



Emergency Care at a Music Festival: A First-Person Report

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These emergency physicians describe the collaborative efforts of EMS, hospital planners, and festival staff to create a system to safely treat attendees at a large outdoor electronic dance music festival held in a major city.

Over the past 5 to 10 years, electronic dance music (EDM) festivals have grown in popularity in the United States, developing into massive, multiday events drawing crowds of tens of thousands of attendees.¹ The nature of these events—ie, long outdoor performances attended by a primarily youthful audience in sometimes austere environments¹—presents several unique challenges to local EDs, including the ability to effectively manage mass cases of polysubstance abuse, exposure to

extremes of weather, and dehydration.

Since 2011, Orlando, Florida has been host to a popular annual EDM festival—one that has nearly doubled in size since its inception. In 2015, both the volume of 911 calls related to this event and number of attendees seeking care at the city's first aid stations located at the festival overwhelmed our local emergency medical services (EMS) system and the nearest ED. The acuity of these patient interactions ranged from cases that could have been treated and released on-site to several

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Table. Drugs Commonly Used at Electronic Dance Music Festivals²

Substance	Adverse Effects
Alcohol	Agitation, somnolence, respiratory depression, vomiting
Cocaine	Agitation, cardiac arrhythmia, rhabdomyolysis, hypertension, seizure
Lysergic acid diethylamide (LSD, "acid")	Hallucinations, agitation, vomiting, tachycardia
Marijuana	Confusion, hallucination, anxiety, drowsiness
3,4-methylenedioxymethamphetamine (MDMA, "molly")	Agitation, cardiac arrhythmias, hyperthermia, hypertension

critical care cases, including two fatalities.

In advance of the November 2016 festival, event staff, EMS, and hospital planners worked together to improve attendee safety and to avoid unnecessary admissions to the area receiving hospital, Orlando Regional Medical Center (ORMC). This cooperative endeavor resulted in the creation of a unique, fully staffed field hospital that was seamlessly integrated with EMS personnel and in constant communication with ORMC. The implementation of a field hospital on-site at the event decreased mortality and provided a reasonable and manageable way to safely treat and release patients who would have otherwise required transportation to the receiving center.

The 2016 Festival: Background

Location and Setup

In November 2016, the EDM festival was held at its usual location in the fields and areas surrounding a large stadium near downtown Orlando. Although the fall season in Florida can be unpredictable, the weather during the day is typically hot and humid, with temperatures averaging 80°F to 90°F. The festival took place over a 2-day period between noon and midnight each day. Unlike similar multiday festivals that run over a consecutive period of 24 to 48 hours, there were no overnight activities at this event.

Whereas other similar festivals often take place in more remote, austere environments such as deserts or forests, the Orlando EDM festival was held within the city but did not have on-site overnight accommodations. While this location eased some of our concerns, overnight closure of the field hospital altered our approach to patient management. When the facility closed, many patients who may have been observed overnight and subsequently released, required transport to the hospital for further observation and monitoring.

Attendees and Layout

The festival drew approximately 30,000 to 40,000 attendees each day, with multiple stages and fairground-type attractions spread over approximately 45 acres. The area was transformed by massive stages and production equipment, including complex lighting, pyrotechnics, expansive sound systems, and carnival rides. There were also dozens of on-site kiosks and pop-up structures selling food, merchandise, and alcoholic and nonalcoholic beverages.

Substance Abuse and Elemental Exposures

Although festival planners expressly prohibit illicit drug use at EDM events, substance use has been and continues to be prevalent at these types of festivals—particularly the use of alcohol, amphetamines

such as 3,4-methylenedioxymethamphetamine (MDMA, also known as “ecstasy” and “Molly”), lysergic acid diethylamide (LSD), cocaine, and marijuana (**Table**).²

In addition to substance abuse, the young attendees at this event are often scantily clad, increasing exposure to the elements. Although days are typically hot in Orlando in November, nights can cool off substantially, and exposure to colder temperatures was one of the more common medical complaints.

