



Contents lists available at ScienceDirect

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Characteristics and resource utilization of patients presenting to the emergency department from mass gathering events☆

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ARTICLE INFO

Article history:

Received 24 October 2017

Accepted 2 November 2017

Available online xxxx

Keywords:

Mass gathering

Emergency preparedness

Emergency department

Special event

Resource utilization

Event medical care

ABSTRACT

Introduction: At many mass gathering events (MGEs), emergency medical services decrease the number of patient transfers to the hospital; however, little information is known regarding the characteristics of attendees presenting to or requiring transfer to the emergency department (ED). The purpose of this study is to describe the characteristics of patients presenting from MGEs to the ED. A secondary aim of this study is to describe ED resources utilized by these patients.

Methods: This was a single-center, retrospective review evaluating patients attending MGEs who presented to the ED. Electronic medical records of patients seen in the ED of a tertiary academic medical center between October 13, 2013 and December 31, 2015 were reviewed and a descriptive analysis performed.

Results: We reviewed and included 209 patients. The majority of patients presenting to the ED were from large outdoor concerts ($n = 186, 89\%$), young (median age 20 years), single ($n = 156, 87\%$) and had no past medical history ($n = 114, 63\%$). Alcohol use was reported in a majority ($n = 140, 78\%$) and polysubstance use in over a quarter of patients ($n = 55, 31\%$). The most frequently administered medications were intravenous fluids ($n = 94, 52\%$) and antiemetics ($n = 59, 33\%$). The majority of patients ($n = 161, 89\%$) were discharged directly from the ED, and median length of stay in the ED was 3.3 h [IQR 2.3 to 5.3].

Conclusion: Patients presenting to the ED from MGEs generally required minimal medical care beyond supportive management with low rates of hospital admission. Further controlled studies are needed to confirm these findings.

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1. Introduction

Mass gathering events (MGEs) are common in major metropolitan centers throughout the United States and abroad. Historically, consensus definition was lacking and often included mention of >1000

attendees [1–3]; however, the World Health Organization (WHO) now characterizes mass gatherings as “the concentration of people at a specific location for a specific purpose over a set period of time and which has the potential to strain the planning and response resources of the country or community.” [4].

At many MGEs, alcohol and illicit substance use predispose participants to inadvertent injury, which underlies the importance of the provision of onsite medical care. Deployment of such emergency medical services and personnel in the field is associated with a decreased number of transfers to the hospital [4–9]. Because of this and the low incidence of critical illness at MGEs, very little information exists regarding the characteristics of attendees presenting to or requiring transfer to the emergency department (ED) and the resources necessary to support this patient population [9,10].

Knowing the typical profile of patients requiring transfer to the ED could aid in rapid identification by emergency personnel of patients requiring a higher level of medical care and could help providers in the field to triage patients more promptly and appropriately to the ED.

Abbreviations: MGEs, mass gathering events; ED, emergency department; EMRs, electronic medical records; PMH, past medical history; WHO, World Health Organization; GMF, general medicine floor; ICU, intensive care unit; GMF obs, general medicine observation unit; NSAID, nonsteroidal anti-inflammatory drug; APAP, acetaminophen; BMP, basic metabolic panel; CMP, complete metabolic panel; POC, point of care; CK, creatine kinase; INR, prothrombin time international normalized ratio; aPTT, activated partial thromboplastin time; ECG, electrocardiogram; CT, computed tomography.

☆ Meetings: Presented at the 7th Annual National Update on Behavioral Emergencies, Las Vegas, Nevada, December 2016. Presented at the 2017 Virtual Poster Symposium of the American College of Clinical Pharmacy, May 2017.

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<https://doi.org/10.1016/j.ajem.2017.11.006>

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Please cite this article as: DeMott JM, et al, Characteristics and resource utilization of patients presenting to the emergency department from mass gathering events, American Journal of Emergency Medicine (2017), <https://doi.org/10.1016/j.ajem.2017.11.006>

Additionally, describing the ED resources utilized will aid in resource management and preparation for MGEs. Therefore, the purpose of this study is to describe characteristics of patients presenting from MGEs in the Chicago, Illinois metro area to the ED at a tertiary academic medical center. A secondary aim of this study is to describe hospital resources utilized by these patients.

2. Methods

2.1. Study design and setting

This was a single-center, retrospective review evaluating patients attending MGEs who presented to the ED. Electronic medical records (EMRs) of 209 patients seen in the ED of a tertiary academic medical center in Chicago, Illinois between October 13, 2013 and December 31, 2015 were reviewed. The start date indicates when the study institution began identifying patients in the EMR from MGEs. The study institution's ED is a level II trauma center with approximately 60,000 patient visits per year. The study was approved by the Institutional Review Board and complied with all necessary regulations and procedures.

