

## Clinical audit of emergency unit before and after establishment of the emergency medicine department

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### Abstract

**Objective:** To assess the deficiencies and potential areas through a medical audit of the emergency departments, in six general hospitals affiliated to Shahid Beheshti University of Medical Sciences at Tehran, Iran, after preparing specific wards-based international standards.

**Methods:** A checklist was completed for all hospitals which met our eligibility criteria mainly observation and interviews with head nurses and managers of the emergency medicine unit of the hospitals before (2003) and after (2008) the establishment of emergency departments there. Domains studied included staffing, education and continuing professional development (CPD), facility (design), equipment, ancillary services, medical records, manuals and references, research, administration, pre-hospital care, information systems, disaster planning, bench-marking and hospital accreditation.

**Results:** Education and CPD ( $p= 0.042$ ), design and facility ( $p= 0.027$ ), equipment ( $p= 0.028$ ), and disaster ( $p= 0.026$ ) had significantly improved after the establishment of emergency departments. Nearly all domains showed a positive change though it was non-significant in a few. In terms of observation, better improvement was seen in disaster, security, design, and research. According to the score for each domain compared to what it was in the earlier phase, better improvement was observed in hospital accreditation, information systems, security, disaster planning, and research.

**Conclusion:** Security, disaster planning, research, design and facility had improved in hospitals that were studied, while equipment, records, ancillary services, administration and bench-marking had the lowest improvement even after the establishment of emergency department, and, hence, needed specific attention.

**Keywords:** Medical audit, Emergency service, Hospital, Teaching, Management audit, Education (JPMA 62: 154; 2012).

### Introduction

Emergency medicine (EM) is an important and fundamental component of any healthcare system.<sup>1</sup> In the USA and Europe, emergency departments (EDs) are faced with overcrowding and budget restrictions.<sup>2</sup> The discipline of EM has faced significant challenges since its inception to its successful establishment in many countries.<sup>2</sup> EDs have not been properly provided to cope with these major challenges mostly in large cities and urban areas. This is highlighted particularly in developing countries. It is important for a developing country to establish a comprehensive emergency medical system. Despite these problems in the EDs, the effort

to improve the effectiveness of the ED is justified because EM offers many tools for improving public health.<sup>3</sup>

Iran was the 5th country where emergency rooms were established, but is one of the last ones in which ED was developed.

Before the establishment of EM departments, records, benchmarking, administration and equipment had scored higher than 50%. Other domains did not have an acceptable situation.

Medical auditing as a procedure for the evaluation and improvement of clinical practice involves the proposition of solutions for dealing with deficiencies found in concrete

practice settings. Such audits are carried out by medical professionals in charge of patient care, with the fundamental purpose of improving the latter.<sup>4</sup>

The study reports an audit of six academic EDs based on international standards of medical audit to find out changes in these domains: staffing, education and continuing professional development (CPD), facility (design), equipment, ancillary services, medical records, manuals and references, research, administration, pre-hospital care, information systems, disaster planning, benchmarking and hospital accreditation.

## Methods

The study evaluated EDs of six general teaching hospitals (Imam Hossein, Loghman, Mofid, Modarres, Shohadaye Tajrish and Taleghani) affiliated to Shahid Beheshti University in Tehran. These hospitals are the main teaching hospitals of the university from among a total of ten.

The eligibility criteria for the study was EDs that were established between 2003 and 2008, provided the manager concerned gave voluntary permission for assessment. Exclusion criteria were exit of the hospital from teaching ones or the ED being disapproved during the study period. Checklists were prepared for each hospital for pre-2003 and post-2008 periods.

Establishment of ED, considered as a mixture of interventions, entails several changes in management, 24-hour presence of emergency medicine specialist, education (face to face education of residents and undergraduates), improvement in physical environment area and quality, research (programmed research projects), more facilities for personnel, patients and their attendants, better equipment, registry system for data-gathering, better financial support by the Ministry of Health and some other parts which are mentioned as domains below.

