PROVISION OF EMERGENCY MEDICAL CARE FOR CROWDS

American College of Emergency Physicians
EMS Committee
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Developed by the 1995-96 Emergency Medical Services Committee of the American College of Emergency Physicians.

Contributing Authors

Joseph J. Calabro, DO, FACOEP
Chairman
Department of Emergency Medicine
Newark Beth Israel Medical Center
Newark, New Jersey

Jon R. Krohmer, MD, FACEP
Chair, EMS Committee, ACEP
Medical Director, Kent County EMS
EMS Coordinator, Emergency Medicine Residency
Butterworth Hospital
Grand Rapids, MI

Edgardo Javier Rivera-Rivera, MD, FACEP
Chief, Emergency Services
Medical Director, USAF EMT Program
82nd Medical Group and 882nd Training Group
Sheppard AFB, Texas

D. Joan Balcombe, MD, FACEP
Chief of Staff
Ogden Regional Memorial Center
Ogden, Utah

Joel J. Reich, MD, FACEP
Chairman
Department of Emergency and Ambulatory Care Services
Medical Director, EMS
Manchester Memorial Hospital
Manchester, Connecticut

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INTRODUCTION

Americans love fairs, indoor and outdoor concerts, parades, celebrations, athletic contests, and many other events that draw large crowds. These events may last an afternoon, a day, a weekend, or sometimes a week or longer. The provision of emergency medical care during short events with small crowds is relatively easy to prepare for; events that draw large crowds, especially if the events are to last for an extended period, can present a formidable planning challenge.

Emergency physicians are uniquely situated to coordinate and/or provide expertise in this specific arena. The combination of out-of-hospital medical care, emergency medical care, disaster medical care and some public health care provides a challenge that is particularly well met by emergency physicians. Our purpose here is to present an update to the original document [1] by presenting information from recent experiences and to review topics that must be considered and questions that must be answered if you are asked to provide medical care for a large crowd of spectators, and possibly for the participants as well, in a low-risk competition.

INITIAL PLANNING

Where to Start?

Plans cannot be made without information. Regardless of who initially contacts you concerning medical care, an early meeting with the organizers of the event themselves is important, not only so that you will know each other but also so that misinformation will not be transmitted through a third party.

The first thing you should learn at this meeting is who is in charge of the overall event (the event coordinators) and who to contact if you need specific authorization to carry out certain tasks. You need to know who will be in charge of providing medical care. Presumably, it will be you, but if other health providers will also be present (EMS, Red Cross, etc.), their plans may be at cross purposes to yours. Thus, you will also need to meet with those health providers to coordinate plans and perhaps to establish a chain of command. Assuming that you will be in command overall, these other health providers can be a valuable source of supplies, personnel, and experience. In some areas, American Red Cross personnel have vast experience in providing medical care for crowds, and even if they are not involved in your event, they should be contacted for their suggestions.

You will need to discuss expenses and financial support with the event coordinators.

The organizers of the event will need to contact the local health department to ensure that the preparation, storage, and serving of food are in compliance with local and state health codes.[2]

This initial meeting will allow you to gather enough data so that you can contact your medical malpractice carrier to make sure you are covered under your policy. Likewise, you should assure that all the providers are also covered either individually or by the promoters of the event.

Who can Help?

After meeting with the event coordinators, you will need to meet with personnel from such groups as the fire and the police departments (or with the security team for the event), as well as with those responsible for facilitating any disaster plan that would encompass the site of the event. These meetings should provide you with names and telephone numbers of key contact personnel in these organizations so that problems can be addressed quickly as they arise and decisions can be made in the most efficient manner.

If the event will have participants protected by the U.S. Secret Service or federal agents, you must be aware that they have specific protocols for dealing with medical emergencies for those they are protecting. Your plans must conform to those protocols.

As with all aspects of out-of-hospital emergency care, scene safety and personnel security must be a primary concern. Depending of the size and nature of the event, the issues at hand may be various, and must be addressed during your meetings with local EMS system, police, and security teams. If the event will have portions that may lead to disaster situations, like during air shows for example, plans should be made to smoothly integrate the local EMS system's disaster plan to your medical coverage. What would happen if a plane crashed over one or more of the medical stations? Back up personnel and equipment should be planned for during the initial planning process, should such an unfortunate situation arises, where now your medical people are part of the casualties.

Meetings with security teams and police departments must address the personal safety of medical personnel and scene security. What would happen if during a political rally or a papal mass there is a terrorist attack? What if, because of the strategic location or perceived importance, a group of terrorists take medical station personnel as hostages? What if, because of confusion with law enforcement uniforms, your medical personnel are directly threatened? What if the attack involved usual weapons and therefore produce casualties for which you are not prepared (like chemical/biological warfare)? These type of questions must be addressed with police and security teams. Typically, participants of potentially controversial nature are well secured by special teams, e.g., U.S. Secret Service. However, medical personnel not only are uncovered, but frequently do not know how or who to activate when their safety may be in jeopardy. Procuring a direct access (ring down, direct panic button, special frequency, or the like), or better, designated security personnel, would be advisable in events with these potential risks.

In general, you should integrate your plans with the existing EMS system in your community because its personnel are already knowledgeable about the community's hospitals and disaster plans.

Who Knows How to Do What You've Been Asked to Do?

You should determine whether there have been similar events in your community or nearby communities in the past and, if so, who provided medical care for them. From those persons or organizations you should be able to reap information that will make your task much easier.

QUESTIONS ABOUT THE EVENT ITSELF

How Long?

