on a number of organizational levels. In addition to the global safety culture of the organization, unique cultures can exist at individual work-sites, and for individual departments or work-groups[6]. Safety climate refers to the perceptions and attitudes about safety as an integral part of the work environment[7]. The main difference in the definitions are that where safety culture is characterized by shared underlying beliefs, values, and attitudes toward work and the organization in general, safety climate appears to be closer to operations, and is characterized by day-to-day perceptions towards the working environment, working practice, organizational policies, and management. Thereby safety climate has a narrower focus than safety culture[6].

Studies assessing the safety culture or climate in healthcare organizations have been carried out in various developed and developing countries; in hospital settings, nursing homes as well as primary healthcare settings ([8-11]. Factors including administrative support, leadership, communication and need for a non-punitive culture encouraging error reporting was seen to influence safety culture in most studies. In the Indian context, while studies have focused on clinical parameters as an index of patient safety, there has been lack of research on wider systemic issues such as the culture of patient safety.

Reliable and validated surveys, frameworks and assessment tools have been developed in order to understand the patient safety culture in organizations and whether the organizations are amenable to safety interventions [12-15]. Tools such as the Safety Attitudes Questionnaire (SAQ) have been adapted from other fields such as aviation[16]. Other tools used include, Hospital Survey on Patient Safety Culture (HOSPC)[17], Safety Climate Scale (SCSc) [15]and the Teamwork and Patient Safety Attitudes Questionnaire [18] amongst others. For the current study the Safety Climate Survey (SCS) a shortened version of the SAQ has been used[19]. It consists of 21 questions which primarily measure management and institutional commitment to safety. It has been used in several studies to assess the safety climate[20, 21]. It has good reliability and validity and has elicited high response rates[22]. Building on the systems perspective, the research has used the concept of clinical microsystems to explore safety climate at multiple subsystem levels. The clinical microsystem can be defined as 'small organized groups of providers and staff caring for a defined population of patients'[23].

II. Aims Or Objectives

The objective of the study was to explore factors influencing the safety climate at multiple subsystem levels in the healthcare organization (HCO). This was part of a larger study exploring strategic change in HCO's with adoption of accreditation.

III. Methods

The study was conducted in an accredited 110-bedded secondary care hospital, across the ICU's, in-patient units, the operation theatre as well as the Casualty, which represented the clinical microsystems. Purposive sampling was used to survey a wide range of healthcare providers. All consultants, Resident Medical Officer's (RMOs), Casualty Medical Officer's (CMOs), staff nurses, nursing executives & managers, clinical administrators, and paraclinical staff(physiotherapists, dieticians, radiology technicians) were invited to complete the survey. Exclusion criteria included non-clinical staff and out-sourced staff. The criteria matched the guidelines given by the authors who developed and validated the survey[16]. The questionnaire was numbered and coded prior to distribution. Prior to administration of the survey, an explanatory note by the CEO detailing the purpose of the survey was elicited by the researcher. This letter was included in all the survey packages which were given to the respondents. The survey package (which included an envelope, the survey, explanatory note and a pencil) was also provided to consultants and staff nurses by hand at the study site. The purpose of the study was explained as well as the fact that participation was voluntary and confidential. This method has been seen to generate a 60-70 per cent response rate[24]. The consultants were asked to handover the completed survey pack to the OPD manager, while staff nurses were asked to handover to the unit nursing – in-charge. The survey package was also administered to nursing respondents during planned meetings. These meetings were training sessions which were held for the afternoon and morning shift nurses every day. The purpose of the study was explained as well as the fact that participation was voluntary and confidential. This method was used specifically for staff nurses since it ensured larger numbers and has also been seen to generate a 90% response rate[24]. All survey items in the SCS were entered into Excel. Numerical scores were given according to the likert scale code chosen by the respondent. Negatively worded questions were reverse coded. Excel-based tool was used for calculating basic demographics as well as the safety climate mean and scale. This was done as per guidelines provided by the authors. Further analysis for aggregate of responses and comparison across groups was done using SPSS (version 20 for Windows). Cronbach's alpha had been conducted previously, and the internal consistency was found to be 0.84 for the safety climate domain items which was considered satisfactory.

