



Does Intradisciplinary Conflict Influence to Outcomes of Emergency Medicine Residency Program? A Mixed Methods Study

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ABSTRACT

Objective: To explore impact of emergency medicine residency program on patient waiting times in emergency department (ED) and determine the associated factors.

Methods: A two-phased sequential exploratory mixed-methods approach was used. The first phase was comprised of retrospective before-after design of ED encounters for a 3-month period, six months before and six months after the introduction of an emergency medicine residency program in an Iranian teaching hospital. The second phase included semi-structured interviews with five individuals which purposively selected to participate in qualitative design. Quantitative data were analysed descriptively and qualitative data were analysed using an iterative framework approach.

Results: The most patients were admitted to the hospital in night shift, both before and after the resident EMS. No statistically significant differences were found among all of the waiting times during the two time periods except for the average time interval between admission and physician start time ($p < 0.0001$), which increased (instead of reducing), and the average time interval between physician start time and first treatment measure ($p < 0.0001$), which decreased during the year the residents began. The interviewees revealed the intradisciplinary conflicts and interferences existing between ED and other specialist departments, are main important factor to delayed processing of patients visits.

Conclusion: This study has shown that intradisciplinary conflict would affect the outcomes of emergency medicine residency program and ED process. These new findings enhance the understanding of the nature of conflicts and will persuade policy makers that design a set of clinical practice guidelines to clarify the duties and responsibilities of parties involved in ED.

Keywords: Emergency department; Waiting time; Residency program; Hospital management; Intradisciplinary conflict.

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Introduction

Iran is one of the top 10 disaster-prone countries of the world, which almost 31 out of 40 cases of natural disasters has occur that brought large number of death, injuries and substantial devastations [1]. In addition, about 22500 people die each year as a result of road traffic accidents, which are the leading causes of 16% of all YLL in Iran [2]. Nevertheless, over the past 20-30 years, there has been a considerable reduction in the number of emergency departments (EDs), while the number of patients has seen a steady increase. This increase has been coupled with a change in mortality and diseases pattern, the shift from infectious diseases to non-communicable diseases. In response to these changes, procedures and functions of EDs have also encountered significant adjustment [3].

In most of countries, emergency departments (EDs) are considered as the critical point of health system [4], and improving their performance has therefore become one of the main responsibilities of policy makers. This responsibility can only be fulfilled by the proper design of work processes, track and monitoring their performance, and careful analysis of field observations [5]. As a matter of fact, monitoring and evaluation of performance is one of the most vital processes related to an EDs, therefore defining a set of quantitative standards and specifying varieties of valid and meaningful criteria, for instance; timing the operations and determining the time that a patient must wait to receive each specific service, are the most important prerequisites of this evaluation process [6]; because waiting time is the basis of the intended patient-centered emergency care [7]. Various studies have reported that improving the performance of triage, admission, and staffing operations, or in physical or teamwork structure can improve the patients' waiting time and length of visit [8].

Based on this, a series of researches called "time studies" have investigated the critical times of services given in EDs. These critical times include: the time interval between arrival and triage, the time interval between triage and examination by physician, and the time interval between examination and discharge from ED [9]. In 2010, a British team composed of clinicians from the College of Emergency Medicine and The Royal College of Nursing, with input from the CEM Lay Advisory Group brought a set of new indicators for the quality of care in ED; these indicators included: the total amount of time spent in ED, the time of initial examination of patient, and the time of first treatment measure [10]. Another study has also indicated that waiting time, i.e. the average time that patients wait to receive diagnostic and treatment services, is another important indicator of ED performance [11].

Waiting time is a process indicator that is highly connected to patients' perceptions based on the quality of care and is commonly considered as a

key element of patients' satisfaction [12, 13]. In Iran's health system roadmap to 2025, increase in waiting time is listed as a factor extensively contributing to patients' dissatisfaction [14]. From the results of studies carried out in Iran's medical universities, the most notable problems of EDs (in the order of frequency) are the long waiting times, inadequate prioritization through nursing triage, and unsuitable physical space of the emergency room [15].

Long waiting time and long duration of examination in an ED results in a series of adverse outcomes for both patients and healthcare providers; these include increased mortality rate, increased length of stay (LOS) in ED, increased medication errors, increased ambulance diversion, increased number of patients leaving without examination or against medical advice, increased adverse effects on patients with serious conditions, reduced quality of care, dissatisfaction of patients, attendants, and health care providers, and adverse effects on financial aspects of service. Therefore, the waiting time and duration of examination are important metrics for measuring the timeliness of ED services [8, 16]. In the meantime, a regular complaint about EDs is the absence of specialists in these departments, since most of them are on call, and as a result patients must wait a long time to receive the required services [17].