The checklist consisted of staffing (medical, nursing and others), education and CPD, facility (design), equipment, ancillary services, medical records, manuals and references, research, administration, pre-hospital care, information systems, disaster planning, benchmarking, hospital accreditation (Joint Commission on the Accreditation of Healthcare Organizations: JCAHO). Each of these 14 domains consisted of some variables that were assessed in detail.

Staff was about managers, personnel and management of the emergency unit. Education consisted of various educational programmes and its documentation. Design and facility looked at the guidance system and what facilitates the service for patients and their associates, and the registration system.

Equipment was defined as the presence of all

necessary devices and medications for diagnosis and medical treatment. Ancillary services meant the ability to accomplish rapid laboratory tests, radiographies and the logistics involved. Security consisted of efficient security men for patients and personnel.

Record related to the accessibility to patients' records and guidelines for directing the process of patients' care.

Reference consisted of the presence of textbooks, communication with other centres and access to consultation and services which the hospital was not able to present. Quality consisted of management of shortcomings and rapid valid diagnostic procedures.

Research was defined as conferences for all personnel, publications, grants, and future programmes of the research centre.

Administration meant supporting personnel and management facilities for ensuring stability of affairs and efficient communication between personnel and manager. Hospital accreditation looked at the presence of JCAHO license.

Pre-hospital care was defined as cooperation between pre-hospital and emergency services and educational programmes.

Information system consisted of data registry system, rapid access to the patients' medical information and access to internet in ED.

Disaster was defined as the presence of a disaster committee in ED, guidelines and manoeuvres for disaster management. Benchmarking related to the satisfaction of patients from the entrance until receiving medical treatment.

These domains, their variables and questions related to these variables were designed by our panels. Two external experts commented on the final questionnaire and their comments were also included in the checklist.

One of the researchers educated eight medical students for interviewing and observation. The aim of this particular education was to ensure uniformity of perception about each question. After educating the students, and before starting data collection, two researchers were excluded from the study due to low accuracy in the assessment exam. Then, for checking the validity of the interviews, they observed the equipment, training, processes, procedures, planning, care, and all areas of the forms and made changes whenever needed. For improving the validity of data, Research and Development (R&D) unit of all the six hospitals were assessed for completing and/or re-checking the data. The person who had trained these observers supervised them and checked their reliability during the filling and revision phases.

We informed the manager of each hospital about the whole process, while head nurses and managers of the emergency medicine units were not aware about the direct observation one the interviews were over. It was done to prevent Hawthorn effect<sup>5</sup> while preserving ethical considerations.

The checklist was completed for all hospitals mainly on the basis of observations and interviews as explained above.

The first assessment of these emergency units was done before the establishment of EDs. They were re-evaluated after the EDs, and the results were compared.

The six running volunteers conducted interviews with some head nurses and managers of the emergency medicine units and some personnel of the hospitals about the domains.

Wilcoxon test for comparison of quantitative variables, and Pearson and McNemar chi-square and fisher exact test for comparison of categorical variables were used in the analysis. Scoring was based on the number of each item without weightage. This was done because it was a before-after study and only comparison of the previous state with new condition was important. We also calculated the percentage of score for each domain as score of each hospital for that domain divided by total possible score of that domain (summation of all variables without weighting) and compared the change of each domain before and after the establishment of ED for each domain. The presence of each item meant one score for that hospital. Differences and correlations with  $p < 0.05$  were considered statistically significant. SPSS 16 software (SPSS Inc., Chicago, Illinois, USA) was used for the analysis.

The overall study protocol was reviewed and approved by the Shahid Beheshti University Ethical Committee. Informed consent was obtained from all the stakeholders in the study.

## Results

Before the establishment of ED, records (70.2%), benchmarking (66.7%), administration (64.8%), and equipment (54.7%) had scored higher than 50%. Other domains were found to be below par. After the establishment of ED, records (81%), disaster planning (80%), equipment (67.8%), benchmarking (66.7%), administration (66.7%), design and facility (64%), education and CPD (57.8%), quality (55.2%), staff (52.2%), research (51.5%) and security (50%) had scored 50% or more (Table)

During analysis, we found that education and CPD ( $p = 0.042$ ), design and facility ( $p = 0.027$ ), equipment ( $p = 0.028$ ), and disaster planning ( $p = 0.026$ ) had significantly improved after the establishment of ED. Moreover, reference ( $p = 0.066$ ), quality ( $p = 0.072$ ), and research ( $p = 0.068$ ) had a borderline improvement. However, all domains (except benchmarking with no change) had a positive impact though it was non-significant in a few.

