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Research Article

Management of Foodborne Outbreak of Shigellosis; Need to Determine an Outbreak Preparedness and Management Policy

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Abstract

Introduction: Although some crises cannot be predicted or prevented, quick management of incidents can reduce associated morbidities and mortalities. The current report aimed to present a strategic approach for management of foodborne outbreak of shigellosis.

Methods: Following the report of the poisoning in a number of students at the girls' dormitory complex in Shiraz and evaluations carried out by the team sent to the site, equipment and human force were dispatched to the dormitory. Three halls of the dormitory were equipped as the places for a temporary treatment. After the patients were visited by the infectious disease specialist, they were treated on the site or transferred to the hospital by ambulance. The sources of information were the reports recorded by the commander and paramedics and those extracted from EMS and hospital records. The data were analyzed using the SPSS14 software as well the Mean and Mann-Whitney tests.

Result: In order to avoid congestion in hospitals, nine ambulances, one ambulance bus, the incident command vehicle, five nurses, three physicians and 22 paramedics were deployed to the site. Also, the dormitory was equipped temporarily and 211 individuals (68%) were treated with antibiotics and intravenous fluids. Additionally, 87 individuals (28%) referred to hospitals by taxi or their personal cars and 12 ones (4%) were transferred to hospitals by ambulance.

Conclusion: This report indicated that creating a temporary location for patient treatment at the incident site could reduce the number of transfers and the related expenditures. It could also prevent nosocomial infections and a second crisis in the prehospital emergency system as well as in the hospital emergency ward.

Keywords: *Mass Casualty Incident; Emergency Medical Service; Shigellosis; Emergency Wards; Outbreak*

Introduction

Foodborne diseases are among the most important public health problems in developed and developing countries [1]. Shigellosis is responsible for most morbidities and mortalities, particularly in developing countries. The rate of shigellosis infection has been reported to be over 160 million cases resulting in more than one million deaths worldwide [2]. In this respect, Emergency Medical Service (EMS) system is a major component of healthcare services, playing a key role in providing services on the scene and transferring the patients to treatment centers [3].

The main responsibility of the EMS system is quick evaluation, timely performance of appropriate interventions, reduction of deleterious symptoms, and timely transfer of patients to proper healthcare centers to increase survivals, control complications, and prevent disabilities [4]. Emergency medicine in the developed world is traditionally performed in two different ways. The first is the well-known Anglo-American system (AAS) with skilled Emergency Departments (ED), and a pre-hospital emergency medical service using paramedics. The second is the Franco-German system (FGS), with a highly developed pre-hospital emergency physician service, but only a basic organization of hospital-based emergency medicine. ''Bringing the patient to hospital'' is the term often used to describe the Anglo-American model [5]. Iranian EMS was established in close cooperation with the Anglo-American system. The EMS system in Shiraz carries out more than 80000 missions annually [6]. Although some crises cannot be predicted or prevented, quick management of outbreaks can reduce associated morbidities and mortalities. While confronting with outbreaks, the main goal is inhibition or control of disease spread as well as identification of strategies to prevent manmade or natural disasters [7]. In this context, morbidities and mortalities can be diminished via appropriate strategies and prioritization [8]. In case medical care services are provided without effective planning in critical conditions, they may suffer from inefficiency [4].

Aim of the Study

The present article aimed to report the foodborne outbreak of shigellosis in the largest dormitory complex in south of Iran, Shiraz and the strategies used to manage the incident.

Methods

Design: The present study reported a strategic approach to the management of foodborne outbreak of shigellosis by a pre-hospital emergency in a dormitory complex.

Setting: After the report of poisoning symptoms) watery or bloody diarrhea, abdominal pain, fever, lethargy, or boredom (in a number of students in a girls' dormitory complex in Shiraz, the nearest ambulance was deployed to the incident site. The incident lasted 5 days. Meanwhile, nine ambulances, one ambulance bus, and the incident command vehicle along with five nurses, three physicians (two general practitioners and an infectious disease specialist) and 22 paramedics were deployed to the place. The students had eaten meat for dinner. In order to avoid congestion in hospitals, three halls of the dormitory were equipped as a temporary treatment place based on the command's order. After being visited by the infectious disease specialist in the first hall, the patients were transferred to the second and third halls where they were treated with antibiotics or intravenous fluids. Only unstable patients were transferred to the hospital. This issue was reported to the healthcare supervisor of the university, and a health team was immediately sent to the dormitory for food and water sampling. Stool samples of the patients treated at the dormitory were also sent to the laboratory.