The hours during which the event will take place and the overall duration of the event are very important. A one-day event that will run, for example, for 18 to 24 hours probably will need two shifts of personnel in each medical aid station, whereas an event that will run for eight hours on two consecutive days could be handled by the same personnel on both days. Events that last for many days may well need multiple teams unless you are able to put together medical teams that could commit their services for the entire time.

What is the Site Like?

Equally important information for planning medical care is the size and topography of the area in which the event will take place. A small area may require only one medical station, whereas a large area, such as a fairground or stadium, probably will require more.

Factored into the number of aid stations will be the ease of access to the stations. For example, even though the size of a race track may suggest that it will require only one medical aid station, in reality one station may be required for the stands and a second for the infield because the track is a physical barrier to the movement of people. A hilly area may have more patient transportation problems than a level area and thus require aid stations placed closer together.

Events that take place outdoors present a number of special considerations. Again, what is the nature of the terrain? Bodies of water, such as rivers and lakes, will mean that one must be prepared to deal with near-drowning victims. Cliffs, deep gullies, and buildings with balconies, for example, may mean fall victims. Events held in woods or dense areas of brush may result in cases of poison ivy, insect bites, and

snake bites. Vast unshaded areas will increase the number of patients with sunburn and possibly heat stroke or heat exhaustion. Extreme heat or cold and the probability of rain or thunderstorms should influence the design of the aid stations to ensure the comfort of the medical teams and patients.

Events such as parades, marathons, and cross-country races have a "stationary" segment (the spectators) and a "moving" segment (the participants). You may need to decide how medical care will be rendered to the "moving segments," particularly if they go some distance from the spectators, as in the case of a cross-country race.

If you are not completely familiar with the event site, you should make a personal inspection. If you have maps or drawings, you should take them with you to check their accuracy. If you do not have them, you should make them during your inspection. You should note particularly potential routes along which to move patients who require litter transport to the aid stations as well as consider ambulance access to the aid stations. If the event is to take place within a closed area such as a theater or stadium and your aid stations are within that area, by what route could you remove your personnel and patients if there were a fire?

How Many People?

The number of people expected to attend is an important ingredient in planning medical care. If the event requires advance ticket purchase or is in a closed area, you should be able to acquire a very accurate prediction. On the other hand, if the event is open and the public can come and go as they please, prediction of the number of people for whom you must make medical care available will be less accurate. Estimates in the latter situation may be obtained from persons who have dealt with similar events in your community or nearby.

Who are the People and What Will They Be Doing?

The type of event may give some idea of the age range of those attending, information that will provide some idea of the medical problems to be expected. A rock concert will be attended predominantly by young people; a state or county fair will be attended by people of all ages; a gathering of retired persons predominantly by those more than 55 years old. Because cardiac events correlate with age (as does illicit drug use, to a certain extent), this information is of obvious planning importance.

Another consideration is whether the crowd will be seated (e.g., indoor concert) or mostly moving about (e.g., outdoor fair). The logistics of reaching an unconscious patient in the middle seat of the central section of an enormous auditorium are different from those of reaching a patient stretched out under a tree in a meadow.

Learning whether alcoholic beverages will be allowed at the site coupled with knowledge of the type of people attending and duration of the event will allow you to plan, if necessary, for dealing with overindulgence. If that is a possibility, then you may

wish to plan for an area where intoxicated persons can be observed until it is safe for them to rejoin the activities or go home.

Some events are more likely than others to have in attendance users of illicit drugs. If this is a possibility, you must make plans to deal with the attendant medical sequelae.

If the event to be covered is controversial or potentially controversial, such as a political rally or a protest meeting, you must be ready to deal with patients suffering from physical violence, perhaps severe. Discussions with police or security officers beforehand may be particularly useful here.

Take note of the number of handicapped people expected to be in attendance as persons in wheelchairs or with crutches may need special mechanisms of transport to your aid station or you may need to attend to them where they are.

If the event has a speaker, a band, athletes, or a group of entertainers separate from spectators, it must be determined ahead of time who will provide medical care to the entertainers. An aid station should be located appropriately to cover their medical needs. Athletic teams most likely will provide their own team physician.

Some events will have VIPs, such as high government officials and foreign dignitaries, whose potential medical problems must be considered. In some cases, these persons' own medical personnel will accompany them, but most likely they will not. Your meeting beforehand with the event coordinators should address this situation. In some cases, you may wish to assign a physician just to attend to the VIPs.

If the event is held within a stadium, concert hall, or building, you must clarify the boundaries of your medical care. Will people who get sick or are injured in the parking lot be brought inside the building to you (or you go out to them, depending on how you decide to run your aid station), or will the local EMS system be handling those cases?

What Other Special Problems?

It is useful to know beforehand if the event will have bonfires, torches, or fireworks; if so, you must then be prepared to deal with injuries they might cause.

Traffic conditions will affect the safe transport of a sick or injured patient from the aid station to a hospital. For example, if the approach to a rock concert or a blue grass music festival is solely along a narrow, heavily-traveled, two-lane country road, you may want to arrange to have helicopter transport.

Evaluation of climate effect for your medical area must be done. Appropriate heat, or cooling devices should be set up to minimize environmental effects to either the patients or the medical personnel.

QUESTIONS ABOUT THE LEVEL OF CARE

At this point in the planning process you should know the type and duration of the event, the physical layout of the site, any special hazards of the site and the event, and the number and type of people to expect.

