

# Emergency Medical Decision-Making in the Tactical Environment

By Mark McConnell, M.D. and Daved Van Stralen, M.D.

**T**he tactical environment differs markedly from the Emergency Medical Services (EMS) or hospital settings where medical care is ordinarily rendered. Much has been written on the mechanics of Tactical Emergency Medical Services (TEMS). The techniques of providing medical care in the tactical environment have been covered well in courses like the CONTOMS Tactical EMT course. However very little information on the decision-making processes that effect performance and patient care in the tactical environment has been given to the TEMS provider.

Fire service and law enforcement personnel have long worked together, bound by a common approach to confusing, demanding, overwhelming situations that require decisive action. This quick decision-making ability contrasts markedly to the physician's approach to medical emergencies when decisions are evaluated thoroughly, diagnoses are made, and the concept of "do no harm" prevails. Medical services was partly born out of this "medical conceptual model." Initial energies are directed towards diagnosis of the problem so that appropriate treatment can reverse the injury or disease process. Unfortunately, this model does not lend itself well to medical care in austere environments where resources are limited. The pre-hospital provider rarely has the tools necessary to make an informed diagnosis, and taking time to diagnose could cause harm to the patient or to the medical care provider.

## TEMS Conceptual Model

We believe that the conceptual model born out of critical care medicine provides a better foundation for decision-making in the tactical and pre-hospital settings. In this model the emphasis is placed on reducing death and injury by assuring the basics of adequate oxygen delivery to the tissues.

The goal of TEMS care should be delivery of oxygen to the tissues to preserve vital organ function. The delivery of oxygen to tissues is dependent on three factors:

(saturation), and the cardiac output (volume of blood that the heart pumps out). The formula is:

$$\text{oxygen delivery} = \text{cardiac output} \times \text{hemoglobin} \times \text{oxygen saturation.}$$

The TEMS provider can supplement each factor of the equation in the field. A gunshot wound to the chest decreases oxygen delivery by loss of blood cells (decreased hemoglobin), inability to breathe in adequate amounts of oxygen due to lung injury (decreased oxygen saturation), and decreased cardiac output secondary to blood volume loss. The TEMS provider intervenes in this situation by applying pressure to stop the bleeding, administering oxygen, and by administration of intravenous fluids to increase circulating blood volume.

Seen from this perspective, the initial ABCs of pre-hospital care make sense. Airway and breathing are manipulated to increase the amount of oxygen the patient inspires, and circulation is augmented to increase cardiac output.

Such a basic foundation prevents the inevitable turf battles that occur in the emergency room between pre-hospital providers and physicians and nurses. If the TEMS provider has done everything

possible to increase oxygen delivery, it does not matter what the patient's diagnosis is; a poor outcome is likely outside the control of the TEMS provider.

Although assuring adequate oxygen delivery is not the only role of the TEMS provider, as a conceptual model of providing care in tactical or emergency environments, oxygen delivery represents the most important functions of the TEMS provider.

## Definition of Emergency Medical Care

Based on this conceptual model we define emergency medical care as the provision of medical care in austere and hazardous environments in the time-urgent situation of inadequate tissue oxygen delivery. Emergency medical care is treatment of physiologic dysfunction in the face of environmental constraints and threats.

**EVER TELL PEOPLE  
HOW TO DO THINGS.  
TELL THEM WHAT TO DO  
AND THEY WILL SURPRISE  
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## TEMS Environment

Unlike the hospital setting, tactical emergency care occurs in a chaotic environment characterized by uncertainty, instability, and often times without adequate information. The nature of this environment is such that there may be no clearly indicated type of action, or that some actions may lead to unexpected outcomes. As a comparison, the negotiator's dealings with the recurrent scenario of a barricaded suspect with a hostage may appear similar initially, but various factors determine the outcome as the scenario unfolds. The negotiator must remain adaptable. A ploy that leads to the release of the hostage in one situation may aggravate the perpetrator in another and lead to tragic consequences.