IV. Results

101 respondents participated in the survey. The overall response rate was 60.8% (101/166). By job category the response rates were as follows: nurses 55.2% (59/107), consultants 62.2 % (28/45), allied health professionals 100% (5/5) and managers 100% (9/9). Overall, 100% of the nursing, managerial and paraclinical staff were full-time staff and worked rotating shifts. The overall response rate was more than case A and could be attributed to the fact that being a smaller hospital, it had been easier to solicit participation. Respondent characteristics are shown in Table 1. As expected, majority of the respondents were staff nurses (58.4%). The consultants and registrars made up for 27.7% of respondents. The allied health professionals (5%) included the technicians in imaging, OT as well as physiotherapists and formed the smallest category. The managers (8.9%) included the nursing executives and managers as well as hospital administrators. Unit-wise distribution shows that majority of the respondents belonged to the wards or in-patient department (44.6%) which is expected since majority of the staff are attached to in-patient units. There was lower representation from casualty (12.9%) and ICU (18.8%). Table 20 finds a significant percentage of the respondents had less than a year of experience in the hospital (43.6%). This is due to the fact that majority of the respondents were nurses who had joined the hospital the preceding year. The organization was facing high attrition amongst the nurses as well as Registrar's. This is however offset by almost 55% of the respondents having 1 to 8 years of experience in the hospital. It can be assumed that majority of the respondents have adequate experience in the organization to comment on the safety climate.

Table 1: Respondent demographics

Job Position	**Frequency**	**Percent**
Consultant	28	27.7
Staff Nurse	59	58.4
Managers	9	8.9
Allied Health Professionals	5	5
Total	101	100
Unit type		
Casualty	13	12.9

IPD		45		44.6
OT		24		23.8
ICU		19		18.8
Total		101		100
Job Position versus Experience in Organization				
Job Position	**less than 1 year**	**1 to 2 years**	**3 to 7 years**	**8 to 12 years**
Consultant	5	5	15	3
Staff Nurse	37	15	7	0
Managers	2	2	2	3
Allied Health Professionals	0	2	2	1
Total	44 (43.6%)	24(23.8%)	26(25.7%)	7(6.9%)

V. Safety Climate Domain

The SCS measures the safety climate domain predominantly. The Safety climate domain of an organization relates to two issues: the strength; and the proactive commitment towards patient safety. The strength includes the way patient safety issues and adverse events are reported, managed and responded to. The proactive commitment relates to the attributes of the leaders within the organization to patient safety. The safety climate domain is measured by eight questions which examine how medical errors are handled, discussed and responded to and the level of feedback that clinicians receive. It was calculated as per guidelines given by authors of the SCS[25]. Overall 40.5 % of respondents reported a positive safety climate score. . The safety climate score was also calculated for the clinical units in a similar manner (Fig. 1). The safety climate score is the least in ICU, with 26.3% of respondents reporting a safety climate score above 75%. IPD also finds a low score (34.7%) followed by Casualty (41.2%) and OT (54.2%). Apart from this method of computing safety climate domain, the overall score for safety climate domain was also calculated using SPSS. The aggregate for positive scores, or the those who had scored 4 and 5 for the safety climate items was computed. Previous studies using the SCS or the longer version SAQ, have used both mean of responses as well as the aggregate of responses[15, 16]. The safety climate score in the study is low in comparison to international studies[16] on safety climate (Fig.2).