Now it is time to determine the level of care to be provided. This will be influenced both by the desires of the event organizers and by what you will be able to supply with available resources. In general, you will have wide latitude in making this decision. How near the site is to a hospital or trauma center will influence the level of care you can make available. Another variable to consider is the extent of training of available EMS personnel (i.e., basic EMT versus paramedic). All this information is then considered in light of your best estimate of the types of medical problems that you will encounter.

Throughout your planning, you should keep in mind "the worst possible scenario" factor. If you are covering an air show and an airplane crashes among the spectators, or if hundreds of spectators are crushed against a barrier at a soccer match you are covering, how best could you utilize your medical teams? With large numbers of simultaneously injured victims, who is to be responsible for triage? Who is to contact outside hospitals? Who is to cope with frantic family members? Even if your area has a disaster plan, there will be a gap between the occurrence of the disaster and the initiation of that plan, and medical personnel who are at the site are the ones who will fill the gap. Limitations in cost, personnel, space, etc., may prevent you from full preparation for coping with the worst possible scenario, but you should make what preparations you can.

Corne, et al [3] described patients suffering from traumatic asphyxia in a crowd surge at the European Football Cup Finals in Brussels in 1985 Five patients, in addition to asphyxia, suffered classic crush injury to muscles, leading to increased serum muscle enzymes. Thirty-eight patients were dead at the scene, but at least some probably could have been saved by prompt and definitive airway management.

What Types of Injuries and How Many Should You Anticipate?

Important to the planning of medical care is knowledge of the types of medical problems that will be seen and their incidence. As discussed previously, these problems depend on a number of factors, such as hot or cold weather, ages of the people attending, duration of the event, and whether the crowd will be largely seated versus largely mobile.

A number of articles provide specific data for various events,[1-14] and the reader is referred to them for details. These are not easy to analyze, however, because the authors grouped patients into differing categories; some reported data as number of

patients seen and others as percentage of patients seen within a category. Also, some authors did not record simple problems such as requests for aspirin or Band-Aids®.

Table 1 lists the number of medical encounters per 10,000 people in a variety of types of gatherings. Note the higher number of patients seen at rock concerts. Each event is unique and the reader is referred to each report for a wealth of details, but the table can give a general idea as to the number of visits to expect, depending on the number of people attending the event. Patients requiring CPR have ranged from 0.3[11] to four per million people.[12]

De Lorenzo, et al[15] examined in detail the ability to predict expected patient volume at mass gatherings by analyzing data over a seven-year for events held at a 50,500-seat, indoor, domed stadium. The most common events held in this facility were college football and basketball games and rock concerts.

They found that there were between 2.6 and 3.3 patients per 10,000 spectators at basketball and football games, and almost ten patients per 10,000 spectators at rock concerts. Notable in this analysis, however, was the fact that football and basketball events showed a complete lack of correlation between crowd size and the total patient volume for all three events.

Brunko[16] has discussed an attempt to analyze beforehand the "collective mood" of an anticipated crowd in order to predict the type of medical problems and number of patients. He found, as might be expected, that such predicting is an imperfect science, with both notable successes and failures. He suggested that demographics of event participants and their behavior would be a useful area for future study and analysis.

In general, the most common types of medical problems will be dermal/musculoskeletal (lacerations, abrasions, bruises, sprains, fractures), gastrointestinal (nausea, vomiting, diarrhea, abdominal pain), and possible cardiac (chest pain, syncope, dizziness, loss of consciousness). A fourth category, heat illness, is common during long-term outdoor events held in hot weather.

What are the Feasible Levels of Care?

Possible levels of care are shown in Table 2. Feasible levels of care are those you think you will be able to provide. As to what should be feasible, your best advice will come from those who have provided medical care at similar events, at similar sites, and during similar weather conditions. Once you decide on the level of care you believe you can deliver, you must decide how best to deliver it.

Where Do You Place and How Do You Organize Aid Stations?

The first consideration is the number of aid stations you will need. Aid stations

should be sufficient to ensure that participants can present themselves for care by walking for no more than five minutes or about 1/8 mile.

The medical aid stations must be easily identified by appropriate signs or colored flags and should be clearly marked on any maps available. Security personnel, ushers, officials, and such ancillary personnel as groundpersons, ticket-takers, and concession personnel, who may be asked for directions, must know the location of all aid stations. Any literature given out at the event (e.g., map, program) should contain information on how to obtain medical care, the location of the medical aid stations, and the telephone number and/or radio frequency of the aid stations if telephones or walkie-talkies are used.

The actual location of the aid stations will, in some cases, be dictated by the facilities available. For example, auditoriums and stadiums may have set aside rooms for this purpose. For other events, the location may be left up to you, in which case you should try to place the stations where they can best serve the crowd as well as have easy access to ambulance ingress and exit. To anticipate the "worst-case scenario" in which a large crowd panics, your aid stations should be placed so that they, the medical personnel, and the patients are not endangered by a rush of people.

All aid stations should be stocked with supplies and staffed by personnel well before the event begins, not only because a medical emergency can occur as soon as one person has arrived, but also because it may be difficult later for personnel to reach the aid stations through heavy traffic and the crowds.

The equipment and supplies you will have available obviously can cover an enormous range. That range will be dictated by money available or donations, the time available for assembling the equipment and supplies, the on-site space for storing them, the level of care that will be provided on site, the distance to the nearest hospital, and the types of medical problems anticipated.

