

Mass Gathering Medicine

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Objective: By the end of this session, the reader should be able to:

- Identify the characteristics of a mass gathering from the medical care perspective.
- Identify the variables most likely to affect the amount and type of emergency care coverage that will be needed.
- Identify the most important components of a mass gathering medical coverage plan.

Overview

One of the major activities within the disaster medicine community is providing medical care for "mass gathering" events. Also known as "planned events," the involvement of disaster teams in such events is increasing. This is due to the increasing demand of insurance carriers for on-site public safety response capabilities as well as an opportunity for fund-raising for Disaster Medical Assistance Teams (DMATs). Several teams raise significant funds for their disaster operations by providing "mass gathering EMS" on a fee-for-service basis. This can be accomplished by charging for EMS coverage while utilizing DMAT volunteers; the profit then goes to the team. This session addresses EMS coverage for mass gathering events, not specifically DMAT coverage, but the principles carry over if the DMAT is considered to be a mobile EMS resource.

Defining a Mass Gathering Event

There are three factors that define a mass gathering event and its emergency response plan. First the event, by definition, must be pre-planned and involve a gathering of many people (usually 1,000 or more) to a single site. In fact, the terms “mass gathering event” and “planned event” are synonymous. If the event is not planned, then it is almost exclusively within the purview of regular, on-duty public safety agencies. It should be apparent that planning for a mass gathering event begins with recognizing the event type. Event types include concerts, papal visits, fairs (state, county), air shows, visits from VIPs or diplomats and major sporting events. This author’s EMS unit averages almost 300 events per year; mostly fairs, concerts, and sporting events.

Multi-Agency Coordination

The next factor in defining a mass gathering event plan is the number and type of agencies involved. The event promoter or public safety agency responsible for the mass gathering event plan must ensure cooperation between as many of these agencies as possible. First and foremost, cooperation and a mutual understanding of the team’s mission must be established with the event sponsor or promoter, especially when these groups have their own sponsor-mandated EMS policies, procedures, and/or providers (i.e. NASCAR races). Further, for concert events, it is not uncommon for the performers (also known as the “talent”) to have their own advance personnel who must be included in the planning process. In some cases this may be a stage or program manager, and in other cases it may actually be a security consultant, bodyguard, etc. Law enforcement will almost always need to be involved. This might include local or county agencies for many events, and state law enforcement for events such as state fairs

or state university-sponsored athletics. Additionally, federal law enforcement may often be involved, especially when a VIP visit is planned, such as a presidential visit involving the U.S. Secret Service or a foreign dignitary visit with Department of State security. It is important to include law enforcement in event planning, particularly regarding site security, dignitary protection, and traffic control. In many locales some or all of these functions may be performed by private security firms, so they must obviously be involved in the planning as well.

Depending upon the type of EMS system in a given community, fire department involvement may be necessary. In addition to providing EMS, they may provide inspection and investigation duties (monitoring food vendors with on-site food preparation, for example) as well as fire suppression duties. This latter item may involve the stand-by of fire fighting apparatus on site if there are barriers to site access or if other risk factors (such as on-site pyrotechnics) exist. Regardless of who provides primary fire response and EMS to the venue during normal times, the mass gathering planner will need to coordinate with the 9-1-1 authority well in advance. It must be anticipated that on-site emergencies will be called in to the local Public Safety Answering Point (PSAP). Ensuring prior cooperation of the PSAP prevents the redundant dispatch of off-site units to fight their way through traffic in response to a call that is already being managed by pre-placed on-site assets.