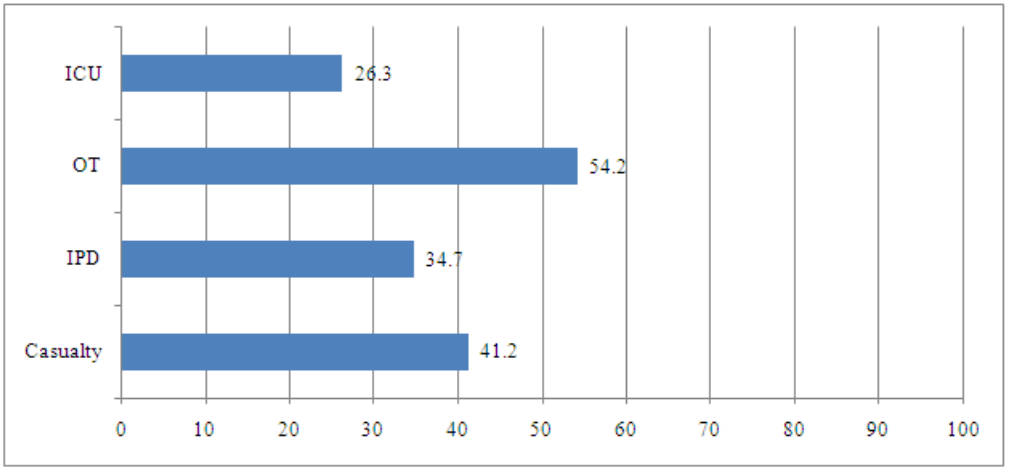

Figure 1: Unit-wise Safety Climate Domain

Table 2 : Safety Climate Domain using percentage positive responses

Safety Climate survey items	**Casualty**	**In- patient**	**ICU**	**OT**	**Overall**
1. The culture of this clinical area makes it easy to learn from the mistakes of others.	61.5%	40.0%	66.7%	52.6%	**51.5%**
2. Medical errors are handled appropriately in this clinical area.	61.5%	64.4%	62.5%	73.7%	**65.3%**
8. I am encouraged by my colleagues to report any safety concerns I may have.	76.9%	51.1%	58.3%	47.4%	**55.4%**
9. I know the proper channels to direct questions regarding patient safety.	84.6%	66.7%	87.5%	52.6%	**71.3%**
10. I receive appropriate feedback about my performance	69.2%	60.0%	62.5%	57.9%	**61.4%**
11. I would feel safe being treated here as a patient.	76.9%	82.2%	83.3%	73.7%	**80.2%**
18. Personnel frequently disregard rules or guidelines that are established for this clinical area.*	100.0%	80.0%	95.8%	94.7%	**89.1%**

*reverse scored

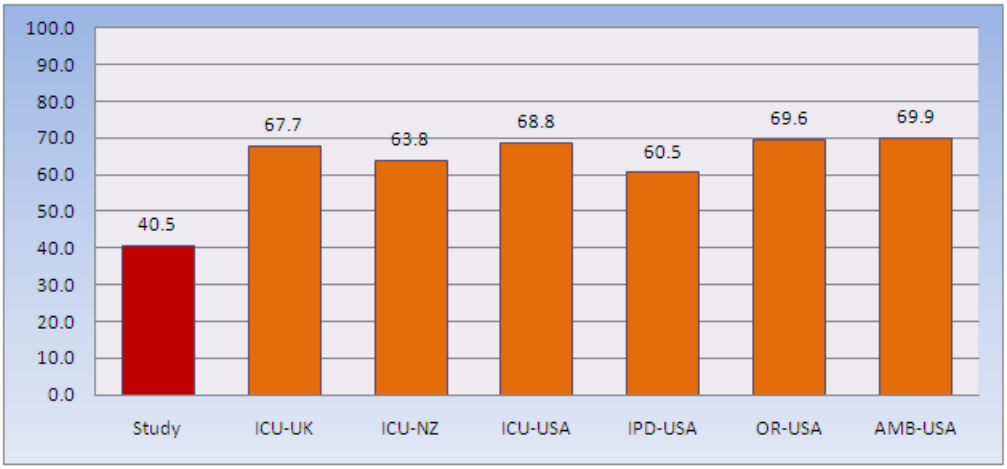

Figure 2: Comparison of safety climate score across international surveys

1.1 Descriptive analysis of the Safety Climate Survey items

The analysis of the Safety Climate Survey items (Table 3) included aggregating the responses into percentage agreeing or Positive percent (which was the aggregate of Likert Responses ' Agree Slightly' and 'Agree Strongly') and percentage disagreeing or Negative percent (which was the aggregate of Likert Responses ' Disagree Slightly' and "Disagree Strongly"). In addition, neutral responses, mean of the responses with standard deviation as well as missing values have been included. Most studies using the SCS have used either the percentage of positive responses [15, 24] or mean of the responses [21] in interpreting the data. The differences in scale scores based on experience and between professional groups were explored using Kruskal Wallis test. The test would be considered significant at the $p \leq 0.05$ level.