Appendices A and B show lists of equipment and pharmaceutical supplies; however, there is no intent to imply that all are needed. Rather, these appendices serve as reminders to help you determine which items will be appropriate. Some of the equipment and some of the supplies are obviously basic and will always be needed; others are optional and can be chosen if believed necessary for a specific event.

Each aid station will need at least a few cots or beds for patients to lie on for examination, treatment, or observation. Events held during hot weather will probably require many such beds than winter events, as will events that have spectators who are apt to overindulge in alcohol. Events attended by crowds using illicit drugs (or overusing alcohol) may produce patients who are difficult to handle physically and whose care must be planned for accordingly.

Depending on the layout of the area covered by the event and the number of

medical aid stations, you might consider having one main station with equipment and supplies that are not present at the others but are readily available if the others should need them. This would make it easier to set up the aid stations. In any event, each aid station should have a list of all drugs and supplies available at every other station (and at the main station if there is one) so that all medical personnel know what is available.

How Will Your Medical Personnel and Your Patients Get Together?

Generally, patients are expected to present themselves to the aid stations for treatment. However, some medical conditions, such as a cardiac arrest, a broken leg, or a stroke, require that medical personnel go to the patient, with subsequent transport of the patient to an aid station or directly to a hospital, if the latter is nearby. (Weaver et al [12] present excellent discussions of strategies for dealing with cardiac arrest victims in large crowds) Thus, you must have equipment and supplies readily available for such sojourns from your aid stations as well as personnel at the stations to care for patients presenting there.

Finding a patient in need of medical care in a large crowd can be difficult for the medical teams. Consequently, it may be helpful for security/ancillary personnel, in addition to maintaining continuous radio contact, to hold up flags to signal their location to the approaching medical teams. Roving medical "spotters" equipped with portable radios to contact the medical command center can be used in large outdoor crowds. Their function is to mingle with the crowd, constantly being on the lookout for patients with medical problems. They can then call for help while giving immediate assistance and guide the medical teams to the patient.

Reliable two-way communications between emergency care personnel, all fixed aid station locations, and all mobile units is essential to achieving successful coordination of medical services. Portable radios provide fast, simple-to-operate, and highly reliable communication links. Portable radios may be available for short-term loan from local, regional, or state emergency care or civil defense agencies. At least two channels with a common link via a communications command center should be dedicated to event communications. The communications command center function can be fulfilled in a variety of ways depending upon the nature and size of the event. At a minimum, the communications command center should enable personnel to communicate with all radio systems utilized by medical and other event personnel including crowd spotters and security. The communication command center is commonly located in an EMS vehicle dedicated to the event, at an aid station, or in a communication van. The command center should have direct access to a hard-wired and\or cellular phone system to ensure a secure alternate mode of communications. The command center should coordinate resource dispatching or should be directly connected to the dispatch center by the communications system. To facilitate prompt communication among medical personnel, each radio assigned to an individual or location should be assigned a unique call name. It is recommended that a list of call names be posted at all fixed radio locations and attached to each portable radio. A map including all

communications systems locations and user call letters should be posted and distributed to personnel. [17]

For large outdoor events, motorized carts (golf carts) are excellent vehicles for rapidly transporting a medical team to a patient. A patient within a building who must be transported to an aid station will require a wheeled stretcher, litter, or wheelchair.

You need to know what personnel will be available to aid in patient transport if too few members of your medical aid team are available. For this, you may be able to recruit ushers, security personnel, or other persons connected with the event, but you will need to discuss this beforehand so that they will be aware that their services might be needed. Authority to request their help must be clearly delineated.

For outdoor events covering a very large area (e.g., fairgrounds or parks), on-site patients might be transported by ambulance, but this will require an ambulance and driver stationed at an aid station as well as vehicular access to all areas.

When the event opens to the public, security personnel will need to keep emergency routes, gates, and roads free of obstruction for emergency vehicles. If locked doors, gates, or elevators requiring keys are part of planned patient transport routes, security personnel with the necessary keys must be in attendance at all times.

Who are Your Personnel and How Do You Organize Them?

One of the most difficult questions to decide is how many medical persons (MDs, RNs, paramedics, EMTs) will be needed, and you will be caught between knowing what are optimal numbers and working with realistic numbers. The best you can do is to be guided by the suggestions of those who have published their experiences and by medical personnel available to you who have worked with crowds.

Historically, event planners have given little thought to optimal staffing, so one finds a wide range of reported personnel. Sanders et al[18] carefully analyzed this complex problem for 15 different types of events and produced recommended guidelines. As a minimum, they suggest that basic first aid and basic life support be provided by two paramedic teams (or a paramedic/EMT team) per 10,000 people, these placed strategically throughout the site. Registered nurses could be substituted for the paramedics or EMTs. Optimal medical services would require the presence of physicians as well, and their recommendations are for one or two physicians per 50,000 people. Credentials of all medical team personnel must be checked to ensure that they are valid. Shifts should be scheduled so that they overlap and so that the number of shift changes is minimal, because shift changes cause confusion, time lost, and delays in care, especially if the incoming teams have to deal with parking in congested areas and with crossing through large crowds to reach their stations.

Petrilli [1] planned medical coverage at the annual Crosby Golf Tournament, a major four-day event held near Winston-Salem, North Carolina. We have medical data for this event: Twenty-two patients were seen per 10,000 people attending the four-day event (Table 1), and the average time spent by a medical staff person with each patient was five minutes. This led to 110 minutes of patient contact per 10,000 people attending the event. Each patient encounter also included writing up the chart and replacing or cleaning used equipment and supplies, which required at least another five minutes per patient. Thus, a total of 220 minutes, about four hours, of medical staff time was spent per 10,000 people.

