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Evaluation of changes in the types of drugs administered by various treatment services in Emergency Department

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ABSTRACT

Objective: To determine the amount and type of changes in the Emergency Department, in order to hasten treatment and disposition process of patients in the Emergency Department to expedite by eliminating or minimizing such changes that decreases the cost of treatment and drug resistance **Methods**: In this study, 1 005 patients' file admitted to emergency department of Rasool Akram Hospital were reviewed to see at least two different health services or two shifts of one service with written orders. **Results**: In total, the rate of drug changes studied cases was obtained as 5.47%. The largest pharmaceutical group in which the changes were developed was antibiotic (2.8% from all cases and 50% of total drug changes). Among the various health services, the internal service had imposed the most changes (67.3% of total drug changes). **Conclusions**: Considering that after the removal of trauma patients, the frequency of drug changes had been 11.47%, then it should be noted that the frequency was high and it was not desirable. The greatest change has been operated by internal services due to the fact that most treatments in this department was carried out by drugs.

1. Introduction

In most hospitals, the emergency medicine services are considered as the first service for patients[1]. This service comprises 8 or 12 h shifts. Patients may visit other services such as internal medicine, surgery, gynecology, *etc.* For instance, a pregnant woman who had an accident may have been seen by 5 services. Even though these visits often hasten the diagnostic-therapeutic process of patients admitted to the Emergency Department, but there are differences between the emergency medicine service and other services (for reasons such as differences between references and lack of supervision of attending to different groups) which always cause harm to patients.

One of the disagreements is on antibiotics. For instance, patients with pneumonia may have two types of antibiotics which are prescribed by emergency medicine service. However, the internal

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service may prescribe two other types of antibiotics at its own discretion. In such a situation, the first two prescribed drugs are actually more expensive for the patients rather than having the therapeutic effect. Noteworthy single dose of antibiotics has no therapeutic effect and on the other hand, poor treatment of an organism with an antibiotic can cause drug resistance[2-4].

The drugs may also be prescribed despite the prevailing circumstances of the medications commonly prescribed for the patients such as reducing blood pressure in patients with different medications that they take at home. The other problem of patient in Emergency Department is cutting off the medications which patient took before then. For example, cutting off the anticonvulsants in patients who stays in the Emergency Department for a long time could cause convulsion in them. So patients should consider that although in emergency conditions, the current problems of the patients are treated, it is also very important to consider the drugs which patients took before then. Due to not consuming the drugs which patients were given before, there may be side effects and the current problem may be caused as a result of overdose or lack of the previous drug[5].

The aim of this study was to determine the amount and type of changes in the Emergency Department, in order to hasten treatment and disposition process of patients in the Emergency Department to expedite by eliminating or minimizing such changes that decreases the cost of treatment and drug resistance.

2. Materials and methods

This cross-sectional study was conducted at the teaching hospital of Iran University of Medical Sciences in Tehran after the approval of Iran University of Medical Sciences board review. The study population included all patients admitted to the Emergency Department who were visited by at least two shifts or more services. In this research, 1 005 records of patients admitted to our Emergency Department were studied. The project comprises two parts; first, study of changes in medications patients have previously received (medical history) which was changed in Emergency Department. Second, reviewing the changes in medications that started in the Emergency Department but was changed by other services or shifts of one service. Order sheets of patients' Emergency Department files were also studied. Patients' medical history was also extracted from patients' biography. For data analysis, SPSS 18 software was utilized. Descriptive data was reported as average with 95% confidence level and qualitative data was reported as frequency percentage with the confidence level of 95%. The *t*- test was also utilized for data analysis. The study was approved by the ethics committee of Iran University of Medical Sciences. The names of patients and doctors were kept confidential and only health service specified changes were introduced. Researchers of this project only aimed to enhance the education and hospital treatment situation in hospitals.

3. Results

The frequency of pharmaceutical changes in patients admitted to the Emergency Department was 5.47% (55 cases from 1 005 cases). The group with the highest pharmaceutical changes was antibiotics (2.80% of total cases and 50.00% of all drug changes).

Most changes in drug groups were as follows: most of the changes had been imposed on antibiotics, changing from the combination of ceftriaxone + azithromycin to imipenem (meropenem) + ciprofloxacin (7.27% of total drug changes and 14.30% of changes in group antibiotics).

Other pharmaceutical widespread changes were as follows: enoxaparin converted to heparin which includes 5.45% of total drug changes. Beta-blockers group comprising 23.00% of the variations related to the change of atenolol to metoprolol as 5.45% of total drug changes (Table 1).