Similarly, the provision of medical care in the tactical environment is characterized by the same uncertainty and instability. A gunshot wound to the chest may require placement of a breathing tube (endotracheal intubation) in one patient and require only the application of oxygen by face mask in another. Likewise, the use of muscle relaxants prior to placement of a breathing tube (tracheal intubation) may facilitate intubation in one patient but prevent adequate oxygenation in a patient with a difficult airway. The TEMS provider needs the freedom to assess each situation as it unfolds and respond appropriately given the resources at hand.

## Threats

In addition to the tactical medical environment being chaotic, there are abundant threats to the safe delivery of oxygen to the tissues. These threats include medical, physical, and social threats.

Medical threats develop when the patient cannot continue to compensate for the inadequate delivery of oxygen to the tissues. Medical threats include uncontrolled physiology when the body needs assistance in delivering oxygen to the tissues. Medical threats can occur regionally leading to permanent disability as in myocardial injury, paraplegia or renal failure. It can occur globally leading to death. The TEMS provider wants to intervene early in the process of low oxygen delivery in order to prevent permanent damage, irreversible shock and death. Therefore TEMS personnel look to evidence of inadequate oxygen delivery by assessing respiratory rate and rhythm, skin color, mental status, and distal pulses and perfusion. Focusing on physiologic function and response as a guide for interventions moves the emphasis of TEMS care toward intervention and away from diagnosis. If a TEMS provider cannot meet the tissue oxygen requirements of the patient with greater controls, then the patient should be moved to a more controlled environment, i.e., from the field to the ambulance, or from the field to the ED.

Social threats refer to uncontrolled human behaviors that constrain the ability to deliver appropriate medical care. Such threats fall into three categories: groups, personal interactions and criminal activity.

Groups naturally form around an EMS incident and can include caregivers, police personnel and bystanders. A group can interfere solely by its presence. Groups may distract the caregiver or, if it becomes unmanageable, can become an acting crowd and harm the caregiver or the patient. The TEMS provider should be aware of the impact of bystanders on the provision of medical care and be able to act to mitigate their influence upon the care of the patient.

Personal interactions can constrain care in many ways. Some EMS personnel may not be able to operate in the TEMS environment, even though they may be experienced in the pre-hospital or hospital settings. Tensions between emergency care providers with different skill levels (i.e. physician vs. paramedic, paramedic vs. EMT) may influence the delivery of patient care. There is often an ambiguous application of roles in tactical situations, so that the TEMS provider functions as a tactical team member and an emergency medical care provider. The TEMS provider may have to police first, and treat second in some situations. Securing weapons, searching suspects and protecting the patient from bystanders may all need to occur prior to the rendering of medical care. Another variable can include the TEMS provider's attitude towards an injured perpetrator who injures or kills another team member.

Criminal activity can constrain care directly, as in assault and battery on EMS personnel, patients or bystanders. Criminal activity can also indirectly impact care by placing barriers between the patient and the caregiver. These barriers include police perimeters, chain of evidence and line of fire.

Physical threats derive from structure, site or space. In these situations the environment blocks delivery of medical care or retains the potential to cause further injury. Energy sources are physical constraints; they include mechanical energy, chemical substances, electricity, heat or cold (thermal energy), and ionizing radiation. Common physical threats in the tactical environment include unsafe structures, sites and confined spaces. Patients in the line of fire require different priorities in order to assure adequate delivery of oxygen to the tissues. Moving the patient to a safe area outside the line of fire takes precedence over managing the airway or manipulating circulation. TEMS providers may compensate to a degree by learning techniques to provide emergency care in dangerous settings through light and sound discipline (i.e., finger intubation, physical assessment by touch).

## Interferences to Decision-Making

In addition to environmental constraints and other threats to medical decision-making, the tactical EMS provider also needs to be aware of other interferences.

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### Lack of knowledge:

TEMS providers generally do not have information on the medical history of potential patients at the scene. In addition TEMS personnel may not participate fully in tactical briefings. This lack of information should not be a barrier to the provision of goal-oriented medical care to patients. The ABCs and oxygen delivery apply whether the patient has prior medical problems or not.