2.2. Selection of participants

A special event marker in the EMR was used to identify patients with ED visits that were associated with MGEs, categorized as either 1.) concert; 2.) sporting event; 3.) participation sport; 4.) other. Concerts included large festivals such as Lollapalooza, Spring Awakening, Pitchfork, North Coast and single band concerts by performers such as Grateful Dead, Fleetwood Mac, and U2. Sporting events included events with only crowd observation such as Chicago Bears (Soldier Field), Chicago Blackhawks (United Center), and Chicago Bulls (United Center) games. Participation sports required physical activity of the attendee such as the Chicago Marathon, Chicago Triathlon, and Chicago Rock'N'Roll half-marathon.

All patients who were transported to the ED via ambulance or self-referred were included for purposes of this study. The triaging nurse was responsible for the identification of special event designation upon presentation to the ED and noted such patients in the EMR. Event volumes were defined as small (<1000), medium (1001–15,000), and large (>15,000 patrons) [11]. Event attendance was retrospectively estimated based on ticket sales and online news reports from event websites where possible.

2.3. Methods and measurements

EMRs were used to obtain clinical data. Demographic information including patient variables such as age, sex, relationship status, past medical history (PMH), and home medications were collected. Substance use, defined as alcohol or illicit drug use, was classified as patient or laboratory reported. In accordance with recommended reporting for MGEs, patients were categorized by chief complaints at presentation into four groups: 1.) injury; 2.) illness; 3.) environmental; 4.) mental health [12]. Injury included physical harm to body (e.g., fracture, lacerations, burn, etc.). Illness included complaints affecting major organ systems (e.g., cardiac-chest pain, respiratory-dyspnea, neurologic-altered mental status, etc.) as well as minor illness (e.g., headache, lightheadedness or syncope, fever, etc.). Environmental included weather-related complaints (e.g., sunburn) and substance-related complaints (e.g., alcohol and illicit substance intoxication). Mental health included complaints related to pre-existing or new anxiety and other psychiatric disorders.

2.4. Outcomes

The aims of this study were to describe the characteristics of patients and ED resource utilization among attendees from mass gatherings. In

addition to the patient characteristics listed above, the frequency of several ED and hospital treatment interventions, including amount of intravenous fluids received, administered medications, laboratory and imaging studies ordered by ED clinicians, number and type of procedures completed in the ED, length of stay in the ED, incidence of intubation, incidence of Chicago Police Department consultation, and mortality were assessed. Patient disposition from the ED was also examined, including the frequency of inpatient hospitalization versus discharge.

2.5. Analysis

Descriptive analyses were performed to process all data using Statistical Package for the Social Sciences version 19 (IBM Corporation, Armonk, New York, USA). Continuous data were reported using median and interquartile range [IQR]. Categorical data were reported using frequency and percentage.

3. Results

3.1. Event-related variables

A total of 209 charts were included for review. The majority of events with patients presenting to the ED were outdoor concerts (Table 1). Because the majority of patients presenting to the ED were from concerts, we restricted our analysis to this group in order to report a more homogeneous population; therefore only patients presenting from concerts are presented in subsequent tables.

Event volumes attended by patients all exceeded 1000 patrons and ranged from 9000 to >100,000. All outdoor concerts included served alcohol and were considered large events (>15,000 participants). Three large events (Lollapalooza, Spring Awakening, and Pitchfork) accounted for the majority ($n = 112$, 54%) of patient presentations. Onsite medical attention was available at all three of these events. Lollapalooza, a large annual outdoor music festival hosting approximately 100,000 attendees per day, accounted for the largest percentage of patients ($n = 62$, 30%).

3.2. Patient-related and prior to ED presentation variables

Patients that presented to the ED from concerts were generally young (median 20 years old [IQR 18 to 27]) and predominantly single (Table 2). A slightly higher percentage of males compared to females was noted ($n = 85$, 47% vs. $n = 96$, 53%). For those patients with past

Table 1
Event data.

	n (%) (total = 209)
Event type	
Concert	180 (86)
Sporting event	8 (4)
Participation sport	18 (9)
Other	3 (2)
Indoor	23 (11)
Outdoor	186 (89)
Top 10 events ^a	
Lollapalooza	62 (30)
Spring Awakening	28 (13)
Pitchfork	22 (11)
Grateful Dead	20 (10)
North Coast	18 (9)
Chicago Marathon	16 (8)
Riot Fest	8 (4)
Chicago Blackhawks (United Center)	3 (1)
Charlie Wilson Concert (United Center)	3 (1)
Luke Bryan Concert (United Center)	3 (1)

^a Top 10 events (percentages do not equal 100%).

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