The Jacksonville Emergency Medical System: A Model for the Seventies

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The Jacksonville, Florida, emergency medical system, one of the most sophisticated systems in the nation, has contributed significantly to the reduction of the death rate of automobile accident victims. The reduction in the death rate of trauma victims has been 38 percent. Training of the emergency medical technicians is described, and data on death rates and survival rates of heart attack victims are presented. The Jacksonville emergency medical system has been a model that many cities and states are seeking to duplicate.

Jacksonville, Florida, with a population of 532,000, has developed an emergency medical system that is considered by many experts to be the finest in the country. Yet, less than 4 years ago the ambulance situation was chaotic; numerous underfinanced private companies and funeral homes competed for business and offered a very poor quality of service. As a result of a campaign by the news media, rising public opinion, and the inauguration of a new consolidated county-city government, the situation has been corrected. This was made possible by the cooperation of government and organized medicine, stiff regulatory provisions for private ambulance operations, and a take-over by the Fire Department of all emergency ambulance service.

Nearly all calls for emergency medical service come into the Fire Department Emergency Operation Center from either home phones or special emergency phones located on street corners. This center has direct phone lines and radio communications with all hospital emergency departments in the city and with the switchboard of the County Medical Society. Punched time cards are kept on each run as well as 24-hour tape records of all communications. In 1969-70, nine rescue squads were distributed throughout the city so that the average running time to the scene was 4.2 min. Over the past 2 years as the population has expanded toward the city limits, the average running time has risen to more than 7 min. However, the first trained help arrives at the scene in an average of 4 to 5 min.

The ambulances have a roomy box type of body mounted on a 1-ton chassis and are fully equipped as mobile emergency rooms. At 60,000-mile intervals, the body is lifted off, the worn chassis is replaced by a new one, and we have a "new" ambulance. Cost for a 10-year period is approximately half that of a limousine type of ambulance.

Five of the 11 rescue ambulances are based at hospitals to afford in-hospital training to the rescue personnel and to provide better ambulance-hospital coordination. The crews are rotated at periodic intervals so that each man spends an average of 5 months each year based at the hospitals. Cooperation between the ambulance and hospital emergency staffs is extremely close.

Training of emergency medical technicians (EMTs) is extensive and starts with the first-aid course given all recruits at the Fire School. In addition to the 20-hour American Red Cross course, training for all recruits includes the 80-hour Department of Transportation Emergency Medical Care course. Advanced lectures in cardiology are then given by physicians. More than 20 EMTs have participated in the program. During in-hospital training, EMTs spend hundreds of on-duty hours in hospital emergency departments. Practical work includes observing childbirths and autopsies, giving EKGs, drawing blood, and working as a part of the cardiac resuscitation team. On-duty formalized exercises and frequent written tests are required, as are periodic lecture series after hours by physicians. Twelve EMTs are enrolled at Florida Junior College in a 61-semester-hour associate arts program in emergency medical technology, one of the first of its kind in the nation. One result of the extensive training program has been the ability of the city to obtain malpractice insurance for all EMTs in the amount of $5,000,000 for an annual total premium of only $7,500.

The medical training program is supervised by the Chief Fire Surgeon who is a prominent cardiologist and who serves at a pay of $1 per year. He is assisted by 10 assistant fire surgeons, all $1 a year volunteers, who act as advisors to the squads, help in the instruction, and monitor their performance to ensure quality control. Each fire surgeon has a two-way fire department radio in his private car and is on call to answer serious emergencies whenever he is on the streets. The dedication of these men and women reflects the outlook of our entire medical community on emergency care.

The most rewarding results have been in the reduction of the automobile accident death rate. After the EMT arrives at the scene, he first checks the victim's airway and stops any bleeding before he attempts to move the victim. If serious injury is suspected, an intravenous blood expander such as lactated Ringer's solution is given to combat shock. Medical advice is instantly available from the hospitals by direct ambulance-hospital radio communications.

