

# Application of the Incident Command System to Motor Vehicle Accident Scenes

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Rapid transport of serious trauma victims to an appropriate surgical facility has a significant impact on survival (1-2). In the case of trauma sustained in major motor vehicle accidents (MVA) with entrapment and/or multiple vehicles and patients, rapid transport is the end result of a major effort to affect patient access, evaluation, packaging, and extrication in a safe environment. These on-scene operations must often coordinate the actions of several emergency crews, vehicles, and other equipment from emergency medical services (EMS), fire departments and law enforcement agencies. These varied resources must control fire hazards, traffic, crowds, helicopter landing zones, disentanglement of patients from wreckage, and communications with receiving hospitals - all in addition to direct patient care. Thus, the speed, efficiency and safety of operations leading to a rapid transport becomes a function of how well these resources are managed in an otherwise uncontrolled prehospital emergency environment.

In an effort to improve our agency's MVA scene management, we reviewed current textbooks and journals for additional information. We found materials pertaining to the single patient and to the full scale disaster, but very little between these two extremes in the realm of the major MVA (3).

Our agency's cross-training in fire sciences provided insight to scene management methods developed for structure fires. These methods are widely adopted in the fire service and are referred to as the incident command system (ICS)(4). The ICS may be utilized on most any scale scene. To overcome its specificity for structure fires, this paper will propose special modification of its concepts and terminology to suit the MVA scene. Its applicability may be somewhat universal to include not only fire department EMS operations, but third service EMS and other primary prehospital provider organizations as well.

## Span of Control

A basic premise of the ICS is that every scene is managed by a single individual who assumes the role of incident commander (IC). Further, the IC or any subordinate commander cannot effectively conduct direct supervision of more than approximately 5-7 emergency personnel - the "span of control."

This is recognition of a practical limit on any scene commander's ability to directly address the many facets of a complex emergency scene. When a scene requires more than this approximate number of personnel, the scene should be divided up into smaller components, called sectors, based on the types or location of tasks to be performed. These sectors each have their own commander, subordinate to the IC. In this manner, the IC can directly manage up to 5-7 sector commanders, who can each manage up to 5-7 others in as many levels of command as necessary to accommodate the needs of the entire scene (Figure 1). Each sector commander is given a specific task for their sector to perform. Upon completion of that task or to obtain other resources or information, the sector commander reports back to the next highest level of command for reassignment or assistance. This delineation of responsibility helps the incident commander to avoid missing the forest for the trees.

## Size-Up and Incident Commander Designation

Upon arrival of the first emergency unit on the scene, an individual should assume the role of IC. One of the most important initial activities on the scene is a size-up, in which the overall magnitude and major priorities of the situation are identified. The size-up is relayed by radio to other incoming emergency units and the dispatch center. The initial size-up should include requests for additional resources that may be required for the incident, such as other EMS, fire, law enforcement, power or telephone company support. The request for additional resources can be modified as better information becomes available. Delay in requesting additional resources can be very costly in terms of life and property loss. It is usually obvious when additional units will be needed upon arrival, particularly at an MVA. It is far better to err on the side of over response and later consider cancellation of incoming units than to wait until triage is completed and a precise but untimely back-up request is possible.

As more personnel and vehicles respond, so will senior officers. The individual on the first arriving unit will often be relieved of their responsibility as IC by these senior officers. Because the identity and location of the IC is critical for assignment of duties to incoming units, declaration of any transfer of command and the location of the command post should be announced on the radio system.

When more than one agency or jurisdiction is involved on

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an incident, there is a potential for political or turf conflicts to surface in deciding who is to assume the role of IC. So long as the individual assuming the role of IC is experienced and competent in their knowledge and application of the ICS, it makes little difference who they work for - EMS, fire, or law enforcement - unless the specific nature of the incident indicates a clear advantage of one over another. Whatever that individual's primary affiliation, they must not focus on issues relevant to their agency in preference to other more logical priorities. Further, the IC's authority must have priority on that scene over the chains of command within each participating agency. This unity in command is essential to get tasks carried out promptly. A practical approach to this situation is assignment of a liaison to the IC with senior EMS, fire and law enforcement officers at the command post. This will promote coordinated medical, fire and law enforcement operations under a single incident commander.