Comparing these findings from coverage of the Crosby Tournament with the recommendation of Sanders et al[18] shows that their recommended two paramedics (or a paramedic/EMT team) per 10,000 people is certainly reasonable. Also, in order to prevent burnout and fatigue, you should not expect your medical staff to be involved constantly in patient care. Thus, if two persons are available for an eight-hour shift per 10,000 people, they should be involved in patient-related duties for a total of four hours and have another four hours total for "free" time. This allows ample time for those occasional patients who require more extensive care.

Some events, particularly those that last a long time, will have periods of increased attendance and, hence, increased requests for medical care. One needs to be cognizant of this fact when assigning personnel in order to make optimal use of their time as well as to provide timely and efficient care.

All members of the medical teams obviously will need access to their aid stations and so will need identification badges, passes, or both to gain access to the specific event. If they are to arrive in their own cars, you will need to be sure that they have been given a place to park. For some events, it may be necessary to assemble the teams at another location (e.g., your hospital) and to transport them by van or bus.

Medical teams must be briefed beforehand on a number of topics. They will need to have a general idea of the layout of the event, not only where their aid stations are, but also where the others are and the most efficient way of moving from one to another. In addition, they will need detailed maps or layouts of the area they are expected to cover, especially if they are expected to go to a patient in need. These maps must be the same as those in the possession of security personnel in order to coordinate efforts. Ideally, there should be a walk-through of the area before the event opens, especially if the site is unfamiliar to members of the medical teams.

Medical aid station’s personnel must communicate with personnel responding to incidents in the field; there may also be the need for radio communication between medical personnel and on-site police officers or security personnel. Thus, hand-held radios are essential. In addition, personnel at the aid stations may need to communicate with the police department, fire department, and nearby hospitals. If possible, every aid station should have ready access to a telephone or hand-held radio.

You will need to determine what time the medical teams should be in place as well as how long the medical aid stations should be staffed. The latter will probably need to be some reasonable period after the event ends because some people will remain on the premises and will still need medical coverage.

An event that requires multiple medical aid stations, especially if the event is long or is expected to produce many requests for care, may require a person to be in charge of supplies at the main station as it would be difficult for team members at an aid station to replenish their stock. Also, it may be necessary to have a person in charge of communications, both for maintaining any portable radios and for communicating with the ambulance service and nearby hospitals.

Finally, personnel at each aid station should know who the overall medical commander is, as well as how to contact him or her to deal with unforeseen problems. They should also be made aware of their duties should the medical problems suddenly rise to disaster levels.

What the medical personnel wear will depend to some extent on local customs, but you should keep in mind the fact that it is easier for the public to determine a person's role if that person wears certain identifying clothing. Paramedics and EMTs are easily identified by their uniforms, and nurses and physicians by white coats or other identifiable jackets, shirts, etc. However, the attire worn by the medical personnel must be different from law enforcement personnel in order to minimize confusion and potential aggressive actions by bystanders in volatile situations. If, for some reason, these are not worn, then a tag with name and title (registered nurse, physician, physician's assistant, etc.) would seem to be a minimal requirement.

You must also keep in mind that the members of the medical aid stations will need food, water, restroom facilities, and breaks, as well as facilities that protect them from the weather. Your aid stations should provide space where they can rest and relax during the interval when no medical aid is needed.

At no time should your equipment and drugs be left unattended. Thus, your aid stations must be staffed sufficiently to allow at least one person present at all times.

You must decide who will see patients, that is, do all patients who present themselves need to be seen by a physician, or can a nurse, physician's assistant, or paramedic, on his or her own authority, treat and release some patients? Should a disaster occur, triage may be necessary and you should have assigned that potential duty to some physician on your medical team. For every patient seen, a record sheet must be filled out with the patient's name, age, address, vital signs, chief complaint, physical examination, treatment, and disposition. If patients must be kept in the treatment area of an aid station for an extended period, you will need some type of patient identification, such as a wrist band.

Demographic, assessment, treatment, and disposition information should be documented for each patient seeking medical care. The type and complexity of documentation will vary with the level of care provided and the level at which the emergency care provider is functioning during the event. In keeping with good multiple casualty incident response principles, documentation should be performed in a manner similar to the usual daily practice of each class of emergency care provider. Basic level providers will find that disaster tags are simple and quick to complete. Nurses and physicians at the aid station\field hospital may prefer to use photocopies of their emergency department medical record form to facilitate documentation of care and transfer of care to the hospital staff. Transport units should utilize their normal documentation procedures. A master log including basic data for each patient should be maintained at a central location. An analysis of the data should be included in the post-event debriefing for use in subsequent planning activities.[17]

If your personnel are drawn from different professional environments, it may be helpful to provide them with printed ACLS protocols as well as other treatment regimens so that treatment will be standardized. The medical staff should have a meeting to discuss this topic beforehand.

Very large events with many aid stations and personnel and a large inventory of equipment may require persons with specific designated tasks. The categories in Appendix C are suggested, but you must obviously tailor the list to fit your specific event.

How Does All This Get Paid For?

No one likes to discuss expenses, but they are part of everyday life, and the cost of providing medical care during a large-crowd event is no exception. If you are lucky, you can get an all-volunteer staff, but in many cases at least some of the personnel must be paid. You can try sweetening the deal by providing free meals, free tickets (if the event is one that requires tickets), participation in parties not open to the public, or special shirts/hats. These and other possibilities should be discussed with the event coordinators.

