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## Integrating Six Sigma model with Team STEPPS: A plan for sustaining interdisciplinary teamwork.

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Background Teamwork and communication are critical to the safe delivery of care. The International Joint Commission (2011) declared that research has found that 70% of all medical errors can be attributed to breakdowns in healthcare team interactions. Aim; This study aimed at Integrating Six Sigma model with Team STEPPS as a plan to sustain interdisciplinary teamwork. Methods; Procedure was carried out on the basis of six sigma model for process improvement. The Team STEPPS Teamwork Perception Questionnaire (T-TPQ) was distributed on all unit staff; also they have been observed intermittently through "Team performance observation check list"(TPOC) for three sessions / week in different shifts. Pareto charts were constructed to represent the vital few team work 'problems. Then root causes of those problems have been identified by the administrative team. Results; Regarding (T-TPQ) and (TPOC), The Pareto charts indicated that vital few of interdisciplinary team work was related to leadership and team structure. The main root causes of those problems were lack of clinical supervision, empowerment, training and inter-professional meetings. Conclusion: integrating six sigma models with Team STEPPS explored the interdisciplinary team work' problems thus facilitate planning for improvement.

**Keywords:** Six Sigma, Team STEPPS, Interdisciplinary teamwork.

### INTRODUCTION

Patient safety is a global concern affecting developed as well developing countries, although estimates of the size of the problem are scarce, especially in developing and transitional countries, it is likely that millions of patients worldwide suffer from delayed care, injuries or death every year due to unsafe medical care. Health care-associated infections, misdiagnosis, injury due to the inadequate use of medical devices, and, adverse events due to medication errors, are common causes of un safe patient care (Abdou & Saber, 2011) .

In today's health care system, delivery processes involve numerous and continuous

interaction among multiple health care practitioners with varying levels of educational and occupational background. "During the course of a 4-day hospital stay, a patient may interact with 50 different employees", which include physicians, nurses, technicians, and other health care providers. In order to have efficient and effective clinical practice, critical information must be accurately communicated. When health care professionals are not communicating effectively, patient safety is at risk because of lack of critical information, misinterpretation of information, unclear orders over the telephone, and overlooked changes in status (Daniel and Alan, 2008).

"Team STEPPS is a systematic approach developed by the Department of Defense (DoD) and the Agency for Healthcare Research and Quality (AHRQ) to integrate teamwork into practice". It is designed to improve the quality, safety, and the efficiency of health care by improving communication, and teamwork skills. Team STEPPS is practical and adaptable because it enables teams to gain skills to be able to adapt to changing situations, to optimize resources to achieve the best clinical outcomes for patients, to have a shared understanding of the plan of care, to increase team awareness, to help teams to clarify team roles and their responsibilities, to develop positive attitude and appreciation of teamwork, to provide safer, more reliable, and efficient care (King et al., 2008).

Six Sigma provides an efficient mechanism which focuses on customer requirements through improvement of operation quality which in turn leads to cost reduction. Its implementation requires careful strategic planning and strong management commitment. It is one of quality tools that utilize statistical analysis to improve product or service quality. Six Sigma is used for process improvement in health care through eliminating defects; its goal is to meet customer/ patient's needs and reduce hospital cost without affecting quality of care (Joseph, 2011). This study aimed at Integrating Six Sigma model with Team STEPPS as a plan to sustain interdisciplinary teamwork in the department of clinical oncology and nuclear medicine at Cairo University, Egypt.

