

The Efficiency of Motorlance in Comparison with Ambulance in Shiraz, Southern Iran

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Abstract

Background: In Emergency Medical Systems (EMS), decreasing the arrival time for patients is an important factor and as a result, in recent decades motorcycle ambulance (motorlance) is being used in EMS centers for missions called for in crowded, rural and arduous areas. This study was done to evaluate the impact of using motorcycles on arrival time of EMS technicians to the scene.

Methods: This is a cross-sectional study based on the information of 1727 motorlance and 44426 ambulance missions in Shiraz EMS. One of these motors was settled in the arduous locations and the other in very crowded areas according to traffic statistical information. We compared the results of motorlance and ambulance missions with each other.

Results: There was a considerable decrease in referring patients to the hospital in motorlance missions, probably due to the right performance of the dispatch operators, and also the significant decreased arrival time in motorlance missions.

Conclusion: Although we can improve the efficiency of the motorcycle ambulance through appropriate screening of age, sex, cause and time of the accident, teaching dispatch operator to select the appropriate cases for dispatching motorlances is one of the principles that should be considered. More precise information is needed to locate proper positions for motorlance missions and timely dispatching.

Keywords: Ambulance; Emergency Medical System; Motorcycle ambulance

Introduction

In emergency medical systems (EMS), arrival time is an important factor in defining prognosis of injured persons.¹ As a result, in recent decades motorcycle ambulances (motorlances) are being used in these systems more than before. These motorlances have a box for medical equipments such as pulse oxymeter, intubations device, 1 liter oxygen gauge, manometer, stethoscope, splints, bandage to control bleeding, serums and related sets and sometimes glucometer and ECG monitor. Also, for being in contact with the emergency center, they have cell phone and hands

free equipped with HEAD SET and GPS.^{1,2}

Motorlances are being used to transfer an injured person to the hospitals in a short time. Also in distant areas, blood bags and organs for transplant are transferred and also physicians for labor are sent to the scene by motorlances.¹⁻³ Furthermore, they can be used to decrease the arrival time in crowded metropolitan cities and in rural arduous areas.^{1,4,5} Motorcycle ambulances are being dispatched for the following cases:

1. Critical situations, e.g., when patients need CPR;
2. Accidents in highways that have a lot of injuries (for screening the injured patients);
3. Shortage of ambulance and
4. When connection center operator can not exactly define the accident.^{1,2}

For the first two above cases, motorlances are accompanied by ambulance. Another important point is that although the danger of motorcycle riding is much less than its privilege, more attention must be paid to

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motorlance riders' safety.² So this study was done to evaluate the impact of using motorcycles on arrival time of EMS technicians to the scene.

Materials and Methods

In a cross-sectional (descriptive- analytic) study, connection center operators were instructed on how to use motorlances by the information used in the world and the information reported in motorlances mission cards in the first year of establishment (August 2006 till July 2007). The information was provided regarding motorcycle ambulances carried on missions (M_1 or M_2), age and sex of the injured person, results of missions including outpatient treatment, cancelled missions, death or delivery of injured persons to ambulances, arrival time (Time between calling for ambulances by patients to arrival time of the vehicle) and the results of cancelled missions.

There were two motorlances in Shiraz EMS (M_1 and M_2), according to their efficiency and differences in location. M_1 was settled in the old areas of the city with arduous roads and heavy traffic and M_2 was settled in a crowded part of the city that has much more missions (based on the information from the week before). Therefore, the location of motorlances varied in different weeks. It should be mentioned that motorlances were used more in day light for more safety and also its location was selected according to the peak of missions in the city.

All 1707 missions which were carried out in this period by motorlances were surveyed. Finally, we used information by the use of SPSS statistics software (version 14, Chicago, IL, USA), Chi Square and T tests to define the meaningful differences ($\alpha = 0.05$).

Results

Among 1707 missions, 1177 cases (68.9%) were carried out by M_1 and 529 cases (30.9%) by M_2 . The

comparison of motorlance missions with ambulance missions was shown in Table 1. In this study, there was a difference between the motorlance and ambulance cancelled missions. Cancelled missions of the former was 34.7% and that of the latter was 12% ($p < 0.0001$). In motorlance missions, 30.6% of the cases were referred to health centers, and for ambulance these cases were 52.2%.