According to the difference between the pre-ED and post-ED phases, better improvement was seen in disaster, security, design and facility, research, education and CPD, quality, information system, staff, hospital accreditation, reference, pre-hospital care, equipment, records, administration, ancillary services, and benchmarking, respectively.

**Table: Assessment of different aspects before and after establishment of emergency medicine department, their differences and multiplying of changes and their significant level.**

Domains	Before establishment of EM department, N=6, score/total, %	After establishment of EM department, N=6, score/total, %	Difference (%), multiplying	P-value
<b>Clinical</b>				
Pre-hospital care	8/36, 22.2	13/36, 36.1	13.9, 1.63	0.18
Bench marking	8/12, 66.7	8/12, 66.7	0, 1	1.0
Quality	34/96, 35.4	53/96, 55.2	19.8, 1.56	0.072
<b>Educational</b>				
Education and continuing professional development	67/192, 34.9	111/192, 57.8	22.9, 1.66	0.042
Research	17/66, 25.8	34/66, 51.5	25.7, 2	0.068
<b>Administrative</b>				
Reference	31/144, 21.5	51/144, 35.4	13.9, 1.65	0.066
Staff	49/138, 35.5	72/138, 52.2	16.7, 1.47	0.104
Administration	35/54, 64.8	36/54, 66.7	1.9, 1.03	1.0
Hospital accreditation	0/6, 0	1/6, 16.7	16.7, 167	0.317
Information system	1/54, 1.9	11/54, 20.4	18.5, 10.74	0.18
Disaster	12/30, 40	24/30, 80	40, 2	0.026
Design and facility	56/150, 37.3	96/150, 64	26.7, 1.72	0.027
Equipment	282/516, 54.7	350/516, 67.8	13.1, 1.24	0.028
Ancillary series	39/192, 20.3	42/192, 21.9	1.6, 1.08	0.713
Security	1/6, 16.7	3/6, 50	33.3, 2.99	0.157
Record	59/84, 70.2	68/84, 81	10.8, 1.15	0.414

We considered an index showing the situation of each domain. It was calculated by dividing the score of each domain after the establishment of ED by its previous score. According to this index, better improvement was observed in hospital accreditation, information system, security, disaster planning, research, design and facility, education and CPD, reference, pre-hospital care, quality, staff, equipment, records, ancillary services, administration and benchmarking.

## Discussion

Audit should be a key component of emergency medicine education.<sup>6</sup> Considering absolute values in the present study, security, disaster planning, research, design and facility had better condition in hospitals of the area under study, while equipment, records, ancillary services, administration, and benchmarking had not improved much even after the establishment of ED, and needed specific attention. We had only limited access for improvement of pre-hospital care. Other domains had similar priority in our eyes and they were considered equally. The Ministry of Health is the only organisation responsible for providing funds for teaching hospitals and departments. However, the budget is low and it arrives at the department indirectly after reaching the university. This budget cannot be assigned to different parts of ED (ancillary, education, research, etc) equally. As a result, one hypothesis for difference between these 14 domains can be related to the difference in the amount of budget received by different sections.

The study showed the importance of audit in improving ED in a general hospital. This audit is one of the first reports at the national level in Iran. The study was carried out in six general teaching hospitals in Tehran, the capital of Iran, with more than seven million population. The structure of the city is dense and crowded in most areas. Previous reports have highlighted that from the public's point of view, the emergency service was not capable of performing its role; and also the EDs in general hospitals have not been properly prepared.<sup>7</sup>

After establishing ED based on first assessment, pre-hospital care score was improved from 22 to 36 per cent and these included increasing a systematic cooperation between pre-hospital and emergency services in Tehran, providing helicopter bands. Although we had great progress in pre-hospital care, its quality should be monitored periodically.

