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Relationship between patient safety and nurse's teamwork in ICU, CCU and operating rooms in health centers of Rasht in 2013

Fardin Mehrabian¹, Said Asefzade², Shila Kianmehr^{2*}, Ahmad Nikpey³, Amin Adel⁴

¹ Department of Health Education and Health Promotion, Social Determinants of Health Research Center, School of Health, Guilan University of Medical Sciences, Rasht, Iran

² Department of Health Care Management, School of Public Health, Qazvin University of Medical Sciences, Qazvin, Iran

⁴ Department of Occupational Health, School of Public Health, Qazvin University of Medical Sciences, Qazvin, Iran

⁵ Department of Health Care Management, School of medical Management and Information, Iran University of Medical Sciences, Tehran, Iran

*correspondence should be addressed to Shila Kianmehr, Department of Health Care Management, School of Public Health, Qazvin University of Medical Sciences, Qazvin, Iran; Tell: +9833826412; Fax: +988642237411; Email: shila.kianmehr@gmail.com.

ABSTRACT

Patient safety is a global concern in all areas of health care. In addition to inflict pain on humans, unsafe care leads to heavy economic costs. Teamwork formal trainings have been proposed as a systematic approach to finish these errors. Some recent researches have been emphasized on the role of teamwork in providing proper care for the patient in different areas of health care. Our study aimed to evaluate the relationship between patient safety and nurse teamwork in operating rooms and intensive care units in education and treatment centers of Rasht city. This cross-sectional descriptive analysis study conducted in summer 2013. Sample was included education and treatment centers employees and CCU, ICU and operating rooms of education and treatment centers nurses of Rasht city (n=280). Data have been collected using mandatory standards of patient safety friendly Hospitals checklist and teamwork assessment questionnaire and analyzed by SPSS software and descriptive statistical parameters. According to this study, there was significant relationship between patient safety and nurses' team working ($p < 0.05$) and the correlation coefficient was 0.840, so, there was a positive correlation in between. Regarding positive correlation between patient safety and teamwork, to increase patient safety, freedom of employees to express their ideas and suggestions, sufficient human resources and skills are recommended.

Key words: patient safety, teamwork, health centers

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1. INTRODUCTION

One of the main issues of health sector is the quality of provided care for patients (1). In this section, hospitals are organizations with the aim of improving health that perform numerous health cares (2). Since one of the most prominent human rights is the safety from dangers and damages while receiving health services (3), services are provided for patients should have the highest possible quality (4). Certainly in comparison with other industrial and services, health sector is one of the most high risk sectors (5). Statistics indicate that a large percent of patients facing health systems, particularly

hospitals, encounter complications from the services and the related problems. Naturally, in such circumstances, the risk possibility of health services will increase, however empirical evidence indicates that the number of patients who encounter complications due to medical errors is not remarkable. Therefore, attention to the issue of patient safety is considered as a crucial issue in the health systems of different countries (6). Patient safety, as one of the main components of health care quality, means avoiding patient from injury while providing health care (7). Reducing medical errors depends on a safe environment in the systemic and clinical fields. Teamwork formal trainings

have been proposed as a systemic approach to eliminate these errors (8). Also in patient safety academic literature, the necessity of teamwork to provide patient care has been recognized (9). Generally the group is defined as a collection of two or more people who work together to achieve common goals, they have specialized skills and tasks, use common resources and communicate with each other to coordinate and adapt the encountered changes (10). Over the past twenty years, group and team work have largely been investigated. Numerous books and articles have studied the importance of teamwork (11) and also recent researches have emphasized on the role of teamwork to provide proper care in different areas of health (12). The researches have shown that 70% of medical errors can be attributed to poor communication in healthcare teams. 8 case studies that were performed on 4.7 million patients over a period of 11 years up to 1996 showed that teamwork can lead to a reduction of 43% of the cash payment cause by errors (8). Patient safety experts believe that communication and other teamwork skills are very important in preventing and reducing medical errors, and teamwork is essential to achieve high reliability in health care organizations (13). Evidence derived from high reliable organizations (industry, aviation and nuclear power), that involve high risks but create and maintain safe environments, have shown that these organizations could dramatically reduce errors with a systemic approach to safety and create safety culture (14). Medical teams, compared with the groups in other industries, particularly in the areas such as operating rooms, intensive care, emergency, trauma or resuscitation groups often worked under variable and unpredictable situations, and in these circumstances, members of the group, constantly change and the members who have different expertise, skills and cultures, often will work together for a short time (1). The relation between treatment results and teamwork behaviors including the relation of members and streamlined workflow has been reported (12). Although patient safety problems can occur in non-intensive care units, specific risks threat patients in operating rooms, so that 45% of medical errors are related to these units. Estimated percentage of surgical events at the time of the presence of patients in the operating rooms varies from 35% to 66% (15). A significant proportion of the side effects occur in surgical procedures (47.7% in Harvard Studies and 50.4% in Australian Studies). A study that examined the results of 4500 surgeries in hospitals in the United States indicates that between 30 to 50 percent of the major complications in patients under general surgery would be avoided. Also the complexity of the processes and conditions of intensive care units (such as availability of monitoring devices), makes these units vulnerable to errors, so that many researches are performed on adverse events in these units (16). Researches in various fields that were performed by reliable organizations and researchers have tried to determine the optimal teamwork in complex and dynamic healthcare environments. Despite ongoing efforts

