A Planning Model of Pharmaceutical Needs for Mass Gatherings at Public Special Events

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Abstract

The mass gatherings may be the result of a special public event or a spontaneous unplanned event. A special public event is a planned and organized activity which will place 10,000 or more participants in a defined geographical area, gathered at a specific location for a defined period of time where access by emergency vehicles might be delayed. Historically, planning for an event provides the prevention of risk, injury, suffering, or death that may occur at public events, however, the continuous system improvement includes expenses in order to reduce the costs by avoiding waste of resources. The aim of this work was to verify the usefulness of a formula for estimating the probable number of patients to be treated in field and to assess their needs in a special event for 50th anniversary of the Italian aerobatic team “Frecce Tricolori” air show September 11-12, 2010 Rivolto – Italy. We have developed, from these data, the following formula to calculate the number of people needed to treat and their pharmaceutical needs.

Results: The number of attendees was lower than expected number of approximately 20% for a total of about 320,000 people. 174 patients (about 0.45% of the people) required medical treatment: 30 people less than expected (14.7% overestimation). Of these, 38 (above 33%) required emergency treatment in field (8% less than expected). The mathematical model adopted was appropriate and helpful in preventing possible shortages or waste of drugs.

Keywords: Mass gatherings; Air show; Pre-hospital care

Aim of the Study

On 11 and September 12, 2010 in military base of Rivolto - Udine - Italy was held the air show for the 50th anniversary of the Italian aerobatic team “Frecce Tricolori”. The aim of this work was to verify the usefulness of epidemiological-mathematical formula in emergency planning of a number of people to be treated in the field and pharmaceutical needs in special event management.

Introduction

Mass gatherings may be the result of a special public event or a spontaneous unplanned event. A special public event is a planned and organized activity which will place 10,000 or more participants in a defined geographical area, gathered at a specific location for a defined period of time where access by emergency vehicles might be delayed [1,2].

The special events attract large numbers of spectators or participants, and, under normal conditions, these events go on with few or no problems [3]. However, spectators and participants at mass gatherings may require medical attention in the event of illness or injury. Typically, the incidence of illness at mass gatherings will be similar to that normally found in a population of comparable size. The main concerns in planning medical care are the expected percentages of patients and casualties from heat stroke, dehydration, cuts from broken glass, injuries from bottles and cans, fainting and exhaustion, cardio-respiratory problems, and-related illness [3]. Providing onsite first aid and intermediate or advanced level medical care at mass gatherings reduces the number of patients requiring transport to hospital [4-7].

Historically, planning for an event provides the prevention of risk, injury, suffering, or death that may occur at public events, [6-8] however, the continuous system improvement includes to discuss expenses in order to reduce the costs by avoiding waste of resources.

In a special event with high risk of major incident, and the “the experience has proven that air shows are high-risk events” the provision of resources requires particular planning for major incident in addition to the generally applicable guidelines to respond to demands of care under normal conditions [2,9].

Planning pharmaceutical needs, including aspects of health risk assessment and economic assessment, can play a key role, and in most cases, there is a tendency to overestimate the need for fear that the resources are insufficient. Of course, all the numerical models require a proper calibration before it can be used with reasonable accuracy. The overall accuracy can usually be obtained to a greater extent, with the precision of the data and experimental investigations. The limitations intrinsic to the mathematical formula, in any case require an appropriate degree of needs overestimation.

Method

The planning process includes, among the main objectives of emergency plan, the analysis of patients be treated, which is an essential prerequisite to define the requirement and availability of pharmaceutical resources.

Clinical pharmacist attended meetings with the team of Out-Hospital Emergency Medical Service (EMS) in the two months before the event, for health/emergency planning. The presence of about 200,000 spectators for day ranging in age from 1 to 85 years was provided in airport during the show. In the planning of pharmaceutical needs, were considered the treatment of ambulatory and urgent health problems in site of event. Empirically, based on historical data, were instead defined the pharmaceutical needs for a possible emergency

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with mass casualties considering the probability of having to treat in field above 100 serious patients.