### Medical Command

In most every emergency situation, there is a potential for victims. When the need arises for assignment of large numbers of personnel for medical operations, a medical division of command should be established under a medical commander (MC). The MC, subordinate to the IC, will allow specialized medical expertise to control those operations in coordination with other non-medical sectors. On a scene large enough to warrant assignment of a MC, that individual should remain in a command rather than task oriented mode, i.e. - they should not engage in direct patient care. The MC should address issues such as EMS crew assignments to specific patients, patient transport destinations and coordination between the scene and all receiving hospitals. The MC may establish sectors as needed to carry out those or other specific tasks using the same span of control limitations as the IC.

An EMS medical director or other appropriate physician with extensive participatory (not observational) field experience and working familiarity with the ICS may be utilized as an MC, but their expertise may still be better utilized for direct care of the most severely injured or in a triage capacity.

### MVA INCIDENT COMMAND

To clarify responsibilities and communication on an MVA scene, common terminology should be adopted by all responding agencies. Current ICS terminology refers primarily to structure fire situations. The following nomenclature and approach may be useful for the MVA.

There can be several layers in a command structure at major incidents, including large MVA scenes. In adapting structure fire terminology to MVA scenes, a potential source of confusion was noted between supervisory levels which oversee other supervisors (i.e. medical command over individual pa-

tient care team leaders) and levels which directly supervise and participate with task oriented personnel (i.e. - individual patient care team leaders). To clarify and distinguish, it is suggested that the term command be used as a suffix to supervisory titles that oversee other supervisors. Levels which oversee task oriented crews should have the suffix of sector. Thus, a chain of command from the individual EMT in direct patient care might include a patient sector officer, medical commander and the incident commander. A sector is then defined as a smaller division of the scene which is task oriented. A sector officer, in most situations, may participate in the tasks assigned to that sector as a working supervisor. A command is a usually a larger division that does not directly supervise or directly participate with task oriented personnel.

### MVA Commands

**Medical and Vehicle Commands** - The medical commander is responsible for supervising specifically medical operations, primarily patient care sectors. On larger scenes, there may be other command levels between the medical commander and the patient sector officers. Most commonly, these will be vehicle commands, which are employed in cases with multiple vehicles containing multiple patients. Establishing a vehicle command is usually necessary when the span of control limits on the medical commander are being extended too far.

Each vehicle involved should be referred to by a very short identifier phrase that will distinguish it from other vehicles, such as "red car," "overturned car," or "pick-up truck." This vehicle identifier may then be used uniformly on the scene for clarity in crew assignments and the names of vehicle command areas.

**Fire Command** - The fire commander is responsible for control of specifically fire oriented operations, to include the fire hazard sector (i.e. - control of fuel spills) and the extrication sectors.

**Safety Command** - The safety commander must assure the safety of emergency crews, victims and by-standers. Often, this entails the safety commanders' continuous movement around the scene, looking for and correcting any compromises in safety. At an MVA, the safety commander may supervise sectors to locate and secure safe helicopter landing zones, control traffic and crowds, allow for rest and recovery of emergency personnel on extended duration incidents, and provide safe and controlled access to the scene for media personnel.

### Medical Command Sectors

**Patient Sectors - In Vehicle** - Patients still inside vehicles at the time of initial evaluation are each designated as separate sectors. Their care and documentation are the responsibility of a specific individual acting as their patient sector officer (PSO). In the case of very minor injuries, a single individual may serve

as PSO for more than one patient. In contrast, a patient requiring extrication and ALS procedures may need 3 or more people, to include a PSO, but excluding the extrication team used to disentangle the wreckage from the patient. As packaging and extrication are completed, any extra personnel may be released from the sector for reassignment by the next higher level of command. Whenever possible, keep crews together on the scene, particularly ambulance crews. Delay and disruption can occur when the driver and attendant must be reunited from different sectors before transport can begin.