Lessons From the 2015 Festival

The 2015 EDM festival in Orlando had taken place without significant coordination between local EMS medical directors and ORMC, and was treated in a similar manner to other mass gatherings held in the area—ie, with extra EMS personnel on-site as well as several first aid stations. However, over the course of the 2015 event, the medics on-site were overwhelmed by the number of attendees seeking care, and felt obligated to transport a large number of these patients to ORMC (many of whom did not require hospital care), or to treat and release patients in a manner that was not in accordance with existing protocol.

As a result, the online medical control doctors at ORMC were overwhelmed by the sudden influx of calls for treat-and-release orders or intravenous (IV) hydration—not a common occurrence at this institution. This resulted in dozens of patient transports to the ED. Many of these patients did not require emergent care but simply needed shelter from the elements, rest because of sleep deprivation, or a place to recover from the effects of alcohol or drugs. Some patients, however, presented to ORMC in critical condition, two of whom died from suspected drug-related causes and/or severe hyperthermia.

After-Action Review

An after-action review of the 2015 EDM festival conducted by the Orlando Fire Department (OFD) concluded that signifi-

cantly more medical support was needed for this and similar large-scale events in the future. Together with OFD, we examined how other regions in the United States handled similar festivals, and it became clear that a multidisciplinary approach, including a field hospital, EMS, ORMC, and festival planners, would be necessary for the 2016 festival.

Collaborative Planning for the 2016 Festival

Festival planners and promoters worked closely with the City of Orlando and EMS medical directors for months leading up to the 2016 EDM festival. The complexities of stage set-up alone required significant coordination, including the closure of several roads. To set up the field hospital, we first tried to acquire “real estate” on festival grounds. When this proved not to be feasible, we worked with city officials to create a field hospital on a street just outside the festival’s side gate.

Resources

Throughout the process, we worked closely with the festival’s planners, as well as a medical team designated by its parent company, to coordinate shared resources. The medical team provided a significant amount of medical supplies to our field hospital. In addition, the festival obtained and paid for an insurance rider extending coverage to our medical staff while working at the event.

Ground Control Staff

The planners and promoters of the EDM festival host several other festivals each year, including some that are larger and longer than the annual event held in Orlando. A small team from Orlando visited their set-up at a larger festival in Nevada several months prior to the 2016 EDM festival, gathering information on how we could best execute our plans. In addition to equipment and support, the festival also designated ground controllers (GCs)

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External view of the field hospital.



Critical care (red) area.



stationed throughout the festival area. These were individuals without medical training who could be easily identified and could guide those in need of medical attention to the nearest first aid station or to the field hospital, or contact us when someone was in need of immediate or emergent care.

Access and Communications

Several areas identified for improvement from 2015 included better ambulance ac-

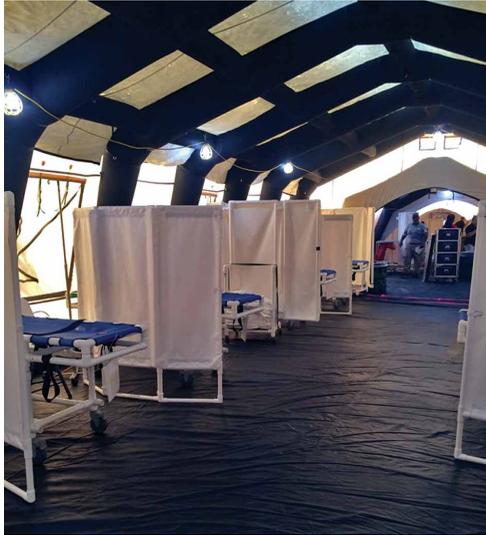
cess, radio communication (especially with physicians), and appropriate staffing. To provide additional medical staff for the 2016 EDM festival, the Office of the Medical Director (OMD) and the Central Florida Disaster Coalition (CFDC), a regional non-profit organization that assists with disaster-health response in the area, utilized this event as a drill for a large-scale disaster that would require a self-sufficient field hospital. Part of this initiative included radio transmission equipment that would allow the routing of all 911 and other emergency calls from the festival grounds directly to on-site medical personnel.

In addition to the CFDC resources, we had dedicated medical control on the radio to answer questions from the paramedics staffing the outer first aid stations. This was separate from our normal medical control base-station process, and allowed our traditional EMS operating structure to continue outside the event without any confusion or added burden from within.