Table 3 is a descriptive analysis of the survey while Table 4 and Table 5 list the top five and bottom five items in terms of responses. Based on mean scores, there is overall high agreement among respondents that staff would not disregard rules or guidelines in the clinical areas (mean=4.50, SD=0.687). Other survey items which had high agreement included perception of feeling safe if treated as a patient in the organization (mean=4.11, SD= 0.781), perception of briefing or "handovers" between shifts (mean= 4.24, SD= 0.778) as well as knowledge of channels to report safety events (mean= 4.02, SD= 0.808). Comparison across clinical units reveals these scores to be highest in Casualty and IPD.

Low scores are found for perception of safety concerns being heard by the management (mean= 3.53, SD= 0.936) as well as perception of multi-disciplinary briefings (mean= 3.55, SD= 0.950). Low scores were also found for perception of leadership driving safety efforts (mean=3.7, SD= 0.849) as well as belief in a non-punitive system (mean= 3.56, SD= 1.066). Comparison across clinical units based on mean scores reveal these scores were lowest in ICU.

Table 3: Descriptive analysis of Safety Climate Survey

Safety Climate survey items	Positive Percent	Negative Percent	Neutral (%)	Mean (SD)	Missing*
1. The culture of this clinical area makes it easy to learn from the mistakes of others.	51.5	15.8	32.7	3.62 (1.066)	2
2. Medical errors are handled appropriately in this clinical area.	65.3	5.9	28.7	3.83 (0.812)	7
3. The senior leaders in my hospital listen to me and care about my concerns.	61.4	11.9	26.7	3.74 (1.026)	0
4. The physician and nurse leaders in my areas listen to me and care about my concerns.	64.4	5	28.7	3.84 (0.842)	2
5. Leadership is driving us to be a safety-centered institution.	54.5	5	37.6	3.71 (0.849)	3
6. My suggestions about safety would be acted upon if I expressed them to management.	46.5	12.9	36.6	3.53 (0.936)	4
7. Management/leadership does not knowingly compromise safety concerns for productivity.	65.3	13.9	18.8	3.78 (1.074)	2
8. I am encouraged by my colleagues to report any safety concerns I may have.	55.4	13.9	29.7	3.58 (0.987)	1
9. I know the proper channels to direct questions regarding patient safety.	71.3	3	20.7	4.02 (0.808)	5
10. I receive appropriate feedback about my performance	61.4	10.9	25.7	3.64 (0.909)	2
11. I would feel safe being treated here as a patient.	80.2	2	15.8	4.11 (0.781)	2
12. Briefing personnel before the start of a shift (i.e., to plan for possible contingencies) is an important part of safety.	77.2	1	16.8	4.24 (0.778)	5
13. Briefings are common here.	48.5	11.9	34.6	3.55 (0.950)	5

14.1. I am satisfied with the availability of clinical leadership of Consultants	53.4	11.9	29.7	3.56 (0.904)	5
14.2 I am satisfied with the availability of clinical leadership of Staff Nurses	65.3	5	24.7	3.89 (0.844)	5
14.3 I am satisfied with the availability of clinical leadership of Allied Health Professionals*	48.5	13.9	28.7	3.55 (0.953)	9
15. This institution is doing more for patient safety now, than it did one year ago.	61.4	6.9	27.7	3.84 (0.909)	4
16. I believe that most adverse events occur as a result of multiple system failures, and are not attributable to one individual's actions.	54.5	19.7	22.8	3.56 (1.066)	3
17. The personnel in this clinical area take responsibility for patient safety	73.3	3	19.7	4.05 (0.808)	4
18. Staff frequently disregard rules or guidelines that are established for this clinical area**	0	89.1	10.9	4.50 (0.687)	0
19. Patient safety is constantly reinforced as the priority in this clinical area.	63.4	7.9	27.7	3.83 (1.074)	1