To clarify patient sector assignments, each patient in the vehicle, at time of initial evaluation, is referred to by a number based on their location in the vehicle. Moving in a pattern from driver side to passenger side and front to back, each patient is numbered sequentially as they are encountered in the pattern. The vehicle identifier and patient sector number should be marked on the forehead or on a triage tag affixed to the patient (5-7). These are helpful in correlating patient sector numbers to actual patients after they are removed from the vehicles, particularly by the receiving emergency department personnel who may only have information in terms of patient sector numbers.

**Patient Sectors - Outside Vehicles** - Ambulatory occupants of vehicles involved in the accident are still potential patients and should be evaluated and treated accordingly. Further, their uncontrolled walking about the scene can pose a significant hazard. To organize their assessment, treatment and accountability, the ambulatory should be directed to a specific safe area as their injuries allow. This area can be designated as the ambulatory sector. In this location, the ambulatory may be assessed for possible injuries, monitored for changes, documented on an EMS run report, and be available for interview by accident investigators. Before directing a patient to the ambulatory sector, it should be determined if it is indeed safe for them to walk. It may be necessary to immobilize the spine of selected patients where they stand (8).

In the case of non-ambulatory patients outside of vehicles, a patient identifier phrase should be selected that will distinguish between other out of vehicle patients. In selecting such patient identifier phrases, remember that injuries may later be covered by bandages and clothing may be removed during the course of the incident. Again, forehead marking and triage tags may be helpful.

**Transportation Sector** - Communications should be established between the scene and the receiving emergency departments as early as possible to determine individual hospital capacities to accept various types of cases. The medical commander may delegate this task to an individual acting as a transportation sector. This sector officer may then relay hospital destination assignments, through the medical commander, to the various patient sector officers. The transportation sector officer can also coordinate on-line medical control or consultations with receiving hospitals and physicians if requested by any patient sector officers.

## Fire Command Sectors

**Fire Hazard Sector** - In many cases, fire hazards may be quickly addressed by disconnection of batteries and having a charged hose line pulled off the fire truck, ready for immediate use should fire occur. If there are more serious fire hazards with larger fuel spills, etc., a formal sector assignment for this task should be made. If an EMS agency does not have back-up response from the fire department for MVA's, consideration should be given to carrying and training in the operation of large to moderate size ABC dry chemical fire extinguishers, which are designed for fires of common combustibles, flammable liquids and electrical fires.

**Water Sector** - When volumes of water exceeding the capacity of on-board water tanks of engines on-scene are needed to complete wash down, foam or extinguishment operations, a water supply must be secured. Depending on the total volume and complexity of this task, a water sector may need to be established. Otherwise, it may be a simple additional task for the fire hazard sector.

**Extrication Sector** - Extrication involves the disentanglement of wreckage from the patient to allow evaluation, treatment and packaging for removal from the vehicle. The actual manipulation of the wreckage is a non-medical task that can entail use of hydraulic tools and compressors that should ideally be left to specially trained fire department crews. In some areas, EMS personnel have this responsibility and training. Regardless, the extrication sector should be separate from the patient sectors when there will be more than one victim requiring disentanglement. As a separate sector, the extrication crew can move from patient to patient in order of priority. Good communication between the patient and extrication crews will help select the best and safest strategy for the disentanglement and packaging process. In some situations, it may be necessary to have more than one extrication sector to access multiple critical patients simultaneously.

## Safety Command Sectors

**Crowd and Traffic Sector** - Without assignment of personnel to this task, the risk of additional vehicles becoming involved in the accident or exposure of by-standers to scene hazards is dramatically increased. This sector is appropriate for law enforcement personnel.

**Landing Zone Sector** - Helicopter evacuation of serious trauma victims directly from the scene is becoming more common with the spread of the trauma center concept. Personnel assigned for locating, clearing debris and marking the site may be reassigned immediately after helicopter departure. Some agencies utilize an engine company for this task as a precaution in case of mishap with the aircraft.

**Rest and Recovery Sector** - Extremes of temperature at an extended incident can lead to significant emergency personnel fatigue problems. The rest and recovery (R&R) sector is a place

for personnel to cool off or warm up, get drinking water, and recover for return to operations. The sector should be located upwind and uphill from the incident. During rotation of a crew to the R&R sector is an appropriate time for them to be screened for heat exhaustion by orthostatic blood pressure checks. Failure to obtain a 90 mm Hg palpated reading in a standing position may be cause to retain personnel in that sector until their condition improves (9).

