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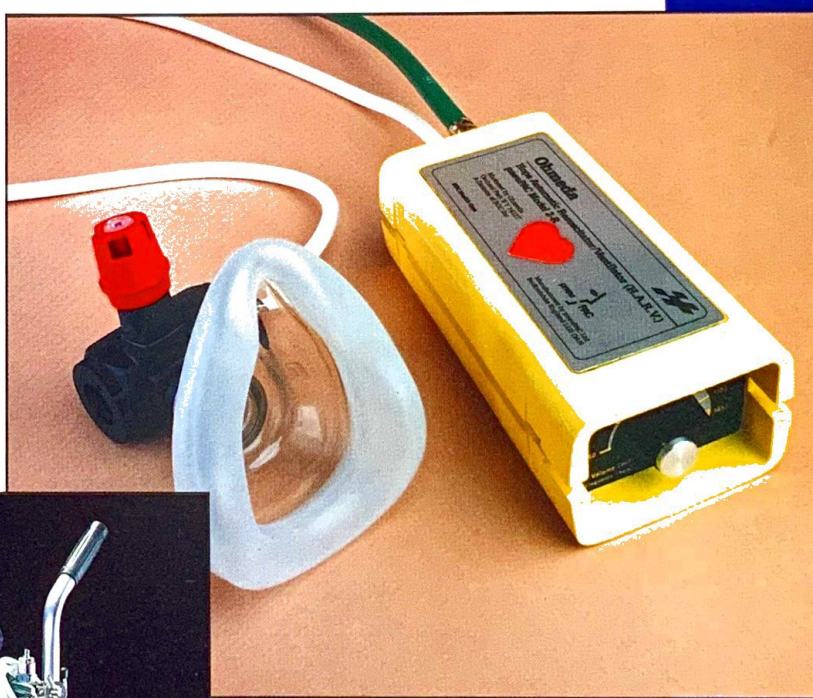

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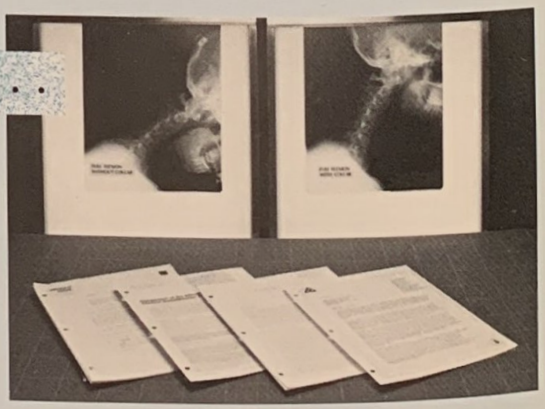

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Thrombolytic Therapy in Acute Myocardial Infarction

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It is estimated that 800,000 people in the U.S. suffer an acute myocardial infarction (AMI) each year; in addition, an estimated 500,000 deaths annually are attributed to AMI (1). The role of thrombolytic therapy in AMI had been vague (2) until the late 1970's and early 1980's at which time research utilizing coronary angiography during AMI showed that in approximately 86% of all cases, a clot or thrombus was present in the infarct-related artery (3). This finding renewed interest in the area of thrombolytic therapy.

Initial studies involving thrombolytic therapy were performed using streptokinase (SK) via the intracoronary route (4). These showed a 75% reperfusion rate of the occluded coronary artery if therapy was initiated within the first three hours of onset of AMI (5). However, due to limitations of the intracoronary route such as limited availability of cardiac catheterization labs, the need for specially trained staff available around the clock, and delay in treatment intrinsic to the catheterization procedure itself, more and more research turned to intravenous (IV) thrombolytic therapy. Streptokinase and urokinase (UK) were the first generation of "lytic" agents tested (6).

Subsequently, research has led to the development of new thrombolytic drugs that can be termed second generation agents. These include tissue plasminogen activator (TPA), anisoylated plasminogen streptokinase activator complex (APSAC) and pro-urokinase (Pro-UK)(6). Despite their potential for safer and more effective therapy in AMI, further study and data are needed before they completely supplant the first generation thrombolytic agents.

CORONARY THROMBUS FORMATION

The coronary arteries, as well as other blood vessels, are normally lined by an extremely smooth and slick layer of endothelial cells called the intima. The blood normally contains substances which promote and those which inhibit blood coagulation. Normally, the balance between the two groups of substances is in favor of the anticoagulants so that obstructions do not occur in smooth and free flowing vessels.

Coronary atherosclerosis is caused by the accumulation of cholesterol and other fatty substances which form deposits beneath the intima of the coronary arteries. These deposits can cause narrowing (stenosis) with superimposed rupture, cracking or hemorrhage of the intima (2). This presents a rough surface to the bloodstream. The rough surface of the atherosclerotic lesion causes attraction of platelets. The platelets become sticky, swollen and irregular in shape and attract still more platelets in a vicious cycle to form a platelet plug. The rough surface also triggers the formation of prothrombin activator which converts prothrombin to thrombin. Thrombin then combines with fibrinogen to form fibrin threads which will become woven into the platelet plug enmeshing platelets, red blood cells and plasma to form a solid blood clot (7,8).

Acute myocardial infarction is most often related to such thrombus formation in a coronary artery. The coronary artery occlusion by the clot may occur at the site of a preexisting atherosclerotic stenosis or more distally if the clot breaks away, lodging in a narrower segment of the coronary vasculature.

THROMBOLYSIS

Thrombolysis, the breakdown and dissolution of the fibrin and clot, occurs when plasminogen is converted to plasmin by plasminogen activator. Plasminogen is a normal part of all blood clots, trapped with the plasma during clot formation. The plasmin is a proteolytic enzyme that digests fibrin and other clotting factors to affect dissolution of the clot. The conversion of plasminogen to plasmin occurs intrinsically, but at a very slow rate (8). The thrombolytic agents accelerate the conversion of plasminogen to plasmin.

METHODS OF ACTION FOR THROMBOLYTIC AGENTS

Each thrombolytic agent catalyzes the conversion of plasminogen to plasmin in a generally similar, yet different method. For example, SK, a non-enzymatic protein acquired from the bacteria group C beta hemolytic streptococci (2), achieves its thrombolytic action via indirect activation of plasminogen, thus converting fibrin bound as well as circulating plasminogen to plasmin (7). Plasmin then acts to lyse fibrin, the foundation of the thrombus (7). However, due to its action on circulating plasminogen and other clotting factors (V and VIII), SK causes a systemic lytic state (2). Because of this systemic lytic status, extreme caution must be employed to avoid serious and potentially life threatening hemorrhage.

Urokinase is produced in vivo by mast type cells, such as endothelial cells, and is then secreted into the bloodstream in the

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form of the pro-enzyme, pro-urokinase (7). However, in the event of an AMI, the body cannot produce sufficient amounts of UK quickly enough to effect rapid lysis of the coronary thrombosis. UK is therefore produced for commercial use from human renal cells, an expensive process (7). UK, unlike SK, acts directly with plasminogen to convert circulating and fibrin bound plasminogen to plasmin, thereby catalyzing thrombus dissolution (7).

A third and newer thrombolytic drug is tissue type plasminogen activator (TPA) which, in addition to SK, recently gained FDA approval for use in treating AMI. TPA is a somewhat more fibrin specific drug, thus its effect on circulating plasminogen is to some degree diminished. TPA is an intrinsically occurring protease, which is produced by various human tissue cells in response to certain stimuli and has the ability to directly activate plasminogen (2,5,7). Currently TPA is manufactured through the use of recombinant DNA technology (2,7). The foremost advantage TPA holds over other thrombolytic agents is its relative affinity for fibrin bound plasminogen in contrast to circulating plasminogen (7). This characteristic of TPA offers a diminished systemic lytic effect, certainly a desirable attribute.

APSAC, essentially a second generation SK, is another of the three newer thrombolytic agents and is only available for use through entry into an investigational protocol at the present time. This new drug is derived through chemically altering (acylation) the active center of the SK molecule (3,5,9). Because of its unique structure, APSAC can be given as an IV bolus injection and has a slightly increased specificity for fibrin bound plasminogen (5,9). One other benefit APSAC has is its 120 minute half-life, giving extended thrombolytic activity when compared to the half-life of other thrombolytic drugs (2,9). Once APSAC is injected into the bloodstream, it undergoes deacylation at a controlled rate. This restores its ability to activate plasminogen to form plasmin, thus effecting clot dissolution (9). Unfortunately, when APSAC is given at its therapeutic dosage for coronary thrombolysis (30 units) it also causes a systemic lytic state (5,9).

The last of the five thrombolytic agents, pro-urokinase (pro-UK) is a precursor of UK and, like TPA, is released from various cells within the body (5,7,10). It is a highly clot selective drug, though its exact mechanism of action is not known (5,7). One speculation for its mode of action is that it activates fibrin bound plasminogen as opposed to circulating plasminogen (11). Another theory is that when pro-UK is given, it is bound with an inhibitor which is dissociated by fibrin then converted to a form of UK, the plasminogen activator (11). Pro-UK is manufactured using recombinant DNA technology and is only available for investigational use.

A sixth method of thrombolysis, monoclonal antibodies, is also under investigation, though it is still in the early stages of development. This new and promising technique involves the tagging of SK or UK with fibrin specific antibodies thereby producing a very highly fibrin specific thrombolytic drug (5,7).

GOALS OF THROMBOLYTIC THERAPY

Given early, within four hours of onset of AMI, thrombolytic therapy has, depending upon the agent given, approximately a 60-80% chance of thrombolysis (Table 1) with subsequent restoration of blood flow to the ischemic myocardium. With reperfusion, myocardium can be salvaged, thus limiting infarct size, preserving left ventricular function, and decreasing mortality both in hospital and up to one year post treatment (2). The benefits of reperfusion have been well demonstrated in the Thrombolysis in Myocardial Infarction (TIMI) trial, utilizing IV TPA (12) and in a large Italian study using IV SK in nearly 12,000 patients (13).

PATIENT SELECTION

Regardless of which thrombolytic agent is administered, the key to a successful and uncomplicated course of treatment is adherence to a strict protocol for patient selection (14). This protocol should have criteria for both inclusion and exclusion (1). Patients should first meet criteria for inclusion (14,15):

1. Continuous chest pain of 30 minutes duration or longer, unrelieved by nitroglycerine (IV or sublingual), or sublingual nifedipine
2. ECG changes indicative of AMI, i.e. ST elevation of 0.1mV in one or more standard leads, or at least 0.2mV in one or more precordial leads
3. Patients should ideally be candidates for coronary angiography in order to more appropriately define treatment
4. Patients must be able to receive the thrombolytic drug within four hours from onset of symptoms, since after four hours the chance of reperfusion and limiting the infarct size declines sharply (2,3,5,13)

One exception to criteria number 4, however, may be with TPA which appears to have a fairly good rate of reperfusion in the four to six hour range, though the amount of myocardium salvaged may be limited.

After patients have met the inclusion criteria, they must be subjected to evaluation for exclusion criteria (14,15):

1. Age greater than 75 years (carries increased risk for cerebral hemorrhage)
2. Patients on coumadin therapy (increases risk for bleeding secondary to an already altered clotting system)
3. Patients with active internal bleeding
4. History of CVA, intracranial neoplasm, AV malformation, or cerebral aneurysm
5. History of recent (within 6 months) intracranial or intraspinal surgery

Drug	Route/Dose	Time from onset of AMI	Avg. time to reperfusion	% reperfusion	Cost per dose
Streptokinase	IV 1,500,000 units over 60 min	< 3 hours	30-45 min.	55-65%	$500-$1,000
TPA	IV 70 mg over 3 hrs.	< 4 hours	30-45 min.	70-80%	$2,500 to $4,000
APSAC	IV 30 units over 3-5 min.	< 3hours	45 min.	65-70%	approx $1,000
UK	IV 2,000,000 units in bolus	< 3 hrs.	30-45 min.	60-65%	$2,000 to $4,000
Pro-UK	IV 70 mg. over one hour	< 3 hrs.	30-45 min.	65-70%	unknown (high)

Table 1 - Comparison of Different Thrombolytic Drugs: Dose , Effect, and Cost

6. History of recent G.I. or G.U. surgery (within 10 days)
7. History of external chest massage (for this episode of chest pain/AMI) or any significant trauma
8. Recent history (within 6 months) of severe uncontrolled hypertension, or at any time a history of complications resulting from severe hypertension, i.e. hypertensive encephalopathy
9. Patients having undergone surgery in the previous 10 days which could result in life threatening bleeding
10. Pregnant or lactating women or women of childbearing potential (unknown consequences)
11. Patients with prosthetic valves, dilated cardiomyopathy or ventricular aneurysm (risk of breaking up chronic thrombus formation and causing emboli)
12. Patients who have received SK within the previous 6 months (if SK or APSAC are to be given for this event due to antigenicity of these two drugs)

PATIENT MANAGEMENT

Once the diagnosis of AMI is determined and all criteria for receiving thrombolytic therapy are met, the patient must then be made to understand the treatment and its goals. After drawing blood for baseline lab work (to include CBC, chemistry profile, PT, PTT, thrombin time, platelet count, cardiac enzymes with isoenzymes, and type and crossmatch for at least 2 units of blood), thrombolytic treatment may begin. The patient must then be watched closely for any adverse events such as allergic reaction (mostly with SK and APSAC), bleeding, hypotension, severe headache and/or change in level of consciousness (16,17). Allergic reactions to SK or APSAC are infrequent but can be lessened by giving 50 mg. of diphenhydramine and 100-500 mg. of hydrocortisone IV just prior to treatment (16). Bleeding, should it occur, may necessitate stopping thrombolytic therapy and administering blood, fresh frozen plasma, or aminocaproic acid. Hypotension can occur but is usually transient and benign. Headache or changes in level of consciousness require immediate stopping of thrombolytic therapy followed by diligent monitoring of neurologic condition. In addition to observing for thrombolytic related adverse events, the patient requires close monitoring and treatment for other problems associated with AMI (i.e., hypotension associated with cardiogenic shock, dysrhythmias, and pain). The patient should also be observed closely for signs frequently associated with reperfusion in the infarct-related vessel: decrease or cessation of chest pain, rapid resolution of the ST segment elevation, or reperfusion dysrhythmias (frequently accelerated idioventricular rhythms)(16).

Once thrombolytic therapy has been initiated, the next important step for optimal patient treatment is urgent coronary angiography, in order to determine if reperfusion has occurred. If reperfusion with good flow in the infarct-related artery is present, further intervention by percutaneous transluminal coronary angioplasty (PTCA) or coronary artery bypass grafting (CABG) is probably not necessary immediately. Recent studies suggest that PTCA of the underlying atherosclerotic lesion can probably be done more effectively if delayed for several days. In this situation, it is essential to keep the patient

therapeutically anticoagulated with heparin (IV infusion to maintain a PTT approximately 1.5-2x control). Otherwise, the incidence of reocclusion is very high. If reperfusion with good flow has not been effected by thrombolysis, PTCA can be done immediately. CABG may be necessary after reperfusion if severe multivessel disease is present, or if the occasional single-vessel disease that cannot be adequately managed by PTCA is associated with a large area of jeopardized myocardium. Cardiac catheterization, PTCA, and even CABG can all be effected without markedly increased risk and complications by experienced angioplasters and surgeons.