Even if all your personnel are volunteers, there will still be expenses. Supplies (bandages, Band-Aids®, Ace Wraps®, etc.), drugs, documentation forms, and food for personnel must be paid for unless donated. Sources of revenue should be discussed with the event organizers, because a money-making endeavor should be able to budget for medical care. Charity events, on the other hand, may not have an adequate budget for medical supplies; for those events donations may be solicited from sponsors, especially companies dealing in health care products, if they are given compensatory public display of their names. In addition, many hospitals, equipment vendors, medical schools, etc. may loan necessary equipment for the event.

If volunteer rescue organizations donate their personnel, equipment, or both, you

may want to consider a method of collecting donations from the public to cover their expenses.

Any Final Considerations?

Outdoor events during hot weather produce a great demand for water, which is often in short supply, especially if only carbonated beverages are available at the event. The medical aid station might want to consider providing water to prevent dehydration or supplying (or selling) products such as Gatorade®.

Outdoor events during hot weather will probably produce a number of people who become overheated. This can result in health stress syndromes as well as unhappy and often belligerent people. If the physical layout permits, you might consider providing areas with sprinklers so that people can cool off. Musical band members must be advised about heat stress if they are wearing uniforms. Preventive measures such as taking off their coats and sitting down (in the shade, if possible) while waiting for the event to begin can greatly reduce the number of heat illnesses that you treat.

In addition to the transport of patients to local hospitals, experience has shown that you must take into consideration requests for transporting people for other medical reasons. They will request transport to their local physicians, to their homes to get medicines, or to their cars or homes because they are tired or ill. You will need to decide beforehand how such requests will be handled.

Because the medical teams are readily visible and are viewed by the public as "helpers," you must warn them that they will be asked to deal with such nonmedical requests for help as lost-and-found, baby-sitting, or information about the event. Although they may not be able to fulfill every request, medical personnel must be aware of the likelihood of such requests, know how to deal with them in a friendly, helpful manner and, when possible, know the person to whom such requests should be referred. A positive, helpful attitude will not only be good public relations, but will help to maintain a friendly, nonaggressive crowd.

AFTER THE EVENT

After the event is over, consideration must be given to potential injuries and illness during clean-up and any dismantling of structures used during the event. Whether medical coverage should continue during this time should be determined during preplanning.

The medical director should compile a summary of the number and types of illnesses and injuries encountered, and their treatment and disposition. This report should include a summary of problems and suggestions for improvement. Such

information will be invaluable in the planning for future events. A post-event meeting with police, fire, and security personnel as well as any other health care givers may facilitate ease in planning for similar events. Seeking feedback from the event organizers may provide valuable information because they are the ones most likely to have received complaints.

As a final and important gesture, letters of thanks should be sent to all organizations, personnel, and companies that donated time, money, or equipment.

REFERENCES

1. Leonard RB, Nuji EK, Petrilli R, Calabro JJ: Provision of Emergency Medicine Care for Crowds. *American College of Emergency Physicians Information Paper* 1990.
2. New York State Sanitary Code, Part 18: Public Functions with Attendance over 5,000 People. *Public Health Law Section 225* 1991.
3. Corne L, Dhondt E, Vincken W, et al: Traumatic asphyxia following a crowd-crush disaster: The "Heizel Drama" (abstract) *Ann Emerg Med* 1986; 15:652-653.
4. Baker WM, Simone BM, Niemann JT, et al: Special event medical care: The 1984 Los Angeles Summer Olympics experience. *Ann Emerg Med* 1986; 15:185-190.
5. Cwinn AA, Dinerman N, Pons PT, et al: Prehospital care at a major international airport. *Ann Emerg Med* 1988; 17:1042-1048.
6. Crippen D, Olvey S, Edwards S: Acute medical care for championship auto racing. *Ann Emerg Med* 1985; 14:249-253.
7. Osler DC, Shapiro F, Shapiro S: Medical services at outdoor music festivals. Risks and recommendations. *Clin Pediatr* 1975; 14:390-395.
8. Ounanian LL, Salinas C, Shear CL, et al: Medical care at the 1982 US festival. *Ann Emerg Med* 1986; 15:520-527.
9. Chapman KR, Carmichael FJ, Goode JE: Medical services for outdoor rock music festivals. *Can Med Assoc J* 1982; 126:935-938.
10. Pons PT, Holland B, Alfrey E, et al: An advanced emergency medical care system at National Football League games. *Ann Emerg Med* 1980; 9:203-206.
11. Spaite DW, Criss EA, Valenzuela TD, et al: A new model for providing prehospital medical care in large stadiums. *Ann Emerg Med* 1988; 17:825-828.
12. Weaver WD, Sutherland K, Wirkus MJ, et al: Emergency medical care requirements for large public assemblies and a new strategy for managing cardiac arrest in this setting. *Ann Emerg Med* 1989; 18:155-160.
13. Mariano JP: First aid for LIVE AID. *J Emerg Med Serv* 1986; February:47-57.
14. Gustafson TL, Booth AL, Fricker RS, et al: Disease surveillance and emergency services at the 1982 World's Fair. *Am J Public Health* 1987; 77:861-863.
15. De Lorenzo RA, Gray BC, Bennett PC, et al: Effect of crowd size on patient volume at a large, multipurpose, indoor stadium. *J Emerg Med* 1989; 7:379-384.
16. Brunko M: Emergency physicians and special events (editorial). *J Emerg Med* 1989; 7:405-406.
17. Laskowski E, Najarian M, Smith A, et al: Medical Coverage for Multievent Sports Competition: A Comprehensive Analysis of Injuries in the 1994 Star of the North Sommer Games. *Mayo Cliic Proc* 1995; 70:549-555.