*= value in units

**= negatively worded item

Table 4: Top 5 performing items

Item	Mean (SD)	Percent Positive	Percent Negative	Neutral	Missing
18. Staff frequently disregard rules or guidelines that are established for this clinical area**	4.50 (0.687)	89.1	0	10.9	0
12. Briefing staff on handovers before the start of a shift (i.e. to plan for possible contingencies) is an important part of safety.	4.24 (0.778)	77.2	1	16.8	5
11. I would feel safe being treated here as a patient.	4.11 (0.781)	80.2	2	15.8	2
17. The staff in this clinical area takes responsibility for patient safety.	4.05 (0.808)	73.3	3	19.7	4
9. I know the proper channels to direct questions regarding patient safety.	4.02 (0.808)	71.3	3	20.7	5

Table 5: Bottom 5 performing items

Item	Mean (SD)	Percent Positive	Percent Negative	Neutral	Missing
6. My suggestions about safety would be acted upon if I expressed them to management.	3.53 (0.936)	46.5	12.9	36.6	4
13. Briefings are common here.	3.55 (0.950)	48.5	11.9	34.6	5
14.1 I am satisfied with the availability of clinical leadership in Consultants*	3.56 (0.904)	53.4	11.9	29.7	5
16. I believe that most adverse events occur as a result of multiple system failures, and are not attributable to one individual's actions.*	3.56 (1.066)	54.5	19.7	22.8	3
8. I am encouraged by my colleagues to report any safety concerns I may have.	3.58 (0.987)	55.4	13.9	29.7	1
1. The culture of this clinical area makes it easy to learn from the mistakes of others	3.62 (1.066)	51.5	15.8	32.7	0
5. Leadership is driving us to be a safety-centered institution.*	3.71 (0.849)	54.5	5	37.6	3

*share same values for mean

1.2 Profession wise analysis:

Mean scores across professional categories (Table 7) reveal managers had higher scores for most items compared to other professionals. Managers however show low scores for perception of clinical leadership of consultants as well as allied health professionals (mean= 3.29, SD= 0.756). Lower scores were also seen for staff nurses perception of a non-punitive system (mean=3.32, SD=1.055), consultants perception of feedback on their performance (mean=3.26, SD= 1.032) as well as multi-disciplinary briefings (mean= 3.38, SD= 1.023).

The Kruskal-Wallis H test across professional groups showed statistically significant difference in perception of multi-disciplinary briefings $\chi 2$ (3) = 10.68, $p \leq 0.05$, perception of non-punitive systems $\chi 2$ (3) = 9.25, $p \leq 0.05$ and perception of constant emphasis on safety $\chi 2$ (3) = 11.24, $p \leq 0.05$. Post hoc analysis was done using Mann Whitney U test. The following assumptions were satisfied-

1. The dependent variable which is measured at the ordinal level.
2. The independent variable consists of two categorical, independent groups. In this instance, the test was run group-wise for intergroup comparisons.
3. Independence of observations- no relationship between each group in the independent variable
4. Distribution of scores for both groups may have the same shape or different shape. In this instance, the test compared the mean ranks of the distribution of scores.

From the data it could be concluded that the perception of multi-disciplinary briefings was statistically significantly lower in allied health professionals compared to the Managers (U = 1.5, p = 0.005) as well as staff nurses (U = 54, p = 0.018). The perception of non-punitive systems was statistically lower in staff nurse compared to Managers (U = 118, p = 0.007). The perception of constant emphasis on safety was also statistically lower in staff nurses compared to Consultants (U = 582, p = 0.037) and Managers (U = 125, p = 0.008).

4.4 Unit wise analysis

The Kruskal-Wallis H test across the clinical units (Table 6) showed statistically significant difference in the perception that suggestions about safety would be acted upon by the management $\chi 2$ (3) = 8.919, $p \leq 0.05$), belief in non-punitive systems ($\chi 2$ (3) = 10.022, $p \leq 0.05$) as well as the perception that staff takes responsibility for patient safety $\chi 2$ (3) = 8.875, $p \leq 0.05$. Post hoc analysis was done using Mann Whitney U test, which allowed for comparison across the groups. From the data it could be concluded that the perception of suggestions being acted on by management was significantly lower in ICU compared to OT (U = 124, p = 0.009), while the belief in non-punitive systems was also significantly lower in ICU compared to OT (U = 132.5, p = 0.04) , IPD (U = 195, p = 0.003) and Casualty(U = 52, p = 0.014). Similarly, the perception of staff taking responsibility in their unit was significantly lower in ICU compared to Casualty (U = 64.5, p = 0.02), IPD (U = 240, p = 0.01) and OT (U = 134, p = 0.01).