### Information overload:

At times EMS personnel may be inundated with extraneous information that may distract from their ability to provide adequate medical care. Detailed medical histories of all patients at an incident will not likely improve patient care on scene. And, multiple electronic monitors (i.e. blood pressure, pulse oximeter, heart rate, temperature) may distract the care provider from physically assessing the patient to assure adequate tissue oxygen delivery.

### Excess demands or inadequate resources:

Tactical incidents, especially with multiple casualties, may quickly overwhelm the capabilities of a small contingent of tactical EMS personnel. An incident with two or three injured parties may quickly tax the capabilities of the TEMS system if they are located in hazardous areas or separated by a great distance. A single patient with multiple injuries may be as overwhelming as a multiple casualty incident. Remember to prioritize and maintain the objective. Mobilize extra resources before or as you need them.

### Predictability:

Providers sometimes view every new patient encounter in relationship to the last one. In a chaotic environment this may be detrimental. If a previous patient with a gunshot wound to the chest was transported to the ED without placement of a breathing tube or significant hemodynamic compromise, it does not necessarily mean that the next patient will. Every patient should be assessed recurrently to ensure optimal delivery of oxygen to the tissues.

### Complexity:

Problems in the tactical environment are often too complex to be reasonably trained for or to be covered by specific protocols. This complexity should not distract from the TEMS provider's ability to assess the patient and make appropriate interventions.

### Insufficient authority:

Tactical teams survive on a strict adherence to command and control procedures. TEMS personnel rarely have the autonomy to move or make decisions within the tactical environment without approval of command staff. Commanders who are not oriented to tactical medical providers may not understand the needs of the TEMS team to provide the necessary services to other members of the tactical team or to potential patients. In this situation it is important to make the needs known, maintain the chain of command, and optimize care with the available resources. Remember that the commander has ultimate responsibility for all decisions.

### Fear:

In the EMS setting, fear demonstrates itself as fight, flight or freeze. Both fight and flight are mediated by internal epinephrine responses. The fight reaction manifests itself as anger, shaming or blaming. The flight reaction may demonstrate itself as avoidance, such as the TEMS partner who goes to get an extra piece of equipment just before a dynamic entry occurs. The freeze reaction is the inability to act or to make a decision. It is important that the TEMS provider feels comfortable working

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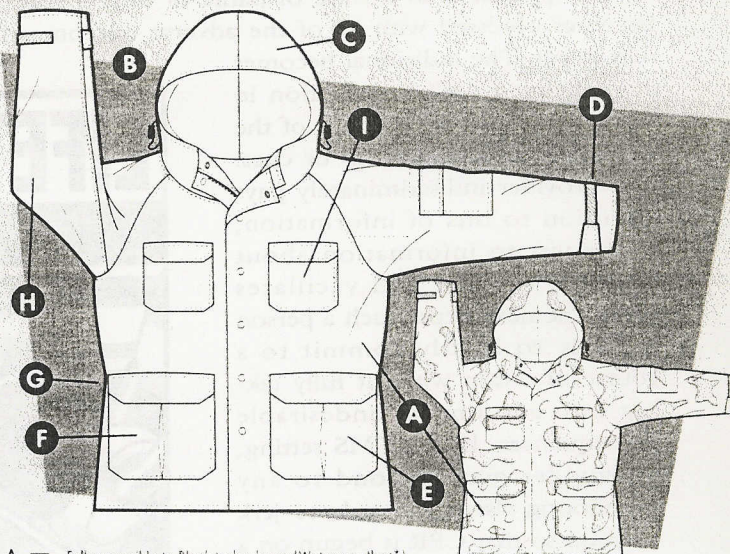
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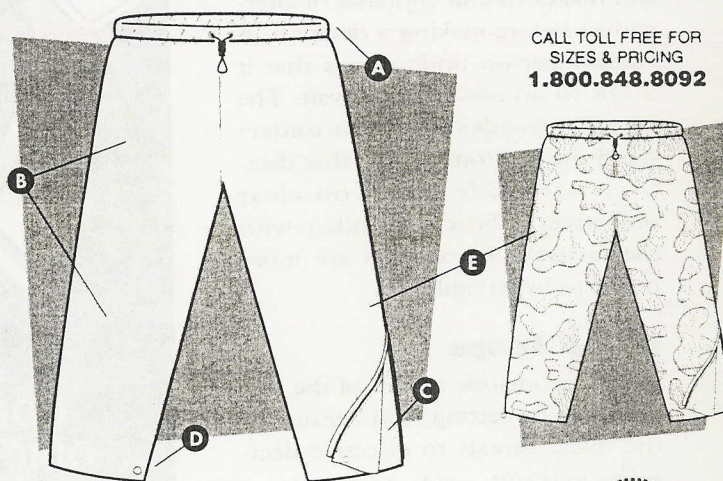
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in the tactical environment, otherwise fear, manifested as fight, flight or freeze, may prevent the proper delivery of care.

