

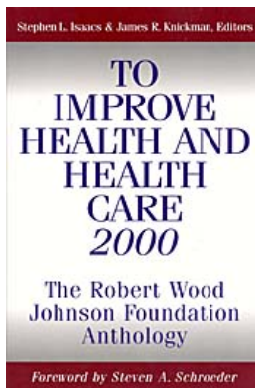
The Emergency Medical Services Program

BY DIGBY DIEHL



Robert Wood Johnson Foundation

Chapter Ten,
excerpted from the Robert
Wood Johnson Foundation
Anthology:
**To Improve Health
and Health Care,
2000**



Edited by
Stephen L. Isaacs and
James R. Knickman
Published 2000

Editor's Introduction

In the early and mid-1970s, the lack of a responsive emergency medical system began to command national attention. Physicians in a number of states established local emergency systems; the National Academy of Sciences issued reports on the need for an organized emergency medical system; veterans returning from Vietnam provided a pool of skilled medics capable of handling medical emergencies; and a popular television show brought the feats of emergency physicians and paramedics into the nation's living rooms. A new philanthropy, the Robert Wood Johnson Foundation, launched as its very first national multisite demonstration the *Emergency Medical Services Program*. It was soon followed by a much larger federal program that aimed at expanding emergency medical care throughout the nation.

In this chapter, writer, book reviewer, and radio and television commentator Digby Diehl takes a look back at the Emergency Medical Services Program. In addition to chronicling the times and the evolution of the Foundation's and the federal government's programs, Diehl raises some fascinating social policy issues. How much credit can one foundation take in bringing about a sophisticated emergency response system in this country? How important were the other forces in play before the Foundation became involved? Would the innovations have occurred whether or not the Foundation made its series of grants?

These questions, difficult to answer under any circumstances, are surely more difficult after more than two decades: some key players are no longer available, memories fade, and the good and the bad become enlarged in the minds of those involved with the program. In his examination of the Emergency Medical Services Program, Diehl nevertheless reaches some conclusions. He finds that the Foundation did play a critical role in seizing an opportunity, providing a spark, and helping to shape the changes that produced today's emergency medical system.

This chapter represents the first look at the Emergency Medical Services Program since the Foundation issued a special report on it in 1976. As part of this retrospective, the Foundation asked the author of that report, James C. Butler, to attempt to find the 44 original grantees and learn the current status of emergency medical services. Butler undertook this task in collaboration with Susan G. Fowler, an information specialist. The results of the survey (presented in the Appendix) show that emergency medical services, many of them highly sophisticated, are functioning well, and that 911 and EMS have become part of the fabric of the nation's health care system.

The 911 call came in at 5:30 p.m. on Sunday, August 16, 1998—an accident on busy Interstate 10. The crash occurred in the westbound lanes of the 17-mile-long Whiskey Bay Bridge, which crosses the Atchafalaya Swamp in Louisiana's bayou country, 35 miles east of Baton Rouge.

The bridge location would make reaching the victims difficult, as the accident had created a bottleneck and traffic was already at a standstill. The Acadian Ambulance communications center dispatched an Air Med helicopter, a paramedic field supervisor, and two ambulances, one approaching from either end of the span. The eastbound and westbound portions of the bridge are carried on two separate spans about 120 feet apart, and the first ambulance to respond radioed the Louisiana State Police and received permission to travel eastward in the westbound lanes, against the flow of traffic. The paramedic supervisor approached the accident from the rear. As he began slowly threading his way through the traffic to get to the scene, he discovered that additional collisions had occurred behind the first crash.