to identify more effective assessment of teamwork skills, the relation between improved skills and enhanced patient safety outcomes have remains elusive. So far, most researches in the field of health care groups have focused on group performances. Although many methodological and conceptual methods have been identified, there is serious necessity to review the effectiveness of the group to achieve better outcomes for patients (17). A research on patient safety and medical errors in 12 rural hospitals in 12 states showed that 90% of staffs believe that patient health is the primary responsibility of the nurses (18). Considering the importance of the issue, the current researchers decided to consider the team work and its relation to patient safety from the perspective of nurses in health centers of Rasht. The results of this research can examine the current state of patient safety, teamwork and their relationship in these centers. So this research is important because the results add new points of view to the existing knowledge in this field. At the other hand, identifying the relationship between teamwork and patient safety can help the health policy makers to formulate effective policies.

2. MATERIALS AND METHODS

This cross-sectional descriptive analysis study was conducted in summer 2013. The sampling method was census and all CCU, ICU and operating rooms nurses of education and treatment centers (n=280) of Rasht city (ICU nurses = 121, CCU nurses = 25, OR nurses = 134) were investigated.

Two standardized instruments were used in this research to examine the variables. Patient safety friendly hospitals mandatory standards checklist was used to evaluate patient safety in studied centers. The Check List was extracted from Patient Safety Friendly Hospital book (19) and organized in two parts. The first part was the standards for patient safety Friendly Hospitals and the second part contained Patient Safety Friendly Hospital assessment tools. Patient safety standards were comprised of five main groups that were divided into 24 following groups. This section included documentations that must be evaluated for each standard; the second part consisted of a set of tools to facilitate the evaluation process. Five standards groups were government and leadership, participation and interaction with the patient and society, safe and evidence-based clinical care, safe environment, and continuing education.

Set of mandatory standards (a total of 20 standards), Basic standards (A total of 90 standards) and advanced standards (A total of 30 standards) have taken place in these five groups. For recognition a hospital as a patient safety friendly hospital, 100% of mandatory standards should be implemented. Basic standards, includes minimum standards that hospital should obey them for patient safety and advanced standards are requirements that hospitals should take action to achieve them in order to strengthen safe services depend on their capacity and resources.

Accordingly, patient safety was assessed by visiting the sample units using friendly hospitals mandatory standards checklist. According to Table 1 , variables of the checklist

were placed in four groups.

Table 1 . Groups, Sub-groups and mandatory standards for patient safety

Groups	Sub-groups	Mandatory standards
A. government and leadership	4 Sub-groups	9 Standards
B. participation and interaction with the patient and society	2 Sub-groups	2 Standards
C. safe and evidence-based clinical care	4 Sub-groups	7 Standards
D. safe environment	1 Sub-groups	1 Standards

Mode of scoring questions was complete (19), partial (0.5), non-compliance (0) and points were expressed as percentage. In order to determine the safety of a hospital, Average Rating 0% - 50% indicated poor performance, 50% - 70% indicated moderate performance, and 70% - 100% was considered good. T-TAQ (Team STEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) Teamwork Attitudes Questionnaire) Questionnaire was used to assess teamwork. The questionnaire is designed by AHRQ (Agency for Healthcare Research and Quality) to measure employees' perceptions of the various components of teamwork. The questionnaire had 55 questions that assessed the level of teamwork at 7 dimensions (Table 2). These dimensions were:

1. Team Foundation
2. Team Functioning
3. Team Performance
4. Team Skills
5. Team Leadership
6. Team Atmosphere
7. Team Identity

Every dimension had several multiple questions, and the scale of questions was five options Likert scale from strongly disagree = 1 to strongly agree = 5. Also the questionnaire contained other questions about age, gender, years of experience and unit.

