

Original Paper

Obstetric Care Made High Reliable: Perception of Staff on Factors Associated with Practice of High Reliability Organization Principles in a Selected Tertiary Care Maternity Hospital

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Abstract

Introduction: Patient safety and high reliability related to obstetric care has become a global concern especially during this COVID-19 pandemic period.

Aim of this study is to assess the components of Socio Technical system as the factors affecting while adopting High-Reliability Organization (HRO) Principles as perceived by staff.

Methodology: This is a hospital based descriptive cross-sectional study conducted using a self-administered questionnaire.

Results: Out of the five factors affecting HRO practices as perceived by staff, "Organizational Safety Culture" (Mean- 4.25., SD-0.454 Significant at <0.01 level), Communication (SD-4.15, SD-0.579), and Teamwork (Mean:3.95, SD:0.499). are having a statistically significant ($p < 0.05$ corresponding to Spearman's correlation Coefficient positive association with the practice of HRO principles. According to Multiple linear regression model explains 29% of the variability of the HRO practices (dependent variable) can be explained by the factors affecting HRO practices (independent variables) if all the factors operate together.

Gender, age, educational level, designation and working experience act as moderating variables to Organizational Safety Culture. There is a significant ($p < 0.05$) difference of HRO practices among female gender, nursing category of staff which is better than other categories.

Conclusion: *Organizational safety culture, communication and Teamwork and work environment show significant effect on determining HRO practices which is important for policy makers and administrators to pay attention on above three factors to improve reliability. But these five factors (including leadership and working environment) explains only one third of variability of HRO practices), hence need to study other factors affecting reliability of performance.*

Keywords

high Reliability Organization, safety, adverse events and healthcare

1. Introduction

1.1 Background

Globally there is a growing concern regarding Patient safety, due to the potential catastrophic nature of medical errors. Up to four out of every ten patients are harmed in health care in primary and ambulatory care settings according to a report by World Health Organization (2018) indicating the gravity of errors.

Due to the disastrous nature of errors, healthcare institutions has started applying High-Reliability Organizations Principles (HROs) (Spath, 2011).

Sri Lanka has demonstrated the commitment HRO in Healthcare by implementing the Continuous Quality Improvement programme, which is centrally coordinated by the Directorate of Healthcare Quality and Safety (DHQS) (Ministry of Health Sri Lanka, 2016).

The National Strategic Plan on Maternal and Newborn Health 2017-2025 emphasizes the importance of improving the quality and safety of maternal care (Ministry of Health Sri Lanka, 2016). The policy on Healthcare Quality and Safety (Ministry of Health, 2015), circular on reporting of adverse event quality review programmes and monitoring visits conducted by DHQS are some instruments for operationalizing safety strategies. Studies have been conducted on “factors associated with patient safety practices (Sridharan, 2017) and quality improvement (Somatunga, Sridharan, Refai, Malavige, & Gamini, 2015). But assessment of the progress of the healthcare institutions on adopting HRO principles, is a necessity as it is mentioned under process auditing element of HRO practices (Roberts, Madsen, Desai, & Van Stralen, 2005).

Obstetric units are more prone to adverse events. Catastrophic consequences are death of a person in economically productive age, disability and prolong stay, leading to increased cost of care. Hospital staff is at risk of litigation and bad reputation to the healthcare institution.

Although precise data is lacking regarding the cost implications of medical errors in Sri Lanka, according to the Centers for Disease Control, there are 2 million acquired infections in hospitals in the United States every year and between 44,000 and 98,000 preventable medical deaths occur in healthcare facilities in the United States each year (IOM, 2000). In the Lower Middle Income Countries (LMICs) 134 million medical errors annually (hospitals), associated with to 2.6 million deaths because of unsafe health care (World Health Organization, 2018).¹ Estimated cost of medication errors is 42

billion USD annually) (World Health Organization, 2018). Hence, it is important to understand causality of adverse events to remedy the errors in healthcare (Sridharan, 2012).