**Public Information Sector** - At a major incident, the media can become very assertive in trying to get close to the scene. The safety of media personnel are the responsibility of the safety commander. To accommodate media interests and still maintain safety and control, they should be directed to a specific forward location from which they may obtain photographs or video. Under the supervision of a public information officer (PIO), the media may be lead around the scene at a safe distance. The PIO should handle all media interviews during the incident, to avoid distraction of other emergency personnel, including the incident commander.

## MVA COMMAND WORKSHEET

To assist the IC in keeping track of assignments and the status of various operations, a worksheet is illustrated in Figure 1. This or other worksheets may be printed on plexiglass and used with china markers to facilitate easy erasures and use during inclement weather. Similar worksheets may be developed for medical, fire and safety command functions.

## DISCUSSION

### Sequence of On-Scene Implementation

One of the challenges in applying incident command is the orderly assignment of task and command responsibilities as each unit arrives on the scene. At a scene that might ultimately require several ambulances, engine companies and a helicopter, the first arriving units must begin to address the priority tasks without the luxury of a fully developed command structure for support and direction. As each subsequent unit arrives on the scene, the IC must decide the order in which each command, sector and task assignment will be made. Training exercises can be extremely helpful in developing the command skills that are needed to make these implementations as smooth as possible.

### Shortages of Resources

Until all requested units have arrived on the scene, those on-scene will have to perform with whatever is available. Knowing that other other resources are enroute with a reasonable estimated time of arrival will allow command to temporarily defer some tasks. However, if other resources are not

available or significantly delayed, multiple patient sector assignments per crew may be necessary. Whenever possible, try to limit multiple patient assignments to the non-critical cases.

In extreme or early stages of a scene, the usual limits for the span of control may need to be extended. Personnel in command positions may need to become task oriented with critical patient care, immediate fire suppression or other high priority operations. However, utilization of command personnel in task oriented functions comes at a price proportional to the complexity of the scene. At a simple scene, there may be very little disadvantage. At more complex incidents, the consequent loss of resource coordination can significantly impair the quality, efficiency, speed and margin of safety at which emergency services are provided.

## Standard Operating Procedures

For an incident command policy to be as effective as possible, all participating agencies must understand and support the general concept and the specific policies regarding its utilization.

The support of upper level management and line personnel can be encouraged by their participation in an on-going ICS policy development, critique and refinement process. Preliminarily, this may be facilitated by a multi-agency incident command policy development committee. Their on-going activities will be a direct result of post-incident critique sessions.

Good radio communications capability between command and crews on the scene are vital to maintain smooth coordination of resources. All commanders and sector officers should have radios. On a major incident, it is helpful to handle the call on a frequency separate from other radio traffic. Without adequate radio resources, command and sector officers may need to use aides or runners to exchange information.

Identification of personnel working in command or sector officer roles is important to establishing an orderly process by which incoming crews report for assignment. Brightly colored reflective vests labeled with the various command and sector titles are available commercially.

## Training

Incident command orientation classes may be necessary for agencies that are not already using the incident command system in their other operations. While this may primarily include third service EMS agencies, law enforcement personnel and physicians, it may also include fire departments that do not use the ICS or would benefit from refresher training. For EMS agencies and physicians, ICS could be incorporated into their continuing education programs in trauma, such as the Basic Trauma Life Support (BTLS), Prehospital Trauma Life Support (PHTLS), and Advanced Trauma Life Support (ATLS) curricula.

After orientation of all participating agencies, classroom



coordination usually leads to inefficient resource utilization with consequent delays in transport and an unsafe scene environment. Current paramedic texts offer guidance for management of the single patient and full scale disaster scene, but very little between these two extremes relevant to the major MVA. The fire service has widely adopted a methodology for management of structure fire scenes of virtually any size. The basic concepts of this effective scene management system can be adapted to MVA environment for utilization by fire, EMS and law enforcement agencies. With proper implementation and on-going refinement through post-incident critique sessions, better patient care and overall emergency services performance may be realized.

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