

Medical Utilization Rate at Music Festivals: The Effect of Crowd Behavior

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Abbreviations:

EDMF: electronic dance music festival
LSD: lysergic acid diethylamide
MDMA: 3,4-methylenedioxyamphetamine
MUR: medical utilization rate
PPR: patient presentation rate
TTHR: transfer-to-hospital rate

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Electronic dance music festivals (EDMFs) are rising in popularity but have gained notoriety due to an alarming incidence of hospitalizations and deaths.^{1,2} In order to estimate needed resources, mass-gathering medicine literature has focused on predicting medical utilization at these events. Indicators of medical utilization rates (MURs) include frequency of patient presentation to medical attention and ambulance transport to hospital. Commonly used variables thought to influence MUR include event type and duration, temperature, geographic location (indoor versus outdoor), crowd type and behavior, and alcohol and drug use.^{3,4} Previously described experience at similar events has been shown to accurately predict future needs.⁵ The National Association for EMS Physicians (NAEMSP; Overland Park, Kansas USA) has incorporated these factors into guidelines to help medical directors allocate resources and design risk mitigation tactics.⁵ However, there are currently no evidenced-based recommendations regarding optimal allotment of assets at musical festivals.

We collected data on consecutive patients presenting for medical attention at two large outdoor music festivals in New York City (New York USA). Festival A was an EDMF while Festival B included an array of music genres that included rock and pop; electronic music was not featured at Festival B. The daily outdoor heat index for Festival A was 19°C–36°C (67°F–96°F) and for Festival B was 11°C–23°C (52°F–73°F). We evaluated the difference in MURs between the two festivals by measuring patient presentation rates (PPRs) and transfer-to-hospital rates (TTHR).

Festival A had a three-day attendance of 75,000 with 173 presentations for medical attention, resulting in a PPR of 23 per 10,000 attendees. Eight patients were transported to the hospital, resulting in a TTHR rate of 1.06. Festival B had a three-day attendance of 120,000 with 126 patient presentations, resulting in a PPR of 10.5. Four patients required transport, resulting in a TTHR of 0.33. Thus, despite a much higher attendance at Festival B, the EDMF had a higher MUR and a higher TTHR.

The percentage of reported recreational drug use at Festivals A and at Festival B are displayed in Figure 1. At Festival A, 3,4-methylenedioxyamphetamine (MDMA; Molly, Ecstasy) was most commonly reported, whereas marijuana was most commonly reported at Festival B. Compared to Festival B, patients at Festival A presented with higher systolic blood pressures, respiratory rates, and heart rates; Festival A attendees were also more likely to have dilated pupils and diaphoretic skin.

Recreational drugs used at festivals tend to be *entactogens*: psychostimulants that produce experiences of emotional communion and openness, such as MDMA and lysergic acid diethylamide (LSD; acid). The sympathomimetic properties of MDMA elevate the body's core body temperature while its euphoric qualities both encourage increased physical activity and distract the user from resulting potentially dangerous hyperthermia. Toxicity from MDMA may also cause hyponatremia, seizures, rhabdomyolysis, hyperkalemia, acidosis, multi-organ failure, and death. The hallucinogenic effects of LSD produce heightened sensory perception, euphoria, and sense of well-being, with users commonly describing out-of-body experiences or synesthesia. While hemodynamic and metabolic derangements are less common with LSD intoxication, LSD can precipitate serotonin syndrome and can cause dangerous behaviors based on hallucinatory or delusional beliefs (eg, that the user can fly). The wide-spread use of these drugs at an EDMF affects behavior by creating an energetic and active crowd, which may increase MURs.

Music festivals create a high MUR with a range of illness severity affecting an otherwise healthy population. On-site medical teams should anticipate a higher PPRs and TTHR at

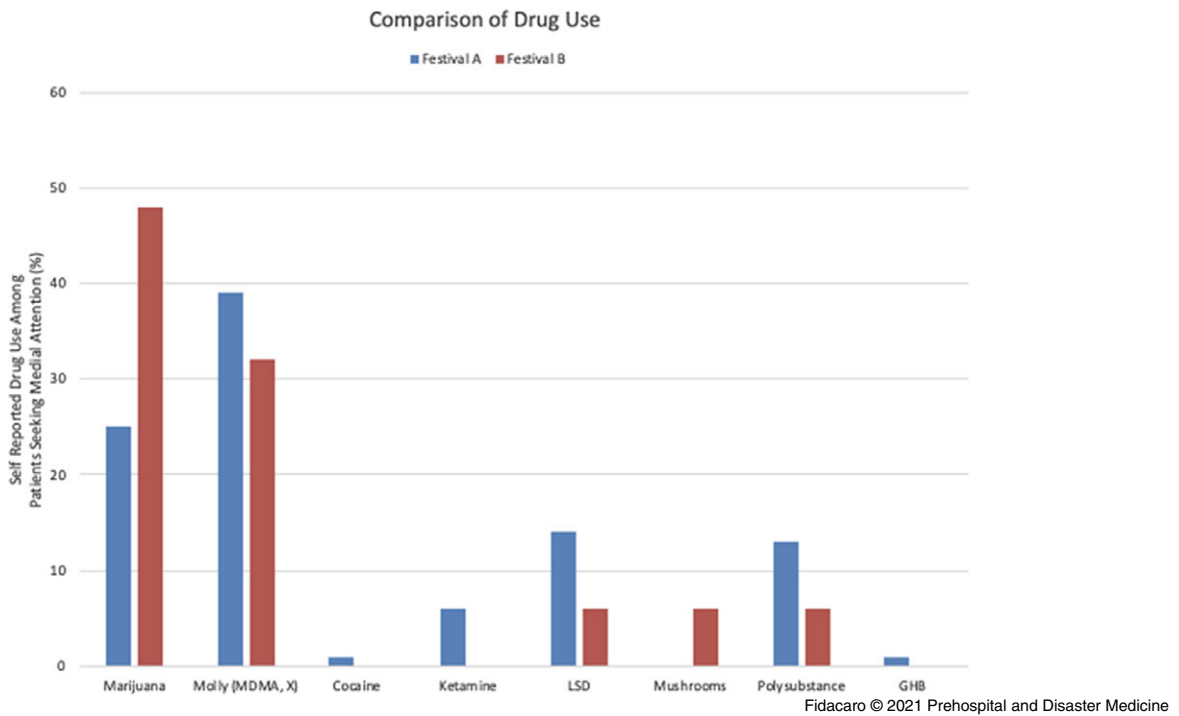


Figure 1. Self-Reported Drug Use Among Patients Presenting for Medical Attention (%).

Abbreviations: LSD, lysergic acid diethylamide; MDMA, 3,4-methylenedioxymethamphetamine; GHB, gamma hydroxybutyrate.

an EDMF, likely attributable to crowd behavior and the common use of recreational stimulants, potentially compounded by exertional heat illness. Further work should focus on improving

prospective prediction methods to adequately assess needs such that local health care resources are not diverted from the usual care they provide for the hosting community.

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