Initially many initiatives were made to understand patient safety (Spath, 2011). The studies of James Reason have a major contribution on systemic accident model (Spath, 2011). It was found there are organizations in which errors have the potential of catastrophic consequences but which seem to avoid such errors (Spath, 2011), which were known as High Reliability organizations. These HRO principles are, “Preoccupation with failure, Reluctance to simplify interpretations, Sensitivity to operations, Commitment to resilience, Deference to expertise” (Spath, 2011). Elements of HROs are, process auditing, appropriate reward, avoiding degradation of quality, risk perception and command and Control (Roberts, Madsen, Desai, & Van Stralen, 2005).

This study aims to understand staff perception on factors associated with the practice of High Reliability Principles in Obstetric Wards in a selected Tertiary Care Maternity Hospital.

Therefore, the implementation of HRO principles is essential to reduce the number of adverse events and consequently to obtain better outcome from clinical care.

2. Methodology

This is a hospital based descriptive cross-sectional study which was conducted in Obstetric wards in De Soysa Hospital for Women. Calculation of the sample size was done according to the formula for cross sectional survey standard formula by Lwanga and Lemeshow (1991) and sample size was 384. With the assumption of 10% non-response rate the sample size was 422 in this study.

Stratified random sampling technique was used to select the participants from the population. Population proportionate sampling was done to select required number participants within each stratum.

The strata consisted of five staff categories:

1. Medical Doctors (Administrators, Consultants, Senior Registrars, Registrars and Medical Officers including MO)
2. Nursing Category Staff (Special Grade Nursing Officers, Nursing Officer Grade I/Sisters, Nursing Officers).
3. Professionals Supplementary to Medicine (PSM) category (Pharmacists, Medical Laboratory Technicians, Physiotherapists, Radiologists and Occupational Therapists)
4. Midwives
5. Healthcare Assistants

2.1 Data Collection Instrument

Structured pre-coded self-administrated questionnaire was used to collect data. The Practice of High-Reliability Organization (HRO) Principles was measured through five different dimensions namely Sensitivity to Operations, Preoccupation with Failure, Deference to Expertise, Commitment to Resilience, and Reluctance to Simplify Interpretations under section “A”. Further, five factors were

assumed to influence the Practice of High-Reliability Organization (HRO) namely Organizational Safety culture, Leadership, Communication, Teamwork, and Work Environment under section “B” of the questionnaire. Part “C” was used to capture the demographic features of the respondents as well.

2.2 Conceptualization

Patient Safety is determined by many factors in a hospital. The organizing framework that was selected for assessing HRO principles were based on Moray’s model of the organizational, human and technical components of socio-technical systems (Lwanga & Lemeshow, 1991).

Factors affecting patient safety programme in Government Hospital in Sri Lanka have been Studied based on this model and it was revealed “Organizational Safety Culture, Leadership, Communication, Teamwork, and Work Environment” as main factors associated with patient Safety programme (Sridharan, 2007).

Therefore, other two elements of this model (legal and regulatory rules, and societal and cultural pressures) were not included.