Table 6: Survey items across clinical units

Safety Climate Items	**UNITS (mean /SD)**			
	Casualty	**IPD**	**OT**	**ICU**
1. The culture of this clinical area makes it easy to learn from the mistakes of others.	3.62 (0.768)	3.43 (1.087)	4.00 (1.180)	3.56 (0.984)
2. Medical errors are handled appropriately in this clinical area.	3.91(0.944)	3.77 (0.774)	3.86 (0.910)	3.89 (0.758)
3. The senior leaders in my hospital listen to me and care about my concerns.	3.69 (0.947)	3.78 (1.042)	3.63 (1.209)	3.84 (0.834)
4. The physician and nurse leaders in my areas listen to me and care about my concerns.	3.83 (0.718)	3.70 (0.930)	4.17 (0.761)	3.74 (0.733)
5. Leadership is driving us to be a safety-centered institution.	4.08 (1.038)	3.74 (0.848)	3.74 (0.810)	3.37 (0.684)
6. My suggestions about safety would be acted upon if I expressed them to management.	3.75 (0.866)	3.48 (0.862)	3.88 (0.947)	3.05 (0.970)
7. Management/leadership does not knowingly compromise safety concerns for productivity.	4.15 (0.899)	3.80 (0.954)	3.50 (1.285)	3.83 (1.150)
8. I am encouraged by my colleagues to report any safety concerns I may have.	4.00 (1.080)	3.59 (0.757)	3.46 (1.250)	3.42 (1.017)
9. I know the proper channels to direct questions regarding patient safety.	4.50 (.674)	3.93 (0.685)	4.29 (0.806)	3.58 (0.902)
10. I receive appropriate feedback about my performance	3.92 (.900)	3.73 (0.899)	3.50 (0.978)	3.42 (0.838)
11. I would feel safe being treated here as a patient.	4.00 (.913)	4.20 (0.701)	4.30 (0.703)	3.74 (0.872)
12. Briefing personnel before the start of a shift (i.e., to plan for possible contingencies) is an important part of safety.	4.08 (0.760)	4.17 (0.853)	4.59 (0.590)	4.11 (0.737)
13. Briefings are common here.	3.46 (1.127)	3.56 (.976)	3.54 (0.932)	3.61 (0.850)
14.1. I am satisfied with the availability of clinical leadership of Consultants.	3.46 (1.050)	3.57 (.941)	3.82 (0.795)	3.32 (0.820)
14.3 I am satisfied with the availability of clinical leadership of Staff Nurses.	3.85 (0.899)	4.05 (0.795)	3.91 (0.921)	3.53 (0.772)
14.4 I am satisfied with the availability of clinical leadership of Allied Health Professionals.	3.54 (0.967)	3.77 (0.872)	3.38 (0.921)	3.32 (1.108)
15. This institution is doing more for patient safety now, than it did one year ago.	4.00 (0.913)	3.77 (0.886)	4.00 (1.024)	3.67(0.840)
16. I believe that most adverse events occur as a result of multiple system failures, and are not attributable to one individual's actions.	3.92 (1.038)	3.75 (0.943)	3.54 (1.103)	2.82(1.074)
17. The personnel in this clinical area take responsibility for patient safety	4.23 (0.599)	4.15 (0.760)	4.17(0.963)	3.58(0.692)
18. Personnel frequently disregard rules or guidelines that are established for this clinical area.*	4.85(0.376)	4.36 (0.802)	4.71 (0.550)	4.32 (0.582)
19. Patient safety is constantly reinforced as the priority in this clinical area.	4.23 (0.725)	3.95(0.834)	3.79(1.285)	3.32(1.336)