Motorists stuck in the backup grabbed their cell phones, either to report the accidents or to tell their loved ones they would be delayed, and the volume of calls jammed the system and rendered the cell network virtually inoperative. The paramedic supervisor relied on the emergency frequency to radio the communications center for additional ambulances. As he helped assess and stabilize the injured at the original accident, he observed a thick plume of smoke billowing from the line of stopped cars about a mile back on the bridge. The crew members of the second ambulance, stuck in traffic, reported the same dark plume to the dispatch center, and then headed for the scene on foot. It was grim: a tractor trailer, unable to stop on rain-slicked pavement, had rear-ended a Mercedes, and both vehicles were on fire. Nine automobiles and three big rigs were involved in the aftermath, and there were still more chain reaction collisions behind it. What originally had been reported as a single crash was now what paramedics call an MCI—a mass casualty incident. Radioing the Acadian communications center, the field supervisor asked for still more ambulances. Using its global positioning system, the communications center found the nearest ambulances and coordinated the arrival of 15 additional ground units, four helicopters, 37 emergency medical technicians, the Louisiana State Police and local firefighters to deal with the burning wreckage.

An Air Med helicopter pinpointed the scattered locations of the injured along an accident scene that now stretched for two-and-a-half miles. The chopper crew transmitted specific grid coordinates to the communications center, and with this data Acadian dispatchers were able to give paramedics precise

directions to reach the wounded, displaying them on mobile data terminals carried in the ambulances. Use of these terminals reduced congestion on emergency radio frequencies and decreased reliance on voice transmissions.

The accident was one of the worst in Louisiana history. Paramedics dealt with 23 separate collisions involving 96 passenger vehicles and 10 tractor-trailers. There were four fatalities and 26 people injured, seven critically. The Acadian communications center tracked patient injuries and distributed victims among eight hospitals. Helicopters airlifted the most critical patients off the bridge within an hour after the 911 call was received.

The efficient, coordinated response to the mass casualty incident on the Whiskey Bay Bridge was made possible by money spent 25 years ago. "When we began in 1971, we couldn't talk to one another," says Richard Zuschlag, one of the founders and the president of Acadian Ambulance, based in Lafayette, La. "All of the local emergency response agencies operated on different frequencies, and cement trucks and beer trucks had better radios than ambulances." Established when the local undertaker opted out of the medical transportation business, fledgling Acadian Ambulance, which had started with two ambulances and eight employees, participated as a subcontractor to the Louisiana Hospital Association in the very first multisite demonstration program grant made by the Robert Wood Johnson Foundation—the Emergency Medical Services Program.

"We continue to see the fruits of the program every day, and people still remember where it came from," says Robert Merkel, president of the Louisiana Hospital Association. "The program was sorely needed at the time, and it pushed everyone to upgrade the level of care."

"We used that seed money to begin developing the most sophisticated emergency communications system in the world," says Zuschlag, originally a communications engineer. "Half the money went to fund radios at the hospitals. With the rest of the money, we put radios in the ambulances and developed a dispatch center. At first, we functioned under an 800 number, but eventually it became a 911 system."

This new communications capability was just one aspect of the revolution in emergency medical care that began in the mid-1970s, and the changes that have occurred since have been so profound that the commonplace practices of a generation ago now seem medieval. Although we are no longer surprised at the ordinary miracles that happen daily in emergency rooms and trauma centers, most Americans have

lost sight of what a short time it has been since these innovations became standard procedure.

EMERGENCY MEDICAL CARE IN 1970

Thirty years ago, you couldn't stand up in an ambulance. It might have been a converted station wagon or limousine—or even a hearse. About half of the country's ambulance services were provided by 12,000 morticians, primarily because in their areas they owned the only vehicle that could accommodate a patient on a stretcher.¹

The ambulance driver was often little more than a chauffeur providing "horizontal transport" service. "In many places, even large cities, ambulances ran with only a driver; the patient rode alone in the back," Jack Kelly wrote in *American Heritage*. "Of 200,000 ambulance and rescue personnel, fewer than half were trained to the level of Red Cross advanced first aid. Only six states offered standard courses for rescuers, and only four regulated ambulances."² Most ambulances lacked the basic medical equipment recommended by the American College of Surgeons. The victim received little or no care before being wheeled through the doors of the emergency room, and the doctors who waited there had no idea what condition their new patient was in.