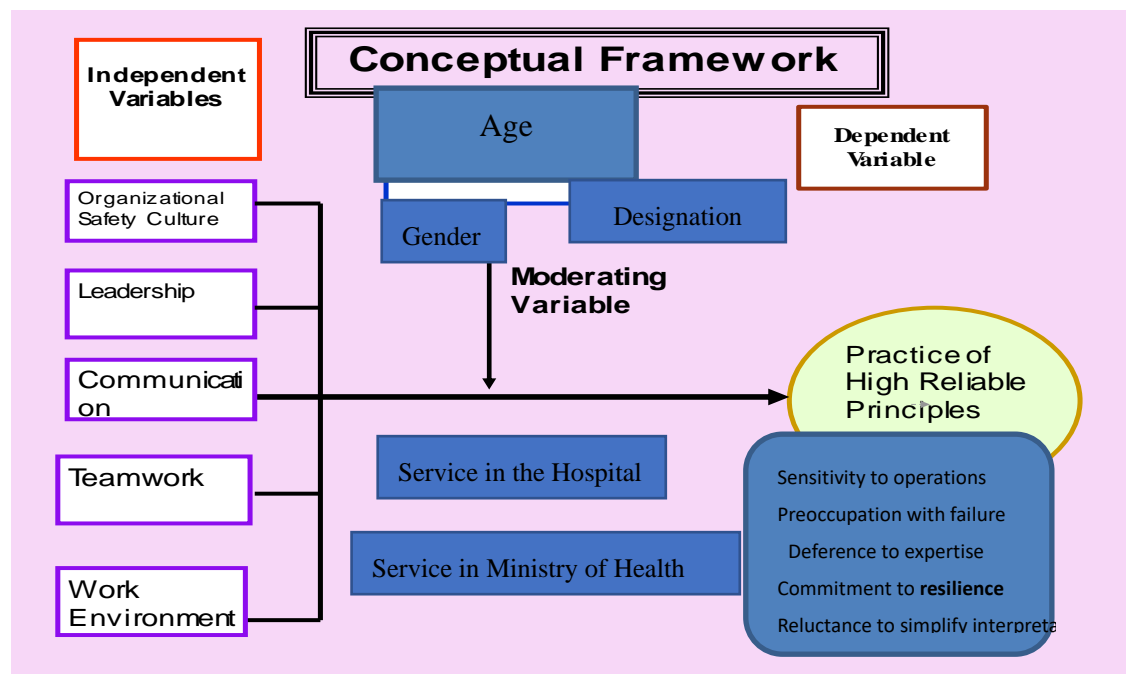


Figure 1. Conceptual Framework

Ethical clearance was obtained from the Ethics Review Committee, Faculty of Medicine, and University of Colombo. The study was performed in accordance with the ethical principles of the Ethical Review Committee.

3. Results

With a 90% response rate the final sample size ended up with 384 responses. The analysis was carried out with two sections; descriptive data analysis was focused on understanding the demographic features of the respondents while inference data analysis was focus on the constructing compositive variables and testing associations and formulating multiple linear regression. The content validity assessed whether all the components of the concept being measured by the tool. A validated questionnaire was used in this study; hence it is assumed that the tool satisfies the minimum requirement of the content validity.

3.1 Descriptive Data Analysis

Table 1. Distribution of the Sample According to Gender

Gender	Number of Respondents (N)	Percentage (%)
Male	42	10.9
Female	342	89.1
Total	384	100.0
Educational Level	Number of Respondents (N)	Percentage (%)
Passed O/L*	55	14.3
Passed A/L*	30	7.8
Diploma (After A/L)	218	56.8
Basic Degree	21	5.5
MBBS	37	9.6
PG Diploma	8	2.1
Master's Degree	5	1.3
MD	10	2.6
Total	384	100.0
Designation	Number of Respondents (N)	Percentage (%)
Medical Consultant	8	2.1
Medical Officer	53	13.8
Nursing Officer	190	49.5
Public Health Midwife	40	10.4
Supportive Staff, SKS	93	24.2
Total	384	100.0
Age	Number of Respondents (N)	Percentage (%)
21 – 30	146	38.0
31 – 40	201	52.3
41 – 50	31	8.1

51 – 60	6	1.6
Total	384	100.0
Designation / Service	Service in the Ministry of Health (yrs.)	Service in the Hospital(yrs.)
Medical Consultant	19.1	5.0
Medical Officer	5.0	2.2
Nursing Officer	5.1	2.4
Public Health Midwife	4.7	2.6
Supportive Staff, SKS	5.4	3.5
Mean	5.4	2.7
Standard Deviation	4.96	2.24

Source: Study Statistics

According to Table 1 (Socio Demographic characteristics majority of the population are females (89%), who have diplomas after A/L-56%). Nursing officers (49.5%) constitute the main occupational category. Majority (52%) are in the category of 31-41years. The population has 3.5 years of average experience in the Ministry of Health and 2.7years in the respective hospital.

Table 2. Descriptive Statistics Principles of HRO Practices

Descriptive Statistics	Value
Minimum	2.52
Maximum	5.36
Mean	4.42
Std. Deviation	0.396
Skewness	-0.814
Kurtosis	1.895

Source: Study Statistics

According to Table 2, the average of the Principles of HRO Practices which varies from 2.52 to 5.36 was found as 4.42 with 0.396 of Standard Deviation. The skewness was negative 0.814 and kurtosis was 1.895.