FUTURE DIRECTIONS OF THROMBOLYTIC THERAPY

At this time, treatment with thrombolytic agents in the United States is restricted to the hospital setting. However, with more and better drugs becoming available, such as TPA, and probably soon APSAC, the question of whether or not to initiate thrombolytic therapy in the prehospital setting (utilizing skilled paramedical personnel in constant communication with a base station physician) is being raised. As a result, patients would almost certainly benefit from earlier reperfusion accompanied by significant reductions in AMI related morbidity and mortality.

Indeed, the idea of administering thrombolytic therapy in the prehospital setting is not a new concept. Already, studies of this type have been carried out; one in France, and another in Jerusalem using APSAC and SK, respectively (15,18). Each of these two studies reported favorable data in regard to the safety and practicality in this method of administering thrombolytic agents (15,18).

Each study required that patients meet entry criteria nearly identical to those listed here. The major difference in the study designs were in their choice of thrombolytic agent. The French study involved administering APSAC, 30 units IV, over approximately 4 minutes. The Jerusalem group gave SK, 750,000 units, as an IV infusion over 20 - 30 minutes. Both study groups used what they termed a mobile intensive care unit (MICU) staffed with a physician, in addition to paramedical personnel (15,18).

Reports from these studies indicated that a thrombolytic drug administered in the prehospital setting can reduce the time from onset of AMI to initiation of thrombolytic therapy by approximately 60 minutes (15,18). In fact, the French group estimated from their data that by instituting treatment in the field, most patients could begin receiving a thrombolytic agent within 3 hours of onset of symptoms, and that as many as half of these patients might have treatment begun inside of 2 hours (18). Reperfusion rates for infarct related arteries where reported as 75% in the French group and 84% in the Jerusalem study. Neither group reported any severe adverse events related to the administration of either APSAC or SK in the prehospital setting. Thus, these authors further concluded that prehospital administration of either APSAC or SK can be feasible, and relatively safe (15,18).

However, despite the favorable data presented above, prehospital administration of thrombolytic drugs is not without stumbling points. Some of these include, but are not limited to, difficulty with making an accurate diagnosis, improper or inaccurate screening for inclusion and exclusion criteria, which drug is best for field use, and what level of education should personnel be required to have for adequate staffing of a MICU ambulance.

Probably the most important potential error would be making an inaccurate diagnosis. Many conditions (such as hiatal hernia, costrochondritis, gastritis, and pericarditis) can have symptoms which mimic those of AMI. Should a patient with one of the above problems be misdiagnosed as having an AMI, and then be given a thrombolytic drug, the consequences could be potentially fatal. If, however, a good set of clinical findings were known to have a high rate of accuracy for diagnosing AMI, then these could be used by the field personnel to relay useful diagnostic information to a base station physician for assistance in making a proper diagnosis. Unfortunately, there are no consistently accurate sets of clinical indicators or predictors for diagnosing AMI (19). Clinical symptoms such as chest pain, radiation of chest pain, diaphoresis, SOB, nausea and vomiting, and ST elevation on rhythm ECG strips were evaluated in varying combinations and provided accurate diagnostic assistance in only 47% to 79% of patients whose definative diagnosis was AMI (19).

On the question of proper use of inclusion and exclusion criteria, an EMS system must develop a specific protocol for AMI and thrombolysis which is strictly adhered to. Such a protocol can be derived using the various reference sources used in this and similar reviews, thrombolytic drug research protocols, and drug package inserts. This protocol could then be tested by screening suspected AMI patients in the field for thrombolytic therapy, then comparing the prehospital diagnosis with the in-hospital diagnosis to determine the proficiency by which AMI patients are detected. The prehospital accuracy rate with such a protocol may be the determining factor regarding the feasibility of prehospital thrombolytic therapy within a given location and EMS system.

The clinical skills of the personnel who staff EMS units must be considered. They must have or be capable of developing the skills to assist the on-line physician with the diagnosis of AMI and be able to competently deliver thrombolytic drugs. Since a physician is usually not present first hand in the field, it is the field personnel on whom the physicians must rely upon for information used to make the diagnosis with their remote but on-line input. The question then must be whether or not current paramedical personnel can be adequately trained to participate in diagnosis of AMI and the prehospital administration of thrombolytic agents. Or, should this level of care be left to a new classification of EMS personnel, such as a higher level para-

medic, a registered nurse skilled in emergency medical treatment or critical care, physicians assistants with training weighted towards cardiology, or some combination of these? This question will have to be answered before patients can routinely be treated with a thrombolytic drug prior to hospitalization. Regardless, an on-line physician, knowledgeable in diagnosing and treating AMI, should be in contact with the personnel in the field.

Regarding the choice of which thrombolytic drugs is most appropriate for prehospital use; probably any one of the drugs mentioned here would be just as efficacious as another. Each of the five drugs currently available (whether investigational or not) when given within a window of three hours or less from onset of symptoms is going to carry a relatively high rate of reperfusion. SK and TPA have the advantage of being the only two thrombolytic drugs currently available with FDA approval for treatment of AMI. On the other hand APSAC is a promising new drug that will probable receive FDA approval in the not to distant future. The advantage of APSAC when compared to the other thrombolytics is that it can be given as an IV bolus injection over about 4 minutes in contrast to prolonged IV infusions of up to 1-3 hours for the other drugs. This unique characteristic of APSAC may make it more suitable for prehospital use since its method of administration should decrease the likelihood for errors in dosing.

CONCLUSION

Treatment of AMI has and is advancing at a rapid pace with new drugs and better methods of mechanical intervention. A time when thrombolytic therapy is almost routine in the prehospital setting will most certainly come. However, in order to do so safely and effectively, questions about the diagnostic accuracy and clinical skills of the field personnel must be resolved. Even when extreme caution is employed with administration of 2nd generation drugs by an experienced cardiologist, the risk of major drug related complications is high. This risk may prove to be too high with currently available agents, so prehospital thrombolytic therapy may have to wait for the development of third or fourth generation drugs with lesser risks of major complications. This will continue to be an exciting and controversial topic and certainly will play a key role in early treatment of AMI in the future.

BIBLIOGRAPHY

1. Kannel WB, Thom TJ: Incidence, Prevalence and Mortality of Cardiovascular Diseases (Ch. 34)(in) Hurst JW(ed): *The Heart*, 6th ed., McGraw-Hill Book Company, New York, 1986.
2. O'Neal WW, Topal EJ, Ottsm B: Reperfusion Therapy of Acute Myocardial Infarction. *Prog Cardiovasc Dis* 20(4):235-266, 1988.
3. Hugenholtz PG: Acute Coronary Artery Obstruction in Myocardial Infarction: Overview of Thrombolytic Therapy. *J Am Coll Cardiol* 9(6):1375-1384, 1987.
4. Renthop P, DeVivie ER, Karsch KR, et al: Acute Myocardial Infarction: Intracoronary Application of Nitroglyceryn and Streptokinase in Combination with Transluminal Recannulization. *Clin Cardiol* 5:254-256, 1979.
5. Sherry S: Appraisals of Various Thrombolytic Agents in the Treatment of Acute Myocardial Infarction. *Am J Med* 83(suppl 2a):31-48, 1987.
6. Braunwald E: Introduction - Ninth Symposium on Modern Thrombolytic Therapy. *J Am Coll Cardiol* 10(suppl B)(5):1b-3b, 1987.
7. Mueller HS, Roberts R, Sowell BE: *Thrombolytic Therapy in Acute Myocardial Infarction.* Mason Medical Communications, Greenwich, Connecticut, 1987. pg 1-21.
8. Guyton A: *Textbook of Medical Physiology.* WB Saunders, Philadelphia. 5th Ed., 1976. pg 99-111.
9. Anderson JL, Rothbard RL, Hackworthy RA, et al: Multi-Center Reperfusion Trial of Intravenous Anisoylated Plasminogen Streptokinase Activator Complex (APSAC) in Acute Myocardial Infarction: Controlled Comparison with Intracoronary Streptokinase. *J Am Coll Cardiol* 11(6):1153-1163, 1988.
10. Sherry S: Thrombolytic Therapy in Acute Myocardial Infarction: A Perspective. *Drugs* 33(suppl 3):1-9, 1987.
11. Tilkian AG, Daley EK: *Cardiovascular Procedures: Diagnostic Techniques and Therapeutic Procedures.* C. V. Mosby, St. Louis, 1986.
12. Williams DO, Ruocco NA, Forman S, and the TIMI Investigators: Coronary Angioplasty After Acute Recombinant Tissue-Type Plasminogen Activator in Acute Myocardial Infarction: A Report from the Thrombolysis in Myocardial Infarctions (TIMI) Trial. *J Am Coll Cardiol* 10(suppl B)(5):45b-50b, 1987.
13. Guppo Italiano per lo Studio Della Streptochinasi Nell' Infarto Micardico (GISSI): Effectiveness of Intravenous Thrombolytic Treatment in Acute Myocardial Infarction. *Lancet* 1:396-401, 1986.
14. Bossaert LL, Demey HE, Colemont LJ, et al: Prehospital Thrombolytic Treatment of Acute Myocardial Infarction with Anisoylated Plasminogen Streptokinase Activator Complex. *Crit Care Med* 16(9):823-830, 1988.
15. Weiss TA, Fine DG, Applebaum D, et al: Prehospital Coronary Thrombolysis: A New Strategy in Acute Myocardial Infarction. *Chest* 1:124-128, 1987.
16. Olsen AR: What You Should Know About Thrombolytic Therapy. *Nursing 87'* (12):52-55, 1987.
17. Korsmeyer C, Midden AL, Taylor GJ: The Nurses Role in Thrombolytic Therapy for Acute MI. *Crit Care Nurs* 7(6):22-30, 1987.
18. Castaigne AD, Duval AM, Dubois-Randle JL, et al: Prehospital Administration of Anisoylated Plasminogen Streptokinase Activator Complex in Acute Myocardial Infarction. *Drugs* 33(6):231-234, 1988.
19. Hartgearten KM, Aprahamian C, Harlan, S, et al: Limitations of Prehospital Predictors of Acute Myocardial Infaction and Unstable Angina. *Ann Emerg Med* 16(12):1325-1329, 1987.

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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 patient 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 the 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 form 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

and live action scenario training exercises should be conducted.

Classroom scenarios may be conducted on a blackboard illustrating the scene and the MVA ICS worksheet. The instructor presents the scenario and tells the participants when each unit arrives on the scene, what problems are encountered and answers any questions. The objectives of these exercises are not to specify the details of what is done for each patient. The participants should focus on how they will prioritize, assign and delegate the various crews and tasks that will be required to resolve the incident. It is an exercise to refine command skills and develop general strategies for handling various types of MVA scenes.

Live action scenarios come next, with as much realism as possible using wrecked cars, and victims that are fully moulaged and rehearsed in their injuries and responses to treatment. In this setting, the training is at both a command and task level, unlike the command only focus of classroom scenarios.

Proctors should be used to document the actions of specific commanders and sector officers in live action scenarios. Each of their actions and observations should be listed chronologically with the corresponding time. The proctor may be complemented by a portable video camera, preferably with an on-screen time display, synchronized to the watch used by the proctor making the written record. The written record and the videotapes then become the basis for a post-exercise critique. Particular attention should be focused on indicators of efficiency, such as times from first unit on-scene to individual initial patient contacts, evaluations, transports, and resolution of various fire and safety problems. A similar process should be used for critique of real incidents. The post-incident critique is probably the most important component in the overall incident command implementation and training process (10-12).

CONCLUSION

Rapid transportation of serious trauma victims to appropriate surgical facilities has a significant impact on survival. Transportation of a victim from a major motor vehicle accident (MVA), with entrapment and/or multiple vehicles and victims, is the end result of a considerable logistical effort at the scene by emergency medical services, fire and law enforcement personnel. At these complicated emergency scenes, the logistical coordination of resources can be a significant problem. Poor

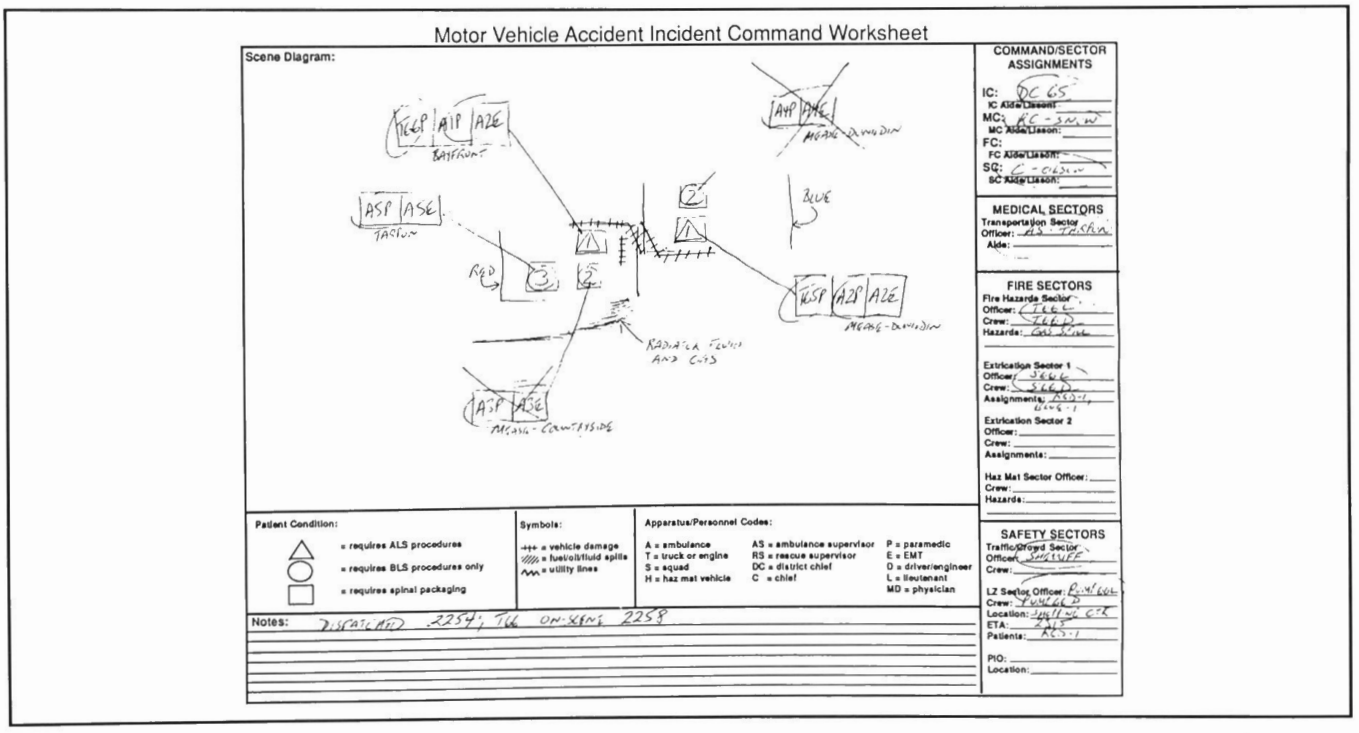

Figure 1 - MVA Incident Command Worksheet - The worksheet provides a tool for control of operations in the field and a documentation method that is helpful in the post-incident critique. This example illustrates a two car collision with five patients. Vehilcle identifiers are "red" and "blue." In the red car, the driver (patient 1) will need advanced life support, as indicated by the triangle around the patient number, and spinal packaging, as indicated by the square. Three people are assigned to this patient sector called red-1: a paramedic from Engine 66 (T66P) and the paramedic and EMT from ambulance 1 (A1P, A1E). All three individuals are with that patient, as shown by the circle around the crew assignment box for patient sector red-1. As they leave or become reassigned, the circle is crossed out. Patient red-1 will be taken to Bayfront hospital, as noted below the crew assignment box. Note the damage symbols for the front ends and driver doors of both cars as well as to the dashboard of the red car.

