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Original Article

Association between Evidence-Based Organization of Pathways and Quality Management System in Acute Myocardial Infarction (AMI) and Stroke in Tehran Hospitals

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Abstract

Introduction: The clinical pathways are an approach to standardizing care process which supports the use of clinical guidelines and protocols. The aim of this study was to investigate the association between the evidence-based organization of pathways and quality management system in acute myocardial infarction (AMI) and stroke in Tehran Hospitals.

Methods: A random sample of 21 hospitals were studied. The anonymous questionnaire of Quality management system index (QMSI) was conducted through quality manager of these hospitals. The validity and reliability of the 40- item questionnaire were obtained. 450 patient's records in two acute conditions of acute myocardial infarction (MI) and stroke were reviewed with evidence-based organization pathway (EBOP) checklist. Data were analyzed using descriptive statistics, Pearson corelation coefficient, ANOVA, T-Test, alpha Cronbach and multiple linear regression analysis. SPSS version 21 was used to analyze the data.

Results: There was a positive association between quality management system and evidence-based organization pathway in (AMI) (β: 0.654) .PR>t: 0.014: and stroke (β: 0.833), PR>t: 0.01, respectively. Hospital characteristic and QM were not related.

Conclusion: We concluded that compliance of QM at the highest level of the hospital could improve the quality of special performance inpatient with two acute conditions in AMI and stroke. This study revealed that QM strategies were effective.

Keywords: Hospital quality management, Evidence-based organization pathway, stroke, acute myocardial infarction

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Introduction

Nowadays, evidence-based guidelines pathways are developed systematically to manage the quality of care in healthcare concerning the standardization and organization of the care processes of patients with acute conditions (1). Implementation of clinical pathways reduces the variability in clinical practice and improves clinical outcomes in acute care (2). Two acute conditions of acute myocardial infarction (MI) and stroke are major public health-care concern in the world. Annually, 15 million people worldwide suffer an episode of stroke. Of these, 5 million die and another 5 million are left permanently disabled, with added burden to the family and community (3, 4). Cardiovascular disease (CVD) is the global leading cause of premature death. CVD led to about 17.9 million deaths in 2012 and 347.5 million disability adjusted life years (DALYs) were due to CVD in 2015 worldwide(5, 6).

In Iran, despite the advances in management of Acute Myocardial Infarction (AMI) and Stroke, the most prevalent causes of mortality are these two acute conditions. The first leading cause of mortality is acute myocardial infarction that leads to 46% of all deaths (7), and stroke occurs in 130 per 100000 people in a year. The reports indicate that in Iran, compared with some of the developed countries, ischemic stroke occurs approximately one decade earlier and leads to a greater rate of mortality (8).

Effective treatment of MI and stroke requires a highly functioning health care delivery system, driven by valid and reliable measurement of continuous improvement (9). The use of clinical pathways is becoming more imbedded in the daily practice of health care and support the implementation of clinical guidelines into practice (10).

Clinical pathways (CPW) originated in the United States in the 1980s; these were developed through the collaborative efforts of health care provider to improve the quality of care (10). It is a tool to provide standard care with a little variability. Clinical pathways is increasingly being implemented in many countries to improve the care of stroke and CVD patients (10, 11); there is little evidence for the effects of CPW on stroke and MI management in Iran (12, 13).

Quality management systems in healthcare are referred to as a set of procedures and methods which manage, direct, monitor, control and promote the quality of car(14). QMS exists at the hospital level of the health care system and is operationalized within departments and smaller organizations through QM activities (14). In Iran, QM efforts began in 1990. Several models of quality management have been implemented, such as ISO, clinical governance, European Foundation for Quality management (EFQM), Total Quality Management (TQM), and recently the national hospital accreditation program. Although these models have inevitable positive outcomes, lack of integrity in the quality management activities and non-systematic approaches used are the challenges to which health care system in Iran is confronted. (15, 16).

There are few studyies to on the assessment of the association of quality management systems at the hospital level and evidence-based organization pathway in MI and stroke at departmental level in Iran. Our study aimed to address this issue. The study aimed to investigate the relationships between quality management systems and evidence-based Organization of Pathways in acute myocardial infarction (AMI) and stroke in Tehran Hospitals.