### Vigilance vs. Hypervigilance

Similarly, the concept of hypervigilance is related to the fear response and may interfere with the ability to render care in the tactical environment. Hypervigilance occurs when a person is in a state of panic or near-panic and becomes obsessed with all of the adverse outcomes that may occur. The individual becomes overwhelmed with information in the attempt to take account of the deluge of subtle warnings or cues. The provider indiscriminately pays attention to bits of information, overreacts to information about possible threats, and vacillates about the next steps. Such a person is likely to hastily commit to a course of action without fully taking into account its undesirable consequences. In the EMS setting, a provider may respond to any monitoring alarm with a knee-jerk reaction so that CPR is begun on a patient with apparent asystole (loss of heartbeat) on the monitor only to find that the monitor lead is loose or disconnected.

A vigilant person, on the other hand, is careful to search for relevant information, assimilates new information in an unbiased manner, and makes careful appraisal of alternatives before making a decision. A vigilant person understands that it is OK to do nothing and wait. The TEMS provider needs to understand the environment so that decisions are made based on clear objectives. Those unfamiliar with the tactical environment are more prone to hypervigilance.

### OODA Loops

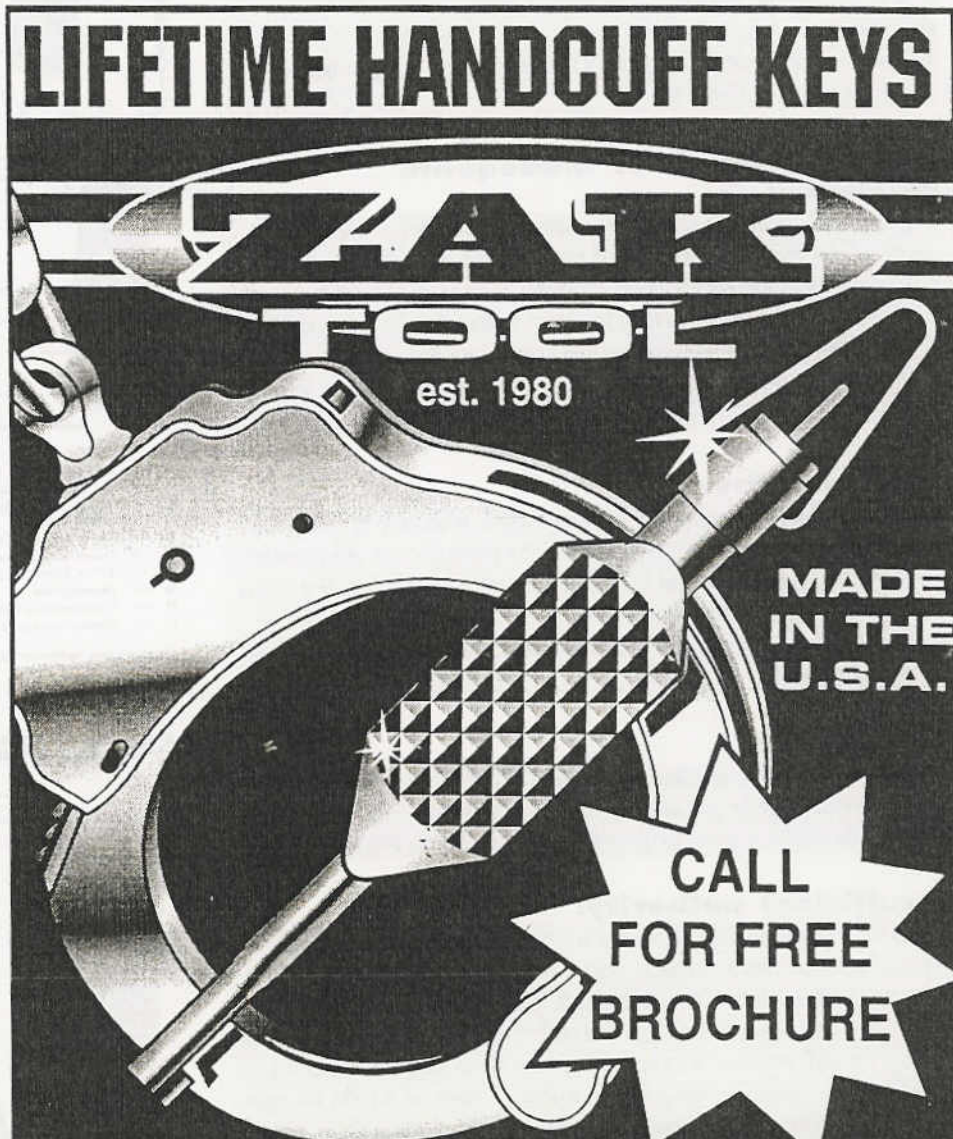
Given the chaotic nature of the tactical medical setting, and because of the many threats to effective decision-making, we advocate a straight-forward decision-making model that can be used in many different situations. These so-called OODA Loops (Observe, Orient, Decide, Act) were developed by the

military for decision-making tactics in combat.

All threats require rapid assessment of the situation, orientation to the problem and decisions for action. The TEMS provider should first observe the situation. Rapid assessment of the situation involves identification of current and potential threats as well as the likelihood of hidden or unexpected threats; it is done with rapid evaluation of the patient's physiologic function. Next, the TEMS provider should orient himself to the situation, using observations to formulate a plan to achieve his objectives. Orientation