The data obtained showed that 30% of M_1 missions (360 missions) led to out-patient treatment, 35% (423) of the missions were cancelled and 32% were delivered to ambulance for referring to health centers and 3% (36) died and for M_2 , 36% (193) of the cases led to outpatient treatment, 33% (177) were cancelled, 29% (160) were delivered to the ambulance and 2% (8) died. There was a significant difference between M_1 and M_2 missions ($p < 0.045$) and also there was a significant difference between outpatient treatment, cancelled mission and death as compared with the cases who needed transfer ($p < 0.05$).

Because of the importance of cancelled missions for future planning and decreasing arrival time and costs, the reasons for cancelled motorlance missions are shown in Figure 1.

Twenty seven percent of the emergency cases were women and 73% were men. Fifty two percent of the female cases were outpatient, 46% needed to be transferred to health care system, and 2% died. As to men, 47% were outpatient, 48% were transferred and 5% died ($p < 0.0001$).

According to age, the patients were divided into 3 groups of 0-15, 16-45, and more than 45. This grouping is somehow similar to that of medical emergency centers. In these groups, the ratio of cases delivered to ambulance as compared with the number of death and outpatient treatment shows the efficiency of motorlances. In the 0-15 year old group, 48%, in the 16-45 year old group 46% and in more than 45 years, 59% of the cases were delivered to ambulance ($p < 0.001$). The percentage of missions in spring was 27%, in summer 32%, in autumn 21% and in winter 21%. The number of delivered cases to ambulance

Table1: Comparison between motorlance and ambulance missions.

Missions	Death		Patient needs to transfer		Canceling mission		Outpatient treatment		Total
	%	No.	%	No.	%	No.	%	No.	
Ambulance	3.0	1315	52.2	23209	12.0	5336	32.8	14566	44426
Motorcycle	2.7	44	30.6	530	34.7	600	32	533	1707

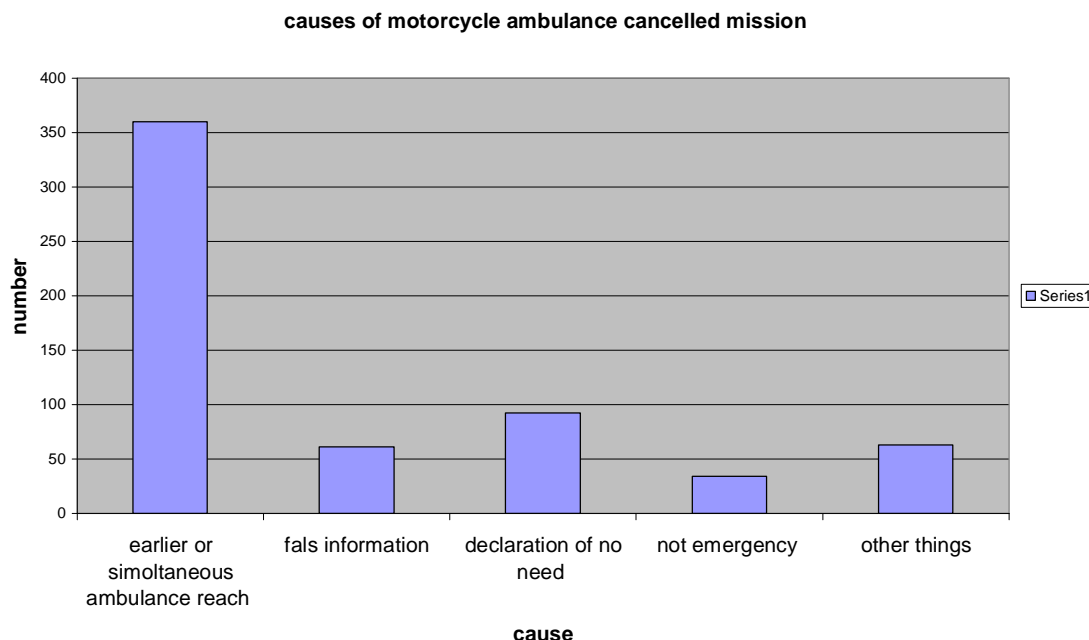


Figure 1: Causes of cancelled motorcycle ambulance mission.

for referring to health centers and outpatient treatment, death and cancelled missions vary in different seasons (Table 2).