Methods

The cross-sectional research design was used in this study. This study was conducted at 21 systematic randomly selected hospitals in Tehran city in 2016-2017. Inclusion criteria were general acute hospitals with more than 35 beds that manage two acute conditions of myocardial infarction and stroke. Hospital clusters include all general public, private, security social organization and military hospitals that had enough patients for collection of data over the study period. Exclusion criteria were the hospitals which did not provide care for the two acute clinical conditions, did not have enough patients, and did not agree to participate in the study. 21 quality improvement managers of these hospitals, one manager of every hospital, participated in the study. The records of a sample consisting of 450 female and male patients hospitalized for at least the previous three months were reviewed. At last, 30 consecutive records of each hospital. Definitive diagnosis of the patients was acute MI or ischemic stroke which included patients with ST-segment elevation infarct (STEMI) and those with positive MRI of ischemic stroke. Patients were excluded from the study if they had a co-morbidity disease such as patients with diabetes. The sample size calculation was based on the review of literature at similar studies conducted by European countries (17, 18). Two tools were used to collect the data about the study subjects.

Tool 1: QMSI questionnaire: It was developed by Wager et al. (19)and consisted of nine dimensions and 40 items including quality policy documents (2 items), quality monitoring by the board (5 items), training of professionals (4 items), formal protocols for infection control (5 items), formal protocols for medication and patient handling (4 items), analyzing performance of care processes (8 items), analyzing performance of professionals (3 items), analyzing feedback and patient experiences (3 items), and evaluating the results (6 items). Hospital quality managers respond to each item using a four-point Likert scale ranging from “not available” (0) to “fully implemented” (4). The maturity of the management system is expressed as an index (0–27), based on the extent of implementation of quality improvement activities (19).

Evidence-based organization of pathways (EBOP) was used to measured the clinical pathway at two emergency conditions. This tool explores whether an organization of the pathway cover requirements for evidence-based medicine. To evaluate evidence-based organization pathway (EBOP) items, we used two national protocols of the Ministry of Health that were implemented in hospitals and the checklist was designed (15). Although the EBOP recommendation differed for two conditions, the checklist questions were selected that were followed by a generic care pathway design and included items related to admission and acute care. The final measures included 11 pathway-specific items. It involved 2 parts:

Part (a): recommendation for myocardial infarction (5 items)

Part (b): recommendation for stroke (6 items)

Clinical practice summary indicators had 3 possible values: “Yes”, “No”, or “Not applicable (20)

The validity of QMSI questionnaire was measured with content validity and construct validity. The tools were reviewed by15 hospital management experts in the field of quality management for revision. Construct validity was measured by confirmatory factor analysis. The reliability of the tools was estimated using Cronbach’s Coefficient alpha test. The study was carried out on two phases: Assessment phase and retrospective review of the patient’s record phase.

An official letter was sent to the hospitals; after hospital permission, the researcher attended the hospital, visited the quality improvement directors, gave the questionnaire to them, and collected them at the end of the visit. The quality manager of the hospital was defined as the person responsible for the coordination of quality improvement activities. He/she should have a good overview of all activities toward quality improvement.

The quality manager was allowed to ask other people in the hospital if he/she was not sure about the right answer, but only one questionnaire per hospital was expected to be filled in.

At the second phase, data for the clinical practice indicators were retrieved through retrospective patient record review using the ministry of health protocol delivered checklist. 470 patient’s records of 42 departments of 21 hospitals were assessed for compatibility with (EBOP) checklists (20).

Statistical Analysis

We used descriptive statistics, confirmatory factor analyses, Pearson correlation, ANOVA, and student’s t-test. The analysis was performed using statistical software SPSS version 21. We performed descriptive statistics for each of the variables included in the study. Outcome variables consisted of a set of 11 single clinical practice items. To investigate the relationships between QMS and EBOP, we used linear regression models (19, 20). We calculated the association between the dependent variable (QMS score) and independent variables of hospital characteristics (ownership, teaching status and hospital size). The significance level was adopted at P<0.01 for interpretation of the results of tests of significance.

Ethical Consideration

An official permission to conduct the study was obtained from hospital management board. Verbal consent was obtained from the quality manager to be included in the study after the purpose of the study was explained. Participation in the research was voluntary and anonymous questionnaires were obtained.