The EMT at the scene, with the radioed advice of the hospital physician, makes diagnoses and renders treatment, not merely first aid. The procedure has the full blessing of the great majority of our physicians and is sanctioned by an amendment to the Florida Medical Practices Act passed by the legislature in 1970 at the urging of the Florida Medical Association. That such an advance has occurred in less than 5 years is a tribute both to the quality of emergency care rendered by the rescue branch and to the farsightedness of our medical professionals. Whereas IVs can be initiated by the EMT, the administration of drugs must be prescribed by radio or phone by a physician.

After the victim's condition is stabilized, great emphasis is placed on proper extrication and use of backboards. Patients are kept on these backboards until after they are X-rayed. Spare backboards are provided at the hospitals so that the ambulance can quickly return to service. Less than 5 percent of the runs from the scene of the accident to the hospital are done at high speed with light and siren. En route the patient is given antishock therapy and monitored on an oscilloscope if required. The hospital is warned ahead of time of the nature, vital signs, and the estimated time of arrival of any serious case. In severe cases the patient can be left wired to the oscilloscope until a physician examines him and approves his transfer to the emergency room. A form detailing the treatment of the case is filled out on each patient.

Because of the advance notice given the emergency departments and the fact that four of them have emergency practice groups present at all times (a fifth is a large teaching hospital with full extra-duty manning), little delay is encountered in beginning treatment at the hospital on serious casualties.

The results in reducing the death rate in automobile trauma victims have been spectacular. Before this program was initiated, medical authorities predicted that the provision of rapid and effective treatment on scene could reduce automobile trauma deaths by 20 percent. How has the Jacksonville system done?

In 1968, when we initiated the program, there were 15,846 accidents involving approximately 8,669 injuries and 139 deaths. In 1971, the number of accidents yearly

increased to an estimated 22,500 (based on 11 months of data) involving an estimated 12,380 injuries, but the deaths dropped to 117! The save rate of injured victims was 99 percent. Deaths per thousand accidents were reduced from 8.27 to only 5.2: a reduction of 38 percent or nearly twice that predicted by medical experts. In contrast, the number of automobile deaths in the state of Florida rose 7.8 percent in 1971.

Much of this reduction has to be attributed to our advanced emergency medical system. Of course, post-1967 cars, with new safety features such as collapsible steering columns, breakout windshields, and padded interiors, have had their effect as has a stepped-up highway law enforcement system; yet in the surrounding seven rural counties, where new cars are also involved, the death rate per thousand accidents was 23.4 in 1970—four times greater than Jacksonville's present rate. These counties lack sophisticated emergency care systems.

The practice of on-scene diagnosis and advanced treatment has had another marked effect. Prior to 1968, nearly all victims were placed in an ambulance and rushed at high speed to a hospital, where many turned out to be suffering from only minor injuries. In 1971, the rescue units responded to 18,204 calls for help. Yet, they transported only 8,427 to hospitals; the rest either required no treatment, were treated at the scene and released, or were allowed to go to a doctor or hospital by automobile. The reduction in load on the emergency departments and rescue branch is significant.

Whereas 117 people died in 1971 in Jacksonville in automobile accidents, more than 1,600 died of heart disease. Nationally, a large percentage of these deaths occur outside the hospitals. The overall death rate on initial myocardial infarction is approximately 25 percent; but, for patients treated in the intensive care units of hospitals, the rate drops to approximately 18 percent. It is shocking that 60 percent of those who die of a heart attack in the United States die outside the hospital without a doctor in attendance. To increase the rate of survival outside the hospital, our rescue ambulances have been fitted with special cardiac equipment and rescue crewmen have been given special training in treatment of cardiac cases, including defibrillation, cardiopulmonary resuscitation, and, when prescribed by a physician, the administration of drugs. Two-way radio communications can be maintained with a physician in the emergency room, and all of the ambulances are equipped to telemeter EKGs by radio. On all suspected heart attack cases, two ambulances (or an ambulance and a fire engine) are dispatched to provide the manpower necessary to carry out life-sustaining procedures.

Unfortunately, statistics on heart attacks are not so complete as those on automobile trauma, but we are now preparing a study of results for 1971. However, a brief overview of the suspected heart cases for January 1972 is enlightening. It must be emphasized that the final diagnostic results have not been received from the hospitals and that the data are for those persons who had symptoms that were strongly suggestive of cardiovascular distress.