Table 2. Questions of teamwork assessment questionnaire separated by each dimension and the scale

variable names	Questions
1 Team Foundation	Questions 1 to 12
2 Team Functioning	Questions 13 to 18
3 Team Performance	Questions 19 to 22
4 Team Skills	Questions 23 to 28
5 Team Leadership	Questions 29 to 36
6 Team Atmosphere	Questions 37 to 46
7 Team Identity	Questions 47 to 55

Scoring mode of dimensions of teamwork was 5 options Likert scale (strongly agree = 5, agree = 4, no opinion = 3, disagree = 2, strongly disagree = 1). The collected data analyzed using SPSS software. Descriptive statistical techniques were used to assess the observance of the variables and for assessing the patient safety and teamwork relation, Pearson correlation was used.

3. RESULTS AND DISCUSSION

The observance amount of mandatory standards for patient safety friendly hospital came in Table 3. Based on the data of this table, the highest observance was in hospital No. 3 (79%) and lowest one was in the hospital No. 1 (45%). Average rate of observance of standards in the hospitals was 64%.

Table 3. Rate of patient safety standards in studied hospitals

Hospital Code	1	2	3	4	5	6	7	Mean ± SD
Rate of observance	45%	66%	79%	68%	84%	46%	58%	64%±0.15

According to the categories of checklist questions in four groups A, B, C, D, data presented into separated groups in

Table 4.

Table 4. Observance rate of patient safety standards groups

Hospital Code	A	B	C	D
1	44%	0%	50%	75%
2	61%	50%	67%	100%
3	83%	50%	75%	100%
4	72%	50%	58%	100%
5	89%	50%	83%	100%
6	50%	0%	50%	75%
7	50%	50%	58%	100%
Average	64/14%	35/71%	63%	92/85%

Highest rate of group A is in hospital No.5 (89%), Group B in hospitals 2, 3, 4, 5, and 7 (50%) in group C in hospital No.5 (83%) and group D in hospitals 2, 3, 4, 5 and 7 (100%). The lowest observance in studied hospitals was in hospital No. 1 (A: 44%, B: 0%, C: 50%, D: 75%).According to the findings, the highest observance rate was related to Group D (93%) and the lowest observance belonged to the group B (36%).In Group A with the observance of 64%, the highest rate was related to "appointment one of the directors of hospitals as coordinator of patient safety activities and risk management" and the lowest level was related to "existence of adequate equipments in order to ensure disinfection and urgent sterilization".Observance rates in both standards of group B (obtain consent before any therapeutic or diagnostic activity and identifying patients with at least 2 identifiers before any therapeutic or diagnostic activity) is equal. In Group C with observance

rates of 63%, the highest rate was related to observance of "enforcement guidelines, including World Health Organization guidelines in the field of blood and blood products." And the lowest was related to "predict communication channel in order to declare emergency test results" and "ensure proper cleanliness, disinfection and sterilization of all equipment, with particular emphasis on high-risk wards. In Group D the highest average (19) and the percentage of observance (100%) was related to full implementation of "adherence of all health centers of the guidelines for the management of sharp waste disposal". The average observance rate of teamwork in studied health centers in shown in Table 5. Based on this data the highest scale was related to hospital No. 5 (77.56%) and the lowest in related to hospital No. 1 (75.26%).

Table 5. Average observance rate of teamwork in health centers

Hospital Code	1	2	3	4	5	6	7	Mean ± SD
Rate of observance	75.26%	77.16%	77.28%	75.48%	77.56%	75.36%	76.22%	76.33% ±0.99%

The average observance rate of teamwork in health centers studied separated by dimensions came in Table 6.