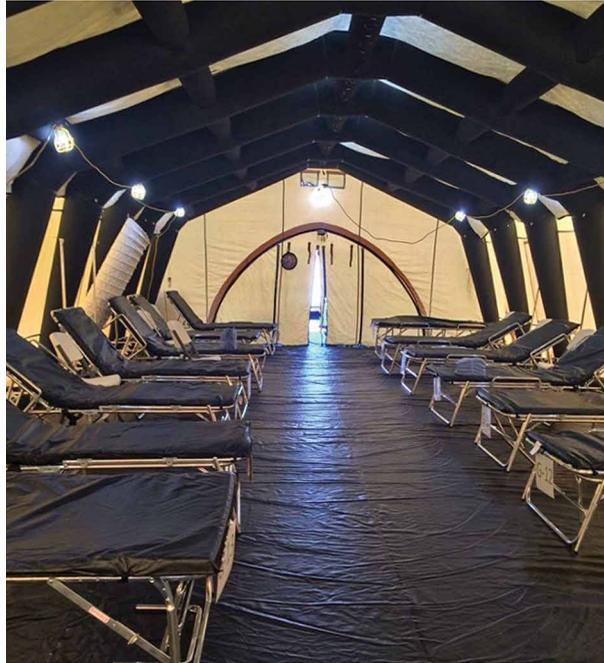
Field Hospital and First Aid Stations

Created just beyond the fencing that surrounded the event, the field hospital was a 3,200-square-foot, enclosed, air-conditioned structure powered by generators. In addition to the field hospital, three first aid stations were strategically placed around the festival grounds, and groups of medical personnel were assigned to walk the grounds.

The field hospital was staffed by physicians, nurses, paramedics, respiratory therapists, administrative staff, and pharmacists, and was divided into three separate color-coded sections based on patient acuity—a “green” section with 16 beds for low-acuity patients; a “yellow” section with 10 beds for medium-acuity patients; and a “red” section with four beds for critical care patients. The critical care area, which was set up as a free-standing ED, had ventilators, ultrasound equipment, an ice bath, and advanced life support equipment. Board-certified emergency physicians were present in each area at all times



Moderate-acuity (yellow) area.



Low-acuity (green) area.

throughout the event, in addition to several emergency medicine residents and medical students. The field hospital also housed a fully stocked pharmacy.

To direct and manage patients, a registration section was set up in front of the field hospital; intake/triage took place in a separate 15-chair, low-acuity area located beyond the front door. Charting was performed on CFDC charts and maintained for records; however, no patients were billed for care.

Separate command vehicles were set up for operations, radio communication, and storage of the staff's personal belongings. The festival organizers provided meals to all medical personnel.

Access, Communications, and Transportation

A designated road was closed off to all nonemergency traffic leading from the field hospital to an open access point. Our closed communication system meant that 911 calls inside the event would be dispatched to our personnel stationed on-site.

The field hospital served as a single casualty collection point for the entire event, so any patient transported out would first go to the field hospital for evaluation, then move to a waiting transport vehicle, if

necessary. This arrangement not only allowed the on-scene staff to evaluate and, when necessary, stabilize patients before transport, but also permitted us to identify and care for those who could be treated on-scene instead of sending them to the hospital. Routing all patients through one location also allowed the EMS staff to appropriately monitor the exact number of patients being treated. The first aid stations were staffed by paramedics and emergency medical technicians, and stocked with advanced life support and first aid equipment.

Motorized golf carts, "gators," and hand-held carts were used to convey patients from first aid stations and other parts of the festival grounds to the field hospital. On several occasions, physicians accompanied paramedics responding to calls on the festival grounds.

The 2016 Festival: First-Person Report

An hour before the event began, we arrived at the scene, familiarized ourselves with the layout, and met with incident



command, EMS, medical directors, and festival staff to discuss plans and divide the teams up. Prior to the event, a medical toxicologist reviewed with participating medical staff several priority resuscitation measures for patients presenting with drug intoxication. These priorities included control of hyperthermia, management of drug-related arrhythmias, seizures, and agitation, all of which permitted smooth transition of care and mutual understanding about which patients ultimately required transfer to the hospital.