In January 1972, 348 dispatches were made to calls from citizens who described symptoms of breathing difficulty, chest pains, and the like. On 165 of these calls, symptoms were so suggestive that two units were dispatched, the second unit usually being an engine or ladder company that is trained and equipped to help the rescue unit. Transportation and treatment were required for 158 calls. Of these, 113 had suggestive cardiovascular symptoms, and the other 45 were suffering from respiratory distress or various other illnesses.

Of those with heart symptoms, six were dead before arrival of the first unit, and resuscitation was not attempted. The other 107 were treated and transported. Eleven of these suffered heart or breathing arrest while in the hands of the rescue unit and were given cardiopulmonary resuscitation or drugs. Three of these 11 died before arrival at the emergency department, whereas eight who had suffered arrest or arrythmia were delivered viable. Of the 107 suggestive heart patients transported, 97.2 percent were delivered viable to the emergency department! We must caution the reader that past experience has shown that perhaps half of these in the final analysis will prove not to be heart patients; even so, the safe delivery rate of true heart patients would be over 94 percent.

The introduction of the special intensive care rescue units has led one prominent thoracic surgeon to remark, "Jacksonville is the safest place in the United States to have a heart attack."

As the citizens of the city became aware of the immediate availability of help when they were in distress, the calls and load steadily increased and, consequently, so did the time required by the rescue unit on arrival at the scene. The most obvious solution was to add more rescue units. However, the expansion of the city also demanded that we increase the number of engine companies, and four more ladder companies were recommended by the underwriters. Such an augmentation was beyond our financial capability. We came up with what we feel is an innovative solution.

Ladder companies are primarily used to provide special rescue and extrication equipment, lighting and ventilation gear, and manpower. The long aerial ladders are used in only 2 percent of all calls, especially in suburban areas. A pumper, if it arrives promptly, can usually extinguish a fire with the 500 gallons of water carried in its integral tank without having to hook onto a hydrant. An accident or heart victim, if he is treated promptly at the scene, can wait the additional 5 minutes or so until a rescue ambulance arrives.

We, therefore, converted four excess pumpers as triple threat units, manned by three men each, and designated them as quick response squads (QRS). By removing the bulky large hose, we provided space to stow all the special rescue equipment carried by ladder companies. Racks were made for 35- and 14-ft aluminum ladders, which are adequate for most suburban fires. Five hundred feet of 1½-in. preconnected hose is carried for fire fighting, utilizing the water carried. Also, the QRS vehicles were given a full complement of first-aid equipment and were painted a distinctive lemon-yellow color. The men for these units were given a special 7-week course at the fire school and 120 hours of medical training. These units can act as an engine company, a ladder truck, or a rescue unit. Although they cannot transport patients, they can initiate treatment and often have the patient ready to go when the rescue ambulance arrives. The total conversion cost for each unit was less than $3,000. Manpower was obtained by reducing the manning of the urban companies, which we compensated for by adding one more engine company to each assignment, resulting in more manpower actually available at a fire. The assignment of four QRS units to the suburbs has eased the load on the rescue units and has enhanced their ability to extricate and treat victims.

Thirteen rescue-oriented units were thus available to aid citizens in distress, far in excess of the resources usually available in a city of our population. However, we were aware of the fact that, in a city of 840 square miles, we still had time and distance problems. We turned our attention to the fire fighting companies (combat), of which we had 49 in 41 stations, strategically distributed throughout the city. Why not use these, which were often nearest an accident, to render aid until a rescue unit arrived? Firemen have historically been underutilized, yet they must be ready 24 hours a day in case of an alarm. In 1971, we adopted a formal policy of dispatching a combat company along with a rescue squad on all serious medical cases. Trained in comprehensive first aid and carrying first-aid kits and oxygen, they can initiate treatment until a rescue unit arrives with even more sophisticated equipment and EMTs, who can transport the victim if required.