Table 6. Average observance amount of teamwork in each health center

Hospital Code	Team Foundation	Team Functioning	Team Performance	Team Skills	Team Leadership	Team Climate and Atmosphere	Team Identity
1	74.02%	75.26%	58.98%	76.92%	76.08%	73.14%	78.7%
2	76.38%	75.82%	75.82%	80.68%	76.14%	75.74%	79.9%
3	78.24%	77.2%	77.04%	77.74%	77.16%	75.36%	78.5%
4	76.8%	72.08%	77.18%	78.06%	75.06%	74.16%	75.2%
5	78.28%	78.76%	78.26%	80.58%	77.44%	71.48%	80.34%
6	74.4%	77.82%	73.44%	78.82%	77.86%	72.7%	79.1%
7	76.5%	73.9%	77.5%	79.5%	76.36%	72.5%	78.66%
Average	77.06%	75.64%	77.24%	78.92%	76.48%	73.64%	78.26%

According to the findings, the greatest observance amount of groups "Team Foundation", "Team Functioning" and

“Team Performance” in hospital No. 5 is, respectively, 78.28%, 78.76%, and 78.26%. Highest Observance rate of the “Team Skills” was in Hospital No. 2 (80.68%), “Team Leadership” in Hospital No. 6 (77.86%), “Team Climate and Atmosphere” in Hospital No. 2 (75.74%) and the highest observance of “Team Identity” in hospital No. 5 (80.34%). Moreover the highest observance rate was related to "Team Skills," 78.92%, and the lowest belonged to the Team Climate and Atmosphere 73.64%. In the dimension of "Team Foundation” with the observance rate of 77.06%, the highest rate was related to "Group and organization alignment targets" and lowest belonged to the “Existence of space, time and resources necessary to achieve the objectives". In the dimension of "Team Functioning" with the observance rate of 75.64%, the highest rate was related to "Positive impact of group goals and objectives on the organization" and the lowest belonged to the "Participation of all members in team". In the dimension of “Team Performance” with the observance rate of 77.24%, the highest rate was related to “Effective performance of group " and the lowest belonged to the " Considering internal and external customers needs by group ". In the dimension of “Team Skills” with the observance rate of 78.92%, the highest rate was related to "Familiarity of members with each other responsibilities”

and the lowest belonged to the "Group's ability to modify or improve the performance of their duties ". In the dimension of “Team Leadership” with the observance rate of 76.48%, the highest rate was related to "Task sharing between team member” and the lowest belonged to the “employees freedom to express ideas and suggestions to the group leader ". In the dimension of “Team Climate and Atmosphere” with the observance rate of 73.64%, the highest rate was related to "Members awareness regarding to their duties” and the lowest belonged to the “employees sense of freedom to express their views ". In the dimension of “Team Identity” with the observance rate of 78.26%, the highest rate was related to "Members awareness about the reason of their presence in the group” and the lowest belonged to the "no impact of a person, group or gender on group activities". Pearson's test was used to identify the correlation between patient safety and nurse’s teamwork. Pearson's test results concluded that there is significant correlation between patient safety and nurses' working ($p < 0.05$). As it is shown in Table 7 Pearson correlation coefficient is 0.840 and because the Sig is 0.018 (less than 0.05) so the correlation coefficient is significant, and because the correlation coefficient is 0.840 (greater than 0.8), there is high positive correlation.

Table 7. Correlation between patient safety and nurse teamwork in intensive care units and operating rooms of health centers of Rasht in 1392

Statistical indicators Variables	Number of test (N)	The test statistic (y)	The probability (p-value)
Patient safety	7	0.840	0.018

Pearson's test was used to identify the correlation between patient safety and nurse teamwork. From the results it can be concluded that:

*There is no significant correlation between governance and leadership and nurses’ teamwork ($p > 0.05$).

*There is no significant correlation between participation and interaction with patients and the community and nurses’ teamwork ($p > 0.05$).

*There is significant correlation between safe and evidence-based clinical services and nurses’ teamwork ($p < 0.05$). Pearson correlation coefficient is 0.943 and because the Sig is 0.001 (less than 0.05) so the correlation coefficient is significant, and because the correlation coefficient is 0.943 (greater than 0.8), there is high positive correlation.

*There is no significant correlation between safe environment and nurses’ teamwork ($p > 0.05$).