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.

BIBLIOGRAPHY

1. American College of Surgeons: *Advanced Trauma Life Support.* Chicago, 1984.
2. Baxt W, Moody P: Use of Helicopters in Transporting the Trauma Victim. *JAMA* 249:3047, 1983.
3. Kidd JS, Czajkowski JD: Commanding the Extrication Scene. *Journal of Emergency Medical Services* 12(2):30-34, 1987.
4. Brunacini AV: *Fire Command.* National Fire Protection Association. Quincy, Massachusetts. 1985.
5. Maxwell C, Cherneski M: Post-Disaster Drill Analysis. *Journal of Emergency Medical Services* 12(2):43-46, 1987.
6. DeMars ML, Buss RM, Cleland LC: Victim Tracking Cards in a Community Disaster Drill. *Ann Emerg Med* 9:207-209, 1980.
7. Paris PM, Stewart RD, Pelton GH, et al: Triage Success in Disasters: Dynamic Victim Tracking Cards. *Am J Emerg Med* 3:323-326, 1985.
8. Elling R, Politis J: Backboarding the Standing Patient. *Journal of Emergency Medical Services* 12(9):64-66, 1987.
9. Pierson K: Heat Related Illness: Practical Considerations for Treatment on the Firegrounds. Tampa Bay EMS Journal 1(2): 41-44, 1987.
10. Morris GP: The Incident Critique. *Journal of Emergency Medical Services* 12(9):37-39, 1987.
11. Narad RA: Writing the Multi-Casualty Incident Critique. *Journal of Emergency Medical Services* 12(9):40-43, 1987.
12. Morris G: Common Errors in Mass Casualty Management. *Journal of Emergency Medical Services* 11(2):34-38, 1986.

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Emergency Care of Dento-Facial Injuries

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When emergency medical personnel are confronted with traumatic injuries to the teeth, jaws and associated structures, they are not usually life threatening but are almost always accompanied by severe pain, bleeding and emotional distress.

Many such injuries occur in motor vehicle accidents. A report on automotive crash injuries indicates that 72.1% of automobile accident victims suffer injuries to the facial structures (1). Sports injuries are another major cause of dento-facial injuries. An injury due to a fist may be limited to a specific area such as the zygoma, mandible or teeth. However, an explosive injury such as that caused by an automobile crash or gunshot is likely to involve multiple anatomic areas such as both jaws or contiguous structures of the nose, soft tissues and neck. The more violent the force, the greater likelihood of multiple concomitant injuries to other systems. This underscores the importance of a thorough physical examination and consideration of injury potentials (2,3). The potentials for cervical spine injury and/or airway obstruction must be considered during the initial moments of care. If potentials for cervical injury are significant, immobilization of the head and neck must be instituted as soon as possible. The mouth is very vascular and copious bleeding may collect in the oral cavity and pharynx, thereby obstructing the airway. This is especially true when the victim is unconscious or unable to swallow. With a severe fracture of the mandible, the tongue may be displaced posteriorly, blocking the airway. Avulsed teeth may also obstruct and become aspirated into the airway.

Dento-facial hemorrhage is best controlled by elevation of the head and application of local pressure to the wound with clean or sterile gauze. Point pressure over the temporal, facial or other superficial arteries may also help slow the bleeding.

AVULSED AND BROKEN TEETH

When a tooth is traumatically avulsed, an effort should be made to recover it from the scene of the accident. Picking the tooth up by the crown will avoid damage to the tiny fibers on the roots that are necessary for re-implantation. If the tooth is dirty, gentle rinsing with water, without scrubbing, is helpful before reimplantation into its socket. If this is not possible in the field, the patient may hold the tooth in their mouth (if able to do so safely) or the EMS crew may transport the tooth in a container of milk (4). Time is critical - if a patient can receive dental care within thirty minutes, there is a 90% chance for successful reimplantation. Note that if a traumatically avulsed tooth cannot be found at the scene, then possible aspiration of the tooth must be ruled out by appropriate chest and gastrointestinal radiographs.

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If a tooth has been broken, an attempt should be made to locate the fragments. With modern bonding techniques, the fragments can often be reattached. A broken tooth is usually not an emergency unless the nerve (pulp) has been exposed. This is usually a very painful situation and dental consult should be sought immediately. With endodontic (root canal) therapy, such a tooth can almost always be saved. Any tooth that has been loosened should also receive immediate attention from a dentist. The tooth often requires splinting to prevent further trauma and subsequent loss.

FRACTURED JAW

Initial treatment for a fracture of the mandible or maxilla will depend on the severity of the trauma. As mentioned, the accident may lead to obstruction of the airway by teeth, tongue, blood and/or dental prostheses. The airway must be cleared and maintained. In severe trauma, serious head injury or injury to other organ systems should receive treatment priority over mandibular and maxillary fractures.

If a fractured jaw is suspected following a more minor accident, it should be immobilized by any means possible and a cold pack applied for thirty minutes on, thirty minutes off until emergency department care. With a broken jaw, the patient will usually state that the bite feels off and the lip may feel numb. This injury mandates emergency department care with consultation of an oral/maxillofacial surgeon or other specialists trained in the treatment of such injuries .

SUMMARY

In conclusion, thoughtful emergency care of dento-facial injuries can at least spare the patient from a lasting dental deformity and on occasion, may save a life. Proper attention first to the airway, cervical spine and potential head trauma is essential. Dentists and oral surgeons can prove very helpful to emergency personnel in the treatment of such patients.

BIBLIOGRAPHY

1. Cornell University Automotive Crash Injury Research: The Injury Producing Accident: A Primer of Facts and Figures. *Cornell University Press.* Ithaca, NY. 1961.
2. Zook EG: The Primary Care of Facial Injuries. *PSG Publishing Co.* 1980.
3. National Association of Emergency Medical Technicians: *Prehospital Trauma Life Support.* 1986.
4. Stanley WR, Laskin J, Broom CA: Moistness, More than Temperature Variation, Prevents Autolysis of Pulp Tissue in Avulsed Teeth. *Journal of Endodontics* 9(9):360-367, 1983.

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Literature Search: Medical Control and Quality Assurance

This literature search was conducted in late August of 1988 on the PaperChase medical literature database via the CompuServe Information Service. PaperChase contains the entire Medline database from January 1966 thru the current monthly update.

The first step in the search was to look for references pertaining to the keywords shown in lists A through I. The number of citations found for each keyword or combination thereof is shown beside it. Next, lists A and B were added together to yield list J - a basic body of references pertaining to prehospital EMS. Medical control related keywords, in lists C through I, were added together to get list K. References in common between the prehospital EMS literature list J and the medical control keywords list K were identified and put into list L with the resulting 229 references listed below.

A)	EMERGENCY MEDICAL SERVICES	4365
B)	EMERGENCY MEDICAL TECHNICIAN	346
C)	MEDICAL AUDIT	452
D)	QUALITY ASSURANCE, HEALTH CARE	2623
E)	OUTCOME AND PROCESS ASSSURANCE	350
F)	UTILIZATION REVIEW	989
G)	MEDICAL RECORDS	9508
H)	CLINICAL COMPETENCE	4721
I)	QUALITY OF HEALTH CARE	8389
J)	*SUM AB	4711
K)	*SUM CDEFGHI	31183
L)	*ON J&K	229

1 Lewis RP Lanese RR Stang JM Chirikos TN Keller MD Warren JV
Reduction of mortality from prehospital myocardial infarction by prudent patient activation of mobile coronary care system.
AM HEART J 1982 Jan; 103(1):123-30

2 Orr DP
Limitations of emergency room evaluations of sexually abused children.
AM J DIS CHILD 1978 Sep; 132(9):873-5

3 Margulies JL
Emergency medicine in New York [letter]
AM J EMERG MED 1988 May; 6(3):317-8

4 Torrey EF
Emergency psychiatric ambulance services in the USSR.
AM J PSYCHIATRY 1971 Aug; 128(2):153-7

5 Spain DM Fox RI Marcus A
Evaluation of hospital care in one trauma care system.
AM J PUBLIC HEALTH 1984 Oct; 74(10):1122-5

6 Himmelstein DU Woolhandler S Harnly M Bader MB Silber R Backer HD Jones AA
Patient transfers: medical practice as social triage.
AM J PUBLIC HEALTH 1984 May; 74(5):494-7

7 Guzy PM Pearce ML Greenfield S
The survival benefit of bystander cardiopulmonary resuscitation in a paramedic served metropolitan area.
AM J PUBLIC HEALTH 1983 Jul; 73(7):766-9

8 Eisenberg MS Bergner L Hearne T
Out-of-hospital cardiac arrest: a review of major studies and a proposed uniform reporting system.
AM J PUBLIC HEALTH 1980 Mar; 70(3):236-40

9 King BG
Estimating community requirements for the emergency care of highway accident victims.
AM J PUBLIC HEALTH 1968 Aug; 58(8):1422-30

10 Urdaneta LF Sandberg MK Cram AE Vargish T Jochimsen PR Scott DH Blommers TJ
Evaluation of an emergency air transport service as a component of a rural EMS system.
AM SURG 1984 Apr; 50(4):183-8

11 Lucas CE
Presidential address. Commercialism, consumerism, capitalism and care of the acutely ill surgical patient.
AM SURG 1977 Jun; 43(6):366-71

12 Hawkins ML Treat RC Mansberger AR Jr
The trauma score: a simple method to evaluate quality of care.
AM SURG 1988 Apr; 54(4):204-6

13 Stewart RD Paris PM Pelton GH Garretson D
Effect of varied training techniques on field endotracheal intubation success rates.
ANN EMERG MED 1984 Nov; 13(11):1032-6

14 Kallsen G Merritt-Lindgren M
An emergency medical services curriculum for emergency medicine residencies.
ANN EMERG MED 1984 Oct; 13(10):912-5

15 Kelen GD
Out-of-hospital pulmonary edema [letter]
ANN EMERG MED 1984 Jul; 13(7):575-6

16 Murphy JG Jacobson S
Assessing the quality of emergency care: the medical record versus patient outcome.
ANN EMERG MED 1984 Mar; 13(3):158-65

17 Silverman HM
Formal endorsement of FECs questioned [letter]
ANN EMERG MED 1981 Nov; 10(11):614

18 Szczygiel M Wright R Wagner E Holcomb MS
Prognostic indicators of ultimate long-term survival following advanced life support.
ANN EMERG MED 1981 Nov; 10(11):566-70

19 Lowry JW Lauro AJ
A general EMS curriculum for residency training.
ANN EMERG MED 1980 May; 9(5):250-2

20 Latman NS Wooley K
Knowledge and skill retention of emergency care attendants, EMT-As, and EMT-Ps.
ANN EMERG MED 1980 Apr; 9(4):183-9

21 Potter D Goldstein G Fung SC Selig M
A controlled trial of prehospital advanced life support in trauma.
ANN EMERG MED 1988 Jun; 17(6):582-8

22 Smith RJ Keseg DP Manley LK Standeford T
Intraosseous infusions by prehospital personnel in critically ill pediatric patients.
ANN EMERG MED 1988 May; 17(5):491-5

23 Durston W
Impact of HMOs on emergency medical services: another perspective.
ANN EMERG MED 1987 Jun; 16(6):683-5

24 Moore JE Eisenberg MS Cummins RO Hallstrom A Litwin P Carter W
Lay person use of automatic external defibrillation.
ANN EMERG MED 1987 Jun; 16(6):669-72

25 Pointer JE
The advanced life support base hospital audit for medical control in an emergency medical services system.
ANN EMERG MED 1987 May; 16(5):557-60

26 Cales RH Ehrlich F Sacra J Cross R Jr Ervin ME
Trauma care system guidelines: improving quality through the systems approach.
ANN EMERG MED 1987 Apr; 16(4):464

27 Baerman JM Morady F DiCarlo LA Jr de Buitleir M
Differentiation of ventricular tachycardia from supraventricular tachycardia with aberration: value of the clinical history.
ANN EMERG MED 1987 Jan; 16(1):40-3

28 Page JR
FECs and critical care [editorial]
ANN EMERG MED 1986 Aug; 15(8):969

29 Stueven H Troiano P Thompson B Mateer JR Kastenson EH Tonsfeldt D Hargarten K Kowalski R Aprahamian C Darin J
Bystander/first responder CPR: ten years experience in a paramedic system.
ANN EMERG MED 1986 Jun; 15(6):707-10

30 Leicht MJ Dula DJ Brotman S Anderson TE Gessner HW Parrish GA Rose WD
Rural interhospital helicopter transport of motor vehicle trauma victims: causes for delays and recommendations.
ANN EMERG MED 1986 Apr; 15(4):450-3

31 Rhee KJ Strozeski M Burney RE Mackenzie JR LaGreca-Reibling K
Is the flight physician needed for helicopter emergency medical services?
ANN EMERG MED 1986 Feb; 15(2):174-7

32 Rhee KJ Burney RE Mackenzie JR Conley J LaGreca-Reibling K Flora J
Therapeutic intervention scoring as a measure of performance in a helicopter emergency medical services program.
ANN EMERG MED 1986 Jan; 15(1):40-3

33 Pepe PE Copass MK Joyce TH
Prehospital endotracheal intubation: rationale for training emergency medical personnel.
ANN EMERG MED 1985 Nov; 14(11):1085-92

34 Ornato J Mlinek EJ Jr Craren EJ Nelson N
Ineffectiveness of the trauma score and the CRAMS scale for accurately triaging patients to trauma centers.
ANN EMERG MED 1985 Nov; 14(11):1061-4

35 Soler JM Montes MF Egol AB Nateman HR Donaldson EA Greene HH
The ten-year malpractice experience of a large urban EMS system.
ANN EMERG MED 1985 Oct; 14(10):982-5

36 Thompson BM Stueven HA Mateer JR Aprahamian CC Tucker JF Darin JC

39 Stueven HA Thompson B Aprahamian C Tonsfeldt DJ Kastenson EH
The effectiveness of calcium chloride in refractory electromechanical dissociation.
ANN EMERG MED 1985 Jul; 14(7):626-9

40 Powers RD
Serum chemistry abnormalities in adult patients with seizures.
ANN EMERG MED 1985 May; 14(5):416-20

41 Peacock JB Blackwell VH Wainscott M
Medical reliability of advanced prehospital cardiac life support.
ANN EMERG MED 1985 May; 14(5):407-9

42 Shea SR MacDonald JR Gruzinski G
Prehospital endotracheal tube airway or esophageal gastric tube airway: a critical comparison.
ANN EMERG MED 1985 Feb; 14(2):102-12