Today, preschool children across the country are taught to dial 911, but before the 1970s there was no standardized number to call in an emergency. Citizens who needed assistance were told to look in the front of their telephone directory for emergency numbers, and those numbers were different from one community to the next. Worse yet, many counties and townships had been carved up into little fiefdoms, each belonging to a different emergency response organization. In the early 1970s in the Kansas City metropolitan area, there were 109 cities, towns, and villages straddling eight counties and two states. Residents of these communities were served by no less than 45 ambulance companies, and there were 78 different emergency telephone numbers that could be used to reach them.³

If a victim could not pinpoint his or her precise geographic location—which was all too common with accidents on long stretches of the Interstate—emergency response was delayed until jurisdiction was determined. Hapless operators from the telephone company were often left to sort out who was supposed to respond, but as phone companies began to centralize and automate their information service, a caller with an emergency faced the increasing likelihood of being connected to a "local" information operator who might be 200 miles away. The operator's problem was compounded by the fact that frequently there was no right answer, as there was no single designated agency with sole responsibility for emergency

medical services.

"Emergency medical care at that time was really neither fish nor fowl," Blair Sadler, now president and chief executive officer of Children's Hospital and Health Center in San Diego, said recently. "It was not really part of the health care system, and it wasn't part of the public service system like police and fire." Sadler, along with his twin brother Alfred, got a firsthand immersion in the scope of the problem when the two were codirectors of the trauma program at the Yale University School of Medicine. While there, they launched a statewide study of emergency medical services (EMS), in Connecticut, which was one of the first comprehensive assessments of the subject.⁴

"In the early 1970s, we didn't have trauma centers," Sadler went on. "The procedure back then was known as scoop and haul. All of the sophisticated care and treatment that occurs in the emergency department itself, and the phenomenal army of surgical and nonsurgical specialists that fully equipped trauma centers require, were not yet in place. There were no standards for emergency medical technicians, nor were there regulations for ambulance services; in Connecticut, we had ambulance personnel literally fighting over patients."

The function of the ambulance was to deliver victims to the nearest hospital quickly, lights flashing and sirens wailing. The crucial question—whether the closest hospital was the best medical choice to treat the patient—was never asked, but all too often the answer was no. Although children were (and are) among the most frequent accident victims, only a handful of hospitals had a pediatric emergency specialist on staff. Special cases like burn victims and people with spinal cord injuries had to be examined, then reloaded into the ambulance for transfer to another facility. A small community hospital might not have a doctor on duty in the emergency room during off hours, and it could be the following day before a surgical specialist was brought in. By the time many of these victims got the highly skilled help they needed, the "Golden Hour"¹⁵ (the 60 minutes immediately following an accident, injury or heart attack, when aggressive medical intervention is critical to a patient's survival) had long passed, and people died because of it.

David Boyd, a member of the Robert Wood Johnson Advisory Committee and president of Trauma and Emergency Medical Services Systems, Inc., recalls, "When I started as a junior surgical resident at Cook County Hospital in Chicago, there was no standardized way of evaluating incoming trauma patients. In a typical teaching hospital, if the neurosurgical resident got that patient first, the guy went to the neuro

floor, and we were chasing a ruptured spleen up in neuro. There was no specialty known as traumatology, even though it was something the U.S. military had done very well in wartime. Historically, it has been the military who made most of the advances in care of the critically injured. Trauma care improved significantly during World War II, and was further refined in Korea and in Vietnam, where the Army developed what was essentially the first regional EMS system. I don't know why we didn't carry this home sooner, but it took a long time for us to transfer what we'd learned in war to civilian life."

Boyd and his Cook County colleagues restructured the treatment of accident and gunshot victims following the model of the mobile army surgical hospital, or M*A*S*H. When that approach produced positive results, Boyd was asked to design and run a regionalized trauma program for the state of Illinois. This was one of the few locations in the country where improvements in emergency medicine were taking place.