There was no significant relationship between leadership and nurses teamwork ($p > 0.05$). Deering indicated that

when leadership, supervision and support of personnel (as the basic skills of teamwork) are promoting, patient safety did not change significantly that is consistent with the results of this study (20). In Abdi’s study, teamwork and non-punitive response to error have obtained respectively highest score and lowest score (5). Yaghubifar in his research indicated that only 31% of hospitals staff of Sabzevar city had reported the patient safety status as excellent or very good, non-punitive response to error and staff affairs have respectively 13/03% and 22/37% of all positive responses that it is not consistent with this survey’s results (21). In order to improve patient safety in this group, it is necessary to put patient safety programs in strategic and operational plans and also recruitment qualified and skilled technical staff. Based on this results, there is no significant relationship between nurses teamwork and participation and interaction with patient and community ($p > 0.05$). Result of Bidgoli’s study showed that although the relationship between nurses in Kashan’s hospitals obtained highest score, patient safety atmosphere was not in favorable condition and this is consistent with the results of this study (18). In order to enhance score in both groups, it is necessary to improve awareness of patients and their attendants about health to

give them ability to make correct decision about their treatment and ensure the patients identification in all treatment process. According to results of this survey, there is significant relationship between safe and evidence-based clinical services and nurses teamwork ($p < 0.05$). In addition, since the correlation coefficient is 0.943 and it is greater than 0.9, this relationship is positive and very strong. In Deering's survey, after implementation of team working programs to improve patient safety, the rate of safety of blood and blood products injection increased 83% and the risks of Needle stick decreased 70% (20). According to Mayer's study, team working led to reduce average duration of patient staying under Oxygen tent and hospital infections. In addition, average surgical time was reduced by 33% after training of teamwork (22). The result of this study showed that there is no significant relationship between safe environment and nurses teamwork ($p > 0.05$). Given that service personnel with supervision of health environment experts do waste management including waste separation and color encoding, it seems to be logical. According to results of this survey, there is significant relationship between patient safety and nurses teamwork ($p < 0.05$). In addition, since the correlation coefficient is 0.840 and it is greater than 0.8, this relationship is positive and very strong. In Deering's survey patient safety improved considerably after implementation of team working programs (20). The study conducted by AghaRahimi (2011) indicated that there is significant relationship between level of safety and management support of patient safety, team working in each unit, overall perception of patient safety, open communications, team working between units, and non-punitive response to error and employment of staff (23). The results of this study showed that patient safety status in these hospitals was in the moderate level. Competitive environment for hospital managers leads to further effort and motivation of them toward implementation of patient safety programs. In part of 'participation and interaction with patient and community', the results showed that in hospitals correct patient identification gets little attention (it should be done by at least 2 identifier in order to treat correctly). It requires more attention of staff and making culture to compliant patient identification in clinical units. Also, obtain informed consent before any intensive therapeutic or diagnostic activity has the lowest compliance because lack of its legal requirements in Iran (despite of its importance in patient participation). In addition, about 57% of standards related to safe and evidence-based clinical services and hemovizholans system deployment in hospitals are compliant. The highest scale of standards compliance was about safe environment standards, which related to safe management system of waste disposal. A large number of researches and activities have been done in Iran and because of these, hospital wastes are disposed safely. Teamwork assessing revealed many of straights and weaknesses in provider units. Totally, compliance of team working was in good level in the

hospitals. The lowest percentage was related to group environment, so that most of providers stated they have some problems to express their ideas and suggestions and they do not feel free. In addition, human resources and skills that are necessary to achieve the objectives of the group have the lowest positive responses. Among the aspects of teamwork, skills of group have the highest percentage. It represents good communication among group members, useful feedback about activities, members familiarity about other's job responsibilities, group's ability to make decisions and solve problems and specially monitor the patient care programs and improve these programs through using the correct executive procedures.

4. CONCLUSION

Relationship between difference aspects of team working and patient safety indicated that only the correlation between safe and evidence-based clinical services and nurses teamwork was positive and significant and in the others relations there was no significant correlation. However, in addition to the impact of research restrictions in these results, they can indicate that other aspects of patient safety in studied hospitals may be influenced by other factors that are not examined in this survey. In addition, the current results showed that there was significant relationship between patient safety and nurses' team working. These results can help to explain the role of teamwork in improving patient safety and justify further attention to teamwork in the organizations and since the occurrence of errors in hospitals, will enter huge costs to both patients and hospital and eventually the community in addition to physical risks to patients. Investment of these organizations to improve patient safety through increased teamwork culture can lead to return on capital.

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CONFLICT OF INTEREST

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

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