43 Stewart RD Burgman J Cannon GM Paris PM
A computer-assisted quality assurance system for an emergency medical service.
ANN EMERG MED 1985 Jan; 14(1):25-9

44 Evans RF Bull JP
Monitoring emergency care.
ANN R COLL SURG ENGL 1979 May; 61(3):234

45 Dooley A Lucas BG
The evaluation of emergency care. Development of a quantitative criterion.
ANN R COLL SURG ENGL 1978 Nov; 60(6):451-6

46 Silver MH
Quality emergency care.
AORN J 1969 Oct; 10(4):64-8

47 Bouzarth WF Mariano JP
Philadelphia Regional Emergency Medical Disaster Operations Plan (PREMDOP).
ARCH ENVIRON HEALTH 1969 Feb; 18(2):203-10

48 Sax FL Charlson ME
Utilization of critical care units. A prospective study of physician triage and patient outcome.
ARCH INTERN MED 1987 May; 147(5):929-34

49 Reinhold RB
Skoraya Pomosch: Emergency Medical Service of the Soviet Union.
ARCH SURG 1976 May; 111(5):528-31

50 Fiedler MD Jones LM Miller SF Finley RK
A correlation of response time and results of abdominal gunshot wounds.
ARCH SURG 1986 Aug; 121(8):902-4

51 Anderson IW Black RJ Ledingham IM Little K Robertson CE Urquhart JD
Early emergency care study: the potential and benefits of advanced prehospital care.
BR MED J 1987 Jan 24; 294(6566):228-31

52 (No author listed)
Deputising services [letter]
BR MED J [CLIN RES] 1984 Feb 18; 288(6416):570-1

53 Gleadhill DN Thomson JY Simms P
Can more efficient use be made of x ray examinations in the accident and emergency department?
BR MED J [CLIN RES] 1987 Apr 11; 294(6577):943-7

54 Weaver WD Copass MK Bufi D Ray R Hallstrom AP Cobb LA
Improved neurologic recovery and survival after early defibrillation.
CIRCULATION 1984 May; 69(5):943-8

55 Champion HR Sacco WJ
Measurement of patient illness severity [editorial]
CRIT CARE MED 1982 Aug; 10(8):552-3

56 Benson DM Stewart C
Inadequacy of prehospital emergency care.
CRIT CARE MED 1973 May-Jun; 1(3):130-4

57 Poulton TJ Kisicki PA
Medical directors of critical care air transport services.
CRIT CARE MED 1987 Aug; 15(8):784-5

58 Stair TO
Quality assurance.
EMERG MED CLIN NORTH AM 1987 Feb; 5(1):41-50

59 Johnson DV
An administrative perspective on emergency medicine.
EMERG MED CLIN NORTH AM 1987 Feb; 5(1):149-53

60 Stewart RD
Medical direction in emergency medical services: the role of the physician.
EMERG MED CLIN NORTH AM 1987 Feb; 5(1):119-32

61 Mayer TA
The emergency department medical director.
EMERG MED CLIN NORTH AM 1987 Feb; 5(1):1-29

62 Krischer JP
Indexes of severity: conceptual development.
HEALTH SERV RES 1979 Spring; 14(1):56-67

63 Siler KF
Evaluation of emergency ambulance characteristics under several criteria.
HEALTH SERV RES 1979 Summer; 14(2):160-76

64 Thompson HK Jackson PM Mattox KL McIntosh HD
Impact of ambulance life support on outcomes of cardiovascular emergencies.
HEART LUNG 1979 May-Jun; 8(3):486-94

65 DeLeo BC
Endotracheal intubation by rescue squad personnel.
HEART LUNG 1977 Sep-Oct; 6(5):851-4

66 (No author listed)
Paramedics trained to use local medical information pack.
HOSPITALS 1981 Feb 1; 55(3):51

67 (No author listed)
Drug information in the home can save lives.
HOSPITALS 1979 Jul 1; 53(13):36-7

68 Friedman E
Emergency services: growing discipline comes of age.
HOSPITALS 1979 Apr 1; 53(7):85-6, 90, 94-5 passim

69 (No author listed)
Hospital-patient communication aided by innovative medical forms: medical information card aids deaf patients.
HOSPITALS 1979 Jan 1; 53(1):14-5

70 Smith LR
Annual administrative reviews. Emergency services.
HOSPITALS 1974 Apr 1; 48(7):143-5 passim

71 Taubenhaus LJ
Emergency services.
HOSPITALS 1972 Apr 1; 46(7):81-6

72 Sanger RG Bomberg TJ Domer LR
Training programs in emergency medical services for the dental professions.
J AM DENT ASSOC 1979 May; 98(5):695-700

73 Miles SH
Advanced directives to limit treatment: the need for portability [editorial]
J AM GERIATR SOC 1987 Jan; 35(1):74-6

74 Aranosian RD
Medicolegal considerations in emergency medicine.
J AM OSTEOPATH ASSOC 1985 Mar; 85(3):171-5

75 Racey GL Weaver JM
Teaching advanced life support to predoctoral dental students.
J DENT EDUC 1979 Oct; 43(11 Pt 1):590-3

76 Schoonover SC Bassuk EL Smith R Gaskill D
The use of videotape programs to teach interpersonal skills.
J MED EDUC 1983 Oct; 58(10):804-10

77 Nine-Curt J
Medical education and medical care in Puerto Rico.
J MED EDUC 1973 Dec; 48(12):121-3

78 Fischer RP Flynn TC Miller PW Duke JH Jr
Urban helicopter response to the scene of injury.
J TRAUMA 1984 Nov; 24(11):946-51

79 Luterman A Ramenofsky M Berryman C Talley MA Curreri PW
Evaluation of prehospital emergency medical service (EMS): defining areas for improvement.
J TRAUMA 1983 Aug; 23(8):702-7

80 Hedges JR Sacco WJ Champion HR
An analysis of prehospital care of blunt trauma.
J TRAUMA 1982 Dec; 22(12):989-93

81 Law DK Law JK Brennan R Cleveland HC
Trauma operating room in conjunction with an air ambulance system: indications, interventions, and outcomes.
J TRAUMA 1982 Sep; 22(9):759-65

82 Milholland AV Cowley RA Panos ML
Patient vital signs cards.
J TRAUMA 1981 Jan; 21(1):52-4

83 Cayten CG Evans W
Severity indices and their implications for emergency medical services research and evaluation.
J TRAUMA 1979 Feb; 19(2):98-102

84 Knudson P Frecceri CA DeLateur SA
Improving the field triage of major trauma victims.
J TRAUMA 1988 May; 28(5):602-6

85 Clevenger FW Yarbrough DR Reines HD
Resuscitative thoracotomy: the effect of field time on outcome.
J TRAUMA 1988 Apr; 28(4):441-5

86 Baker SP ONeill B Haddon W Jr Long WB
The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care.
J TRAUMA 1974 Mar; 14(3):187-96

87 Boyd DR Lowe RJ Sheaff LC Hoecker C Rappaport DM
A profile of the trauma registry.
J TRAUMA 1973 Apr; 13(4):316-20

88 Aho AJ Vanttinen EA Nelimarkka OI
Rupture of the pericardium with luxation of the heart after blunt trauma.
J TRAUMA 1987 May; 27(5):560-3

89 Boyd CR Tolson MA Copes WS
Evaluating trauma care: the TRISS method. Trauma Score and the Injury Severity Score.
J TRAUMA 1987 Apr; 27(4):370-8

90 Baxt WG Moody P
The impact of advanced prehospital emergency care on the mortality of severely brain-injured patients.
J TRAUMA 1987 Apr; 27(4):365-9

91 Shackford SR Hollingworth-Fridlund P Cooper GF Eastman AB
The effect of regionalization upon the quality of trauma care as assessed by concurrent audit before and after institution of a trauma system: a preliminary report.
J TRAUMA 1986 Sep; 26(9):812-20

92 Kreis DJ Jr Plasencia G Augenstein D Davis JH Echenique M Vopal J Byers P Gomez G
Preventable trauma deaths: Dade County, Florida.
J TRAUMA 1986 Jul; 26(7):649-54

93 Johnson KD Cadambi A Seibert GB
Incidence of adult respiratory distress syndrome in patients with multiple musculoskeletal injuries: effect of early operative stabilization of fractures.
J TRAUMA 1985 May; 25(5):375-84

94 Smith JP Bodai BI Hill AS Frey CF
Prehospital stabilization of critically injured patients: a failed concept.
J TRAUMA 1985 Jan; 25(1):65-70

95 Ottosson A Krantz P
Traffic fatalities in a system with decentralized trauma care. A study with special reference to potentially salvageable casualties.
JAMA 1984 May 25; 251(20):2668-71

96 Eisenberg MS Copass MK Hallstrom A Cobb LA Bergner L
Management of out-of-hospital cardiac arrest. Failure of basic emergency medical technician services.
JAMA 1980 Mar 14; 243(10):1049-51

97 Harvey JC
The Emergency Medical Service Systems Act of 1973.
JAMA 1974 Nov 25; 230(8):1139-40

98 Andrews JL Jr
Medical care in Sweden. Lessons for America.
JAMA 1973 Mar 19; 223(12):1369-75

99 Nahum AM
Emergency medical care systems.
JAMA 1971 Sep 13; 217(11):1530-2

100 Smith RA Bassett GR Markarian CA Vath RE Freeman WL Dunn GF
A strategy for health manpower. Reflections on an experience called MEDEX.
JAMA 1971 Sep 6; 217(10):1362-7

101 Storey PB Roth RB
Emergency medical care in the Soviet Union. A study of the Skoraya.
JAMA 1971 Aug 2; 217(5):588-92

102 Baxt WG Moody P
The impact of a physician as part of the aeromedical prehospital team in patients with blunt trauma.
JAMA 1987 Jun 19; 257(23):3246-50

103 Cummins RO Eisenberg MS Litwin PE Graves JR Hearne TR Hallstrom AP
Automatic external defibrillators used by emergency medical technicians. A controlled clinical trial.
JAMA 1987 Mar 27; 257(12):1605-10

104 Holroyd BR Knopp R Kallsen G
Medical control. Quality assurance in prehospital care.
JAMA 1986 Aug 22-29; 256(8):1027-31

105 Miles SH Crimmins TJ
Orders to limit emergency treatment for an ambulance service in a large metropolitan area.
JAMA 1985 Jul 26; 254(4):525-7

106 Cummins RO Eisenberg MS
Prehospital cardiopulmonary resuscitation. Is it effective?
JAMA 1985 Apr 26; 253(16):2408-12

107 Smith JP Bodai BI
The urban paramedic's scope of practice.
JAMA 1985 Jan 25; 253(4):544-8

108 (No author listed)
A study of the utilisation of skull radiography in 9 accident-and- emergency units in the U.K. A national study by the Royal College of Radiologists.
LANCET 1980 Dec 6; 2(8206):1234-6

109 Eisenberg MS Bergner L Hallstrom A
Out-of-hospital cardiac arrest: improved survival with paramedic services.
LANCET 1980 Apr 12; 1(8172):812-5

110 Myrick JA Kay BJ Kishbaugh D Pittman JV Sayford NF
Acceptance of a volunteer first-responder system in rural communities: a field experiment.
MED CARE 1983 Apr; 21(4):389-99

111 Sytkowski PA Pozen MW DAgostino RB
An analytic method for the evaluation of rural Emergency Medical Service development.
MED CARE 1981 May; 19(5):526-46

112 Mitchell JB Pozen MW DAgostino RB Berezin MM
Implications of alternative sampling strategies for emergency medical service evaluation.
MED CARE 1979 Aug; 17(8):828-34

113 Mayer JD
Emergency medical service: delays, response time and survival.
MED CARE 1979 Aug; 17(8):818-27

114 Sherman MA Rath GJ Schofer JL Thompson CW
Threats to the validity of emergency medical services evaluation: a case study of mobile intensive care units.
MED CARE 1979 Feb; 17(2):127-38

115 Beck JC
An administrative record system for ambulatory facilities.
MED CARE 1974 Mar; 12(3):241-50

116 Allen DV Kuhns PL Werley HH Peabody SR
Agencies' perceptions of factors affecting home care referral.
MED CARE 1974 Oct; 12(10):828-44

117 Ermann D Gabel J
The changing face of American health care. Multihospital systems, emergency centers, and surgery centers.
MED CARE 1985 May; 23(5):401-20

118 Harrison RA
Review of the results of laceration repair in an accident and emergency department [letter]
MED J AUST 1980 Sep 20; 2(6):344-5

119 Ryan JG
The function and fate of locum services. Comment 1.
MED J AUST 1976 May 8; 1(19):710

120 Elliott P
The function and fate of locum services.
MED J AUST 1976 May 8; 1(19):709-10

121 Scott-Findlay J
Darwin and the natural disasters organization.
MED J AUST 1975 May 24; 1(21):644-6

122 Petrovsky CC Maxwell VK
Emergency medical services in the U.S.S.R.
MED J AUST 1974 May 11; 1(19):758-60

123 Ryan GA Clark PD
The emergency care of traffic injury. Care before hospital.
MED J AUST 1972 Jun 3; 1(23):1173-82

124 Brand DA Acampora D Gottlieb LD Glancy KE Frazier WH
Adequacy of antitetanus prophylaxis in six hospital emergency rooms.
N ENGL J MED 1983 Sep 15; 309(11):636-40

125 Eisenberg MS Copass MK Hallstrom AP Blake B Bergner L Short FA Cobb LA
Treatment of out-of-hospital cardiac arrests with rapid defibrillation by emergency medical technicians.
N ENGL J MED 1980 Jun 19; 302(25):1379-83

126 Lister J
By the London Post. Access to primary care—the paradox of medical care—prospect for change?
N ENGL J MED 1979 Jun 28; 300(26):1474-6

127 (No author listed)
Letter: Art of medicine for aged doctors.
N ENGL J MED 1976 Oct 7; 295(15):842-4

128 Noble BK
Toward a system of emergency medical care.
N ENGL J MED 1976 Mar 11; 294(11):609-11

129 Lister J
By the London post. Conflicting loyalties in a damaging dispute—An ancient rivalry—Disaster on the tube.
N ENGL J MED 1975 May 29; 292(22):1171-3

130 (No author listed)
Improving emergency medical services.
N ENGL J MED 1974 Mar 14; 290(11):628-9

131 Richards JC
The personal doctor—a luxury or a necessity?
NZ MED J 1974 Mar 13; 79(510):732-4

132 Read JH
Traffic accidents involving child pedestrians: a program for their prevention.
PEDIATRICS 1969 Nov; 44(5):Suppl:838-47

133 Frey CF Mangold K
The physician and the emergency health service system.
POSTGRAD MED 1974 Jan; 55(1):197-204

134 Roghmann KJ Powell EA
Impact of Medicaid and an OEO health center on use of dental services in an urban area.
HSMHA HEALTH REP 1974 Aug; 89(4):325-9

135 Metsch JM Schwarz A Donn W
An assessment of provider behavior in shared professional facilities.
HSMHA HEALTH REP 1974 Aug; 89(4):307-14

136 Metsch JM Schwarz A Donn W
An assessment of provider behavior in shared professional facilities.
PUBLIC HEALTH REP 1974 Jul-Aug; 89(4):307-14