## MATERIALS AND METHODS

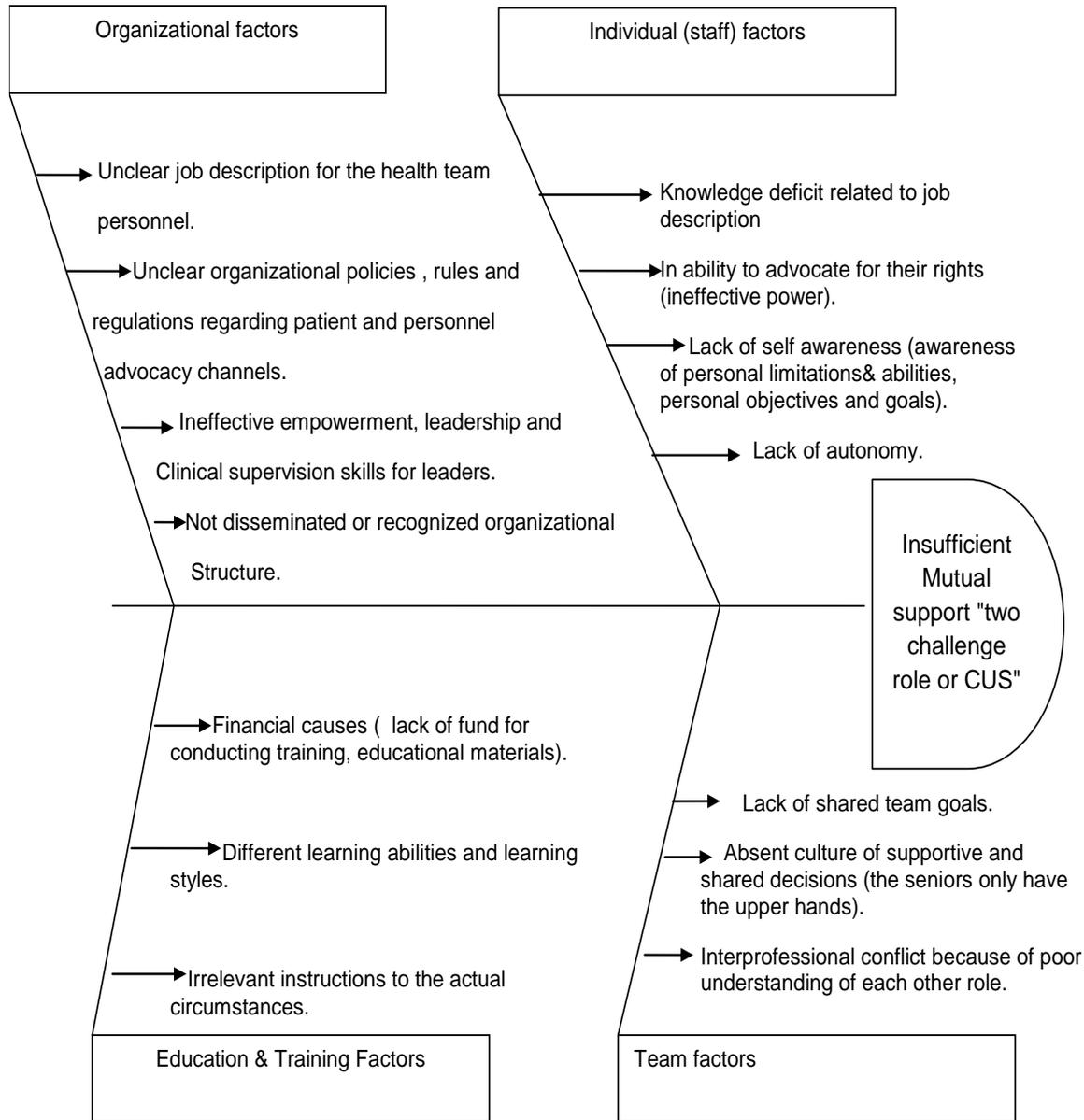
A convenient sample of the interdisciplinary health team members were recruited to carry out the present study divided into :Unit staff (seven

medical residents , one pharmacist, two head nurses and 12 staff nurses); Administrative staff (four Quality and infection control team members, seven Training and education team members and four Development team members)

Tools of data collection were guided by the Agency for Healthcare Research and Quality (2004, 2013); the first one was Team STEPPS Teamwork Perception Questionnaire ( T-TPQ) and the second was the Team performance observation checklist (TPOC).