Pre-determination of jurisdictional boundaries, during the planning phase, would dictate event and off-site agency responsibilities. For example, it might be decided that the on-site public safety agencies will respond to the venue and all affiliated parking lots, but that the off-site local emergency response will be utilized for incidents on the access streets and frontage roads. If the on-site agencies have access to mobile response vehicles (golf-cart ambulances, etc.) the decision might be to not bring outside resources any closer than a four block radius. An

important item to include in the planning is the process of handling off-site emergency vehicles and crew that come onto the venue. Large concerts and sporting events, in particular, seem to attract EMS and fire suppression crews that are “in the area’ but not specifically assigned to the event. It should be made clear to these agencies that they are welcome – or not – but that they are to function within the on-site public safety system while they are within the previously determined boundaries. Please note that the presence of such crews may be very useful, but they must work within the ‘ system.’ As an example, in one recent event, a fire-rescue ALS crew opted to attend an athletic event and was flagged down by passers-by who had noted an emergency in the stands. The first of a two-tier EMS system, after providing initial care, the crew called – on their portable radios – for the dispatch of a transport unit from the second tier ambulance service. The event EMTs, meanwhile, had no idea that the emergency had occurred. Further, they then had none of the necessary documentation for the venue risk management provider after the event concluded. It should be noted that one major advantage to having on-site EMS is the ability to properly document incidents occurring within the venue’s jurisdiction. These data are important not only for risk management purposes but also for validating the need for and determining the requirements of, future events.

Finally, depending upon the type and magnitude of the event, planners may consider bringing other agencies into the planning process. For large events, planners should consider the inclusion of the local emergency management system, the local or regional Disaster Medical Assistance Team (DMAT), and other EMS agencies (public or private) that might be utilized in the event of a mass casualty incident (MCI). As the plan develops with the input from these agencies, it is useful to develop a briefing packet and a training program to be presented to venue

employees. For example, many state fairs hire numerous temporary employees who need training in fire extinguisher use, evacuation of the larger on-site facilities, and so forth.

Venue Characteristics

The third, and final, factor in determining a mass gathering event plan is the venue itself. Unless a specific, pre-identified venue exists, the event cannot be considered a planned event. In most cases event locations are frequently used for mass gathering events and so the planners will be familiar with their layout and special requirements. Once an event is planned, the cooperating agencies are identified, and the venue is selected, the EMS plan must take three basic concerns into consideration.ⁱ These three concerns establish the skeleton of the EMS plan that is then modified by other factors. The first of these basic concerns is the character of the event. The EMS plan for a heavy-metal concert will obviously vary from the plan for a symphonic orchestra which, in turn, will vary from the plan for an athletic event. The EMS planner must take into consideration the event type from the perspective of the type of attendance expected. On the one hand, large numbers of youth attending a contemporary “head-banging” concert will likely bring illicit agents into the venue and a “mosh” pit, along with its health risks, may be expected. On the other hand, older and more mature audiences will demand entirely different services.ⁱⁱ Part of the calculus in determining the effect of the event type on the amount and kind of EMS services likely to be needed is to predict the demographics of the audience (age, gender, educational level, income, etc.) and plan for the known disease and injury profile for people of similar demographic characteristics. One very useful – but often overlooked – technique in the EMS planner’s toolbox is establishing contact with other venues that have already hosted the specific event. At present, for example, the author is planning a concert by a heavy-metal group

that had three fatalities at a recent concert. Needless to say, the EMS plan for this concert will be modified to take the additional risk factors into account.

The second concern is the size of the anticipated crowd. Although statistics vary on the subject, it is clear that the EMS plan must anticipate the number of health care providers needed for a specific crowd size. This number ranges from one team per 1,000 in attendance to one team per 10,000. The former number seems to be an established starting point; the latter figure is probably only applicable in specific circumstances where sufficient experience has demonstrated the efficacy of lesser coverage. In general it appears safe to schedule one team for the first 5,000 to 10,000 (again, depending upon the type of event and venue) and then add teams as the population in attendance increases per thousand thereafter.ⁱⁱⁱ Please note that a ‘team’ is defined as two providers at the appropriate level (generally ALS) with a full complement of medical and communications equipment. It is interesting to note that one study on this topic at a football stadium showed that the volume of patients encountered by EMS grew in proportion to crowd size, but only up to a certain point.^{iv} Most other research has indicated a proportional EMS demand as the crowd size increases.