137 Ederma AB
Occupational health services for Federal employees.
PUBLIC HEALTH REP 1970 Jun; 85(6):550-7

138 Mac Mahon AG
The modified vital index in prehospital emergency care.
S AFR MED J 1985 Aug 17; 68(4):238-42

139 Scott CD
Health care delivery and advanced technology.
SCIENCE 1973 Jun 29; 180(93):1339-42

140 Swineford O Jr
Medical education: retrospective and prospective observations.
SOUTH MED J 1977 Feb; 70(2):191-4

141 Yunker RM Levine MK Sajid AW
Freestanding emergency centers and the patient population of internists.
SOUTH MED J 1986 Apr; 79(4):424-7

142 Jensen NH
A medically staffed emergency ambulance service. Report of a 5-year prospective study.
ACTA ANAESTHESIOL SCAND 1983 Jun; 27(3):226-8

143 Derom F Van de Velde G Schoofs E
[The organization of a service for first aid in accidents]
ACTA CHIR BELG 1966; :Suppl 3:5-12 (Published in DUTCH)

144 Arbelo Lopez de Letona A Lopez C Canovas M
[Pediatric emergencies. An insoluble problem? (editorial)]
AN ESP PEDIATR 1986 Feb; 24(2):81-2 (Published in SPANISH)

145 Wollinsky KH Mehrkens HH Haas S
[The traumatic emergency patient in emergency service. Critical evaluation of 718 emergency cases]
ANAESTHESIST 1984 Jan; 33(1):47-55 (Published in GERMAN)

146 Ellinger K Grau U Hartung HJ Osswald PM
[Medical performance record of emergency physicians' mobile unit and emergency aid helicopter]
ANASTH INTENSIVTHER NOTFALLMED 1983 Aug; 18(4):204-9 (Published in GERMAN)

147 Richard JP Tonellot JL Gippet J Blanc JF Valat J Mille C Benatia P Olivier P Kassim S Serre L
[Analytical study and processing of information from a primary intervention report]
ANN ANESTHESIOL FR 1978; 19(9):790-4 (Published in FRENCH)

148 Beckers R Pleysier B
[Bottlenecks in emergency medical services]
ARCH BELG 1986; 44(5-6):217-44 (Published in DUTCH)

149 Just H Lang KF Limbourg P Scholmerich P
[Intensive care of acute myocardial infarct in the framework of an internal medicine department]
BULL SOC SCI MED GRAND DUCHE LUXEMB 1973 Nov; 110(2):259-63 (Published in GERMAN)

150 Dostal J Vanak V Masarik Z
[Documentation of first aid services]
CESK ZDRAV 1980 Dec; 28(12):516-9 (Published in CZECH)

151 Kavaler F Swire MR
Health services for foster children: an evaluation of agency programs.
CHILD WELFARE 1974 Mar; 53(3):147-57

152 Penschuck C
[Problems with multitraumatized severely injured in a small, so- called peripheral hospital]
CHIRURG 1979 Feb; 50(2):114-7 (Published in GERMAN)

153 Wilson DH
The development of accident and emergency medicine.
COMMUNITY MED 1980 Feb; 2(1):28-35

154 Safar P
Health care delivery problems and goals: a personal philosophic appraisal.
CLIN ANESTH 1974; 10(3):1-32

155 Franke K
[Incidence of skull-brain injuries in Berlin and problems of their management]
DTSCH GESUNDHEITSW 1967 Oct 19; 22(42):1982-5 (Published in GERMAN)

156 Popova TP
[Improvement of skills of paramedical personnel at first aid centers]
FELDSHER AKUSH 1979 Mar; 44(3):52-5 (Published in RUSSIAN)

157 Moss JG Ross WB Small WP
Sources of referral and letter content of acute surgical emergencies referred to one general surgical unit.
HEALTH BULL (EDINB) 1984 May; 42(3):126-31

158 Young M Ponder LD Hurley RS
Educating the consumer about emergency medical services.
HEALTH SOC WORK 1978 Aug; 3(3):173-81

159 Spitzer G
[Effectiveness surveillance of first aid education of lay persons]
HEFTE UNFALLHEILKD 1978; (132):92-4 (Published in GERMAN)

160 Lynch WR Jr
Indiana's Emergency Medical Services. An open letter to physicians interested in improving pre-hospital (ambulance) patient care.
INDIANA MED 1985 Oct; 78(10):898-9

161 Snook R
Medical care at accidents and disasters.
INJURY 1978 Aug; 10(1):14-21

162 London PS
Observations on medical investigation of ambulance services.
INJURY 1972 Apr; 3(4):225-38

163 Ryan GA
Casualty care in car crashes.
INT J EPIDEMIOL 1974 Mar; 3(1):31-5

164 Teeling-Smith G
More money into the medical sector: is this the answer?
INT J HEALTH SERV 1973; 3(3):493-500

165 Beck RG
Economic class and access to physician services under public medical care insurance.
INT J HEALTH SERV 1973; 3(3):341-55

166 (No author listed)
Recommended standards and practices for a college health program.
J AM COLL HEALTH ASSOC 1977 Mar; 25 Spec No:1-35

167 Miller PJ
Liability issues in contact lens practice.
J AM OPTOM ASSOC 1986 Mar; 57(3):227-9

168 De Angelis C McHugh M
The effectiveness of various health personnel as triage agents.
J COMMUNITY HEALTH 1977 Summer; 2(4):268-77

169 Pointer JE Osur MA
EMS quality assurance: a computerized incident reporting system.
J EMERG MED 1987 Nov-Dec; 5(6):513-7

170 Zautcke JL Lee RW Ethington NA
Paramedic skill decay.
J EMERG MED 1987 Nov-Dec; 5(6):505-12

171 Pons PT Dinerman N Rosen P Dernocoeur K Coxon K Marlin R
The field instructor program: quality control of prehospital care, the first step.
J EMERG MED 1985; 2(6):421-7

172 Headrick RW Leonard MS Goldman J
A quality of care evaluation measure for emergency medical service systems.
J MED SYST 1978; 2(4):281-301

173 Bismuth V Ferrane J
[The organization of a radiology service in a general hospital]
J RADIOL ELECTROL MED NUCL 1972 Mar; 53(3):260-1 (Published in FRENCH)

174 Howell KA Martin JE
An evaluation model for school health services.
J SCH HEALTH 1978 Sep; 48(7):433-42

175 Neujahr H Kelley G Owen M Verwayen D
School health service needs in Wisconsin.
J SCH HEALTH 1975 Dec; 45(10):595-8

176 Harrison RR Maull KI Boyan CP
Emergency medical technician (EMT-A) instruction of medical students.
JACEP 1979 Dec; 8(12):513-4

177 Eisenberg M Bergner L Hallstrom A Pierce J
Evaluation of paramedic programs using outcomes of prehospital resuscitation for cardiac arrest.
JACEP 1979 Nov; 8(11):458-61

178 McSwain NE Jr
Medical control—what is it?
JACEP 1978 Mar; 7(3):114-6

179 Skelton MB McSwain NE
A study of cognitive and technical skill deterioration among trained paramedics.
JACEP 1977 Oct; 6(10):436-8

180 Anderson GV Roy A Looney GL Donnelly P
A unique approach to evaluation of emergency care.
JACEP 1977 Jun; 6(6):254-8

181 Lenehan GP Bowie S Ruksnaitis N
Rape victim protocol and chart for use in the emergency department.
JEN 1983 Mar-Apr; 9(2):83-90

182 Robbins D
Ethical questions surrounding "neighborhood emergency centers": balancing access with quality.
JEN 1982 Sep-Oct; 8(5):264-5

183 Willis DT
A study of nursing triage.
JEN 1979 Nov-Dec; 5(6):8-11

184 Ness B
California EMSC project establishes guidelines for rural pediatric emergency care [news]
JEN 1988 Mar-Apr; 14(2):125-6

185 Halpern JS
Precautions to prevent transmission of human immunodeficiency virus infections in emergency settings.
JEN 1987 Sep-Oct; 13(5):298-300

186 Szczypiorowski B Rywik S Mikolajczyk W Korewicki J
[Evaluation of the reliability of data on the incidence of myocardial infarct based on the records of Warswa Emergency Health Services]
KARDIOL POL 1976; 29(6):499-506 (Published in POLISH)

187 Popov VG Topolianskii VD
[Analysis of the materials concerning pulmonary edema in extrahospital conditions]
KLIN MED (MOSK) 1974; 52(8):67-71 (Published in RUSSIAN)

188 Burghart H
[The emergency physician in the system of the rescue organization]
KRANKENPFLEGE (FRANKFURT) 1982 Feb; 36(2):52-3 (Published in GERMAN)

189 Cecchini RA Ferraro PJ
The standard of care in emergency room procedure.
LEG ASPECTS MED PRACT 1977 Dec; 5(12):45-50

190 Houtchens B
Initial evaluation and management of major trauma in the rural setting: an appeal for a 'national standard'.
LEG ASPECTS MED PRACT 1977 Dec; 5(12):38-9

191 Dobosevic A
[Organization of emergency service in injuries]
MED GLAS 1972 May-Jun; 26(5):201-4 (Published in SERBO-CROATIAN, ROMAN)

192 Currey CJ
Adapting the medical audit to the practice of the military physician's assistant.
MILIT MED 1980 Jul; 145(7):498-503

193 Munter DW
The Emergency Treatment Record: time for a change [editorial]
MILIT MED 1988 Jan; 153(1):53

194 Delovski D
[Methodology of supervision of the professional work of emergency medical service]
NAR ZDRAV 1971 Feb; 27(2):70-3 (Published in SERBO-CROATIAN, ROMAN)

195 Rausch T Rund D
Nurses' clinical judgments.
NURS MANAGE 1981 Dec; 12(12):24-6

196 Davidson RG
Paramedics at work-4. Learning the job.
NURS TIMES 1982 Feb 10-16; 78(6):252-5

197 Bailey A Hallam K Hurst K
Nursing practice. Triage on trial.
NURS TIMES 1987 Nov 4-10; 83(44):65-6

198 Creighton H
Your legal risks in emergency care.
NURSING (HORSHAM) 1978 Feb; 8(2):52-5

199 Shumada IV Kostin NS
[Organizational problems of medical care for trauma patients in vehicular road accidents]
ORTOP TRAVMATOL PROTEZ 1987 Jun; (6):64-6 (Published in RUSSIAN)

200 Shumada IV Protsyk AI
[Improvement in the medical care for victims of vehicular traffic accidents at the prehospital stage]
ORTOP TRAVMATOL PROTEZ 1987 Mar; (3):41-4 (Published in RUSSIAN)

201 Balakina VS Briantseva LN Lavrov AI Povarushkin NS Pavlova MN
[Comparative evaluation of disability in traffic and transportation and occupational injuries and means of decreasing them]
ORTOP TRAVMATOL PROTEZ 1986 May; (5):56-9 (Published in RUSSIAN)

202 Weigel JA Resinger WW
Are you in good hands?
PA MED 1975 Nov; 78(11):53-4

203 Slater PE Ellencweig AY Goldstein L Dresner R Fink TR
Quality of emergency room care during the Israel doctors' strike.
PUBLIC HEALTH 1984 Nov; 98(6):354-60

204 Cohen S Wolpin S Cohen BD
Medical emergency: clinical basis of combined patient care audit criteria for diabetic ketoacidosis.
QRB 1978; Special No:12-9

205 Kresky B Henry MC
Responsibilities for quality assurance in prehospital care.
QRB 1986 Jul; 12(7):230-5

206 Gaillet RP
[Health services and the medical practitioner: viewpoint of a general practitioner]
REV MED SUISSE ROMANDE 1986 Oct; 106(10):953-66 (Published in FRENCH)

207 Danes L Snajdr V
[Results of the 1974-1976 survey of the activities of the First Aid Station at the Institute of Public Health of Prague]
SANTE PUBLIQUE (BUCUR) 1977; 20(2):167-74 (Published in FRENCH)

208 Hallstrom A Eisenberg MS Bergner L
Modeling the effectiveness and cost-effectiveness of an emergency service system.
SOC SCI MED [MED ECON] 1981 Mar; 15C(1):13-7

209 Vavulina NN
[Emergency medical service in RSFSR and the measures for its further improvement]
SOV MED 1976; (9):3-7 (Published in RUSSIAN)

210 Kustova EA Arbakov AI Paskevich IuB
[Method for determining the standards of urban population need for emergency outpatient medical aid]
SOV ZDRAVOOKHR 1973; 32(3):30-6 (Published in RUSSIAN)

211 Kolotilova IA
[Quality control of injury treatment]
SOV ZDRAVOOKHR 1971; 30(7):46-8 (Published in RUSSIAN)

212 Kustova EA Arbakov AI Vil AA
[Experience in organizing emergency medical service in Tartu, Estonian SSR]
SOV ZDRAVOOKHR 1969; 28(9):42-5 (Published in RUSSIAN)

213 Knudsen T
[Poor education of Falck emergency paramedics costs human lives (interview by Helle Kastholm Hansen)]
SYGEPLEJERSKEN 1987 Sep 30; 87(40):14-6 (Published in DANISH)

214 Ostby BA
[Transport services in radical change. Nursing's role in ambulance services]
SYKEPLEIEN 1985 Jan 23; 72(2):12-8 (Published in NORWEGIAN)
215 Clogston CP
Medical control of EMS in San Antonio.
TEX MED 1986 Aug; 82(8):21-4
216 (No author listed)
TDH rules on hospital transfers take effect April 1.
TEX MED 1986 Mar; 82(3):59-62
217 Malterud K
[Battered wives' patterns of injuries and life situation. A study from the Oslo Municipal Emergency Service]
TIDSSKR NOR LAEGEFOREN 1982 Nov 30; 102(33):1787-90 (Published in NORWEGIAN)
218 Blikra G
[Catastrophe planning for hospitals]
TIDSSKR NOR LAEGEFOREN 1971 Sep 20; 91(26):1862-4 (Published in NORWEGIAN)
219 Otterstad HK Hjortdahl P
[Do patients get the right level of care? A study of patients and the stream of patients at the Red Cross emergency department in Oslo]
TIDSSKR NOR LAEGEFOREN 1985 Oct 20; 105(29):2076-80 (Published in NORWEGIAN)
220 Sijbrand JT
[How qualified is the ambulance nurse, and will he be even more skilled?]
TIJDSCHR ZIEKENVERPL 1983 Feb 1; 36(3):74-7 (Published in DUTCH)
221 Schraa J Volckmann CA
[First Aid in Accidents for nurses. III. Observations on the nurse's functioning in and around the ambulance]
TIJDSCHR ZIEKENVERPL 1979 Nov 27; 32(24):1110-20 (Published in DUTCH)
222 Boisen E
[Iatrotropy and relevance of the medical service in Copenhagen 1975. Does the function of medical service meet the patient's requirements]
UGESKR LAEGER 1975 Nov 10; 137(46):2745-8 (Published in DANISH)
223 Wenzel V Attinger E Rockwell D Stearns C Rosenthal K Buck R Edlich R
Evaluating the pre-hospital phase of the emergency medical system.
VA MED 1979 Nov; 106(11):858-9
224 Thomasson J
[That's why SHSTF needs to get signed contract: nurses are guarantee for medical quality]
VARDFACKET 1985 Nov 14; 9(20):18-20 (Published in SWEDISH)
225 Tomesch W
[Emergency measures in acute arterial occlusion of the extremities]
Z AERZTL FORTBILD (JENA) 1980 Feb 15; 74(4):159-60 (Published in GERMAN)
226 Roding H
[Guidelines for medical assistance in a mass disaster of burns]
Z AERZTL FORTBILD (JENA) 1971 Jan 15; 65(2):57-62 (Published in GERMAN)
227 Orlov AN Stegunin SI
[Experience with the operation of rural emergency medical services]
ZDRAVOOKHR ROSS FED 1972 Nov; 16(11):15-22 (Published in RUSSIAN)
228 Karachunskaia MI
[Acute public health problems in the USA (review of the foreign literature)]
ZDRAVOOKHR ROSS FED 1971 Mar; 15(3):34-9 (Published in RUSSIAN)
229 Jeuter J
[The missing sick card. Billing in private practice—claims]
Z ALLGEMEINMED 1970 Mar 20; 46(8):397-400 (Published in GERMAN)

Call for Abstracts

12th Annual Educational Conference of the National Association of Emergency Medical Technicians

The 12th Annual Educational Conference of the National Association of Emergency Medical Technicians will be held June 6-11, 1989 at the Allis Plaza Hotel in Kansas City, Missouri. The Scientific Session Subcommittee is now accepting original research papers involving all aspects of prehospital care. Several papers will be selected for presentation at the conference and considered for publication in the *Journal of Prehospital Medicine*.