Results

Overall, 21 departments and 21 quality managers of these hospitals in Tehran city provided valid data. The hospital and quality manager’s characteristics are shown in Table 1. Most hospitals were public (n=9, 42.9%) and almost a third of them had a teaching function (n=8, 38.1%). Most quality managers were women and nurse (n=13, 61.9%) and worked at the same hospital for the previous 3 years (n=6, 27.58%) (Table 1). A total of 470 clinical records (60% of expected) were analyzed. Patient characteristics are shown in Table 2. Table 3 shows the Mean and SD, Corrected Item-Total Correlation, Pearson coefficient and Cornbrash’s Alpha for QMSI dimensions of Tehran hospitals. Table 4 shows evidence-based organization of care pathway recommendations for AMI and stroke. They followed a generic care

Table 1: Characteristics of hospitals and quality managers of Tehran hospitals

Hospital characteristics	**N=21 (%)**			**Quality manager characteristics**	**N=21 (%)**	
General Hospital Ownership	Private	8 (38.1)	ANOVA Sig:0.791	Age (years), mean (SD)	45 (8.6) years	
	Public	9 (42.9)		Number of years affiliated with the hospital, mean (SD)	6 (27.58) years	
	Social Security Organization	3(14.3)				
	Military Hospital	1(4.8)				
Number of active beds	<100	10 (47.6)	ANOVA Sig:0.218	Number of years as quality manager, mean (SD)	3 (0.0) years	
	100 - 200	8 (38.1)				
	200 – 300	1(4.8)				
	>300	2 (9.5)		Job	Nurse	13 (61.9)
					Physician	8 (38.1)
Teaching Status	Teaching	8(38.1)	T-Test Sig 0.975	Sex	Male	6(28l57)
	Non-teaching	13(69)			Female	15(71.43)

Table 2: Characteristics of the Patients in the Chart Review

Characteristics		All Departments	Acute Myocardial Infarction(AMI)	Ischemic Stroke
Number of case (% of total)		470 (100)	250 (53.3)	220(46.7)
Sex n (%)	Male	279(59.3)	164 (65.4)	115(51.9)
	Female	191(40.7)	86(34.6)	105(48.1)
Age(years), Mean(SD)		62± 11.8	60 ±12	66.50 ± 13.49

Table 3: Evidence-based organization of care pathway recommendations for AMI and stroke

	Evidence Based organization of pathways at Acute Myocardial Infarction (AMI)	Yes N (%)
1	There are written criteria and procedures for very quick admission and treatment of patients with chest pain.	36 (14.4)
2	Arrangements ensure that eligible STEMI (ST segment elevation MI) patients, within the first 30 minutes after the patient arrives for thrombolysis	37(14.8)
3	There is access to a specialist physician at 24hour/7 day to determine of coronary blood supply.	57(22.8)
4	There are facilities for immediate or rapid coronary angiography.	48(19.2)
5	There are facilities for performance and transport for percutaneous coronary intervention	44(17.6)
	Evidence Based EBOP organization of pathways at Stroke	yes
1	There is an agreement or procedure to transfer the patients to appropriate stroke units	42 (19)
2	Proper procedures ensure that stroke patient receive thrombolysis treatment if necessary	31 (14)
3	Thrombolysis services are available 7 days a week or there is a formal agreement for treatment	55(25)
4	There are protocols and procedures for brain imaging for stroke patients within one hour of arriving at the hospital.	62(28.1)
5	Hospital protocols exist for documenting multidisciplinary goals up to the first 5 days of hospitalization.	70(31.8)
6	There is immediate (up to an hour) access to a stroke specialist for people with persistent neurological symptoms.	46(20)

Clinical practice summary indicators had 3 possible values: “Yes”, “No”, or “Not applicable

Table 4: Mean and SD, Corrected Item-Total Correlation, Pearson coefficient and Cornbrash’s Alpha for QMSI scales of Tehran hospitals