Procedure was carried out on the basis of six sigma model for process improvement (DMAIC); during define phase; the data collected through "T-TPQ" and the observation of "TPOC" were collected to determine the level of health team perception and performance. During measure phase and based on the previous phase; Pareto charts were constructed to represent the vital few of interdisciplinary teamwork. According to the principle (also known as the 80/20 rule) roughly 80% of the effects come from 20% of the causes. Analysis phase; Based on the previous phase; the root causes of the problem have been identified by administrative team with the investigator. Resulting list have been displayed by cause-effect diagram (Fig 1,2,3,4). Improvement phase; The resulting list of these root causes was integrated with Team STEPPS program to be used as a plan for sustaining interdisciplinary team work. Control phase Based on the previous phases; (T-TPQ) will be distributed and (TPOC) will be used through which the administrative team and the investigator will make sure that the intended results being achieved and periodically monitored to ensure that team work is sustained.

**Figure (1) Cause and effect diagram representing possible root causes of insufficient mutual support**



**Figure (2) Cause and effect diagram representing possible root causes of Improper Team structure**

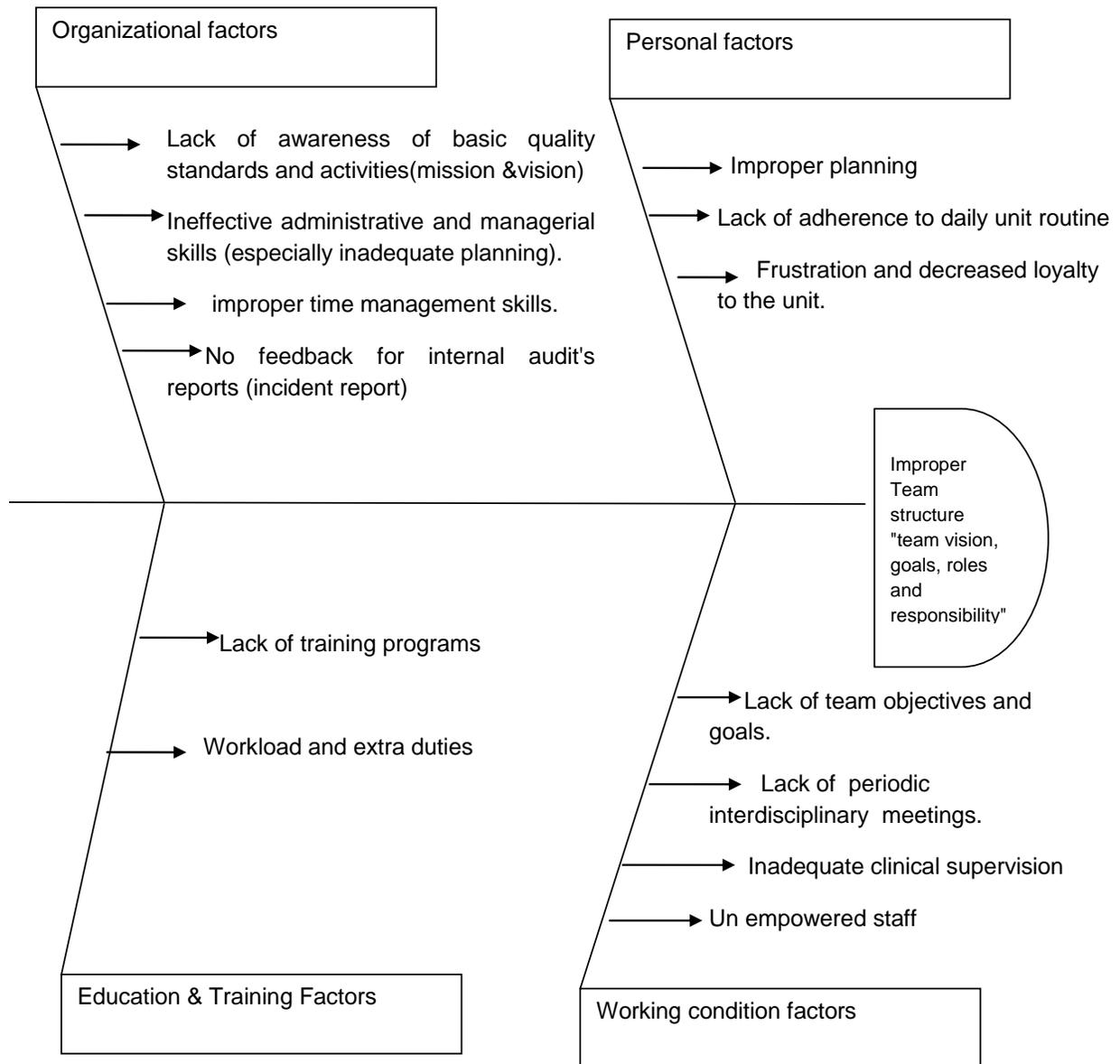
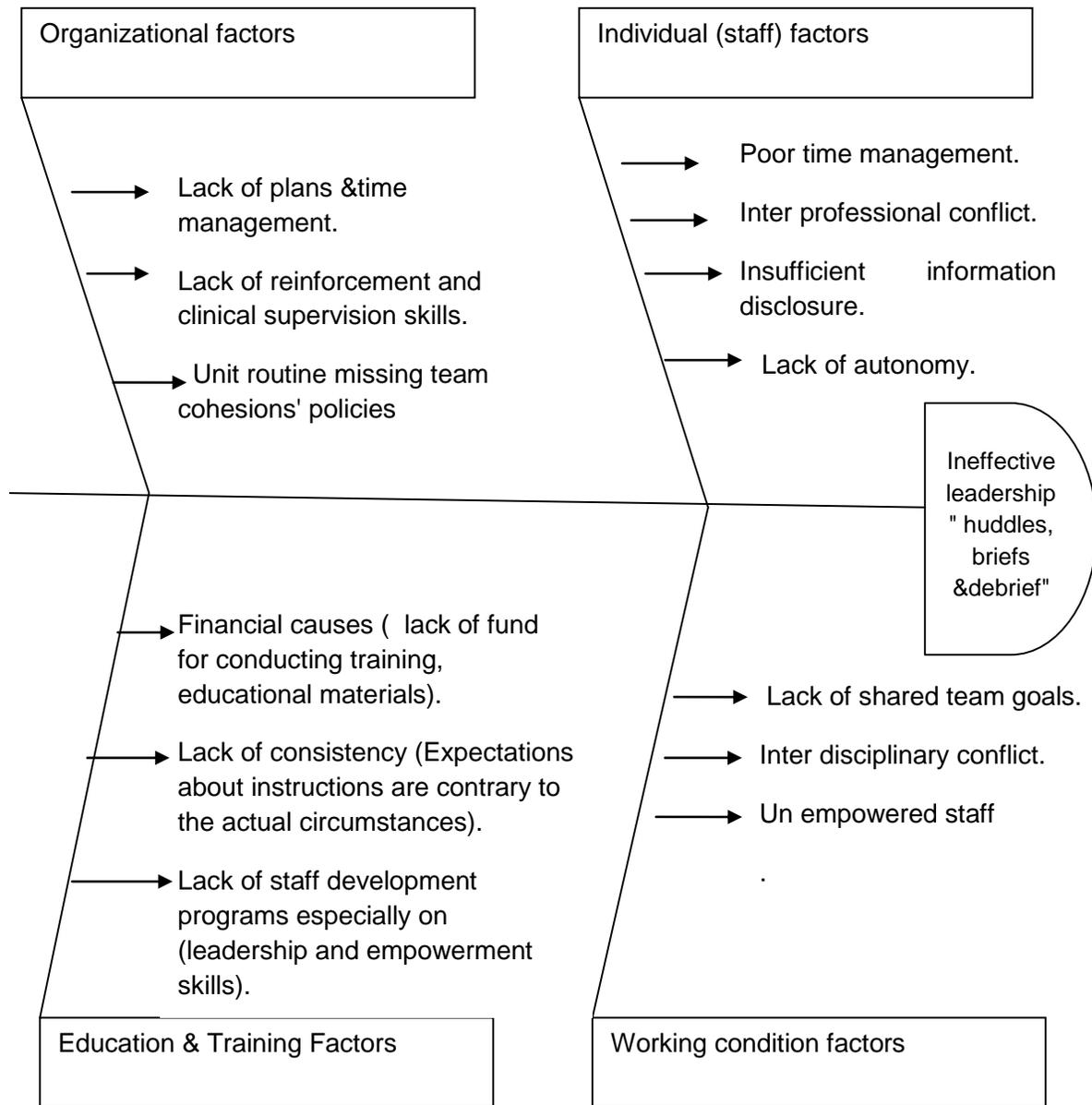
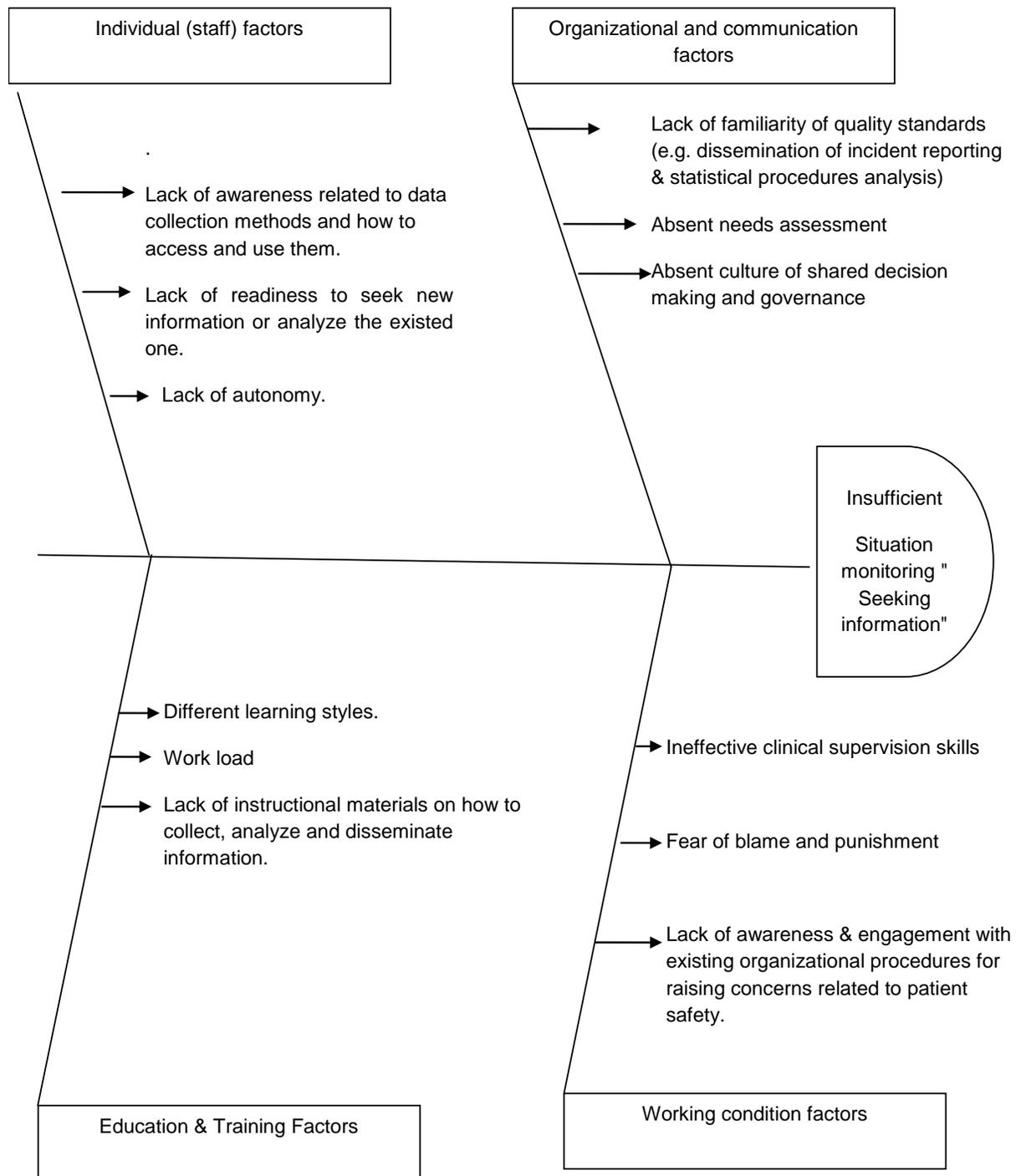