Unexpected Needs

The medical needs were not great during the daytime hours. However, by sunset, a constant stream of attendees visited our field hospital, bringing their own prescription medications, including some requiring refrigeration, and requested that we store these on their behalf. We quickly created a process for safe storage and accountability of these medications.

In addition to requesting an unanticipated storage facility, attendees presented with more expected and typical “urgent care needs,” including headaches, rashes, and blisters. By the late afternoon, we began seeing patients who had been vomiting after riding fair attractions and those with heat-related syncope.

As evening descended, our triage area became busy with a wave of agitated, intoxicated patients presenting via EMS, friends, and GCs. When indicated, benzodiazepines (lorazepam and midazolam) were administered to mild-to-moderately agitated patients after verbal de-escalation attempts were unsuccessful. Severely agitated patients required sedative treatment with an antipsychotic (haloperidol or ziprasidone).

In the low-acuity (green) section, arousable patients whose vital signs were stable rested on cots, as did those requiring oral ondansetron for vomiting and who were able to tolerate oral hydration. The moderate-acuity (yellow) section housed a large number of dehydrated and/or intoxicated patients who required IV fluid therapy. Patients in the critical care (red) area suffered primarily from behavioral issues and altered mental status requiring chemical or physical restraint; many of these patients were transported to the hospital once they could be safely moved. Other critical care patients with medical emergencies were also housed in this area, including an overdose victim for whom endotracheal intubation was needed for airway protection.

As the evening progressed, we saw more severe overdoses and intoxications, including several cases of alcohol- and drug-induced seizures. Any seizure that occurred on the festival grounds was considered a potential cardiac arrest, requiring physician response. Some of our most difficult patient encounters included seizing or postictal patients presenting in an agitated fashion among crowds of intoxicated people who were attempting to help. We also treated a middle-aged festival employee with cardiac disease who presented with chest pain and acute electrocardiogram changes.

One festival attendee with a history of shoulder dislocation presented with a recurrent dislocation. Without needing to sedate the patient, we successfully reduced the dislocated shoulder at the field

hospital. Afterward, the patient refused transport to the hospital and insisted on returning to the festival in a sling. Several patients were seen for complaints of eye pain or irritation attributed to vigorous wind and pyrotechnic displays around the large stages—two underwent ophthalmologic evaluation with a small eye kit (topical anesthetic, fluorescein stain, and a Woods lamp) and were diagnosed with corneal abrasions.

Multiple patients with histories of asthma presented with respiratory complaints ranging from mild to severe. Most of these patients were successfully treated with albuterol, though some required supplemental oxygen and corticosteroid therapy. One patient required transport to ORMC for additional care and treatment.

Nonmedical Presentations

The location of the field hospital beyond the perimeter fence of the event created a slight “disconnect” from the crowds and lights—but not from the sound. Several attendees presented to the field hospital, asking for a place to “chill out.” To accommodate these presentations, several chairs were set up under the cover of a pop-up tent for a place to rest and drink a bottle of water. Some individuals remained in this tent for nearly the entire event—refusing care, but feeling more comfortable being in proximity of the field hospital. Although many of these individuals appeared to be intoxicated, the area remained calm throughout the event. This makeshift rest area also served as cover during a brief rain storm in the late afternoon on day 1, as well as for those seeking shelter from the hot afternoon.

Emergency Medical Services

The OFD contributed substantial resources to the 2016 festival, and their support continued throughout the event. Operations were based on the National Incident Management System’s framework, which was developed in coordination with the OMD, OFD, and other stakeholders within

ORMC. Logistics and medical groups were created, and the event was divided geographically into “northern,” “southern,” and “eastern” divisions. The unified command structure included a fire department deputy chief and a liaison officer (the OFD off-duty coordinator) who maintained face-to-face communications with festival operators throughout the event. The medical group was coordinated by the OFD EMS chief in collaboration with the OMD. A communications plan was created and used effectively throughout the event to coordinate patient movement, transfers, and transports to the field hospital and ORMC. Briefings were conducted for each operational period and included all personnel involved in the event.