	QMSI Dimensions	Mean	Standard deviation	Pearson’s coefficit	Corrected Item-Total Correlation	Cornbrash’s Alpha
1	Policy documents (2 item)	7.4	2.8	0.526	0.3- 0.75	0.75
2	Quality monitoring by the board (five items),	13.5	5.5	0.808	0.6 - 0.87	0.92
3	Training of professionals (four items)	21.23	4.2	0.552	0.4 - 0.97	0.83
4	Formal protocols for infection control (five items)	10.33	4.3	0.863	06 - 0.8	0.99
5	Formal protocols for medication (four items)	7.8	3.1	0.963	0.6 -0.87	0.92
6	Analyzing performance of care processes (eight items)	18.9	7.6	0.739	0.4 - 0.89	0.92
7	Analyzing performance of care professionals (three items)	7.4	3.02	0.811	0.6 – 0.7	0.84
8	Analyzing feedback patient experiences (three items)	7	3.49	0.748	0.7 – 0.8	0.88
9	Evaluate results (six items)	12.19	7.2	0.932	0.7 – 0.9	0.97
	Sum	20.5	4.92		0.4 – 0.9	0.758

pathway design and included items related to admission and acute car. The final measures included 5, 6 pathway-specific items, respectively. Performance was generally low in all areas, such as thrombolysis intervention for the patients (compliance of 14.8%). The average score of all departments on QMSI was 20.5 out of 27 (SD 4.92). Multivariate linear regression model was used to detect associations of QMSI with EBOP measures at AMI and stroke and adjusted for fixed effects at the hospital level (ownership, teaching status and number of bed). There is a positive and weak association between QM and EBOP at AMI (β: 0.119, pr>t: 0.019) (Figure 1) and a positive and weak association between QMS and EBOP at stroke (β: 0.114, pr>t: 0.014) (Figure 2). (All coefficients were significant at a P≤0.001 lev).

Discussion

Our study revealed that there was a positive association between evidence-based organization pathways and hospital QM at two acute conditions of acute myocardial infarction and stroke. The results demonstrated that the quality management system items (QMSI) had a positive compliance with EBOP at AMI (β: 0.119, pr>t: 0.019) (Figure 1). Also, there was a positive association with EBOP at stroke (β:

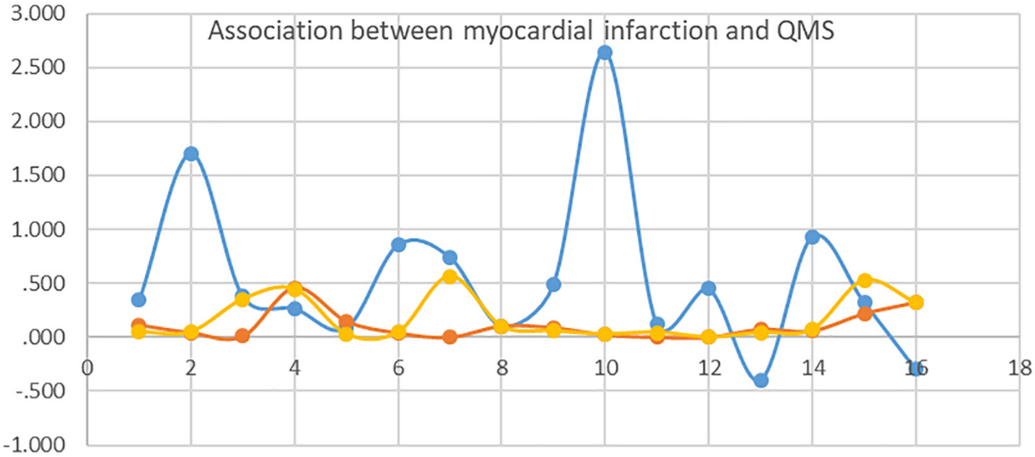

Figure 1: The association between myocardial infarction and QMS with multiple regression model adjusted for fixed effect of hospital characteristics