Another was Miami, where Dr. Eugene Nagel began instructing firefighters in cardiopulmonary resuscitation in 1966. Hoping to improve the prognosis of victims by beginning treatment before they arrived at the hospital, he sought permission to train firefighters in the use of defibrillation equipment and intravenous medications—and was refused. The fire chief and the city fathers were afraid of liability if nonmedical personnel carried out medical procedures. However, once it became possible to transmit an electrocardiogram (EKG) and other vital information from the scene to the hospital via radio, doctors in the emergency room could assume responsibility for directing the treatment of the patient. This eliminated the liability issue, but officials continued to be skeptical.

Nagel gave the commissioners a live demonstration. "I lay down on the commissioners' huge teak conference table and said, 'Let's imagine that I've collapsed in your chamber.' Then I brought in the paramedic unit. They looked at my EKG, said, 'Start an IV,' and radioed the hospital for approval. As soon as the hospital answered back with the okay, they stuck a needle in my arm and started the drip, right there on the table. The commissioners finally consented, but we were dragging our chiefs, the department, and the city every step of the way. For each improvement, we had to convince them that procedures like defibrillation and intravenous fluid therapy were reasonable, safe, and logical."

Sadler in Connecticut, Boyd in Illinois and Nagel in Miami, together with pioneering emergency response programs in Seattle and Los Angeles, were isolated examples where EMS was working. In the rest of the country, the situation was bleak. By the early 1970s, the United States was in the midst of a

public health crisis about the practice of emergency medicine. Seven hundred thousand people died from heart attacks every year, half of them before they got to the hospital. Accidents of all kinds, including traffic collisions, poisonings, burns and on-the-job mishaps, injured 50 million people annually, 115,000 of them fatally. Trauma was the leading cause of death for those between the ages of one and 37.⁶ Carnage on the highways was staggering—auto accidents alone injured 1.8 million people a year. Estimates projected that as many as 90,000 lives a year could have been saved with better emergency treatment.⁷ Lives were being lost as a result of the delay in beginning care, and as a result of the lack of communication between doctors at the hospital and those first on the scene.

In 1966, a panel appointed by the National Academy of Sciences studied the problem, and in a report entitled *Accidental Death and Disability* it called trauma "the neglected disease of modern society."⁸ Reexamining the situation in 1972, the Academy's Committee on Emergency Medical Services found that little progress had been made, and concluded, "Emergency medical services is one of the weakest links in the delivery of health care in the nation."⁹

By the early 1970s, the field of emergency medicine was beginning to develop. Emergency medicine residencies, initially established in 1970 at the University of Cincinnati, grew to 32 by 1976. A lengthy study issued by the Yale Trauma Program in 1972 recommended the development of regionalized emergency medical communications systems. In 1972, the Department of Health, Education, and Welfare funded EMS demonstration programs in Arkansas, Illinois, and areas around Jacksonville, San Diego and Athens, Ohio.

One fortuitous aspect of the Robert Wood Johnson program in this transformation was timing. There were clearly other forces at work that were beginning—but just beginning—to push the country toward a more sophisticated approach to EMS. The TV program *Emergency!*, which went on the air in January of 1972, made heroes of a team of Los Angeles County Fire Department paramedics. It brought a glamorized version of EMS to prime time, much as the program ER does today.

"*Emergency!* was the prairie fire," Nagel says. "That show lit the spark of public awareness. Before that, it was doctors talking to doctors." *Emergency!*'s ratings put a positive spin on EMS, and facilitated the social change needed to get EMS adopted across the country. The Robert Wood Johnson Foundation program, which came along at the height of that popularity, made it possible for communities to start acting on this growing public familiarity with EMS. A federal Health, Education and Welfare Department program

provided increased funding to keep the ball rolling. When *Emergency!* went on the air, there were only 12 paramedic units in the country; four years later, at least 50 percent of the American population was within 10 minutes of a paramedic unit.¹⁰