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to the problem involves matching resources to the situation while treating the patient's needs. Next, the provider formulates one or more plans, balancing between safety and deteriorating physiology. Then action is taken to implement the plan. All actions need to be monitored for immediate effects, especially response of the patient's physiology. This process is repeated as the TEMS provider observes the patient's response to the interventions. If the response is not what was intended, new plans are made and new actions taken.

The key to using OODA Loops is observing the results in order to close the loop. Since every action creates new information, OODA Loops are information generators. Since the emphasis of OODA Loops is on observing, there are no wrong decisions. If an intervention does not produce a desired result, that information is used to change the plan in the future. As an example, if a patient is in cardiac arrest due to a traumatic injury, the emergency medical personnel survey the surroundings and determine whether the patient's airway is open and the patient is

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breathing, and whether there is a presence or absence of pulses and cardiac rhythm. Once these are confirmed, the provider will make a plan to intervene taking into account the resources available and the nature of the environment. For example, can the provider do one-person or two-person CPR? Does the patient need to be moved to a safer area? Once these contingencies are addressed, a plan is made and implemented – the airway is established and intravenous access is obtained. The patient is given medications and the provider reassesses the

patient to determine the response to therapy. If there is no response then the action is repeated or a new course of action is taken. If the patient fails to respond to any interventions, the provider must determine whether to transport to a higher level of care or to cease all actions. If interventions are stopped and a patient is pronounced

dead, the objective changes to notifying and comforting family members, and a plan is developed to achieve that objective.