The third and final concern is the actual venue itself. A plan that is perfect for a specific event type and size is not always transposable to a different venue. As a starting point, is the venue designed for the type of the event? Is it indoors or out? In one case an EMS plan for a famous vocalist accompanied by a symphony orchestra failed to account for the fact that the concert floor was multiple rows below ground level. The failure of this plan became apparent when the attendees – mostly older – began climbing out of the venue. EMTs were called to manage three consecutive patients suffering from myocardial infarctions and a person with a fractured hip. Although it is unlikely that an EMS planner would ever have any input in the

matter, the closer the match between the facility's design and its utilization, the better. For example, venues frequently used for mass gathering events are more likely to have predetermined first aid areas, etc. A large rock concert held in a football stadium would require changes in fencing, vendor location, visitor flow, etc. Is the venue an enclosed facility, or is it open? Environmental considerations come into play in either case. If enclosed, the venue might become over-heated and poorly ventilated while an open facility might be hot or cold and could require that the possibility for precipitation be factored into the planner's equation. The EMS planner must work closely with venue management and vendors to account for these variables. If enclosed, the venue management should provide air conditioning and do so well in advance of the door opening time, lest the heat be allowed to build up and not dissipate. Although occasionally a sticking point with vendors that wish to sell it, plenty of easily accessible, free water should be available for venues that have the potential to get hot. In addition, the operational area for medical management must have adequate ventilation and temperature control. This may require including in the plan large fans for hot climates and heaters for cold venues. Open or outdoor venues should have shaded areas included, possibly with water misters to facilitate mass cooling. Although less likely, venues that tend to be cold should have plenty of warm areas available. The patient treatment areas in cold venues must be heated. Another consideration of enclosed or open venues is ventilation, especially if pyrotechnics are to be included in the program. The failure to properly vent smoke after fireworks displays is likely to generate multiple patients with respiratory distress.

Communications

An important planning consideration for each venue is its communications capacity. Depending upon factors such as the type of construction and size of the venue, on-site communications may require advance implementation of fixes. In general the best such fix is technological, e.g., a repeater or expansion of the venue's phone system. The plan should also specify – in advance – what phone number will be used for internal emergencies, where that phone will ring, who will be responsible for staffing it, etc. Any communications system must have three “layers.” The first of these is the requirement that all involved agencies (vendors, venue management, EMS, etc.) can speak with or otherwise be able to quickly access each other. Second, the medical team (and other public safety agencies as appropriate) should be able to communicate internally (among themselves). This is especially important – and difficult – if the venue is geographically disbursed, such as fairgrounds or athletic facilities with large areas designated for parking. This is best handled by installation of an on-site repeater for utilization by the EMS providers. And third, the venue must have established communications with the off-site public safety agencies. There should also be protocols enabling the PSAP to route its incoming calls back to the venue. By having fail-safe communications and established protocols, the PSAP and other public safety agencies would be protected from liability by “assuming” that an incident was being handled when, in fact, the on-site emergency teams may not even be aware of the incident. Reciprocally, these procedures provide back-up to the on-site public safety agencies by allowing the off-site response to occur if the on-site agencies are taxed or unable to get to the location of the emergency.

Access and Egress

Each venue has unique access and egress capabilities. It is essential to work with law enforcement and/or security – whomever is responsible for the traffic plan – to establish a minimum of one route whereby emergency vehicles can both access and exit the facility. If possible, more than one such route should be established, negating the need to establish multiple locations for rendezvous with the transporting EMS agency. If access and egress routes are not available for any reason, an on-site stand-by ambulance should be arranged. In some cases private ambulance services will provide stand-by service for free and preserve the right to bill any patients who are transported. Please note that, despite popular misconception, many events do not require on-site transport-capable EMS in order to function. For many years, one athletic department stopped their game when the ambulance had to leave the facility. Only upon close investigation was it determined that the specific conference that this college was in did not require a stand-by ambulance except during play-off games.