At least one EMS medical director was on-site at all times, in constant communication with the EMS chief on scene, who functioned primarily at the field hospital to guide throughput of patients. The OFD staffed three first aid stations with advanced and basic life support providers, and had personnel roving the festival grounds. In addition to having advanced life support capabilities, the first aid stations dispensed acetaminophen, adhesive bandages, ear plugs, and bottled water, and responded to nearby calls for help and transported patients to the field hospital as needed.

The OFD was also the primary transport agency. Ambulances were dedicated to the event and stationed at the field hospital to transport patients to ORMC. In total, 32 EMS personnel were on scene, including ambulance personnel, staffing at first aid stations, and personnel circulating among the crowd.

The Orlando Police Department (OPD) was also a constant presence at the event, providing security for both festivalgoers and staff at the field hospital. We did not have our own security personnel at the field hospital, and OPD provided a comfort level for the medical staff as the number of agitated, intoxicated patients increased.

Any seizure that occurred on festival grounds was considered a potential cardiac arrest, requiring physician response.

Orlando Regional Medical Center

During the 2015 EDM festival, ORMC had been inundated with festivalgoers. Many required only minor care, but some were in need of critical care, including two cardiac arrest patients. Based on this festival experience, hospital administration at ORMC ensured adequate staffing for the 2016 festival, including nursing, medical technicians, radiology technicians, and respiratory therapists. Communication between familiar colleagues, operating under



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mutually understood protocols, and the ability to communicate with the field hospital, allowed for very smooth transitions of care throughout the 2016 event.

There was a direct correlation between the time of day and number and severity of patients transported to the hospital. Early in the day, patients presented with heat illness and altered mental status, syncope, and confusion; all were easily managed. By late evening, patients with possible arrhythmias, seizures, hyperthermia, chest pain, and altered mental status began to arrive. While the number of patients with the clinical presentation of intoxication and agitation was not surprising, the outcomes were occasionally unexpected—including several elevated troponin levels and occasional arrhythmias.

The hospital received 68 patients directly from the field hospital at the festival. More than 100 presented to the field hospital with altered mental status, of which dozens resolved with observation and close monitoring. Thirty patients had transient arrhythmias ranging from tachycardia and a slightly widened QRS complex. Six had seizures which responded to benzodiazepine treatment. One patient suffered respiratory failure; he was managed by mechanical ventilation, which was performed at the field hospital, and afterward transported to ORMC with a resident physician. Five patients had hyponatremia, which may have been dilutional from excess free-water intake or mediated by syndrome of inappropriate antidiuretic hormone secretion secondary to MDMA use. Hyperthermic patients were managed with active cooling.

Laboratory evaluation revealed elevated troponin levels in six patients, though none of the patients required emergent cardiac intervention. The elevated troponin levels were possibly secondary to demand ischemia from sympathomimetic toxidromes.

Although many patients admitted to using recreational drugs, few specified the type or amount of drug taken, either because they were too altered to communicate, were unfamiliar with what they ingested, or feared legal repercussions. Ethanol, marijuana, and MDMA were the most commonly reported drugs.

Lessons Learned

Over the 2-day 2016 EDM festival, 235 patients were treated at the field hospital, and 68 were transported to ORMC—almost 100 fewer hospital transports than during the 2015 EDM festival, which lacked a field hospital. Although two attendees at the 2016 event required intensive care at ORMC, there were no deaths. Overall, the field hospital and cooperative approach provided a safer method for treating patients and without overwhelming hospital or EMS resources. Successful utilization

of a field hospital at the 2016 EDM festival required the coordinated efforts of multiple organizations, including the EMS system, ORMC, festival organizers, and disaster response groups. The deployment of this strategy required a great deal of planning, coordination, and efforts months before the actual event, and included a sufficient number of trained emergency and medical personnel, support staff for equipment set-up, operation, and takedown, and insurance coverage.

In reviewing the medical care model provided for the 2016 EDM festival, we concluded that a more effective and efficient staffing model would have deployed more nurses and fewer physicians. Utilizing the event as training for residents and medical

students resulted in a large number of providers on-site, but inadequate support staff.

When planning for this event, we did not anticipate the extent of the primary care and urgent care concerns encountered during the event, though we did anticipate that the most critical medical concerns were sympathomimetic and hallucinogenic toxidromes requiring restraint, benzodiazepines, and antipsychotics.

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