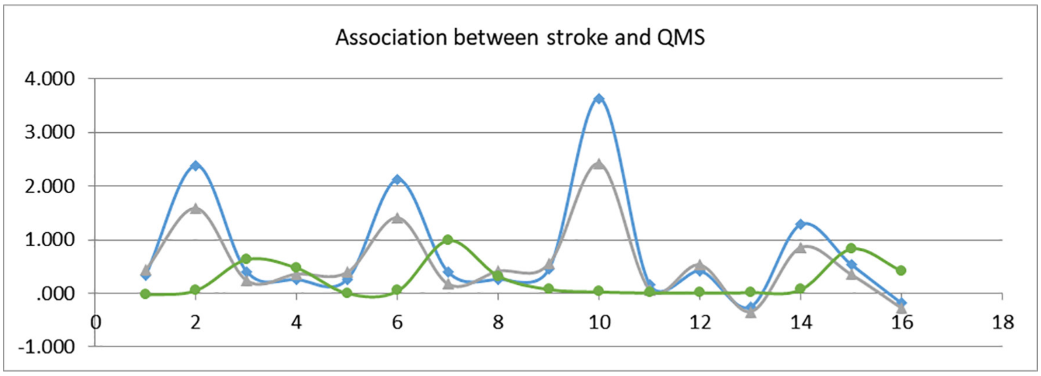

Figure 2: The association between stroke and QMS with multiple regression model adjusted for fixed effect of hospital characteristics.

0.114, pr>t: 0.014) (Figure 2). This finding was in line with that of Wagner et al. (2014); they mentioned that there was a positive association between the two variables (19). Despite this positive association, our results revealed that certain key recommendations were far from ideal (Table 3).

The results showed that delayed hospital presentation in addition to the lack of an organized and comprehensive acute care program in the hospitals were the major difficulty in receiving proper acute treatment. These findings were in accordance with those of Perneger et al. (2006) who stated that the key component of the care pathway in AMI and stroke was prompt and timely intervention (21). Emergency Medical Services (EMS) are the integral component of acute care centers by their vital role in rapid transport of the stroke patients and MI patients to the designated facilities (22). The rate of prompt presentation in the emergency department in our study was 19% after stroke and 14.4% for MI. This is significantly lower in comparison with other countries (23). In Iran, rapid patient transfer is a challenge (24) Our results were similar to the other studies, suggesting that delayed hospital presentation and unavailability a procedure for proper triage of patients with MI could increase the complication (25, 26).

Although there is a lack of an organized and comprehensive management program in the hospitals, we found that only 14.8% of the patient with STEMI within the first 30 minutes after their arrival received thrombolysis drugs; our results were consistent with those of a study carried out in Iran which found that the ECG to diagnosis time was far from the global standard (27).

Findings of the present study revealed that only 28.1% of the hospitals had a protocol for timely intervention and imaging. Late imaging evaluation due to overwhelmed ED with critically ill patients and high demands for diagnostic modalities are important reasons for inappropriate acute stroke treatment (28). Additionally, poor compliance with EBOP recommendations might be influenced by the fact that they are not a legal or contractual requirement and also perhaps by the fact that hospitals advocating their implementation have overly focused on the passive dissemination of knowledge, and ignored contextual factors that might facilitate or hinder implementation (29). Performance monitoring and feedback system are essential steps for quality improvement. According to the ministry of health, the health care delivery system throughout Iran is still weakly regulated and has significant quality challenges (30).

Based on the study conducted by Zare et al. smaller and private hospitals have been more successful in QMS implementation (16); however, in our study there was no association between QM and hospital ownership and number of beds and teaching status. This is the first study on Iranian hospital QMS using a newly developed tool (QMSI), and the results showed that QMS maturity in these hospitals was relatively good.

Conclusion

There are significant gaps between the recommended clinical pathway standards of care and treatment behavior in the sample of the hospitals. Implementation of hospital-level quality management was associated with a good evidence based organization pathway at departmental-level and good clinical practice. Further research should aim to develop clinically relevant quality standards for hospital departments, which appear to be more effective than generic hospital-wide quality systems.

Limitations of the Study

First, we cannot generalize the results of this study to other hospitals due to the study design. Second, the limited number of patients and their incomplete medical records due to different ownerships of hospitals may feature bias. Another limitation is related to the hospital sampling strategy that was used. The convenience sampling of the hospitals is a limited generalization to participating because of possible self-selection by the hospitals that participated in the project, but mixed method design gives more reliable results than a single method design; on the other hand, external assessment by the researcher is a confirmatory method for questionnaires.

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Conflict of Interest: None declared.

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