EDs are always the busiest department of healthcare centers, and by definition are the destinations of majority of patients needing medical services in unconventional hours and days [18], so unlike other departments, they become more active after 10 pm [19]. Therefore, the Iranian Ministry of Health (MOH) has issued an order requiring the attendance of emergency medicine specialists (EMS) in all EDs at 24/7 [19]. Therefore, according to the guidelines of health transformation plan (HTP), the instructions based on the attendance plans of resident EMS in all hospitals affiliated by MOH has been given to ensure the timely provision of medical services, adequate 24-h readiness of medical centers, examination of emergency patients by relevant specialist physicians in a timely fashion, and to ensure timely provision of emergency and surgery procedures thereby increasing public satisfaction. From these instructions, all hospitals have been mandated to plan and schedule the 24-h attendance of resident EMS in their EDs [20]. Iran's Hospital Accreditation Standards have also reiterated the importance of the presence of full-time resident EMS in EDs [21]. Considering the inadequate research on the effect of this type of national policies on the performance of EDs, this study aims to examine the effects of implementation of resident EMS on the times and durations of services provided by EDs.

Materials and Methods

Design and Population

This study used a two-phased sequential

exploratory mixed-methods approach to explore impact of EMS residency program on patient waiting times in ED and determine the associated factors. In Phase I, through retrospective before after study, we reviewed the medical records of patients who were ED encountered for a 3-month period, six months before (from 22 September 2011 until 21 December 2011) and six months after (from 22 September 2012 until 21 December 2012) the introduction of an EMS residency program in Shohadaye Tajrish Hospital. In the second phase, we explored five individuals' perspectives to interpretation of results from the first phase. A Major advantage of second phase is to interpret the results of the quantitative phase. For the first phase, We used a simple random sampling for calculation of sample size using Rosner formula [22]. Therefore, 374 patient medical records were calculated for each period. For the second phase, semi-structured interviews were conducted with 5 individuals (EMS (n=2), nurse staff (n=2) and admissions officer (n=1) who had experience with ED situation both before and after the introduction of an EMS residency program. We interviewed 5 key informants to achieve saturation, and data collection has been discontinued when subsequent interviews have yielded no additional concepts.

Setting

Shohadaye Tajrish hospital was located in north of Tehran and affiliated to Shahid Beheshti University of Medical Sciences (SBUMS), which is the 2nd largest medical university in Iran. It contains 18 wards, and 300 beds, which ED contains 27 beds. It should be noted that the choosing of this Hospital was to the following reasons: most recent implementation of EMS residency program in ED and appropriate registration of patients waiting time data the medical records than other hospitals.

Ethical Considerations

Ethical clearance for this study was obtained from Iran University of Medical Sciences (IUMS). A formal letter was sent to Shohadaye Tajrish hospital to explain objectives of the study. Medical records department was assured anonymity and confidentiality of patients.

Data Collection and Analysis

For collecting data, we consider the following patients waiting time: 1- the time interval between admission and physician start time, 2- the time interval between physician start time and the first treatment measure, 3- the waiting time for laboratory services, 4- the waiting time for radiology services, and 5- the LOS in ED. The data was collected through a data extraction form consisting of eight questions in two sections of demographic and patients waiting times, which validity was confirmed by experts and ED officials. Data collection was performed by referring to the medical records department and therefore retrieves and

registration of patients waiting times. We undertook first phase analyses using SPSS software (SPSS Inc., Version 18, Chicago, USA). Also, the t-test was used in comparing the before and after of residency program on waiting times in hospital. Semi-structured in-depth interviews were transcribed verbatim and analyzed thematically using an iterative framework approach. It should be noted that qualitative results were given in discussion section.

Results

The demographic data of patients in the ED during the two study periods are reported in Table 1. Majority of patients were male, which constituted 50.8% (n=190) and 64.2% before and after, respectively. Majority of patients were under 30 years old and 65 years old and over before and after the resident EMS, respectively. The night shift received the highest fraction of patients, both before and after the resident EMS.

Table 1. Characteristics of participants

Characteristic	Before n=374 (100%)	After n=374 (100%)
Sex		
Male	190 (50.8%)	239 (64.2%)
Female	184 (49.2%)	133 (35.8%)
Age		
≤30 years	128 (34.22%)	134 (35.83%)
31–60 years	119 (31.82%)	100 (26.74%)
61+ years	127 (33.96%)	140 (37.43%)
Shift		
Morning	106 (28.34%)	124 (33.16%)
Afternoon	88 (23.53%)	87 (23.26%)
Night	180 (48.13%)	163 (43.58%)