*reverse scored

Table 7: Survey items across profession

Safety Climate Items	Profession (Mean / SD)			
	Consultant	**Staff Nurse**	**Managers**	**AHP**
1. The culture of this clinical area makes it easy to learn from the mistakes of others.	3.30 (1.265)	3.79 (0.932)	3.44(1.130)	3.60 (1.140)
2. Medical errors are handled appropriately in this clinical area.	3.77(0.908)	3.80(0.810)	4.33(0.500)	3.60 (0.548)
3. The senior leaders in my hospital listen to me and care about my concerns.	3.61(1.315)	3.78(0.872)	4.22(0.972)	3.20 (0.837)
4. The physician and nurse leaders in my areas listen to me and care about my concerns.	4.15(0.732)	3.80 (0.826)	3.44(1.014)	3.40 (0.894)
5. Leadership is driving us to be a safety-centered institution.	3.77(0.815)	3.72 (0.894)	3.67(0.707)	3.40 (0.894)
6. My suggestions about safety would be acted upon if I expressed them to management.	3.52(1.122)	3.52 (0.831)	3.78 (1.093)	3.20 (0.837)
7. Management/leadership does not knowingly compromise safety concerns for productivity.	4.26(1.059)	3.59 (1.027)	3.78(1.202)	3.40 (0.894)
8. I am encouraged by my colleagues to report any safety concerns I may have.	3.48 (1.122)	3.54(0.971)	4.00(0.707)	3.80 (0.837)
9. I know the proper channels to direct questions regarding patient safety.	3.77 (1.032)	4.07(0.704)	4.38(0.744)	4.20 (0.447)
10. I receive appropriate feedback about my performance	3.26 (1.130)	3.72(0.768)	4.22(0.667)	3.60 (0.894)
11. I would feel safe being treated here as a patient.	3.93 (0.958)	4.15(0.715)	4.38(0.518)	4.20 (0.837)
12. Briefing personnel before the start of a shift (i.e., to plan for possible contingencies) is an important part of safety.	4.12 (0.833)	4.32(0.776)	4.22(0.667)	3.67 (0.577)
13. Briefings are common here.	3.38 (1.023)	3.62(0.895)	4.29 (0.756)	2.60 (0.548)
14.1. I am satisfied with the availability of clinical leadership of Consultants.	3.74 (.944)	3.57(0.901)	3.29 (0.756)	2.75 (0.500)
14.3 I am satisfied with the availability of clinical leadership of Staff Nurses.	3.65(0.892)	3.95(0.847)	4.25(0.707)	3.75 (0.500)
14.4 I am satisfied with the availability of clinical leadership of Allied Health Professionals.	3.64(0.907)	3.53(0.979)	3.29(0.756)	3.80 (1.304)
15. This institution is doing more for patient safety now, than it did one year ago.	3.92(0.929)	3.76(0.953)	4.22 (0.667)	3.60 (0.548)
16. I believe that most adverse events occur as a result of multiple system failures, and are not attributable to one individual's actions.	3.78 (1.086)	3.32(1.055)	4.33 (0.707)	3.80(0.837)
17. The personnel in this clinical area take responsibility for patient safety	4.04(0.824)	4.02(0.834)	4.44(0.527)	3.80 (0.837)
18. Personnel frequently disregard rules or guidelines that are established for this clinical area*.	4.43(0.690)	4.47(0.704)	4.56(0.726)	5.00 (0.000)
19. Patient safety is constantly reinforced as the priority in this clinical area.	4.11(0.801)	3.54(1.164)	4.56(0.527)	4.40 (0.894)

*reverse scored

4.5 Experience wise analysis

The Kruskal-Wallis H test across years of experience showed statistically significant difference in the perception that staff is encouraged by their colleagues to report safety concerns $\chi 2$ (3) = 9.393, $p \leq 0.05$), belief in non-punitive systems $\chi 2$ (3) = 16.988, $p \leq 0.05$) as well as perception of constant emphasis on safety $\chi 2$ (3) = 13.058, $p \leq 0.05$). Post hoc analysis was done using Mann Whitney U test, which allowed for comparison across the groups. From the data it could be concluded that belief in non-punitive systems was significantly lower in staff having less than a year of experience compared to staff with 3 to 7 years of experience (U = 250, p = 0.01) as well as 8-12 years of experience (U = 72.5, p = 0.02). The perception of being encouraged to report safety concerns was significantly lower in staff with less than a year of experience compared to those with 8-12 years of experience (U = 51, p = 0.004). The perception of constant emphasis on safety was significantly lower again the staff with less than a year experience compared to those with 8-12 years of experience (U = 71.5, p = 0.02) as well as those with 3 to 7 years of experience (U = 337, p = 0.005).