Research papers submitted for review must not have been published previously in a refereed medical journal nor presented at any other national conference. The primary investigator/author must be a non-physician who is actively involved in some aspect of prehospital care. Co-investigator/authors may include physicians, nurses, scientists and those involved in allied health professions. All papers must include an abstract submitted on the official abstract form and must be postmarked no later than February 15, 1989.

For more information and to receive an official abstract form, contact: Jeff Salomone, REMT-P, c/o NAEMT, 9140 Ward Parkway, Kansas City, MO 64114 or telephone (816) 444-3500.

Journal of Prehospital Medicine

Volume 2, Number 2
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Abstracts

Compiled by Journal Staff

Esophageal Placement of an Endotracheal Tube By Paramedics

Abarbanell NR
American Journal of Emergency Medicine 6:178-179, 1988

Accidental intubation of the esophagus is a hazard of endotracheal intubation. Caroline advocates in her text, *Emergency Care in the Streets*, immediate extubation when this error occurs. The author, a paramedic, offers several reasons why this action may not always be desirable. His rationale includes: A) maintaining a cuffed endotracheal tube in the esophagus may contain otherwise regurgitated gastric contents B) an esophageally placed endotracheal tube provides a direct route to the stomach for decompression and C) the placement of an endotracheal tube in the esophagus may facilitate endotracheal intubation. He further goes on to point out that work by Greenbaum, et al has demonstrated maintenance of adequate oxygenation in dogs by ventilation being done with supplemental oxygen in conjunction with esophageal occlusion by an 18 French Foley catheter with a 30-ml balloon. Thus, if endotracheal intubation proves impossible, sufficient esophageal occlusive force may be obtained to reach adequate P02 levels on ventilation by closing the proximal end of an ET tube placed in the esophagus and ventilating the patient with a bag valve mask and supplemental 02. The problem of the end of the tube protruding from the mouth and preventing a good face mask seal can be managed by cutting down the tube to a more suitable size. The author concludes by advocating that protocols should suggest that in the event of accidental esophageal intubation, the misplaced tube should only be removed after first protecting the airway with a correctly positioned, cuffed endotracheal tube. 11 references. Reprints: NR Abarbanell, 1919 Washington St., Evanston, IL 60202.

Cactus Spine Injuries

Lindsey D, Lindsey W
American Journal of Emergency Medicine 6:362-369, 1988

The removal of various types of foreign bodies from the skin can sometimes prove to be a tiresome challenge. Cacti are commonly found in various parts of the world including the desert southwest region of the United States. The problem with cacti is the spines cling to the body with varying degrees of tenacity. In this article, the authors review the four types of culprit spines: long spines, medium spines, small and very small spines, and discuss the basic characteristics and clinical implications of each. Spine length can vary from as long as 15 cm to as small as 4-8 mm. Infection of cactus spine punctures is reported as being rare. Chronic granulomatous reaction induced by spine fragments is more common and maybe due to the cactus itself or an accompanying fungi. A glochid (a small spine cacti such as the polka dot cactus or bunny ear cactus) in the eye can be a major emergency because it's tiny, translucent, yellow or white form is almost impossible to locate. In addition to recommending the general use of goggles, gloves and long sleeves for self protection, the authors discuss using several types of agents for small or very numerous spine removal (the other types can usually be removed simply with tweezers). Rubber cement, white woodworking glue, and depilatory have been discussed in the medical literature. However, the authors suggest the best approach may be the use of a water soluble facial gel which can be applied with a fan brush. The gel is patted on gently until thin at the edges, allowed to dry (takes 20 minutes in the desert or can be expedited by a hair dryer) and then picked up at the edge with fingernails. The gel (unnamed) was found at a local academy of beauty. The success in using this agent to remove the culprit spines was reported to be 99.9%. Reprints: D. Lindsey, MD, Section of Emergency Medicine, University of Arizona, Tucson, AZ 85724.

Tracheal Tubes in Cold Stress

Dahlgren BE, Nilsson HG, Viklund B
Anaesthesia 43:683-686, 1988

Tracheal intubation in cold weather may be made more difficult by stiffening of the tube and cuff, occasionally becoming damaged in storage and use. An evaluation of plastic and rubber endotracheal tubes in cold temperatures was made to document the problem and develop corrective measures. Various brands and sizes were studied at temperatures of 20, 10, 0, -10, and -20 degrees Centigrade. The force required to reshape the tube to a normal contour was measured using a dynamomter. Elasticity of the cuff was measured by increases in cuff air pressure when insufflated with a fixed volume of air. Deformation of the tube was measured by bending it approximately 180 degrees around a metal rod until the inner walls of the tube were in contact with each other. Gentle pulling force was applied to the insufflation catheter to test the adhesive point. The cuff adapter and air lock were squeezed by forceps to test their strength. The force required to reshape tubes to a normal contour changed very little with lower temperature but was more pronounced with plastic tubes. Cuff elasticity was greatly reduced by lower temperature but was much less noticeable in the rubber tubes. In deformation, plastic tubes cracked but rubber tubes were not damaged.

Pulling the insufflation tubes and squeezing the cuff adapters caused damage in plastic tubes but none with the rubber tubes. The authors conclude that rubber tubes are preferable to plastic tubes in cold temperatures. Any plastic tubes used in cold environments must be thoroughly protected in storage and inspected prior to use. The authors suggest that the rescuers body heat may be used to rewarm tubes prior to use.

Out-of-Hospital Cardiac Arrest : A Six-Year Experience in a Suburban-Rural System
Eitel DR, Walton SL, Guerci AD, Hess DR
Annals of Emergency Medicine 17:808-812, 1988

Using the proposed uniform reporting format of Eisenberg et al, the authors retrospectively evaluated out of hospital cardiac arrests for a six year period in the suburban-rural area around York, Pennsylvania. In cases of VF or VT, the survival rate was 29% where BLS was started within 4 minutes and ALS was started within 10 minutes. These survival rates dropped to 7% if BLS was started within 4 minutes but ALS was delayed beyond 10 minutes. If BLS was delayed beyond 4 minutes but ALS was begun within 10 minutes, the survival rate was 10%. If BLS was delayed beyond 4 minutes and BLS was delayed beyond 10 minutes, the survival rate dropped to 4%. This study reinforces the essential importance of initiating BLS in less than 4 minutes and initiating ALS in less than 10 minutes. Questions related to the time of defibrillation are not addressed. Reprints: David R. Eitel, MD, Emergency Medical Resource Center, York Hospital, 1001 South George Street, York, PA 17405

A Prospective Evaluation of Field Categorization of Trauma Patients
Kries DJ, Fine EG, Gomez GA, et al
Journal of Trauma 28(7):995-1000, 1988

No single methodology has been adopted by EMS agencies to select cases requiring trauma center care. A prospective evaluation was made of the field trauma categorization method used in the Dade County, FL (Miami area) EMS system in a one year period, encompassing 8,891 trauma cases which were transported to a hospital. The Dade County EMS system utilized an adaptation of the Trauma Score and recommendations from the 1983 Conference on Injury Severity Scoring and Triage. These criteria included commonly employed criteria such as Trauma Score less than 13, Glascow Coma Score less than 10, motor vehicle accident impact at greater than 40 M.P.H., etc. Paramedics were required to document the reason for transport to a trauma center on their run report. Initial hospital disposition of patients was used as the criteria for assessment of severity in this study and not the Injury Severity Score. Severe trauma was defined as any patient who died in the ED, underwent emergency surgery or was directly admitted to the ICU. Moderate injury included all those who were admitted to the hospital. Data was collected from rescue reports and all area hospital trauma coordinators for computerization by the trauma registrar. High speed motor vehicle accidents were the most frequent reason for trauma center transport (25.6%) with only 9% of those having severe to moderate injuries and a mortality rate of only 0.2%. The finding of a Trauma Score of less than 13 was the most accurate predictor of severe injury with an accuracy of 92.2% and a mortality of 54%. The authors conclude that a Trauma Score of less than 13 is predictor of severe trauma. High speed accidents alone are the most common reason for trauma center transport but only has an accuracy of 9% and mortality of 0.2% and is therefore not a useful predictor of severe injury. Reprints: David Kries, Jr., MD, Division of Trauma, Health Sciences Center TI9-060, State University of New York, Stony Brook, NY 11794

Rates of Needle-Stick Injury Caused by Various Devices in a University Hospital
Jagger J, Hunt EH, Brand-Elnaggar J, Pearson RD
New England Journal of Medicine 319(5):284-288, 1988

With the increased awareness of infectious diseases, especially AIDS, people are more aware of the potential hazards of needle sticks. By using the reported number of needle sticks and correcting for underreporting, the authors compare the incidence of needle sticks for six different devices. This study noted the number of injuries for five categories of hospital personnel. Although disposable syringes produced the highest number of injuries, they accounted for the lowest number of injuries (6.9/100,000) when corrected for the number of uses. The highest rate of injury (36.7/100,000) occurred with the use of intravenous tubing/needle assembly. Only 17% of the incidents occurred during the use of the items. The remainder (70%) occurred when workers were preparing the devices for disposal or after disposal (13%). The authors point out that users of these devices, while aware of the hazards associated with their use, are caught between the hazard of getting stuck while attempting to recap a sharp device and the hazard of attempting to protect themselves from exposed needles when several items need to be carried to a disposal box. The authors feel that part of the solution lies with increased education but, part of the ultimate solution needs to be based on the design of safer devices. Some of the problems presented here are probably more noticeable in the prehospital setting because of the relative unstructured setting of prehospital care. Reprints: Janine Jagger, M.P.H., Ph.D., University of Virginia Medical Center, Box 180, Charlottesville, VA 22908

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Book Reviews

Clinical Management of Shock
by David J. Kreis, Jr., MD and Arthur E. Baue, MD

One area of practice which confuses many EMTs and paramedics is shock. At what point does an injured patient require aggressive therapy for shock? Kries and Baue state that their book "should bridge the gap between the pathogenesis of shock and its appropriate clinical management." To this end, the authors provide introductory chapters on the cardiovascular system and an overview of shock. These chapters present the subject matter in an uncluttered, direct way with liberal use of graphics to render complex relationships more readily understood. Throughout the book, the chapters are annotated in the margins to highlight key points, a useful feature. Following the introductory material, a chapter is devoted to a thorough discussion of four types of shock. These chapters contain material on the definition, etiology, diagnosis, pathophysiology, and treatment for each of the four shock categories. This organizational scheme helps the reader to move smoothly between pathophysiology and management. A final chapter on multiple organ failure syndrome details the catastrophe that befalls the patient in shock when aggressive therapy is withheld. Each chapter of the book contains both annotated and general bibliographies, which are helpful in finding the clinical studies on which the authors base their approach. Controversial issues, such as crystalloid fluid replacement therapy are fairly and decisively handled. Although the complexities of shock at the cellular level remain, Kreis and Baue have managed to focus the attention of the clinician on the clinically relevant details of this complex picture. The authors have admirably bridged the gap between what we see in the shock patient and an adequate, timely response.

Kreis DJ, Baue AE: *Clinical Management of Shock*. University Park Press, Baltimore, 1984. 197 pages, softcover.

Reviewer: Richard Konrad, REMT-P, Pinellas Park Fire Department, Pinellas County, FL EMS System, Odessa, FL

Emergency Care Handbook: How to Deal with People in Emergencies
by Arthur R. Ciancutti, M.D.

The curriculum for emergency medical technology is largely devoted to the behavior of EMTs and paramedics. Only the sections regarding behavioral disorders and substance abuse focus on the behavior of patients. The vociferous complaints about the behavior of ill and injured people make it clear that many EMT's believe that patients are capable of the same kind of judgement and control as people not involved in emergencies. Dr.Ciancutti's remarkable book should disabuse prehospital workers of the foregoing notion. In fact, unreasonable expectations of what behavior to expect from patients in emergent circumstances frequently increases the difficulty of already stressful work. In the preface, Dr. Ciancutti says that his book is about "Teamwork ... Confusion ... Help ... Stress." These are the very areas which trouble practicing EMTs the most as they attempt to function in chaotic and barely controlled situations. The first four chapters deal with the patients perception of their situation and stress the necessity of empathizing with the feelings of loss and fear experienced by the patient in an emergency. The author points out that many actions of the emergency patient which appear arbitrary and uncooperative make remarkable sense if his experience of the emergency is taken into account. A discussion of the patients disorientation to reality and how to cope with it follows. The assumptions and beliefs of practitioners in emergency care systems are examined in the context of their affect on interaction with patients. Communications, time management and stress, and the requirements of both patient and healer are all addressed. Finally, Dr, Ciancutti deals with the special situations of pediatric patients, pain, cardiac arrest management, death, and triage. Throughout the text, the author's style is relaxed, inviting the reader to participate in answering the questions he raises. For EMTs who are confident in their technical abilities, the areas of practice which produce stress, involve decision-making, resource allocation, management, communication with other members of the EMS system, and communication with patients. Dr.Ciancutti's book will benefit EMTs in all of these areas, helping them to understand more clearly what constitutes help to patients undergoing emotional and physical trauma. Additionally, by examining their own beliefs and assumptions, practitioners may reduce stress in their professional lives.

Ciancutti AR: *Emergency Care Handbook: How to Deal with People in Emergencies*. Technomic Publishing Co., Inc, Westport. 1977. 100 pages, hardcover.

Reviewer: Richard Konrad, REMT-P, Pinellas Park Fire Department, Pinellas County, FL EMS System, Odessa, FL

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Calendar

The Journal wishes to promote continuing education and other adademic events open to the EMS community by offering free listings in this section. Please submit the date and title of the program, city in which it will be held, sponsoring organization, name, address and phone number to contact for additional information, and tuition rate(s). Calendar items must be received no later then 60 days prior to the cover date for the issue in which the announcement should appear. Send the items to Calendar Editor, P.O. Box 280173, Tampa, Florida 33682 or call (813) 687-1574.