18. Sanders AB, Criss E, Steckl P, et al: An analysis of medical care at mass gatherings. *Ann Emerg Med* 1986; 15:515-519.
19. Bruns L, Ellison P: First Aid and Emergency Care at a Major-League Baseball Stadium. *J. Emerg Nursing* 1992; 18:329-334.
20. Edwards, M: Airshow Disaster Plans. *Aviat. Space Environ. Med*. 1991; 62:1192-1195.
21. Bock H, Cordell W. Bock H, Vukov L: Using Regression Analysis to Predict Emergency Patient Medical Care at the Indianapolis 500 Mile Race (183-1990*). Ann Emerg Med*. 1992; 21:1204-1207.
22. Bowdish G, Cordell W, Bock H, Vukov L: Using Regression Analysis to Predict Emergency Patient Volume at the Indianapolis 500 Mile Race. Ann Emerg Med. 1992; 21:1200-1203.
23. Thompson J, Savoia G, Powell G, Challis E: Level of Medical Care Required for Mass Gatherings: The XV Winter Olympic Games in Calgary, Canada*. Ann Emerg Med.* 1991; 20:385-390.
24. McCormack D, Niebuhr V, Risser W: Injury and Illness Surveillance at Local Special Olympic Games. *Br J Sports Med.* 1990; 24:221-224.
25. Martinez R, Waeckerle J: Catastrophes at Sporting Events*. The Physician and Sportsmedicine* 1991; 19:40-44.
26. Ma OJ, Pirallo R, Rubin J: Survey of Medical Services at Major League Baseball Stadiums. *Prehospital and Disaster Medicine* 1995; 10:28-272.
27. Parrillo S: Medical Care at a Mass Gatherings: Considerations for Physician Involvement. *Prehospital and Disaster Medicine* 1995; 10:268-272.
28. Flabouris A, Bridgeater F: An Analysis of Demand for First-Aid Care at a Major Public Event. *Prehospital and Disaster Medicine* 1996; 11:48-54.
29. Personal communication from Joel J. Reich, MD, FACEP, Chairman, Department of Emergency and Ambulatory Care Services, Manchester Memorial Hospital, Manchester, CT and Medical Director, The Manchester Road Race, one of the oldest and largest road races in the world.
30. Additional reference missing from new list: Hadden WA, Kelly S, Pumford N: Medical Cover for 'The Open' Golf Championship. *Br J Sports Med* 1992; 26(3):125-127.
31. Year estimated from publication date.
32. From new list of references.
33. Boch HC, Cordell WH, Hawk ACTION:, et al: Demographics of emergency medical care at the Indianapolis 500 Race (1983-1990), *Ann Emerg Med*. 1992; 21:1204-1207.

Table 1. Reports of Experience in Medical Care for Crowds

Event	Location/Date	No. of People	Medical Encounter/ 10,000	Reference (see page 15)
Live Aid Concert	Philadelphia July 1985	90,000	33	13
Rock Music Concert	Toronto, Ontario August 1980	30,000	167	9
Rock Music Concert	Holland, Vermont September 1982	35,000	69	7
Rock Music Concert	Devore, California September 1982	410,000	64	8
National Football League	Denver 1978 Season	72,000 per game	4 Average 10 games	10
Crosby Golf Tournament	Advance, North Carolina May 1987 (4 days)	80,000	22	1
World's Fair	Knoxville, Tennessee May-Oct 1982	11,000,000	23	14
World Exposition	Vancouver, British Columbia May-Oct 1986	22,100,000	39	1
Summer Olympics	Los Angeles 1984	3,450,000	16	4
'The Open' Golf Championship	Several Venues, United Kingdom 1981 to 1990	1,568,833 (10-yr period)	51	30
Special Olympic Games	Galveston, Texas Spring, 1989 [31]	777 (athletes)	347	32
Indianapolis 500 Road Race	Indianapolis/1983-1990	400,000 per year	3.5 average for 8 races	33
Winter Olympics	Calgary, Canada February 1988	1,800,000	15.2	2

Table 2. Requirements for Providing Various Levels of Medical Care

Levels of Care	Requirements		
	Personnel	Equipment	Patient Disposition
Basic	RN and/or EMS personnel	Basic first aid	EMS transport to emergency department as needed
Intermediate	RN and/or paramedic with physician control (by radio/ telephone)	IV equipment; D_{50}; 0_2; subcutaneous epinephrine	Patient observation and EMS transport to emergency department as needed
Advanced	RN and/or paramedic, physician present	Full ACLS/ATLS capabilities	Patient observation and treatment areas, EMS transport to emergency department as needed
Critical Care *	RN and/or paramedic, physician present	Above plus: obstetric packs; chest tubes; auto transfuser; tPA/streptokinase, etc.	

* As per capabilities of area.