In the first 6 months of 1973, nearly half of all responses by combat companies involved medical emergencies rather than fire. In a number of cases, their prompt arrival definitely saved lives. In taking this step, we have placed the full resources of our Fire Department and its thousand men at the disposal of the citizens who are stricken, rather than just the 120 plus men in rescue and the QRS units. It is a practice that is here to stay and one that every citizen in the nation should consider.

A nominal charge of $22.50 is made by the rescue branch when a patient is transported; no charge is made if he is treated on scene and released. The charge is more a deterrent to needless calls than a revenue source. The cost to the citizens of Jacksonville for this superb rescue service is $1.56 yearly per capita in tax dollars. It is one tax expenditure that brings no public criticism. In nearly 6 years of operation,

only 10 written complaints have been made about the service.

Despite the great strides we have made, there are still problems. Here, as nationally, we are continually faced with delays of 1 to 6 hours after the onset of symptoms before the heart attack victim seeks help. All too often it is then too late. The best team in the world can do nothing for a man who has been dead 10 minutes.

Our rescue service has probably been more publicized than any in the nation, and we have mailed emergency telephone number stickers to all citizens. Yet, in January 1972, 23 percent of the people seeking emergency medical rescue service called the police; the fire control center, which handles rescue, got the message secondhand. Furthermore, 10 percent of fire alarm calls were actually made to the police department.

We are deeply concerned that a 1971 study of heart attack patients admitted to five of our city hospitals showed that 67 percent of them drove to the hospital by automobile instead of calling the rescue branch—an extremely dangerous practice that costs a number of lives. Yet the American Heart Association advises in case of a heart attack first contacting your doctor, and, if unable to do that, going to the hospital immediately. This may be practical advice in some areas where ambulance service is poor or where doctors can be reached immediately, but it is not in Jacksonville and we are advising our citizens to first call rescue. The rescue branch and Fire Department respond immediately and notify the patient's doctor if requested.

Because of our highly effective rescue system and the network of high-speed highways throughout the city, we have few occasions to use medical evacuation helicopters within the city limits. Three large naval air stations have seven helicopters available and are most cooperative in providing them to us on short notice for evacuating patients from the surrounding rural counties. The Army National Guard unit has more than 15 modern helicopters available and will provide them when crews are available during weekend drills. Heliports are available at three major hospitals in the city.

Under our agreement with the Navy, our rescue branch provides the EMTs and medical equipment and the Navy provides the helicopter and crew. In 1971, a number of successful medical evacuations were made following a request from one of our surrounding rural counties. A critical test came in February 1971, when a tremendous explosion at a Thiokol plant in southeast Georgia killed or injured more than 80 people. In an isolated area, with only three doctors in the county, outside aid was the only hope. The Jacksonville Fire Control Center took control of the operation and dispatched ground rescue units, four Navy helicopters, a police helicopter, and numerous doctors and EMTs. Patients were treated at the scene and loaded onto helicopters for rapid transportation to Jacksonville hospitals, where surgical teams were mobilized and waiting. Twenty-seven critical patients were brought in by land and air, and 26 survived. When the last patient arrived less than 2 hours after the first alert, the northside hospital complex still had surgical and bed capabilities to handle 80 more patients.

The major urban centers with their great hospitals must extend help to neighboring rural areas, and the helicopter is an ideal transportation mode for such medical evacuations. Because of the tremendous operating expense of large helicopters capable of carrying prone patients, they must be provided by the military rather than the states and cities. Utilizing the communication, control, and medical facilities of a major city system, combined with a military airlift capability, we have the know-how today to quickly set up an areawide model. During the past year, over 70 groups from other cities and states have visited Jacksonville to observe our system, and its components have been copied and implemented in many other areas. Our capability is being extended into the surrounding rural areas as a model of an urban-rural area EMS system, and we have $3 million of federal funding for such a project. The system will be fully operational by 1974.

In a message to Congress in 1971, the president called for a new approach to providing care to those who live in remote rural areas. We in the Jacksonville area are ready with a new approach, and we are confident that it will continue to stimulate other areas in a common effort to avert the appalling and needless loss of life suffered yearly in this country because of a grossly inadequate emergency medical care system.