Improving the Emergency Medical System´s Response to Emergencies in a Middle-Income Country

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ABSTRACT

Introduction: The main task for all Emergency Medical Services (EMS) is to save lives and be available to those with severe medical conditions. In both of the situations, a timely arrival by the ambulance is mandatory. Irrespective of the origin and geographical belonging, all EMS are faced with two critical problems: 1) long response times and 2) availability. One way to achieve a shorter response time is to bring ambulances closer to the patients. The lower availability of ambulances is often due to the unnecessary transportation of patients with benign conditions, who can be assessed and discharged at the scene or at their homes by the ambulance crew, using qualified follow-up procedures and standardized protocols.

Aim: The aim of this study was to analyze and evaluate the response times and ambulance availability in a middle-income country (Shiraz, Iran) and to test the abovementioned measures as part of system improvement.

Method and Material: Study I: Descriptive study aimed to study the Shiraz EMS in Iran (around 1.7 million inhabitants). Information about the EMS organization, resources, response times, and discharged patients and their follow-up was obtained, registered, and analyzed. Study II: Interventional and prospective study aimed to statistically evaluate the ambulance response time in two groups of ambulances: 1) permanently stationed ambulances (PS) and 2) temporarily stationed ambulances, "fluid deployment" (TS). The latter were localized based on the registered data pointing out areas with a high number of incidents during a defined period. Study III: Prospective follow-up of retrospective data about patients discharged at the scene or at their homes by the EMS, 4–12 months after an incident. A questionnaire, consisting of nine questions, was used as part of a quality control measure for the EMS, following the patient's approval. Study IV: Interventional study aimed to evaluate a new protocol for discharging patients with non-traumatic abdominal pain. NOTRAPS was developed based on three validated protocols: RETTS-A triage, Behavioral Pain Scale, and VAS scale, which were approved by five specialists.

Results: Study I: A long ambulance response time and an unclear follow-up of patients discharged at the scene. Study II: Implementing "fluid deployment" of ambulances resulted in a statistically significant reduction in the response time (2 min) for ambulances that were temporarily stationed. A tendency toward a lower mortality rate in this group of ambulances was also obtained (not statistically significant). Study III: Two groups of patients were identified: those who were discharged by the EMS crew (A) and those who were discharged based on their own decision (B). In this low-quality follow-up, the mortality rate was 4.8% in Group A and 6.1% in Group B. Study IV: Using NOTRAPS in patients with "non-traumatic abdominal pain" vs. consulting a physician at a dispatch center, there was a slight but statistically significant difference in the safety and accuracy of EMS paramedic´s decision on transport to the hospital in NOTRAPS group (p 0.02).

Conclusions: EMS face the same challenges worldwide (longer ambulance response times and unnecessary ambulance use). A shorter ambulance response time could be achieved by fluid deployment. Patients with benign conditions may be discharged at the scene by the ambulance crew, with better follow-up and standardization. One way to achieve standardization is by using relevant protocols such as NOTRAPS, which was used in this study for assessment of non-traumatic abdominal pain. These results may have a better implication in middle- and low-income countries.

Keywords: EMS, Emergencies, Response time, Ambulances, Protocols, Abdominal pain

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