The Robert Wood Johnson Foundation entered the field in 1973, launching a \$15-million initiative to develop regionalized emergency medical services in forty-four sites. At about the same time that the Foundation was reviewing applications, Congress was beginning to grapple with the EMS problem. After a couple of false starts and a presidential veto by Richard Nixon, Congress passed the Emergency Medical Services Systems Act of 1973. Championed by Michigan Representative (and soon-to-be vice president) Gerald Ford, it was signed into law in November of 1973.¹¹ The program became operational just as Nixon resigned in August of 1974. It authorized \$185 million over a three-year period for EMS. Ford, an EMS supporter, tapped David Boyd, who had helped develop the Foundation's program, to run the new Division of Emergency Medical Services at the Department of Health, Education and Welfare (later the Department of Health and Human Services).

ROBERT WOOD JOHNSON FOUNDATION INVOLVEMENT

EMS was among the very first concerns of the Robert Wood Johnson Foundation, which became a major national philanthropy in 1972. "The Foundation's president, David Rogers, was concerned about how emergency medical services worked," says Robert Blendon, an original senior staff member at the Foundation and now professor of health policy and political analysis at Harvard University. "He believed that there was something wrong in America if people who could benefit from the best of medicine never got to the hospital before it was too late, or they got to the wrong place." In January 1973 Rogers enlisted the participation of the National Academy of Sciences to set up the screening process for grant proposals, monitor the projects and evaluate the impact of the program.

Blendon was charged with getting the program moving and sought out Blair Sadler in Connecticut. "Before we began the program, we gathered significant numbers of national experts to talk about emergency medical service," Sadler recalls. Those experts included David Boyd and Eugene Nagel. "We asked them how a major philanthropy could make a difference. We sat around Bob Blendon's dining room table and started creating the first national program in Foundation history, and from an administrative standpoint it turned out to be the template that the Foundation uses today."

"The Robert Wood Johnson Foundation was unique at the time," Nagel says. "The charge given to us by the Foundation was, if we had \$15 million to spend on EMS, how would we spend it, and what good

should we expect it to do? The Foundation wanted the program to be a catalyst. 'We'd like you to look for the key log in the EMS logjam,' they told us. 'Use the \$15 million to break that key log and get things moving.'" In April 1973, the EMS grants program was announced. Three months later, Blair Sadler left his position with the Yale Trauma Program to become a Foundation vice-president and head up the program.

Sadler, Rogers, Blendon and others connected with the Foundation envisioned the program as a one-shot effort that would create improved access to the emergency medical-care system across the country. The goal was to set up projects that would have "a catalytic effect on bringing together various aspects of emergency health services operated by different geographic and institutional jurisdictions with new and more satisfactory operational and administrative arrangements,"¹² the Foundation announced.

"Because we wanted to take a comprehensive approach to prehospital care, we designed the program like a series of building blocks," Sadler says. "It had three basic components. The first was technology, which was basically radios. The second was training, which was twofold. One part had to do with upgrading the skills of people who were still called ambulance attendants. The rest was about training dispatchers in basic emergency medicine. The third part was interagency coordination, which was perhaps the most difficult of all."

When the Foundation announced the EMS program, it told potential applicants exactly what they had to do to get the money, and established a set of requirements to be met within a year of funding. These specifications included central and immediate citizen access to the emergency medical system; central control of EMS communications, with a single institution designated for dispatch and coordination; prompt dispatch of emergency care to the scene; adequately trained dispatch and ambulance personnel; emergency system capacity; access to radio channels and phone lines; and assurance that the program could become self-sufficient after a two-year period. These specifications represented the first time that any organization had put forward a nationwide definition of what a sound EMS system ought to entail. At that time, the idea that a foundation would publish specifications and invite applicants to prove they could hit the target was unique.