Despite the improvement, there are still inadequate staff and CPDs based on the standard criteria.

An audit-based programme that involves nurses, house staff, a self-assessment tool and a focused morbidity and mortality conference can result in significant policy changes, more rapid assessment of unstable patients and improved hospital outcomes.<sup>8</sup>

A recent study to determine the appropriateness of the South African Emergency Medicine Curriculum for the burden of disease in Cape Town showed that the curriculum did not cover all the clinical conditions, procedures and investigations encountered by EM registrars and the investigations section of the curriculum correlated particularly poorly with the skills needed for handling the burden of disease.<sup>9</sup> These results were similar to our study in view of the low score of most domains.

EDs provide services across all specialties and for all ages in most countries. However, in Tehran people with overdose and/or in toxicated and those with burn injuries are referred to special centers. Patients with primary care problems are also seen by staff in EDs. In our first assessment which was done in the pre-ED phase, the need of educating and increasing the number of staff was felt. Therefore, these general teaching hospitals increased the number of necessary staff and provided the essential CPD programmes to increase their knowledge and skills.

The first audit had revealed that the clinical staff did not have appropriate access to information for their decisions in patient management. We improved the system by providing necessary resources of information such as online database and textbooks. Other studies also emphasised the impact of continuing medical education (CME) programmes on physician performance in their practice.<sup>10,11</sup> French doctors also had difficulties in organising their education because of personnel and financial constraints. The e-learning development could be a solution that gives doctors fast access to the information they need.<sup>12</sup>

Despite a remarkable improvement in information systems in these hospitals (10.74 times), it is still far from being ideal (20.4 from 100). Since such a system is essential, we need some revisions in this regard as well.

The numbers of single rooms and single-sex wards have been increased for admitted patients. Patients have been given privacy during treatment, consultation or when receiving personal care. Personal conversations with patients are conducted away from the bedside or in such a way that they cannot be overheard by other patients and/or visitors. Reviewers in the study mentioned improvements in this regard. Appropriate facilities and equipments had also been provided. However, these segments need more improvement.

The assessment of administration system showed that EDs in the hospitals studied had a reasonable function. For example, the referral system was well coordinated between different units of the hospital and the ED.

Good management information is a prerequisite for improving operational performance. Accurate and timely reporting is needed on indicators that are relevant to patients' experiences. The availability of management information had



shown significant improvement between 2005 and 2008. Despite the acceptable recording system, employing information technology has not been properly embedded in these evaluated EDs.

Hospital managers must now make sufficient use of information to improve the organisation of services, and, hence, the treatment of the patients.

Since Tehran is threatened by earthquakes, EDs need to be prepared to manage disasters. Based on these facts, EDs formed an expert committee, performed annual manoeuvre and followed the national guideline on disaster management.

While research issues had a low score during the first assessment, they fared much better in the post-ED phase compared with education. It highlights the importance of the research for our attending physicians, maybe due to the obvious gain from research for improving their degree, class and position. Since education is the cornerstone of such teaching hospitals, more attention should be paid on issue, considering the fact that it may lead to higher motivation to get familiarized with appealing new techniques.

Since the study involved referral hospitals in an area with low, moderate and relatively high socioeconomic environment in the northern, central and eastern parts of Tehran, with an old structure and different religious cultures, the results shall be generalised with some caution.

Emergency medicine has changed in Iran during the previous decade. Though we have no EM research centre in the country, we were successful in attracting more budgets for EM. Even the Ministry of Health has put EM on its list of priorities. In addition, most of teaching universities are now interested in having residents in this field. Even other specialties which have scientific and practical interaction with EM (internal medicine and surgery, for instance) now have a tendency to have such a specialty in their hospitals. As a result, the EM apparently has a better future in Iran.

### Conclusion

The study indicates that auditing could be used as a tool for measuring the improvement and also for establishing ED. It then requires management efforts and skills in EDs in general hospitals to bring about improvements in terms of

capacity, efficiency and quality.

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