Table 2 provides details of the ED service times before and after the resident EMS. The average time interval between admission and physician start time (first examination by physician) has seen a 7.45 min increment from 7.63 min before the resident EMS to 15.08 min after its implementation, which is statistically significant ($p<0.0001$). The average time interval between physician start time and first treatment measure has witness a 13.51 min reduction from 26.92 min before the resident EMS to 13.41 min after its implementation, which is statistically significant ($p<0.0001$). The average waiting time for laboratory services has witness a 0.01 min increment from 100.02 min before the resident EMS to 100.03 min after its implementation, which is not statistically significant ($p=0.998$). The average waiting time for radiology services has witness a 6.46 min reduction from 53.84 min before the resident EMS to 47.38 min after its implementation, which is not statistically significant ($p=0.604$). The average LOS has seen a 21.92 min increment from 217.04 min before the resident EMS to 238.96 min after its implementation, which is not statistically significant ($p=0.078$). The average of total processing time has seen an 18.46

Table 2. Comparing the before and after of residency program on patients waiting times

Topic	Before		After		T	DF	p-value
	mean±SD	n	mean±SD	n			
Time interval between admission and physician start time	7.63±0.59	374	15.08±0.84	374	7.271	746	<0.0001
Time interval between physician start time and the first treatment measure	26.92±35.19	374	13.41±20.43	374	6.418	746	<0.0001
Waiting time for laboratory services	100.02±34.57	101	100.03±34.16	92	0.003	191	0.998
Waiting time for radiology services	53.84±41.36	38	47.38±67.65	52	0.521	88	0.604
LOS	217.04±156.07	374	238.96±183.06	374	1.762	746	0.078
Total time	280.19±185.38	374	298.65±205.3	374	1.291	746	0.197

min increment from 280.19 min before the resident EMS to 298.65 min after its implementation, which is not statistically significant ($p=0.197$).

Discussion

Results of this study demonstrated that the implementation of resident EMS has increased (instead of reducing) the time interval between admission and physician start time. According to interview with EMS, nurse staff and admissions officer of ED, one of the important factors that increase this time period is the increased duration of triage process. Before the resident EMS, once a patient is admitted into the ED, they would have been directly examined by a general practitioner (GP) and directed to specialized services. But after implementing the program, once admitted, patient must first undergo a triage process, and then be examined by an EMS assistant. In fact, the procedure of triage and taking patients' history, which must be carried out even before the initial examination by EMS assistant, has been given as the factor that causes a significant delay in this part of the process. Furthermore, before the implementation of program, GPs were processing the patients more quickly, according to the interview with EMS. In other words, before the implementation of program, a GP would have made a brief (not thorough) examination on patient, but after the implementation of program, an EMS assistant should acquire thorough history, perform a full examination, and even make an initial diagnosis, which consequently prolong the process.

Several studies have shown that another factor that delays the examination by physician is the lack of meaningful change in the performance of medical assistants in response to their increased workloads. For instance, a study by Brook, which analyzed the efficiency of medical assistants in dealing with increased numbers of emergency patients, revealed that performance of medical assistants had no correlation with the number of patients admitted into the ED (this performance was measured by the hourly number of patients prioritized based on level of care) [23]; a study by Jeanmonod and colleagues has also confirmed this argument [24].

In addition, a study by Berios and colleagues has

found that performance of specialists is reduced with the increased duration of their shift, and has attributed this observation to excessive drowsiness of residents [25].

On the other hand, results of a study by Murrell and colleagues have revealed that processing the patients by an emergency physician at the beginning of triage improves the indicator of physician start time [26]. Results of a research by Salimifard on the same subject have also demonstrated that performing these examinations by an EMS instead of a GP improves the waiting times and patient's LOS [15].

According to our results, implementation of resident EMS has improved the waiting time for the earliest treatment. This reveals that the presence of an EMS in night shifts not only contributes to superior processing of each individual patient, but also speeds up the rate of service. The presence of these specialists also acts as a facilitator, accelerating the start of treatment. A study by Jayaprakash and colleagues has also demonstrated that the utilization of specialist physicians in ED can contribute to quicker processing of patients [27]. A research carried out by Zare Mehrjardi and colleagues, the use of an EMS after triage to reach a quick diagnosis or speed up the required diagnostic procedures in the early stages of the process was recommended [28].

A factor that has been found to increase the waiting time is the time of access to diagnostic services [29]. Therefore, the present study has also investigated the inter-ward relationship between ED, laboratory and radiology. The results reveal that resident EMS does not affect the patients wait time to receive laboratory services. Based on this, a study carried out by French and colleagues, which examined the effect of the absence of resident physician in an academic emergency room, has revealed that this parameter has no effect on the number of laboratory tests [30]. Hosseini and colleagues have also reported that the procedure by which laboratory test or surgery services are requested has an impact on the average time interval between triage and physician examination, between examination and start of treatment, and consequently on the time interval between triage and start of treatment [9].