Figure (3) Cause and effect diagram representing possible root causes of Ineffective leadership



**Figure (4) Cause and effect diagram representing possible root causes of Insufficient Situation monitoring**



## RESULTS AND DISCUSSION

### Mean scores and standard deviation of unit staff perception and their performance regarding to interdisciplinary teamwork.

Regarding to teamwork perception ( T-TPQ) as displayed in table (1), the situation monitoring and leadership represented the lowest mean scores (26.33±7.06 and 26.82±6.94) respectively. As regard to Team performance (TPOC) which is displayed in table (2); leadership, mutual support and team structure have got the lowest mean scores (2.9±2.00, 2.44±1.4 and 2.45±1.73) respectively.

### Contradicting to the study findings;

Nancarrow et al., (2013) on their study about principles of good interdisciplinary team work; the study concluded that leadership is the first defining characteristic of a good interdisciplinary team work. They recognized the important role that leadership plays for the complex communication and coordination necessary among different groups of professionals and non-professionals. They also demonstrated the need for both flexibility and clarity of roles when the bodies of knowledge of distinctive professional groups are shared, protected, and preserved.

More over; Hwang and Ahn (2014) , in their study on "Teamwork and Clinical Error Reporting

among Nurses in Korean Hospitals" indicated that mutual support was rated highest mean score 3.49 and SD 0.52 which is positively associated with nurses' error reporting that will contribute to encouraging the reporting of errors and improving patient safety.

### Contrary to the present study;

Andreas; Lowton and Karen (2008) in their study on "what fosters or prevents inter professional team working" concluded that the two main themes emerged that had an impact on inter professional team working: team structure and team processes .Also Emanuel et al., (2011) on their patient safety education program indicated that effective team is one of the core clinical strategies for improving quality and patient safety. Effective teams coordinate, support and mutually provide back up in order to improve communication within the clinical team and to increase patient involvement.

### The vital few of interdisciplinary teamwork

Regarding to teamwork perception ( T-TPQ) as displayed in figure (5), the situation monitoring, leadership and team structure represented the vital few of interdisciplinary teamwork (74.998 %). As regard to Team performance (TPOC) which is displayed in figure (6), the vital few of interdisciplinary teamwork were leadership, mutual support and team structure (73.932 %).

**Table (1) Mean scores and standard deviation of total unit staff' perception according to (T-TPQ) (n=22)**

Items	Mean	SD
Situation monitoring (7 items)	26.33	7.06
Leadership (7 items)	26.82	6.94
Team structure (7 items)	27.15	6.26
Mutual support (7 items)	27.15	6.38
Communication (7 items)	27.47	5.67

**Table (2) Mean scores and standard deviation of total unit staff' performance according to (TPOC). n=66**

Items	Mean	SD
Leadership (6 items)	2.9	2.00
Mutual support (5 items)	2.44	1.4
Team structure (4 items)	2.45	1.73
Situation monitoring (5 items)	3.74	1.98
Communication (4 items)	2.77	0.42