Principles of HRO Practices is not following the normal distribution, hence using one-way ANOVA would be not statistically sound as it violates the assumption of normality of the continuous variable. Therefore, The Kruskal-Wallis H test (sometimes also called the “one-way ANOVA on ranks”), which is a rank-based nonparametric test to determine if there are statistically significant differences between two or more groups of an independent variable on a continuous or ordinal dependent variable was used to test the association of Principles of HRO Practices with categorical demographic variables.

Table 3. Testing Association of Principles of HRO Practices with Categorical Demographic Variables

Features	Categories	Mean HRO	Kruskal-Wallis H	df	Asymp. Sig.
Gender	Male	4.28	7.709	1	0.005
	Female	4.43			
Age	21 – 30	4.41	2.977	3	0.395
	31 – 40	4.43			
	41 – 50	4.44			
	51 – 60	4.07			
Education	Lower than Degree	4.44	2.186	1	0.139
	Degree or higher	4.34			
Designation	Medical Staff *	4.29	32.089	3	0.000
	Nursing Officer	4.52			
	Public Health Midwife	4.24			
	Supportive Staff, SKS	4.36			

* include Medical Administrator, Medical Consultant, Medical Officer

Source: Study Statistics

According to Table 3, the statistical non-parametric test of Kruskal-Wallis H suggests, at a 95% significant level there is a statistically significant difference in Principles of HRO Practices among the Male and Female. It was found the mean value of Principles of HRO Practices is higher among nursing officers (4.52) compared with all the other designations. But Principles of HRO Practices do not statistically differ among different age or educational categories.

Table 4. Testing Association of Principles of HRO Practices

Working Experience	Correlation Coefficient	Sig. (2-tailed)
Working Experience in Ministry of Health (yrs)	-0.044	0.388
Working Experience in Hospital (yrs)	-0.054	0.294

Source: Study Statistics

According to Table 4, since the Principles of HRO Practices is not exhibit normal distribution, Spearman Correlation was used to test the association of Principles of HRO Practices with working experience. According to Table 11, there is no statistically significant association between working experience in Ministry or the hospital as the corresponding probability value is not less than 0.05.

Table 5. Describing the Factor Influence the Principle of HRO Practices

Factors	Cronbach's Alpha Value	Number of Items
Organizational Safety culture	0.793	5
Leadership	0.710	5
Communication	0.795	5
Teamwork	0.737	5
Work Environment	0.764	5

Source: Study Statistics

Five factors were measured using five questions for each factor using a 1-6 Likert scale. The internal consistency of the five factors was assessed through Cronbach's Alpha to determine whether each of the respective questions can be used to measure each factor.

According to Table 5, testing the internal consistency using Cronbach's alpha, all the five factors can be measured using the respective questions assigned to each factor as the minimum requirement of Cronbach's Alpha Value 0.70, has been fulfilled by all the above five composite variables.

Table 6. Descriptive Statistics Five Factors – Composite Variables

Factors	N	Min.	Max.	Mean	SD
Organizational Safety culture	384	2.0	5.4	4.25	0.454
Leadership	384	2.0	6.0	4.69	0.616
Communication	384	2.4	6.0	4.15	0.579
Teamwork	384	1.0	5.0	3.95	0.499
Work Environment	384	2.0	6.0	4.08	0.535

Source: Study Statistics

Table 6 exhibits mean and standard deviation of five factors along with the minimum and maximum values, "Leadership" was having a mean of 4.69 and SD: 0.616 while varying from 2.0 to 6.0. which has the highest mean value followed by "Organizational Safety culture" which has a mean of 4.25, SD: 0.454, and range from, 2.0 to 5.4. "Teamwork" was having the lowest mean value of 3.95 with SD of 0.499, Min. 1.0, Max. 5.0. Interestingly "Teamwork" has fallen to negative perception territory as the mean value fell below 4.0.

Table 7. Testing Association of Principle of HRO Practices and Factor

Spearman's rho	Organizational Safety culture	Leadership	Communication	Teamwork	Work Environment
Correlation Coefficient	0.250**	0.028	0.210**	0.274**	0.110*
Sig. (2-tailed)	0.00	0.591	0.00	0.00	0.03
N	384	384	384	384	384

Source: Study Statistics

Table 7 (Testing the Bivariate Association with Spearman Correlation) suggests, there is a statistically significant association between the Principle of HRO practices and Organizational Safety Culture, Communication, Teamwork, and Work Environment at 95% confidence level.