October 5, 1988

Trauma and Emergency Medicine

Kansas City, Missouri. Sponsored by Bixby Institute for Postgraduate Medical Education, 2316 E. Meyer Blvd., Kansas City, MO 64132. Tuition $50.

October 6-8,1988

Annual Meeting - American Association for the Surgery of Trauma

Newport Beach, California. Contact C. James Carrico, MD, Department of Surgery, RF -25, University of Washington, Seattle, WA 98195. (716)894-1213

October 12-14, 1988

9th Annual Traumatic Head Injury Conference

Braintree, Massachusetts. Contact Public Relations Department, Braintree Hospital, 250 Pond St., Braintree, MA 02184. (617)848-5353.

October 17-18, 1988

Pediatric Emergences

Ann Arbor, Michigan. Contact University of Michigan Medical School, Towsley Ctr - Box 0201, Ann Arbor, MI 48109-0201. Tuition $395.

October 19, 1988

AIDS Survival

Tampa, Florida. Sponsored by the Association of Practitioners of Infection Control - Suncoast Chapter. Contact Miriam J. Gray (813)426-7242. Tuition $50-70.

October 20-23, 1988

Seventh Annual Advances in Pulmonary and Critical Care

San Fransisco, California. Contact Clare Butler, Postgraduate Programs, University of California - San Fransisco, M-979, 505 Parnassus, San Fransisco, CA 94143-0120. (415)476-5208. Tuition $365.

October 21-23, 1988

Doctors for Disaster Preparedness (DDP) and the American Civil Defense Association (TACDA) Seminar/Conference

Salt Lake City, Utah. Contact Helen Baker, c/o DDP/TACDA Seminar Conference, PO Box 1057, Starke, FL 32091. (904)964-5397.

October 28-30, 1988

9th Annual Virginia EMS Symposium

Tysons Corner, Virginia. Contact Mary Camp, Virginia Division of EMS, Department of Health, Commonwealth of Virginia, Richmond, VA 23219. (804)786-5188.

November 2-6, 1988

Back to Basics '88

Reno, Nevada. Contact Emergency Response Institute, 1819 Mark St., NE, Olympia, WA 98506. (206)491-7785.

November 3-5, 1988

13th Annual Alaska Symposium on EMS

Anchorage, AK. Contact Charles Ramage, EMS Section, Department of Health and Social Services, Box H-06C, Juneau, AK 99811-3027. (907)465-3027.

November 4-8, 1988

Management of the Child with Head Injury

Monterey, CA. Contact Kim Leadon, Children's Hospital - Oakland, 747 52nd St., Oakland, CA 94609. (415)428-3021. Tuition $150-280.

November 7-11, 1988

Emergency Medicine: A Critical Appraisal

Las Vegas, Nevada. Sponsored by Emergency Medical Abstracts, California ACEP, and Florida ACEP. Contact Robert Cowsill, 5010 Edenhurst Ave., Los Angeles, CA 90039. (818)243-5976. Tuition $275-425.

November 10-11, 1988

Washington ACEP 18th Annual Clinical Conference: Topics in Emergency Medicine

Seattle, Washington. Contact Pamela Moore, Executive Director, Washington ACEP, 2033 6th Ave., #900, Seattle, WA 98121. (206)441-9762. Tuition $110-280.

November 10-11, 1988

Alabama ACEP Scientific Assembly

Birmingham, Alabama. Contact Pat Gandy, Alabama ACEP, P.O. Box 210727, Montgomery, AL 36212-0727. (205)567-2000.

December 1-3, 1988

11th Annual National Trauma Symposium

Baltimore, Maryland. Contact Kimberly Unitas, MIEMSS, 22 Greene St., Baltimore MD 21201. (301)328-2399.

December 4-9, 1988

Current Concepts in Emergency Care

Bellingham, Washington. Sponsored by Institute for Emergency Medical Education and Washington ACEP. Contact George Elich, Kailani World Travel, 4192 Meridian Ave., Bellingham, WA 98226. (800)524-5264. Tuition $275-400.

December 9-10, 1988

Trauma Update

Albuquerque, New Mexico. Contact University of New Mexico School of Medicine, Office of Continuing Medical Education - North Campus, 815 Vassar, NE, Albuquerque, NM 87131. Tuition $125.

December 14, 1988

Topics in Emergency Medicine: Neurology

Hanover, New Hampshire. Contact Office of Continuing Education in Health Science, Dartmouth-Hitchcock Medical Center, 2 Maynard St., Hanover, NH 03756. Tuition $90.

December 27-30, 1988

Emergency Medicine: A Critical Appraisal

Orlando, Florida. Sponsored by Emergency Medical Abstracts, California ACEP, Florida ACEP. Contact Robert Cowsill, 5010 Edenhurst Ave., Los Angeles, CA 90039. (818)243-5976. Tuition $275-425.

January 7-11, 1989

Emergency Medicine: A Critical Appraisal

Cancun, Mexico. Sponsored by Emergency Medical Abstracts, California ACEP, Florida ACEP. Contact Robert Cowsill, 5010 Edenhurst Ave., Los Angeles, CA 90039. (818)243-5976. Tuition $275-425.

January 13-14, 1988

Emergency Medicine

Ann Arbor, MI. Contact University of Michigan Medical School, Towsley Ctr, Box 0201, Ann Arbor, MI 41809-0201.

January 21-28, 1988

Orthopedic Emergencies

Kona, Hawaii. Sponsored by American Institute of Postgraduate Education, Scripps Memorial Hospital and Utah ACEP. Contact Edith S. Bookstein, PO Box 2586, La Jolla, CA 92038. (619)454-3212. Tuition $285-395.

January 26-30, 1989

Emergency Medicine: A Critical Appraisal

Maui, Hawaii. Sponsored by Emergency Medical Abstracts, California ACEP, Florida ACEP. Contact Robert Cowsill, 5010 Edenhurst Ave., Los Angeles, CA 90039. (818)243-5976. Tuition $275-425.

February 22-23, 1989

Emergency Medicine Conference

Stratton Mountain, Vermont. Contact Albany Medical College, Office of CME, 47 New Scotland Ave., Albany, NY 12208. Tuition $150.

March 21-23, 1989

International EMS Development Conference

Washington, DC. Contact MDC/International - EMS Division, 1742 R St., NW, Washington, DC 20009. (202)462-1920.

September 10-15, 1989

6th World Congress on Emergency and Disaster Medicine

Hong Kong. Sponsored by the World Association for Emergency and Disaster Medicine. Contact Ann Burrows, Congress Manager, 6WCEDEM Secretariat, Meeting Planners (HK) Ltd., 701 Tung Wai Commercial Bldg., 109 Gloucester Road, Wanchai, Hong Kong. Telephone (5)891-6972. TELEX 65609 LITON HX.

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Correspondence

The Correspondence section is designed to accomodate feedback and debate regarding papers previously published in the Journal or of concern to the EMS community. It is also an appropriate place for smaller items of interest that may not require the space of a full article. The Correspondence section can be one of the most interesting parts of a professional publication, where published debate can fully explore all sides of an issue. We invite your critique and comments. Direct all correspondence submissions to the Correspondence Editor, Journal of Prehospital Medicine, P.O. Box 280173, Tampa, FL 33682. (813) 687-1574.

Statistics From Trauma Calls

The paper (Konrad R: An Analysis of Selected Statistics From Trauma Calls in a Large Urban EMS System. 2(1):1-6, 1988) attempts to provide a retrospective descriptive analysis of the characteristics of severe trauma in one Florida county for calendar year 1987. This objective is laudable and the data provided could be of some value if appropriately presented and discussed.

Table 1 shows that approximately 40% of the patients did not have completed times. Some analysis should be provided of this 40% of patients to see, for example, if their trauma scores were similarly distributed to the ones under analysis i.e., was a bias introduced by only having times on 60% of the patients? Why was analysis of interventions limited to just 60% when it probably could have included all of the patients? The data provided in Table 3 are interesting but should also be supplied with numbers of patients in the sample, standard deviations and statistics to show whether they are significant or not. The author has presented data and no statistics.

The purpose of collecting the data is to evaluate the system. The data presented would seem to indicate that the scene time for helicopter transport of patients is statistically significantly longer. However, is this because the helicopter is not dispatched at the same time as the ambulance? Is the delay in waiting for the helicopter worthwhile? Were these calls in a distant part of the county? What was the time interval between injury and treatment? Was it shortened by the helicopter, or would ambulance transport have been more appropriate in these patients rather than waiting at the scene for the helicopter to arrive?

No data are produced with respect to the time to definitive care, i.e. the arrival of the patient at the trauma center. What is the level of care on the helicopter? Is it superior to that which is available on the ambulance? Is the time longer at the scene for the helicopter related to the need for two teams of prehospital health care providers to describe injuries and repeat primary assessment and hand off care from one team to another? Does the author have any survival data which would compare the outcomes of the patients who are transported by land or air?

One other comment worthy of note is the incidence of the severe injuries in the population. It is quite low and the number of patients triaged to trauma centers is also quite low. This is certainly different in southern Florida where the incidence of severely injured patients requiring trauma centers is in the region of 1,400/million/year, although all of these do not have trauma scores of 12 or less.

Howard R. Champion, MD
Chief, Trauma Service
Washington Hospital Center
Washington, DC

Reply to Dr. Champion:

Dr. Champion is quite correct in suggesting that the paper raised a good many more questions than it answered. Certainly a more thorough analysis of the entire sample of runs (including the 40% for whom data was incomplete) would be more revealing. One of the points I was trying to make is that a convenient data base inclusive enough to allow such an analysis is non-existent in this EMS system. No single record contains dispatch times for all responding agencies (including the helicopter). Hospital arrival time for the helicopter, while available in hospital flight records, is not available on the County run report. The construction of the run record demonstrates the priorities of the system in regard to analysis of its performance. The present construction of the run report makes complete analysis of the issues raised by Dr. Champion frustrating and difficult.

Dr. Champion has sensed the "identity crisis" which is inherent in this paper. I certainly make no claim to have done a rigorous retrospective study of trauma in this system. My view is that such a study should be part of the system's normal process of self-analysis. I hope that the questions raised in the article will move planners and analysts within the system to modify data recording techniques so that exhaustive studies of performance may be undertaken. This paper grew out of my amazement that a paramedic with limited experience in the county computer system (the only source of information immediately available) would be the only one looking at these issues. In retrospect, however,the paper may have seemed to promise more than it was able to deliver. Dr. Champion's comments have encouraged me to attempt to cull from a variety of sources sufficient information to make a more thorough analysis.

Richard Konrad, REMT-P
Pinellas Park Fire Department
Pinellas County, FL EMS System
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Editorial

Graduation from Paramedic School: A Beginning or an End?

Upon graduation from a paramedic training program, students as well as their employing agencies consider the event as a culmination of their medical education. Having met the criteria for certification in advanced cardiac life support, basic trauma life support or prehospital trauma life support, perhaps one of the various pediatric life support programs, in addition to the entire set of behavioral and skills objectives of the National Standard Paramedic Training Cirrciculum, these health care professionals are now fully qualified to assume complete clinical responsibilies for the care of the critically ill or injured during the crucial period prior to hospital arrival. Their didactic and clinical training is so complete that an occasional refresher and update are all that's necessary for them to provide the best possible care an EMS system can offer.

It sounds nice and unfortunately, it seems to reflect a prevailing attitude about paramedics and their continuing education. Many give lip service to the need for real continuing education, but very few do anything significantly more than engage in an endless cycle of renewing their various acronym merit badges and filtering through redendant refresher classes - the curricula of which are carefully homogenized so as not to go beyond the absolute minimum requirements, lest risk teaching a paramedic something that might be considered too advanced or only appropriate for the hospital environment. When does something become too advanced or only appropriate for the hospital environment? When it exceeds the minimum requirements of the acronym courses or the basic paramedic curriculum? Do we plan, educate, certify and authorize to the level of the least common denominator? If that is the case, we should stop this charade to ourselves, the rest of the medical community and the public about our professional status and quietly accept our place as simple technicians trained by rote to perform a rigid and specific set of proceedures under well defined circumstances only under direct authorization of an on-line medical control physician. To do anything more under that type of educational system is dangerous. Most systems try to do more than this with standing orders and various degrees of clinical discretion in the field. However, these same systems frequently do little more than the aforementioned acronym chasing and refreshers.

Continuing education is something more than that. The philosophy in real continuing education has to consider that graduation from a paramedic training program is only the beginning and not the essential end of an individual's medical education. Having met the absolute minimum equirements to be certified as a field provider of advanced life support, the newly graduated paramedics are now in a position to begin to obtain clinical experience, to accept clinical responsibility, and to begin the career-long continuing education process that will take them from the very rudimentary education of a basic paramedic program to higher and higher levels of didactic knowledge and clinical skill.

Consider a career scenario in EMS. Begining as an EMT, a year or more as a basic life support provider establishes some confidence and clinical experience in working with the critically ill and injured. Proven ability at this level qualifies one for entry into the paramedic program. A year or so later, upon graduation, the paramedic and their EMS system should be looking ahead to 20 more years of progressively advanced and sophisticated didactic and clinical education. Modeled after the training of physicians, of which paramedics act as surrogates, this sequence of career-long education should begin with a rigorous internship under the tutelage of an exceptionally talented and experienced paramedic mentor who has demonstrated highly advanced knowledge and skill combined with the ability to teach in the unique one on one setting between senior and junior partners on an ALS unit. This relationship is complemented by participation in case study conferences, journal clubs and other such programs found in the internship and residency training of physicians. The objective is not to make paramedics into physicans (although an aggressive CME program conbined with particpation in a pre-med program would seem to be an extraordinary vehicle for preparing the next generation of EMS physicians for medical school). Rather, it is to provide for the education of highly skilled health care professionals who work towards the prevention and amelioration of acute illness and injury in direct collaboration with the EMS physicians who assume ultimate responsibility for their actions. Without this type of professional development process or something akin to it, our dicipline will fail to attract or retain substatial numbers of personnel of the calibre this mission of acute prehospital care deserves.

Our challenge is to have the vision and initiative to create progressively challenging CME rograms that can provoke and stimulate intellectual curiosity and professional growth throughout the entire career of a paramedic. It doesn't start with some elaborate national standard or task force. It begins in your agency with your personnel and your initiative in your CME program.

Michael R. Gunderson, REMT-P
Editor

Special Announcement to all Readers

We are proud to announce the collaboration of the

Acute Care Foundation
National Association of EMS Physicians
and the
World Association for Emergency and Disaster Medicine

to publish a new academic journal for the prehospital and disaster medicine communities. This new publication will bring together the *Journal of Prehospital Medicine*, the *Journal of the World Association for Emergency and Disaster Medicine* and the academic publishing efforts of the National Association of EMS Physicians under a single new publication, title to be announced.

During this transition, a short interruption in the normal quarterly release schedule may occur. All current subscription and advertising obligations will be honored for the number of issues remaining in those agreements.