The highest rates of pharmaceutical changes were imposed by the internal medicine service (67.30% of total drug changes and 78.40% of changes in medications prescribed by emergency medicine and 44.40% of changes in the patient's previous medication). Moreover, in the Infectious Service, the greatest changes were seen in medication (43.63% of total pharmaceutical changes and 64.86% of total pharmaceutical changes in internal medicine service). Most changes were applied in patients with primary diagnosis of sepsis (16.40% of total pharmaceutical changes).

Changes were mainly carried out in medications prescribed by emergency medicine service to the patient rather than the previous treatment (68.00% *vs.* 32.00%). The most changes applied in medications prescribed by emergency medicine service were in patients with primary diagnosis of pneumonia and pneumosepsis

Table 1

Percentages of drug changes in Emergency Department.

Drug category	Drug change	Changes from all drug changes (%)	Changes from the same group (%)
Antibiotic	Ceftriaxone+Azithromycin to imipenem+ Ciprofloxacin	7.27	14.30
Anticoagulant	Enoxaparin to heparin	5.45	75.00
B-blocker	Atenolol to metoprolol	5.45	23.00
Anticonvulsant	Phenytoin to valproate	3.63	40.00
Sedative-hypnotics	Diazepam to alprazolam	1.81	The only change
Anti-acid	Ranitidine to pantoprazole	1.81	The only change
Anti-inflammatory	Hydrocortisone to dexamethasone	1.81	The only change
Decreasing glucose level	Glibenclamide to insulin	1.81	The only change

(12.60% of the changes applied on prescription drugs in Emergency Department), the most changes was also applied in the patient's previous treatment with primary diagnosis of stroke (CVA) (22.20% of changes in the patient's previous treatment).

The frequency of changes in prescribed medications was higher than the changes that were imposed in the previous medications of patients (drug history of patients) (68.00% compared with 32.00% of total pharmaceutical changes, P=0.01).

Unfortunately, 20.39% histories written in Emergency Department didn't contain full medical history of the patients. Among the cases without pharmaceutical history, the largest number was in orthopedic patients (45.90%) and primary diagnosis was soft tissue injury (16.10%).

In addition, in the 14.32% of emergency cases, there was no emergency medicine service order while emergency medicine resident put only related services visit without any other agenda. In these cases, even basic and most essential commands had not been mentioned. The highest numbers of files without orders of emergency medicine service were related to the ophthalmology (3.78% of the total cases), orthopedics (3.38%) and obstetrics and gynecology (3.08%) services respectively.

4. Discussion

To the best of our knowledge, no similar study has been published based on this context. The reason may be due to the fact that in some countries, the only service that determines the patients' disposition in the Emergency Department is the emergency medicine service and after that the patients can visit other services[1]. Moreover, in many countries, including Iran, the field of emergency medicine specialty is still at its early stage[1,6,7] and so far no study has been carried out at universities having emergency medicine services.

The frequency of changes in the studied drug cases was 5.47%, which has been expected at first glance. It seems that some of the reasons have been effective in the above statistics: in some diseases, the possibility of change is small. For instance, trauma patients are usually stabilized by emergency medicine service and then delivered to other services such as surgery and orthopedic. In these patients, the specific drug therapy is usually not taken by emergency medicine service. By removing all trauma patients (543 patients), the pharmaceutical changes obtained in non-traumatic patients was a significant percentage of 11.47%. Also in some cases, the first visits were carried out by other services before the emergency medicine service, which causes less change.

As expected, the greatest pharmaceutical changes were imposed in the antibiotics group (50.00% of total pharmaceutical changes) and such causes include: lack of similarity in the early diagnosis by different services. For instance, a patient with a fever who was referred may be diagnosed with urinary tract infection by the emergency medicine service while the internal medicine group may suspect pulmonary infection. There are also different protocols and references for infectious diseases[3,7]. For example, in the treatment of urinary tract infections, antibiotics such as cephalosporins, quinolones etc can be properly used and this factor also causes pharmaceutical changes. Probably one of the causes of changes in emergency medicine with very sick patients is dealing with time constraints and accordingly, making the decisions is mostly based on history and clinical examination rather than the initial para-clinical results[8].

As earlier mentioned, the largest pharmaceutical changes had been imposed by the internal medicine service which was expected. This is due to the following reasons: pharmaceutical therapy is mostly performed in internal medicine service than in other services. In fact, internal medicine service carries out this type of treatment more frequently while other services such as surgery and orthopedic surgery often apply non-drug treatments. In patients who receive only medication, the possibility of emergency medicine intervention is higher than in surgical treatments which are actually not carried out by emergency medicine service. It also seems that emergency medicine service, especially emergency medicine residents don't have the desire to intervene in some cases such as ophthalmology and gynecology.