3.2 Multiple Linear Regression Analysis

The multiple linear regression was performed selecting Principles of HRO practices as the dependent variable and Organizational Safety culture, Leadership, Communication, Teamwork, and Work Environment as the independent variables.

Table 8. Goodness of Fit Measure for Multiple Linear Regression Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.54	0.293	0.283	0.3357	2.034

According to Table 8 the R-squared (Coefficient of Determination) and Adjusted R-squared values as 29.3% and 28.3% respectively in the regression model. That indicates 29% of the variance in the Principles of HRO practices can be explained by the five factors together as a linear combination. The Durban-Watson value 2.034 suggests no autocorrelation of data, supporting linearity of distribution.

Table 9. Multiple Regression Model ANOVA Summary

	Sum of Squares	Df	Mean Square	F	Significance
Regression	9.083	5	1.817	17.31	0.00
Residual	37.781	360	0.105		
Total	46.863	365			

Source: Study Statistics

According to Table 9 the F-test statistics of 17.31 and corresponding probability value of 0.00 at a 95% confidence level. Therefore, the null hypothesis could be rejected at a 95% confidence interval level: which is; none of the independent variables influence the dependent variable. Hence, it can be stated that at least one of the parameter coefficients is significant to explain the dependent variable and overall model (including five variables) capable of explaining Principles of HRO practices.

Table 10. Distribution of Coefficients of Factors Associated with HRO Practices

	Unstandardized		Standardized		
	Coefficients		Coefficients		
	Beta	SE	Beta	T	Sig
(Constant)	2.04	0.297		6.873	0.00
Organization Safety Culture	0.26	0.040	0.303	6.362	0.00
Leadership	0.00	0.029	0.005	0.096	0.92
Communication	0.11	0.037	0.165	2.916	0.00
Teamwork	0.23	0.058	0.232	3.93	0.00
Work Environment	-0.02	0.048	-0.020	-0.329	0.74

Source: Study Statistics

Table 10 illustrates the distribution of Coefficients, the proportion of the variability among the Principles of HRO practices (dependent variable) that can be explained by each factor (independent variables). Organizational safety culture shows a significant (< 0.01) effect of variability of HRO practices as the std. the coefficient is 0.303. Similarly, Communication and Teamwork also have a significant influence on the Principles of HRO practices as the corresponding probability is less than 0.05 and corresponding coefficient values are 0.165 and 0.232. In contrast to those three factors, leadership and work environment is not a significant influence on Principles of HRO practices as the probability values are not less than 0.05. Out of significant factors, Organization Safety Culture was the most influential factor while teamwork and communication were followed second and third.

3.3 Testing the Hypothesis for Moderator Effect

Testing moderation tests were carried out using PROCESS Macros for SPSS, which was developed by Andrew F. Hayes which does the centering and interaction terms automatically. The macro allows us to select 74 different types of moderator models. Model 1 was selected for this study, which is the simplest model in line with the conceptual model of this study.

Table 11. Test of Moderator by Gender

Factors	Overall Moderator Effect			Sig.		
	Coefficient	T	Sig.	Male	Female	Change of R ²
Organization Safety Culture	0.450	2.660	0.01	0.31	0.00	2.35%
Leadership	0.014	0.179	0.86	n/a	n/a	0.00%
Communication	-0.079	-0.517	0.61	n/a	n/a	0.00%
Teamwork	-0.035	-0.201	0.84	n/a	n/a	0.00%
Work Environment	0.178	1.876	0.06	0.98	0.00	0.05%

Source: Study Statistics

Table 11 shows the impact of gender as a moderator variable into factors. It was found that gender influence as a moderator variable only to organization Safety Culture as the corresponding probability of T-statistic (2.660) is less than 0.05. Gender is not a moderator variable for any other factor as the probability value is not less than 0.05 (at 90% significant level Gender is a moderator variable for Work Environment as the corresponding probability is 0.06, which is less than 0.10). Further, it was found that the moderating effect of females is significant while the male moderating impact is insignificant. The gender moderate effect improves the overall R^2 of the model by 2.35%.