VI. Discussion

The areas of strength have been that staff would never disregard rules or guidelines, the importance of handovers as well as knowledge of reporting channels. Areas with potential for improvement includedthe perception of safety being a constant priority,feedback on performance, perception of multi-disciplinary briefings, as well as belief in non-punitive systems. Profession wise analysis finds that allied health professionals differed considerably from managers and nurses in their perception of multi-disciplinary briefings. Staff nurses had lower perception of constant emphasis on safety systems and belief in non-punitive systems. Experience wise analysis finds that staff with less than a year of experience showed lower perception of being encouraged to report safety concerns, belief in non-punitive systems as well as constant emphasis on safety. Unit wise analysis finds that ICU as a clinical area had significantly lower perceptions on their suggestions being heard by management, belief in non-punitive systems as well as staff taking responsibility for safety. There is a

definite trend for managerial perceptions to be better on most items compared to other staff. This finding is similar to that of safety climate studies in international medical centre's[15, 21]. The variability found between the clinical units has been similarly found in other studies, where the variability was more between clinical areas than within the clinical areas[16, 26]. The varied perceptions among staff and units were further explored in qualitative interviews.

An overall impression gained is that while staff viewed safety policies and systems as integral to the clinical units, factors such as management response to their safety concerns, inter-disciplinary briefings as well as perception of non-punitive culture were areas of concern. This was a baseline study and gave valuable insights of safety climate at the unit and professional levels. The safety climate score was much lower compared to international studies (Fig.2). Patient safety culture assessments, required by international accreditation organizations, have allowed healthcare organizations to obtain a clear view of the strengths and weaknesses of their safety culture[27]. Such surveys could be conducted confidentially and would help to establish benchmarks. Apart from identifying problem areas it would also allow participating establishments to assess themselves against national or international benchmarks.

VII. Conclusion

Experience is by industry achieved and perfected by the swift course of time.
William Shakespeare, Two Gentlemen of Verona, Act 1, Scene 3

Institutionalization of patient safety culture at multiple levels has been posited as a necessary adjunct to the structural, procedural and regulatory efforts in the healthcare field[28]. Several interventions could be taken up towards establishing safer cultures at multiple levels. Establishing dedicated infrastructure and capacity-building to address the creation of a patient safety framework would be a logical first step, similar to the ambit of patient safety bodies such as Agency for Healthcare Research and Quality (AHRQ) and National Patient Safety Foundation (NPSF) in U.S[29]. Parameters such as quality indicators, evidence based guidelines; training and dissemination of best practices as well as patient safety culture surveys could be initiated centrally. At the national and State level, engaging with key stakeholders including healthcare professional bodies, patient advocacy groups, healthcare industry and administrator groups, would be necessary for the success of any initiative as well as addressing conflicting concerns. Some interventions which organizations could take to improve the climate include patient safety rounds. Simple concepts such as 'WalkRounds' by senior leaders and executives to patient care areas and discussions at the front-lines of care indicate an invested senior leadership and a well-organized support structure[30, 31]. Developing a framework for patient safety education in the undergraduate curriculum of healthcare providers is another intervention which is being taken up internationally in order to emphasize safety awareness as well as individual and collective responsibility for patient safety [32-34]. The importance of medical students recognizing unsafe conditions, reporting errors and understanding human fallibility has been considered essential towards enabling safer cultures[35, 36]. The WHO too has emphasized the importance of patient safety education in medical curriculum[37]. Early sensitization would engender institutionalization of patient safety skills and mind set earlier in the professional lives of healthcare staff[38].

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