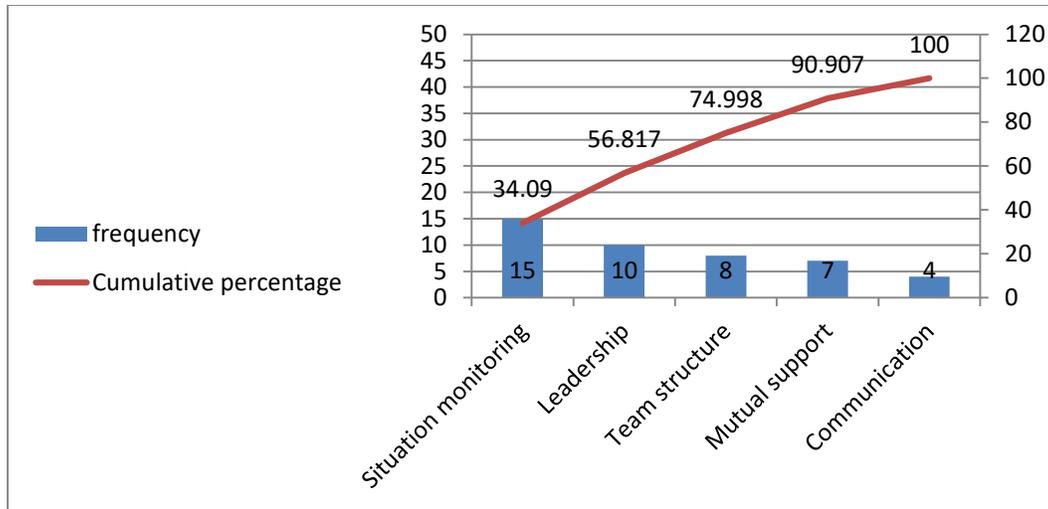


Figure (5) Pareto chart of teamwork perception ( T-TPQ) as indicated by unit staff (n=22)

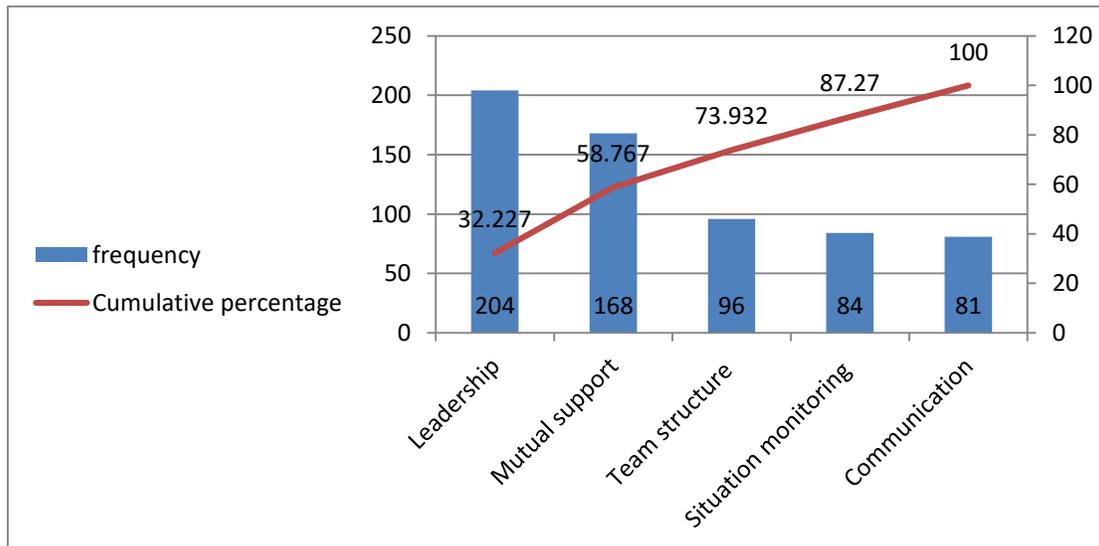


Figure (6) Pareto chart of team performance (TPOC) as indicated by investigator's observation (n=66)

**CONCLUSION**

Integrating six sigma models with Team STEPPS explored the interdisciplinary team work' problems thus facilitate planning for improvement.

**Acknowledgment**

Authors would like to thank all unit staff and the administrative members of the El Manial Specialized hospital, Cairo University, Egypt.

**CONFLICT OF INTEREST**

The present study was performed without any conflict of interest.

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**AUTHOR CONTRIBUTIONS**

HTO collected , analyzed the data and wrote the manuscript, MGM interpreted the data.EAA and FAA concluded the results and drew the lines for improvements and MAH approached the unit staff and explain the aim of the current study, facilitate the channels of communication with the hospital administration. All authors read and approved the

final version.

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