The participating organizations have selected Marvin Birnbaum, M.D., Ph.D. as the new editor. The new publication will utilize formal peer review for selection of papers. The editorial format will focus on original research, collective reviews and case studies relevant to the clinical practice, administration, logistics and educational issues of prehospital and disaster medicine. All papers submitted or in review by either the *Journal of Prehospital Medicine* or the *Journal of the World Association for Emergency and Disaster Medicine* will be forwarded to the new editorial board, now in formation.

We are issuing a call for papers. The editorial review process for this new publication will be fully electronic, allowing us to provide our readers with more timely information and academic authors a faster response from the editorial board. Please direct all editorial inquires and manuscripts to:

Marvin Birnbaum, M.D., Ph.D.
Emergency Medical Services
University of Wisconsin
Clinical Health Sciences Center
600 Highland Avenue
Madison, Wisconsin 53792
Office: (608)263-7094
NAEMSP Data Base Electronic Mail: EM_Birnbaum
(for NAEMSP Data Base access information - (800)228-3677)
or
Michael R. Gunderson, REMT-P
Acute Care Foundation
CompuServe EasyPlex Electronic Mail: 73067,207

National Association of EMS Physicians

Preamble and Mission Statement

The growing importance and increasing sophistication of emergency medical service systems have led to a greater need for the physician, as a patient advocate, to assume a role that would ensure the patient's right to the best care possible. With the documented efficacy of physician extender personnel in the prehospital setting, EMS systems have developed rapidly over the past ten years. While the original systems were closely controlled by the physician organizers and subject to medical scrutiny and continuing education, the widespread growth of the various forms and systems of EMS has made medical supervision and accountability more difficult. As a result, costly EMS systems have evolved which have not necessarily improved prehospital survival. A broad spectrum of prehospital care has developed; from the expensive ride to the hospital to elaborate, well-meaning but medically unwarranted attempts at field stabilization which could lead to deleterious delays in definitive care.

The situation in poorly controlled medical systems has led to criticism of the EMT and paramedic, rather than examination of the root cause of the present problems - lack of responsible, competent physician involvement and inadequate accountability in EMS systems. The recognition that both on-line EMS physicians and medical directors need to maintain - or even regain - medical authority over patient care systems prompts the need for an association to give voice to this principal as well as support those physicians who are responsible for medical standards and other aspects of medical care.

The National Association of EMS Physicians (NAEMSP) seeks to answer the need for mutual support and to act as a forum for the generation and debate of issues supportive of emergency medical services as an area medical care worthy of high standards and capable of influencing morbidity and mortality. Central to these goals is the support of research and development in the area of prehospital emergency care. As a unified, focused group dedicated to improvement in patient care and the lot of EMS personnel, the Association can establish liaisons with other related organizations, institutions and government agencies.

Membership

The National Association of EMS Physicians offers full membership to physicians, organizational memberships, and associate memberships to paramedics and other individuals interesting in the causes of the Association. Membership in the Association now includes most of the designated, medical-legally responsible medical directors of municipal and state EMS systems and EMS programs, as well as their key associates, including state directors, administrative heads, regular EMS personnel, and legal experts from across the U.S. and Canada.

National EMS Database

NAEMSP is proud to announce availability of a computerized data base of 3,500 citations relevant to prehospital medicine from the formal medical literature and articles from other EMS trade publications. The data base is being continually expanded by its Editorial Boards' monthly literature reviews and submission of new citations with original abstracts. Access to the data base is via modem using mini or personal computers. In addition to the data base, the system offers bulletin board and electronic mail services.

National Meeting

The 5th Annual Conference of the National Association of EMS Physicians will be held in San Francisco, June 1-4, 1989 at the Hyatt Regency - Embarcadero. It will feature lectures, presentation of original research papers, and the presentation and debate of new consensus draft papers on important EMS issues.

For further information on the the NAEMSP and any of its programs, contact:

Kathleen Stage, National Coordinator, NAEMSP
190 Lothrop St., Room 113
Pittsburgh, Pennsylvania 15213
(800) 228-3677

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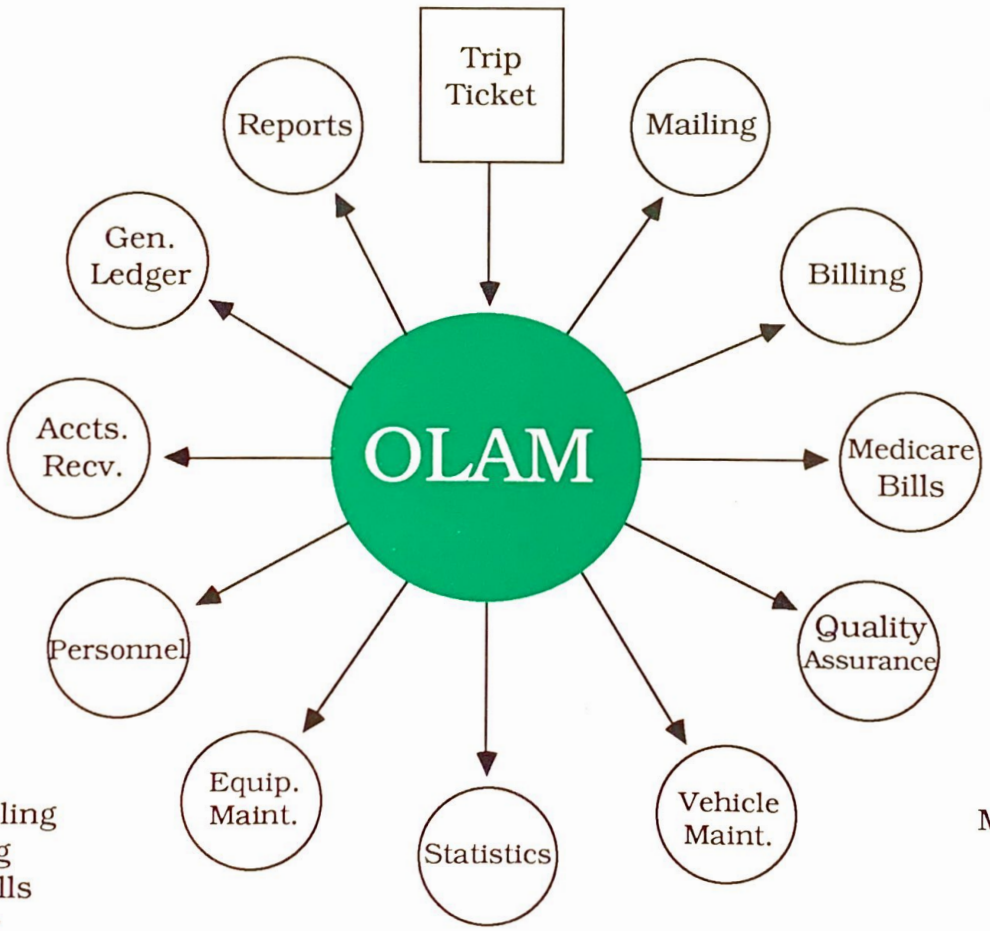

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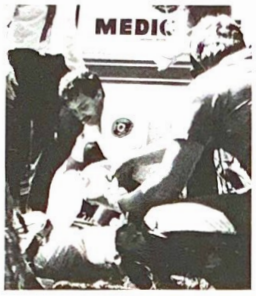

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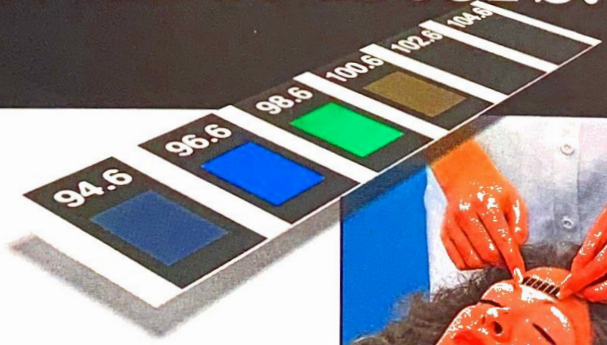

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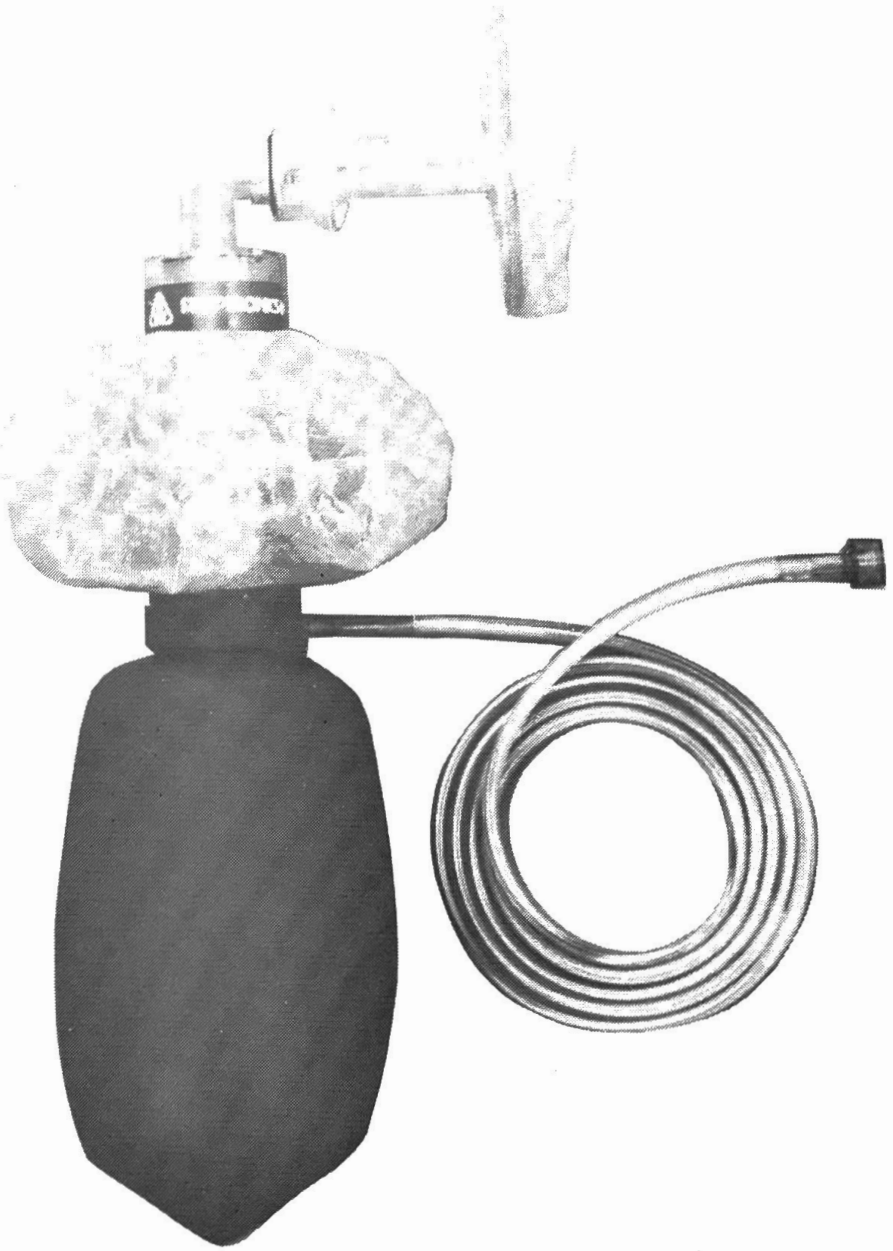

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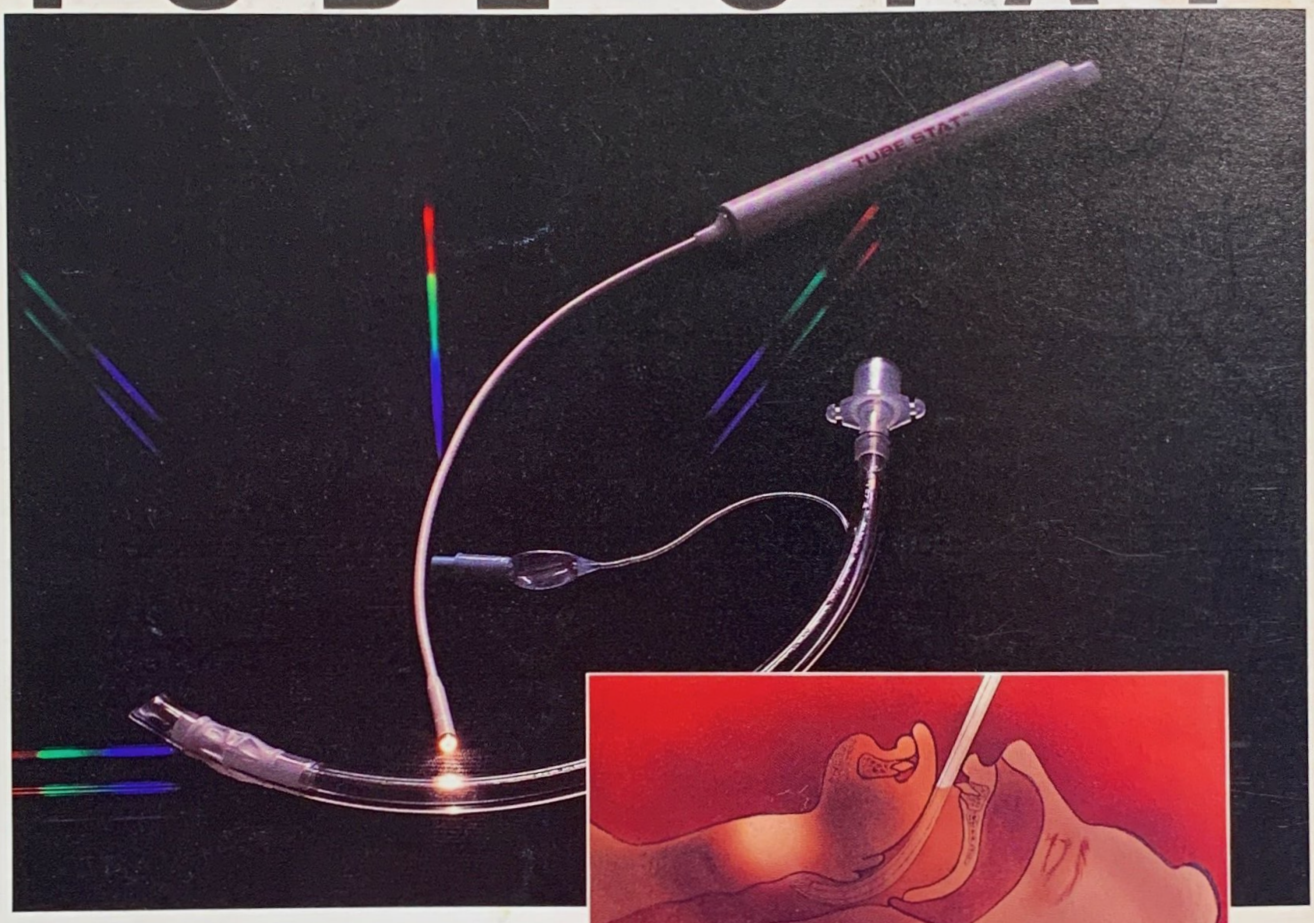

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*Developed in conjunction with the Center for Emergency Medicine, Pittsburgh, Pennsylvania.

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