From the results of our study, the frequency of changes in prescribed medications in the Emergency Department was higher compared to the previous drugs of patients. This is probably due to the lack of accurate and complete records of patient medical history in case of an emergency[5]. Therefore, the level of pharmaceutic changes in the previous medications of patients is estimated lower than the real medication.

Most previous drugs changes was related to changes in patients with primary diagnosis of stroke (22.20% of the changes in the patient's previous treatment), and then acute coronary syndrome as 16.70% of pharmaceutical changes of the patient.

In the two mentioned diseases, antihypertensive drugs have been mostly changed. For instance, patients who had previously consumed losartan were changed by Neurology Service to captopril or changes in the beta blocker group in patients with acute coronary syndrome , so that patients often used atenolol while in Emergency Department, metoprolol was prescribed for them.

Approximately, 21.00% of the fields in the Emergency Department files had no medical history, and the causes can be stated as lack of reviewing the biographies in Emergency Department and high numbers of patients referred in a limited time and also lack of cooperation of patients like patients with decreased level of consciousness. In addition, proper and accurate recording of previous medications of patients especially in patients with internal medicine consult is very important[3]. In this study, 25.90% of patients' files had no drug-related history.

It is also possible that patients' current problems results from the use of a drug or lack of using a drug that will be ignored if it was not asked and recorded in the medical history. On the other hand, lack of accuracy in the medical history and cut-off or lack of prescription of some medications which patients had utilized for a

long time and have been highly absorbed in the blood (antiepileptic drugs) can develop problems. One of the methods that can be used to fix defects in emergency files is more accurate monitoring of emergency medicine attendance by registering in Emergency Department.

In 14.32% cases, emergency medicine service has only relied on the visits of other services and had performed no medical order or take specific actions. However, due to the presence of emergency medicine service, other groups such as ophthalmology, obstetrics and gynecology, pediatrics, and ENT departments that are not normally in the Emergency Department might cause delay in the first visits of patients. In this situation, the lack of prompt and correct visit of the patients by the emergency medicine service in certain disease condition such as acute glaucoma, preeclampsia and eclampsia, vaginal bleeding, epistaxis and pregnant patients can lead to irrecoverable consequences. If only an order of "specific service consult" could be recorded in patients file by emergency medicine service and the patients are not actually visited and the primary essential actions have not been initiated (including liquid therapy or sending the laboratory tests), then it would be better that in triage room, the relevant specialist should be contacted in order to avoid the delays in visiting the patients by therapist.

One of the limitations in this study is lack of completing the record components especially in the profiles. It requires assessing the changes in medical history and biographies while unfortunately a lot of profiles in the Emergency Department have no medical history or has incomplete history. The consequence of this is that it becomes impossible to accurately evaluate the actual frequencies of changes in the medical history.

Another important limitation of this study is the interval between visits by the physicians of emergency medicine and other services. Therefore, the emergency medicine service can only write the medications based on the visiting and patents biographies whereas in other services, the para-clinical results including imaging, sonography, and the laboratory tests have been prepared at the visiting time and therefore the orders of other services will certainly be different from the emergency medicine service. Contradictory information may be obtained in taking biographies from patients and their relatives, especially at different times and this can result to changes in orders for the drug.

Failure to complete full file components, such as lack of documentation, however, does not specify the date and time of the physician's order and in some cases no specific order of service as a result of lack of sealed doctor's letter is another limitation of this study.

Given the removal of patients with trauma, the rate of pharmaceutical changes was obtained as 11.47% and it should be noted that pharmaceutical changes was high which is not desirable. Internal service was the cause of most changes because most treatments in this department was carried out by drugs and after internal service, the different shifts of emergency medicine service and the neurologic service took place in the next ranks. In the files of the Pediatric, Gynecologic, Dermatologic, Ophthalmologic, Psychiatrics' patients no change was carried out which was due to the lack of intervention by the emergency medicine service in these patients. Also 1/5 of all files had no history of drug and this requires more attention.

In the case of lack of orders of emergency medicine service, it can also be pointed out that the main department responsible for patients in the Emergency Department is emergency medicine services[1] and patients should be followed and observed until stabilization and withdrawal of patients from the Emergency Department. One of the ways to reduce pharmaceutical changes is more and better interaction of emergency medicine service with other departments[1,7]. It also leads to reduction in the cost of treating patients, side effects of medications in patients and drug resistance by reduction of pharmaceutical changes[7,9]. Future studies can assess more causes of pharmaceutical changes in order to provide practical solutions to reduce this change.

Conflict of interest statement

The authors declare that they have no conflict of interest.

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