The Foundation actively recruited prospective grantees. "Foundations had not previously engaged in advertising to communities around the country, but we used the way we gave out the money as a means to change the configuration of organizations that might work together on this issue," Robert Blendon

recalls. "We essentially required them to form alliances to be eligible for a grant. We let people know they could get money if they formed a coalition. This was particularly true in the Midwest and the Southwest—areas that did not have much history with large foundation philanthropy. We made them aware that if they could put the structure together there was a high probability that we would fund them."

"From the outset, we had worked with our advisory committee to identify who the appropriate lead agencies might be for this program," Blair Sadler says. "The committee came back and told us that it was quite appropriate in some cases that the lead agencies would be the police department, because they had the dispatch capability. In other cases, it might be the county administrative officer, a large hospital, or the health department. We didn't care. We held them all to the same standards, but they were all diverse agencies. It didn't matter to us who the lead agency was, as long as that entity had the ability to bring all the key EMS players to the table.

"Fire departments were applying for grants from the Robert Wood Johnson Foundation," Sadler says with satisfaction. "That was unheard of. At a time when foundations were focused on medical schools, hospitals, and clinics, we had consortiums of public safety agencies submitting proposals. It was like Mars and Venus coming together in one planet."

The Foundation acted as a funnel for EMS information, bringing knowledge of hardware and procedures to grant recipients. It sponsored workshops, offered low-cost technical assistance on communications issues, and provided guidance on dealing with the Federal Communications Commission. (The newly acquired radios in the ambulances and hospitals had to be licensed by the Federal Communications Commission.) In addition, the Foundation brought grant recipients together for an annual meeting to network and share information.

The Advisory Committee and National Academy of Science staff members monitored progress within each region. They took a hands-on approach with grant recipients, conducting site visits that both reviewed progress and dispensed advice. "We had to have everything working toward a comprehensive EMS system—training for the rescue squad, 911, communications. It was a very serious group that came in," says Richard Edlich, a plastic surgeon and burn specialist associated with the University of Virginia.

The Foundation received 251 applications, and chose 44 grant recipients from 32 states and Puerto Rico. Grants were announced in May 1974 and averaged \$350,000 to \$400,000. The program was a catalyst for change in two distinct sectors: it improved the emergency care delivery system in the areas served by

grant recipients and it spurred and enhanced the federal government action in the emergency medical services field.

IMPROVEMENTS IN SYSTEMS SERVED BY THE FOUNDATION

The 911 System

The Foundation's grantees were some of the first areas in the country to have an operational 911 system. The success of 911 in the grant regions speeded development in other parts of the country; nevertheless, the road to nationwide 911 usage was long and bumpy. In 1967, the President's Commission on Law Enforcement and Administration of Justice had recommended the institution of a single nationwide telephone number for reporting emergencies. In November of that year, the Federal Communications Commission began working with AT&T to put the recommendation into effect. The number sequence 911 was chosen because it was short and easily remembered, and because it carried no leftover baggage—911 had never been used as an area code, nor did the public associate it with any other important function.

Three months later, the first 911 demonstration call was made by Representative Rankin Fite of Alabama, but full adoption of the system languished until 1973, when the White House issued a policy statement calling for a nationwide 911 system. The White House also set up a Federal Information Center to assist local governments in making the transition to 911. These actions by the executive branch dovetailed nicely with the Robert Wood Johnson Foundation's program, and the development of a 911 capability was a priority for the grantees. Before the program, only 11 percent of the population in the 44 grant regions had access to a single emergency telephone number. By the close of the program in 1977, more than 95 percent of the people in those regions could dial a single emergency number for police, fire and medical assistance. At first, this single number was not necessarily 911, but the Foundation's program clearly provided the impetus for greatly expanded 911 usage. At the beginning of the program, only an infinitesimal number of people—0.1 percent within the 44 sites—were served by a 911 system. By the end of the program, this number had grown to 25 percent, and the groundwork for transition to 911 in most of the other program areas had been established.

With large-scale federal intervention, the pattern in the rest of the country was similar. In 1976, just 17 percent of the population of the United States had 911 service; by 1979, more than a quarter of the population was served by 911. Today, 85 percent of the country is covered by some type of 911 system.