Table 12. Test of Moderator by Age

Factors	Overall Moderator Effect			Sig.			
	coefficient	T	Sig.	Lower	Middle	Upper	Change of R^2
Organization Safety Culture	-0.023	-2.387	0.02	0.00	0.00	0.04	0.17%
Leadership	-0.017	-1.996	0.05	0.07	0.91	0.16	0.11%
Communication	0.008	1.076	0.28	n/a	n/a	n/a	0.03%
Teamwork	0.007	0.623	0.53	n/a	n/a	n/a	0.01%
Work Environment	-0.002	-0.226	0.81	n/a	n/a	n/a	0.00%

The Table 12 indicates the impact of age as a moderator variable into factors. It was found that age influence as a moderator variable only to organization Safety Culture and Leadership as the corresponding probability of T-statistic (-2.387, -1.996) is less than 0.05. Interestingly the moderator effect is negative as the corresponding coefficient of the interaction is negative (-0.023, -0.017). Further the analysis suggest the moderate impact is higher and significant in younger age than the older age.

Table 13. Test of Moderator by Education

Factors	Overall Moderator Effect			Sig.		Change of R^2
	Coefficient	T	Sig.	< Degree	>= Degree	
Organization Safety Culture	0.232	2.288	0.02	0.00	0.00	1.30%
Leadership	-0.087	-1.205	0.23	n/a	n/a	0.04%
Communication	0.110	1.156	0.20	n/a	n/a	0.03%
Teamwork	-0.091	-0.649	0.60	n/a	n/a	0.01%
Work Environment	0.147	1.204	0.23	n/a	n/a	0.04%

The table indicates the impact of Education as a moderator variable into the factors. The education was recategorize into two levels namely lower than Degree and Degree or above, It was found that education influence as a moderator variable only to organization Safety Culture as the corresponding probability of T-statistic (-2.288) is less than 0.05.

Table 14. Test of Moderator by Designation

Factors	Overall Moderator Effect			
	Coefficient	T	Sig.	Change of R2
Organization Safety Culture	-0.137	-3.146	0.02	2.42%
Leadership	0.008	0.268	0.79	0.00%
Communication	-0.022	-0.489	0.76	0.06%
Teamwork	-0.055	0.870	0.39	0.30%
Work Environment	-0.067	-1.633	0.10	0.69%

Table 14 illustrates the impact of Designation as a moderator variable into the factors. The designation was recategorized into four levels as follows: Medical, Nursing Officer, Public Health Midwife and Supportive Staff, SKS. It was found that designation influence as a moderator variable only to organization Safety Culture as the corresponding probability of T-statistic (-3.146) is less than 0.05.

Table 15. Test of Moderator by Working Experience in Ministry of Health (WEH)

	Unstand. Coeff		Stand. Coeff.	T	Significance	Correlations		
	B	Std. Error	Beta			Zero-order	Partial	Part
OSC	0.390	0.060	0.460	6.541	0.000	0.297	0.327	0.306
WEH	0.106	0.036	1.400	2.960	0.003	-0.023	0.155	0.139
WEH*OSC	-0.025	0.008	-1.433	-3.010	0.003	-0.005	-0.157	-0.141
LS	0.096	0.047	0.156	2.038	0.042	0.02	0.107	0.096
WEH	0.092	0.037	1.213	2.454	0.015	-0.023	0.129	0.115
WEH*LS	-0.019	0.008	-1.254	-2.499	0.013	-0.03	-0.131	-0.118
COM	0.067	0.052	0.102	1.292	0.197	0.269	0.068	0.061
WEH	-0.034	0.029	-0.451	-1.173	0.241	-0.023	-0.062	-0.056
WEH*COM	0.008	0.007	0.441	1.139	0.255	0.024	0.06	0.054
TW	0.207	0.075	0.211	2.752	0.006	0.274	0.144	0.131
WEH	-0.016	0.034	-0.206	-0.454	0.650	-0.023	-0.024	-0.022
WEH*TW	0.004	0.009	0.192	0.420	0.675	0.009	0.022	0.02
WE	-0.003	0.063	-0.004	-0.047	0.962	0.201	-0.003	-0.002
WEH	0.007	0.028	0.094	0.253	0.800	-0.023	0.013	0.012
WEH*WE	-0.002	0.007	-0.113	-0.300	0.764	0.003	-0.016	-0.014

Table 15 indicates the impact of Working Experience in Ministry of Health (WEH) as a moderator variable into factors. It was found that WEH influence as a moderator variable only to organization Safety Culture and Leadership as the corresponding probability of T-statistic (-3.010, -2.499) of interaction term is less than 0.05.