It is often very effective to consider the ambulance personnel as being part of the EMS system. They should be incorporated in your overall operations plan, for transport as well as for other responsibilities. It may also be required to arrange for another truck and crew to be available outside of, but not too distant from, the venue. This allows restricted utilization of the primary ambulance to only the highest acuity cases; the secondary unit can then get into the area quickly to replace the primary or transport a less-acute patient, leaving the primary unit in play. Similarly, if rapid access to the facility is difficult, having on-site fire suppression apparatus during the event should be considered. In general, all public safety agencies need to be on-site thirty-to-sixty minutes before the venue is open to the public. This will allow equipment and personnel to be placed before the first emergency is dispatched. Further preparatory time should

be scheduled to gather and check equipment, etc. In general, the more personnel and equipment you can arrange for the venue, the better. Privately owned vehicle (POV) use should be avoided as much as possible. POVs will have more trouble entering the facility and getting close to the unloading point than marked vehicles or those with parking passes. It may be difficult to obtain enough parking or venue access passes for vehicles belonging to each member of the health care team. Promoters generally tend to avoid handing out any more passes than required.

Level of Care

The final venue consideration is its compatibility with the desired level of medical care. Any facility where transport off-site is difficult, for example, should have ample space for holding patients. Further, this space should be set up with stretchers – preferably close to the ground – for holding drug or alcohol intoxicated patients or others who require short-term observation. If patient care is going to be provided on-site, sufficient privacy is desirable, if not always easy. In addition, the plan must take into consideration the flow of patients. Will EMS personnel go into the venue and retrieve patients for treatment in a first aid area, will all care be handled at the location of the incident or will both be allowed? And, if so, who makes the decision whether to transport a patient to an off-site health care facility, to the on-site first aid area, or provide on-site care? Once the basic concerns of event type, crowd size, and venue are included in the plan, other issues arise. Although numerous, their impact upon the plan will be dependent upon the specifics of the aforementioned three basic concerns.

Summary of Plan Requirements

Factors which should be included in a comprehensive medical plan include:

- The general composition of the crowd. Elderly concert-goers will generally suffer from more medical conditions than younger spectators (unless drugs are involved). Younger crowds at concerts with mosh pits or “surfing” are likely to present with more injuries than would be expected in an older crowd at a different kind of event. Some kinds of athletic events (i.e. “iron man competitions”) may result in more injuries among participants than observers. Special needs populations among participants or observers need to be considered. At one state fair, the busiest EMS day occurs when special needs students are invited to the fairgrounds.. Both additional staffing (respiratory therapists) and special supplies (diapers, etc.) should be anticipated. Finally, one should never fail to include ethnic or cultural considerations in the EMS plan.
- As discussed earlier, the density of the crowd can either help or hinder the EMS response effort. This is a crucial detail to obtain early in the planning process, usually from the promoter or venue management. Be prepared to be an advocate for anything that decreases overall density or localized densities, such as a mosh pit. General, as opposed to reserved seating will almost guarantee patient access difficulties at most rock concerts, so consideration must be given to positioning responders close to the stage – remember hearing protection and loud and clear radio reception for such teams (utilization of special headphone and microphone systems should be considered and communication with personnel on the away teams should be confirmed periodically).
- Another, less obvious difficulty encountered with high-density crowds is the potential for delays in problem notification. For this reason your EMS plan may include spotters –

with radio communications and binoculars – located high above the general crowd. If possible, establish a unified command post in such a location, allowing the medical incident commander the ability to spot specific problems as well as keep the “birds-eye” view of all operations. Please note the importance of utilizing an approved and generally recognized Incident Command System (ICS), preferably jointly with all on-site public safety entities.