Mean time of starting motorlance missions till arrival at the location of accident was 306 seconds (5 minute) and the median was 294 seconds. According to the scatter plot, most missions were carried out during 200-250 seconds (3.5 -4.5 minutes). The duration of ambulance missions was 451 seconds (7.5 minutes) which was approximately 2 times as much as that of motorlances.

Discussion

In recent decades, motorcycle ambulance (motorlance) is being used in EMS centers for missions requested in crowded, rural and arduous areas for reducing arrival time and increasing EMS efficiency. This study shows more cancelled missions for motor-

lances than for ambulances. And there was no difference between the efficiency of M_1 and M_2 .

Regardless of the missions that motorlances and ambulances have come to the case simultaneously, the percentage of cancelled missions of both was similar. If dispatch center operator could have definite criteria to distinguish the real emergency cases from false information, it would dispatch motorlances to the proper missions because they less costly ambulances.

To decrease the percentage of cancelled missions of motorlances, because of simultaneous arrival of an ambulance, we must do more studies on the location of motorlances and train dispatch center operators to understand where and when they should dispatch motorlances and ambulances together (for critical cases), i.e., they should estimate the optimal time and location of the nearest ambulance to the scene.

The need to transfer the cases to health centers in motorlance missions is less than that in ambulance. More efficiency and lower cost of using motorlances

Table2: comparison of different motorlance missions in different seasons.

Season	Total transfer to health centers		Total death and outpatient cases	
	%	No.	%	No.
Spring	21	111	29	346
Summer	30	159	31	376
Autumn	26	141	21	252
Winter	22	119	19	222

instead of ambulances was significant, if the dispatch operator functions appropriately.

According to the results, the number of female deaths was two times that of men in motorlance missions. Also, the outpatient treatment for women was more than that for men. So, female cases may reduce the dispatch operator's hesitation for sending motorlance because there was no need to send ambulance for outpatient treatments and dead cases. For such cases, dispatching motors are more useful. Also, cases lower than 40 years of age needed less time to be transferred as compared with more than 40 year old cases, and so for these cases dispatching motorcycle was more useful.

In autumn and winter, motorcycle ambulance missions reduced because of the cold and rainy weather; therefore, the percentage of transferring injured patients to health centers increased. Therefore, efficiency of motorlances in warmer seasons was more than that in cold days.

The main aim of using motorlances is to reduce arrival time in critical situations, as we showed in this study (4 minutes lower than the standards). In comparison to ambulance arrival time in Shiraz EMS, there was significant reduction in arrival time of motorlance (4 min versus 7.5 min) as some studies have shown. For example, Soares-Oliveira reported that MEM (Medical Emergency Motorlance) can intervene in a wide variety of clinical situations and a quick response is guaranteed. Moreover, in specific situations, MEM safely and efficiently allows better

management of emergency vehicles. Also, Kiefe and Soares-Oliveira indicated that EMS can impart a quick and efficient response to EMS services in urban areas, if managed with acceptable levels of safety. Defensive driving courses as well as proper use of personal protective equipment can improve security. Another study conducted by Hofman and Dzimadzi concluded that in resource-poor countries, motorcycle ambulances at rural health centers are a useful means of referral for emergency obstetric care and are a relatively cheap option for the health sector.

Finally, arrival time, which is one of the important factors in EMS is reduced by using motorlances. Although we can improve the efficiency of the motorcycle ambulance through appropriate screening of age, sex, cause and time of the accident, teaching dispatch operator to select the appropriate cases for dispatching motorlances is one of the principles that should be considered. More precise information is needed to locate proper positions for motorlance missions and timely dispatching.

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