4. Discussion

The study was designed to determine the organizational factors affecting with the practice of High Reliability Principles as perceived by staff.

A total of 422 were invited to participate in the study, 385 participated giving a response rate of 91%. Out of 385 who participated in the survey that. Majority of the participants (52.3%) were between the age of 31-40 years, indicating relatively young healthcare staff composition which is cost effective to involve in interventions yielding beneficial outcome of interventions (i.e., training). Assuming all will remain up to the retirement age is (60 years) will remain in service for another 20 years indicating long term yield of investment of interventions on human resources. The fact female dominant workforce (n=342 89.1% of total population) shows importance of more female staff in interventions.

Practice of HRO principles higher among females can be due to higher female proportion among nursing officers. This is a positive finding in female dominant workforce. It was found the mean value of Principles of HRO Practices is higher among nursing officers (4.52) compare with all the other designations, showing importance of carrying out further studies to find out what led to the difference among staff categories.

The majority (56.8%) of the respondents were Diploma holders (after GEC Advanced Level -A/L) and 21% had Bachelor degree from a recognized University (MBBS and other degrees). In a similar study majority (60%) had degrees maximum educational level, 150 (39%) of them had completed Diploma (after Advanced Level qualifications), which needs to be considered in comparison of results in two studies since educational level is a confounding variable in organizational safety culture.

Regarding current designation, the majority (49.5%) were Nursing Officers, 24.2% of them were Supportive staff. This finding shows the importance of getting the involvement of Nursing Officers and supportive staff in training and patient safety interventions. It was also found the mean value of Principles of HRO Practices is higher among nursing officers compare with all the other designations which is favourable the given population and needs to be further studied.

Following components of socio-technical system/ were studied ("organizational patient safety culture, work environment, leadership, team structure, and Communication") as independent variables to determine the factor affecting HRO practices.

Therefore, a multiple linear regression was carried out. That indicates 29% of the variance in the Principles of HRO practices can be explained by the five factors together as a linear combination. In the previous study, the linear regression model explains 23% of the variability of the HRO practices (Malavige, 2018). In a descriptive cross-sectional study carried out using the same methodology showed 40% effect of same factors on patient safety programme (Sridharan, 2017). All three studies show the need of further studies to find the difference.

Organizational safety culture, Communication and Teamwork shows a significant effect of variability of HRO practices. Out of significant factors, Organization Safety Culture was the most influential factor while teamwork and communication were followed second and third.

Further it was revealed gender (female) age, educational level, designation and working experience as a moderating variable to organizational safety culture, which needs to be considered in future studies designing phase (restriction of the study population, matching and randomization) or in analysis face(stratification and multivariate analysis).

Limitations of this study are, generalizability of the findings is a limitation as this study was carried out in a tertiary care Line Ministry specialized (maternity) Hospital. Provincial General Hospitals, District Hospitals, and Base Hospitals were not included in this study.

Due to the prevailing patient safety culture as being indicated as reactive in a previous study, reluctance of the staff to answer the questionnaire (Sridharan, 2017).

Lack of awareness among staff regarding patient safety concepts and HRO principles and the implications. Lack of interest in participating for training and updating on patient safety due to heavy workload and work-related stress can affect the awareness and knowledge of practice of HRO principles.

Other two elements of Moray's model of Socio technical system (legal and regulatory rules, and societal and cultural pressures) which can affect the variability HRO principles, were not assessed.

5. Conclusions and Recommendations

The components of Socio-Technical system namely "Organizational safety culture, Communication" and "Team Work" show significant effect on determining HRO practices together with the other two factors conceptualized to associated with patient safety (i.e., leadership and Work Environment), 29% of the variability of the HRO practices (dependent variable) can be explained by Organizational Safety Culture, communication and teamwork emphasizing the importance of improving these to enhance the reliability of Healthcare Institutions. Further research is needed to find other factors affecting HRO practices to improve the reliability of Obstetric care.

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