**Pharmaceutical needs planning for pre-hospital first aid**

It was estimated that the majority of spectators were from our Region. Whereas the normal development of the event, it was considered likely that a number of people to be treated in the field would be equivalent to the number of people entering each day to the emergency room of University Hospital. The people who belong to the hospital emergency room in Udine are about 130,000 each year, of these, 55,000 are not acute patients (white code), and only 75,000 are acute or serious patients, equal to about 8.5 people for hour. We have developed, from these data, the following epidemiological-mathematical model to calculate the number of people needed to treat and their pharmaceutical needs. 

\[ PPN = P \times \alpha \times T \]

- **PPN** = Preventable Patients Number
- **P** = number of acute or serious patients entering the emergency room every hour in regional hospital
- **\( \alpha \)** = correction factor - result of dividing the number of spectators with the number of people who access the emergency room to which you refer. Example: 2 if the number of people to which you refer is half or 0.5 if it is twice.
- **T** = hours of the event duration

In our case, **PPN** = 8.5 \times 1.5 \times 8 = 102 people for day (204 in two days) \[ P = 8.5 \times 75,000 \times 2 \] (yellow code) is 37%. Total emergency patients = 41%. The incidence of the epidemiological formula (PPN) the percentage of regional red and yellow emergency codes for predicting the number of patients to be treated in emergency, as follows. PPN = P \times \alpha \times T = 8.5 \times 75,000 \times 8 = 102 people for day (204 in two days) \[ P = 8.5 \times 75,000 \times 2 \] (yellow code) is 37%. Total emergency patients = 41%. The incidence of the epidemiological formula (PPN) the percentage of regional red and yellow emergency codes for predicting the number of patients to be treated in emergency, as follows. PPN = P \times \alpha \times T = 8.5 \times 75,000 \times 8 = 102 people for day (204 in two days) \[ P = 8.5 \times 75,000 \times 2 \] (yellow code) is 37%. Total emergency patients = 41%. The incidence of the epidemiological formula (PPN) the percentage of regional red and yellow emergency codes for predicting the number of patients to be treated in emergency, as follows. PPN = P \times \alpha \times T = 8.5 \times 75,000 \times 8 = 102 people for day (204 in two days) \[ P = 8.5 \times 75,000 \times 2 \]

**Emergency planning-PEPN=Probable Emergency Patients Number**

The epidemiological incidence of red code (emergency) in people who belong to the hospital of Udine, is about 4%. The incidence of the rapidly evolving emergencies (yellow code) is 37%. Total emergency patients = 41%. We applied to the epidemiological-mathematical formula (PPN) the percentage of regional red and yellow emergency codes for predicting the number of patients to be treated in emergency, as follows. PEPN = P \times \beta \times P = 204 people in two days \[ \beta = \text{percentage of epidemiological emergency severity codes} = 41\% \]

The special events attract large numbers of spectators or participants, and, under normal conditions, these events go on with few or no problems. However, mass gatherings may require medical attention in the event of illness or injury. A mathematical formula for planning pharmaceutical resources, based on the local epidemiology, may be valid and helpful in preventing possible shortages or waste of drugs for all public events. The involvement of the clinical pharmacist within pre-hospital emergency system to planning management health/ emergency in special events is crucial to ensure the proper definition of pharmaceutical needs and the economic control spending and avoid wastage of pharmaceutical resources.

**Results**

The working environment was festive and noisy. In two days, the number of attendees was lower than expected number of approximately 20% for a total of about 320,000 people. 174 patients (about 0.45% of the people) required medical treatment: 30 people less than expected (14.7% overestimation). Of these, 58 (above 33%) required emergency treatment in field (8 % overestimation). The emergency treatment concerned 11 patients with cardio respiratory failure, 3 Acute Myocardial Infarction, 3 asthma attacks, 41 fainting syncope from heat and dehydrated.

**Discussion**

Emergency care management for mass gatherings at special events needs to plan medical resources for major incident and for intermediate or advanced level of care with provision of human and pharmaceutical availability. The purpose of planning is the prevention of injury, suffering, or death that may occur as a major incident but also under normal condition.
References