Interagency Communication

In addition to improving the public's ability to summon emergency medical help, the Robert Wood Johnson grant program improved communication among various agencies within the emergency response system. Before the program began, none of the grantees had any linkage between the central emergency dispatcher and the police and fire departments; by 1977, however, 86 percent of them did. In 1973, none of them had links with emergency dispatchers in other regions; 61 percent of them had made these connections by 1977.

The Louisiana Hospital Association program was one of the most successful. The association received a grant of \$319,000, and focused on improvements in communications. It used part of its funding to install radios in hospitals and ambulances, and also set up what Acadian's Richard Zuschlag calls "a whoop'n'holler system." This was a direct hook-up, a primitive hotline that linked ten different agencies, including police, fire, and emergency medical service providers, and solved the problem of mismatched radio frequencies. One additional aspect of the system monitored the railroad crossings, so that if a railroad crossing arm came down to block traffic as a train passed, the board at the dispatch center lit up. This enabled dispatchers to reroute fire trucks, police cars, and ambulances as necessary.

The whoop'n'holler system is still in use today, but as the mass casualty incident on the Whiskey Bay Bridge demonstrated, emergency communications in Louisiana have become much more sophisticated—as has Acadian itself. Now 911 operators have a direct connection to Acadian Ambulance via BellSouth, and Acadian has become the largest private ambulance service in the United States. It serves an area of more than 24,000 square miles, including more than half the state of Louisiana, bayou swamps and offshore oil installations in the Gulf of Mexico. With more than 70 dispatchers (all trained paramedics), it has a fleet of 168 ambulances, five helicopter ambulances and two fixed-wing aircraft, and uses a satellite-guided global positioning system to pinpoint the location of its vehicles within 100 feet.

Training of EMTs

Many of Acadian's first ambulance personnel were experienced medics from Vietnam, and they were well-versed in dealing with trauma patients. However, in 1975 the Foundation's Emergency Medical Services Program funded additional training for Acadian paramedics, giving them instruction in dealing with cardiac patients through an education program with the paramedics of the Houston Fire Department. Other grant recipients used Foundation funding as well, both to upgrade the expertise of their emergency medical personnel and to increase their number. In 1973, there were some 6,000 emergency medical technicians (EMTs), and just 240 more highly trained paramedics within the 44 grant regions. By 1977, there were almost 26,000 EMTs—a fourfold increase—and over 3,200 paramedics, a

thirteenfold increase.

The University of Virginia in Charlottesville, which maintains a teaching hospital on campus, was one of the 44 grant recipients. Since 1960, the local organization that has taken the lead in emergency medical response has been the Charlottesville-Albemarle Rescue Squad (CARS), an all-volunteer association. For a time, emergency response in Charlottesville functioned in a manner that was a bit out of the ordinary, at least in the United States. When an emergency call came in, a doctor and a nurse went out with the rescue squad in the ambulance to evaluate and stabilize the patient. Dr. Richard Crampton, a cardiologist affiliated with the University of Virginia Hospital, was one of the pioneers of this technique in the United States, adapting it from the physician-staffed mobile unit developed by Dr. Frank Pantridge in Belfast, Northern Ireland.¹³ With this approach, the emergency room came to the patients before they were ever transported. This procedure proved to be invaluable whenever the call involved chest pain or cardiac arrest, as it brought advanced resuscitation directly to the scene of the emergency. However, many experts, including Nagel, believed that the concept of carrying physicians in ambulances was impractical in the long run.