Table 3. EVENT PLANNING SCHEDULE

Prior to event task	1 Yr.	6 Mos.	3 Mos.	1 Mo.	7 Days	6 Days	5 Days	4 Days	3 Days	2 Days	1 Day
Define scope of	X										
event											
Visit event site	X				X				X	X	X
Develop overall	X										
strategy											
Designate agency	X	X	X	X	X						
responsibilities											
Designate		X	X	X	X				X	X	X
treatment/mobile											
unit sites											
Designate Medical/	X										
Administrative											
Directors											
Obtain liability		X									
insurance											
Recruit/organize	X	X	X	X	X	X	X	X	X	X	X
volunteers											
Order uniform		X									
clothing											
Procure		X							X		
communications											
equipment											
Test									X		X
communications											
Procure		X	X	X	X	X	X	X	X	X	
equipment and											
supplies											
Set up for event											X

Appendix A -- Potential Equipment and Supplies*

Elastic bandages (assorted sizes)
Adequate lighting
Airways
Alcohol swabs
Ambu bags
Backboards
Band-Aids®
Batteries for equipment on hand
Benzoin
Betadine®
Blankets
Burn dressings
Cardiac monitors
Cast cutters
Casting/splinting/air cast materials
Cellular access
Cervical collars (assorted sizes)
Clipboards
Cots
Cotton applicators
Cotton balls
Crutches
Defibrillators
Diapers (various sizes)
EKG machines
Endotracheal tubes (assorted sizes)
Epistaxis tray
Examination tables
Eye examination equipment
Eye patches/shields
Flashlights
Gauze pads (various sizes)
Gloves (sterile and examining)
Head immobilization equipment
Hospital gowns
Ice/ice packs
IVACs
IV poles
Kling® dressings (various sizes)
Laryngoscopes (plus various sizes of blades, extra batteries, and bulbs)
Medical records forms
Nasogastric tubes
Obstetric packs
Ophthalmoscopes
Otoscopes
Oxygen masks and nasal cannulae
Oxygen manifold with multiple use and regulator
Oxygen sat. monitor
Patient identification bracelets/logs/charts
Peak flow meter
Pens/paper
Pillows
Pocket mask/face shield

- Prescription pads
- Radios (hand-held) with appropriate frequencies
- Razors
- Reflex hammers
- Refrigerators
- Restraints
- Ring cutters
- Safety pins
- Sanitary napkins
- Scissors
- Scoop stretcher
- Sheets
- Slings
- Soap
- Sphygmomanometer
- Splints
  - Finger
  - Wrist
  - Knee
  - Arm
  - Leg
- Steri-strips®
- Stethoscopes
- Suction machine
- Suction tips/catheters
- Surgical equipment for:
  - Chest tubes
  - Cutdowns
- Suture kits
- Tampons
- Tape (assorted sizes)
- Telemetry equipment
- Telephone access (with cellular access)
- Telfa pads
- Thermometers
- Tongue blades
- Tourniquets
- Towels
- Triangular bandages
- Vaseline®
- Vaseline gauze®
- Water (rehydrating fluids)
- Woods light

*This list is not inclusive for critical care cases.

Appendix B -- Pharmaceutical Supplies

Analgesics
- Aspirin
- Acetaminophen
- Ibuprofen
- Injectable meperidine

Anesthetics
- Injectable lidocaine

Antacids

Antianaphylaxis Agents
- Injectable diphenhydramine
- Injectable epinephrine

Antibiotics
- Intravenous
- Ointment
- Oral

Antiemetic
- Promethazine: PO, IV, suppositories

Antihistamine
- Diphenhydramine: PO, IV

Antipsychotic
- Haloperidol - IM

Antiasthma Drugs
- Injectable epinephrine
- Injectable/PO steroids
- Albuterol inhaler

Antipruritic
- 1% Hydrocortisone cream

Burn Treatment
- Silver sulfadiazine
- Xeroform gauze

Cardiac Drugs
- Atropine
- Bretylium
- Sodium bicarbonate
- Calcium chloride
- Phenytoin - IV
- Digoxin - PO, IV
- Dopamine
- Epinephrine
- Furosemide - IV
- Morphine sulfate - IV
- Propranolol - IV
- Adenocart
- Oxygen

Diabetes Treatment
- Insulin U100 reg
  U100 NPH
- Glucose - D_{50} / D_{25}
- Dextrostix®

Antidiarrheal Drugs
- Immodium
- Kaopectate®
- Lomotil®

Sedative
- Versed

Emetic

- Ipecac

Intravenous Solutions

- D_5W
- Ringer's Lactate
- Normal saline

Ophthalmic Agents

- Anesthetic
- Antibiotic: ointment, solution
- Fluorescein strips
- Irrigating solution
- Midriatic

Antiseizure Agents

- Diazepam
- Phenytoin
- Phenobarbital

Miscellaneous

- Hyper-Tet®
- Narcotic Antagonist
- Sunburn preparation
- Sunscreen
- Tetanus Toxoid
- Activated charcoal
- Normal saline irrigation

Appendix C -- Staff Organization for Large Crowds

Chief of Personnel

- Arranges schedules
- Checks personnel in and out
- Allocates identification badges
- Arranges for substitutes

Chief of Equipment

- Collects needed supplies and equipment
- Delivers supplies and equipment to aid stations
- Resupplies as needed
- Returns supplies and equipment at end of event

Chief of Supplies

- Monitors and maintains stock of disposable items (supplies and medicines)
- Collects and summarizes patient treatment forms

Chief of Communication

- Assembles, allocates, and maintains portable radios
- Arranges for on-site telephones, if used
- Communicates with hospital about incoming patients

Chief of Transportation

- Arranges for use of ambulances
- Coordinates patient transport to a hospital
- Coordinates use of “golf cart” transport, if used
- Arranges for personnel to get to and from aid stations
- Arranges for use of helicopter, if needed

Example of Possible Organizational Structure