Population: The study sample consisted of the female dormitory residents with symptoms of poisoning who were either treated in the dormitory by the pre-hospital emergency team or were transferred to the hospital or went there by their personal cars.

Data collection

The sources of information were the reports recorded by the commander and paramedics, and those extracted from EMS and hospital records.

Data analysis

The data were analyzed using the SPSS14 software as well the Mean and Mann-Whitney tests.

Results

A total of 310 patients (females) with the mean age of 21.9 years were involved in the shigellosis outbreak, of whom 68% were treated with antibiotics and intravenous fluids on the site, 28% referred to hospitals by their personal vehicles, and 4% were transferred to hospitals by emergency ambulances (Table 1).

Day	Treated at the scene	Transferred to hospitals by EMS	Referred to hospitals by personal vehicle	Total
First	31	2	0	33
Second	140	9	38	187
Third	42	0	36	78
Forth	0	0	1	1
Fifth	0	1	10	11
Total	211	12	87	310

Table 1: *The number of patients involved in outbreak of foodborne shigellosis in a dormitory.*

There was no statistically significant difference between demographic characteristics (age, field of study) of the patients treated at the scene and those transferred to hospitals by ambulances or personal vehicles. However, the Mann-Whitney test showed a statistically significant difference between the patients transferred to hospitals by ambulances and those who referred by personal vehicles in terms of the length of hospital stay ($P < 0.000$). The mean length of hospital stay was 3 hours for the patients who referred to the hospitals by personal cars and 24 hours for those transferred by the EMS.

Discussion

The results of stool examinations showed that 6 patients were found with *Shigella sonnei* (*S. sonnei*). Among the four *Shigella* species, *S. sonnei* is more prevalent in industrial countries and its symptoms are weaker than those of *S. flexneri* and *S. dysenteriae*. This bacterium is transmitted from one person to another or via infected foods and drinks [9].

In this study, the number of patients increased within a short period of time and more than 68% of the patients were treated by specialists at the incident site. A large number of patients transferred to hospitals in disasters will increase the system's response time, eventually decreasing its quality of service provision [6]. Additionally, population growth, increased incidence of intentional and unintentional injuries, and drug abuse have caused overcrowding in hospitals' emergency wards in the recent decades. On the other hand, there has been no considerable increase in the physical space of emergency wards, resulting in an increased burden at the time of crises and natural disasters [10]. Considering the bed occupancy rate in the emergency departments of Shiraz hospitals and the possibility of hospital overcrowding and the involvement of Emergency Medical Service's ambulances, the conventional Anglo-American emergency system was not applied in this incident. This change in performance requires prior planning and intra-organizational coordination in order to spend the shortest time for supplying medical staff (specialist physicians and nurses). In this accident, calling for medical team members and providing necessary equipment was time-consuming. Therefore, the need for having Emergency Medical Teams (EMTs) in medical universities in order to minimize the time required for preparing and sending the teams to the accident site and improving the quality of service delivery was emphasized. Organization and planning for emergency services can be promoted by acceptable costs, resulting in better resources utilization, care services, and outcomes [4]. Since there has not been a single instruction for the formation of EMTs so far, it seems essential to provide specific instructions on the classification of EMT types, team members, timing and methods of calling for team members, the equipment needed by each team, and the teams' financing sources. It should be noted that this decision was made based on the type of the incident, patients' conditions, and available equipment and facilities.

Although the outbreak was successfully controlled in a few days, given the possibility of transmission of Shigellosis in closed places, this possibility could have been higher in the dormitory. Also, in the present case, the exact source of contamination could not be determined because no sample of the served food was available for study; however, laboratory tests of the patients showed *S. sonnei*.

Conclusion

This incident was managed by creating a treatment post on the site, which reduced the involvement of Emergency Medical Service's ambulances, prevented further overcrowding, prevented nosocomial infections, and averted the creation of a second crisis in the EMS system and hospitals' emergency wards. It should be noted that this decision was made based on the type of the incident, patients' conditions, and available equipment and facilities.

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Conflict of Interest

The author declared no conflict of interests for this paper.

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