- Common sense and intelligence gathering should indicate the presence of alcohol and/or other illicit drugs. The type of event and crowd composition in addition to the strength of the security and law enforcement are other clues that should be examined. When the presence of these types of agents is anticipated, the clinical portion of the plan must be modified to accommodate the special needs of the intoxicated patients. Considerations such as the ability to observe a high number of patients until they reach sobriety, and the safety of medical staff should be foremost in the plan. Additionally, policies for disposition of patients – particularly juveniles – should be developed. If the decision is made to observe patients until sobriety, protocols for when and how to observe them (i.e., low to the ground and lateral recumbent) and when to transport must be developed. In particular, it is important to determine on what basis these patients are assessed, and how long after the conclusion of the event EMS will remain on-site.
- Legal issues concerning new policies should be considered and risk management and venue management involvement in these discussions may be necessary.
- The geography of the venue should be considered early in the planning process.
- As discussed above, the jurisdiction of the on-site EMS providers should be determined in advance. Once decided, appropriate equipment and staffing can be established. If any

significant amount of parking lot or external property is included in the jurisdiction of the event staff, additional EMS providers with sufficient mobility (bike or golf cart) should be included in the overall operational plan.

- As introduced above, weather conditions must be considered as well. In general the three meteorological conditions are temperature, humidity, and precipitation. The plan accounts for the impact of the weather on the attendees and the probability of adverse weather conditions generating multiple casualties. The availability of (free) shelter from the heat or cold and access to free water will significantly decrease demand on EMS. In addition, the availability of clean food and the presence of adequate sanitation facilities are equally critical. In some cases the promoters and/or venue management will be responsible for planning crowd resources, in other circumstances these simple steps will be overlooked until brought up by advocates for the crowds – probably EMS personnel.
- And finally, what clinical considerations are there? While anything and everything can happen and should be anticipated, it is more likely that the majority of medical demand will be for OTC analgesics (it may be necessary to determine the policy for administering any medications –including OTC analgesics). Inasmuch as OTC analgesics may be outside the scope of EMS practice in some locales, advance arrangements should be made to permit their being dispensed in this limited setting. Also plenty of sunscreen should be available to hand out to the crowd. The makers of sunscreen may be a good resource for obtaining free samples. Band-Aids should also be made available, because slips, trips, and falls are similarly common. Other common clinical complaints are intoxication, overdose and environmental problems. In addition, the medical plan must be crowd-specific, with an increased emphasis placed on the

management of major medical emergencies for older audiences and trauma for any group. Besides clinical considerations, the EMS plan must address the final disposition of all patients encountered. In EMS systems where all encounters result in either transport or refusal of care, adequate staffing and paperwork must be included. Consideration must be made, if possible, to waive the requirement to transport (this alone will make resources go further than any other planning effort). And last, adequate numbers of patient encounter forms should be available on site and protocols developed to determine what signatures are required.

Conclusion

In summary, the need for a mass gathering event to have an emergency response plan is defined when the event is planned in advance, utilizing multiple cooperating agencies, and is established for a specific venue. This plan begins with consideration of the type of event, the make-up of the crowd, and the geography of the venue. The plan is further augmented by including issues arising from sub-groups composing the crowd, the density of the people, and the presence of illicit or controlled substances. Further, weather, resources available to the crowd and clinical considerations must be addressed in a well-developed plan.

ⁱ For further information please see the NAEMSP guidelines for large event EMS plans. Jaslow D: Mass Gathering Medical Care: A Practice Without Standards. NAEMSP News, 1999, May, p.8.

ⁱⁱ See Milsten, Andrew: Marker Variables in Mass Gathering Medicine. Master's Thesis, Department of Emergency Health Services, University of Maryland Baltimore County, May 2000.

ⁱⁱⁱ The American College of Emergency Physicians and others offer some formulas that can be used for calculating the number of providers needed, but the accuracy of such formulas is suspect, leaving much to the judgment of the planners. See: Leonard RB, et al: Information Paper: Provision of Emergency Medical Care for Large Crowds. ACEP, 1990.

^{iv} Shelton S, Haire S, Gerard B: Medical Care for Mass Gatherings at Collegiate Football Games. Southern Medical Journal, 1997; 90(11): 1081-1083.