It is important to remember that objectives may change during any situation, and the OODA Loop objectives must change. It does not necessarily make sense to continue giving epinephrine over and over again to the patient in

traumatic full arrest if there is no response to this therapy. In the event of a wounded team member pinned down in the line of fire, the initial objective may be to move the patient to a safe area. Once this is done then the objective is to maximize tissue oxygen delivery by supplying oxygen, stopping bleeding and giving fluids. However, if the patient and the caregiver come under fire again, then the objective changes to moving both team members to safe areas, and a plan is quickly developed and implemented to achieve that objective.

OODA Loops provide a model for emergency medical decision-making in the tactical environment. The TEMS provider is not responsible for the ultimate outcome of the patient. The patient's outcome may very well be outside of his control. However, the TEMS provider can quickly develop an objective and plan to maximize oxygen delivery to the tissues given the limitations of the environment and resources at hand. If oxygen delivery has been maxi-

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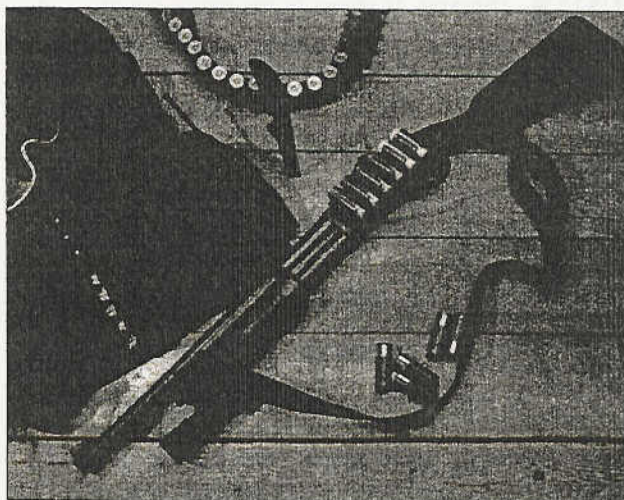
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mized, given the circumstances, then there can be no basis for the external and internal second-guessing which often occurs in life-threatening situations.

### Conclusions

The nature of the tactical environment is uncertain enough that there may be no clearly indicated type of action, or that actions may lead to unexpected outcomes. Providing emergency medical care within this environment requires a certain amount of expertise. In this setting, algorithms and protocols may not lead to expected outcomes as the situation unfolds. The objective of tactical emergency medical care should be concise, simple and obtainable - the delivery of adequate oxygen to the tissues.

The protocols that usually control paramedic actions in the pre-hospital environment may be inappropriate or dangerous in the tactical environment. More freedom needs to be given to TEMS personnel because of the chaotic nature of the environment and the threats to delivering medical care in this environment. OODA Loops are useful tools in emergency decision-making and may be an appropriate model to relieve TEMS providers of restrictive protocols in the tactical environment. ■

### About the Authors

Mark McConnell, M.D., is board-certified in critical care medicine. He is Sheriff Reserve in the San Bernardino County SD. Dr. McConnell is co-Medical Director of the San Bernardino County Sheriff Air Medics and Tactical Emergency Medicine Program. He is the recipient of the San Bernardino County Sheriff's Medal for meritorious service.

Daved Van Stralen, M.D. is a Pediatric Critical Care Physician at Loma Linda University Children's Hospital, Loma Linda, Calif., where he is the Assistant Director of the Pediatric Intensive Care Unit. He is also Medical Director for the program in Emergency Medical Care, School of Allied Health Professions, Loma Linda University which he developed. He has faculty appointments in the Department of Pediatrics and Emergency Medicine in the School of Medicine and in the Graduate School of Nursing. He is Adjunct Professor of Emergency Medical Services, Crafton Hills College; Medical Advisor to the San Bernardino County Fire EMS Officers Association, and the Medical Director for AMR-San Bernardino.