Results of the present study reveal that resident EMS has no effect on the patients waiting time to

receive radiology services. French and colleagues, reported that this parameter has no effect on the number of radiology tests [30]. Various studies that assessed the factors affecting the waiting times in health care services (including ED) have reported that the type of requested service has a significant correlation with the patients waiting time to receive. Noori and colleagues has also demonstrated that the type of requested service and the number of visits to imaging rooms are among the main factors affecting the waiting times of radiology departments [31].

From the results of the present study, resident emergency physician program has had no effect on patients' LOS in ED. As earlier mentioned, in this resident EMS, the first examination must be carried out by an EMS assistant; when needed, this assistant immediately refers the patient to a specialized service, but otherwise or in case of multi-service patients, a thorough medical history must be acquired, initial orders and instructions must be given, required diagnostic procedures must be adhered to, patient must be referred to necessary departments, and then must be monitored until full processing. However, the problem is that after proper diagnosis and referral to a specialized service (based on ED guidelines), patient gets monitored for another 6h and the previous monitoring gets disregarded; but according to same guidelines, point of origin of all these timings should be the patient's arrival to ED.

The late referral of patients by EMS to specialized service is another point of concern. Before this program, patients could be immediately referred to a specialized service, but now they remain under the care of EMS until proper diagnosis. According to interview, there seems to be an intradisciplinary problem in this process; hasty referral to a specialized service may cause problems, so EMS always wait for a proper diagnosis, but then the above mentioned problem of 6-h monitoring in specialized wards creates a significant latency in the completion of process. Another problem is that, despite the full-time presence of resident EMS, assistants of other specialized services do not have adequate presence during the night shifts. Therefore, after EMS processes a patient, the assistant of specialized service to which patient has been referred often fails to readily and quickly respond to the call to ED.

Generally, Our findings are consistent with Lammers [32] and Nasiripour [33], which Lammers revealed a weak positive correlation between the patients' LOS and the presence of third year resident assistants in ED. According to Nasiripour and colleagues, the full-time presence of specialist physician had no effect on the LOS of patients who required surgical procedures (except patients requiring C-section, vaginal birth, and dilation and curettage). According to Arabi and colleagues, has also shown that 24h presence of intensive care specialist in ICU only contributes to consistency of care [34].

However, results of the present study are in contrast

with Taylor, Helling, Gagic, Dimick, Kumar, Rahmani, and Gholamipour [35-41]. and colleagues has reported that hospitals that implemented a resident EMS had a significantly shorter LOS. The research findings of Helling, Gagic, Dimick, and Kumar which focused on ICU, has also indicated that non-stop presence of attending trauma surgeon and intensive care specialist reduced the patients' LOS. Studies of Rahmani and Gholamipour both carried out on department of obstetrics and gynecology, have also reported that full-time presence of gynecologists reduced the average LOS. Akhavan Akbari [42] and Mahoori [43] indicated that full-time residency of anesthetist have beneficial outcomes since it provides quick access to their expertise and therefore quicker diagnosis and treatment options in emergency and crisis situations.

Overall, it can be categorically stated that this program will have a chance to enhance the time of service only if all barriers and facilitators affecting the outcomes are analyzed, and the consequent results will be providing to policymakers and considered as future health system reforms.

Conclusion

Without exception, all interviewees emphasized on the intradisciplinary conflicts and interferences between ED and other specialist departments, such as internal medicine and surgery, and cited these differences as a factor contributing to delay processing of patients by these specialized services. Therefore, it seems that holding adequate briefings attended by key members of all related departments can somewhat decrease these interferences, but this should be followed by developing a set of clinical practice guidelines to clarify the duties and responsibilities of parties involved in ED.

It is important to state that this issue is more severe for public hospitals (especially those with educational approach) rather than private ones, since public hospitals has failed to establish a balanced interaction between mentioned components and are still governed by their own machinations of competitive environment. This challenge can only be overcome by presenting a more precise definition of duties for all specialists working in and around the ED. Unless authorities of the MOH take some measures to reduce the friction between these departments of specialists, they will continue to see each other as rivals, and it will all be at the expense of the well-being of patients, who cannot possibly understand or decide which department is more qualified to treat them.

Even though the stated objective of this program has been to reduce the service times indicators, as shown by the results, this objective cannot be expected to be fulfilled in the current condition, therefore authorities of the MOH are recommended to review, revise, and clarify their definition of

analytic time intervals and methods by which these indicators are aimed to be improved. The problem of 6-h monitoring should also be looked into, since it seems that each specialized service/department has its own interpretation of guidelines and therefore consider a separate monitoring schedule, while according to ED guidelines, this index should be calculated with respect to patient's arrival to ED. This seems to arise from the lack of precise operational definition for this parameter, which needs to be properly addressed. Last but not least,

it is important to bear in mind that similar studies should be carry out in various settings, so that, if the results are repeated and confirmed, it will be necessary to review the national policies.

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