In 1970, Crampton began offering paramedic training to the volunteers of the Charlottesville-Albemarle Rescue Squad, first in basic life support and later in advanced life support. It was one step in the transition from physician-staffed ambulances to mobile units staffed by paramedics with advanced training in cardiac care. The benefits of his efforts were soon apparent. "It helped a great deal that our 100th patient was former President Lyndon Baines Johnson, who was visiting Charlottesville when his son-in-law, Chuck Robb, was a University of Virginia law student," Crampton says. "Johnson's myocardial infarction put EMS and the need for well-trained emergency medical technicians on the front page."¹⁴

Robert Jaskiewicz, president of the Charlottesville-Albemarle Rescue Squad, has been with the organization since the mid-1970s. "In 1976, CARS became the first rescue squad in Virginia to require all of its members to be trained as EMTs," he says. "One of the pieces of equipment we used was a 'Bio-phone', which sent electrocardiograms to the hospital over the radio. The doctors received the information and told us what drug intervention was needed. We became essentially an extension of the cardiac care unit at the hospital. The Robert Wood Johnson Foundation grant money stayed with us for a long time—we still operate in much the same way today."

CARS remains an all-volunteer force that maintains professional standards. Part of what makes this possible is the large, highly educated volunteer pool that the university setting provides. Ninety of the 120 members are trained in advanced life support and 60 are certified at the B level for EMTs. With seven ambulances, three advanced life support quick response cars, two heavy rescue trucks, a water rescue vehicle, a technical rescue truck and a mass casualty incident trailer, CARS serves 80,000 people in a 740-square-mile area, half of whom live in the college community of Charlottesville. The other half are widely dispersed throughout the surrounding rural area. CARS members offer their services free of charge, relying on an annual fundraising drive to cover their operating costs. "There are lots of people who want to make money off what we do for free," Jaskiewicz says. "But there's nothing that money could buy that would change the way we provide our service."

Regionalization of EMS

The Foundation program pushed the regionalization of emergency medical services, and it was telemetry—state-of-the-art radios—that drove contentious organizations to cooperate with one another. "There are no truly regional organizations in the United States—there's state and county," David Boyd says. "Locals don't like regions. Blair Sadler took a bet that if you brought a central nervous system in and made it work, it would be a structure for the EMS system to function on a regional basis."

"The Robert Wood Johnson Foundation paid for radios to be put into ambulances—that was sort of the carrot," Sadler says. "It was the enticement to get ambulance services to coordinate their efforts with a central dispatch function." Before the program began, 25 percent of the grantees had an ambulance-hospital communications system—a radio, in other words—in more than half their ambulances; just 2 percent had radios in all ambulances. In 1977, when the program ended, 91 percent of the grantees had radios in half their ambulances, and 75 percent had them in all ambulances.

Although some grant recipients believed that the radios were the most important benefit of the program, the Foundation saw them as a means to an end. If communications was the key log in the EMS logjam, then the radios were the way to break it. The function of communications as the central nervous system in many cases forced a connection that literally had not existed before, and was a means by which parochial interests could be surmounted. The Foundation's insistence on coalitions made strange bedfellows among local medical providers and public service agencies. In many communities, it forced the police or the fire department, which often had the dispatch technology, to form an alliance with the local hospital. City and county governments had to figure out how to put jurisdictional squabbles aside

in order to show that they could work together.

The grant to the Hennepin County Criminal Justice Council of Minnesota was a case in point. The Hennepin Emergency Medical Services Project was initiated in the spring of 1974, after an incident at the Minneapolis-St. Paul International Airport exposed potentially tragic deficiencies in the county's ability to respond to a major disaster. Part of the problem was the absence of prehospital emergency coordination. The public Hennepin County Medical Center Ambulance Service had primary responsibility for automobile crashes, persons in police custody, and the indigent, but private ambulance services carried those who could afford them. This meant that ambulances were competing with one another to respond to calls; the closest ambulance was not necessarily the one responding. There was also a lack of communication between prehospital emergency personnel and hospitals to which the victims were being transported. Dr. Ernest Ruiz, then chief of emergency medicine at Hennepin County Medical Center, formed a task force to begin addressing these problems, just as the Hennepin County Criminal Justice Council started discussions about instituting a 911 system.

The prospect of a Robert Wood Johnson Foundation grant prompted agencies that had at best coexisted side by side to come together on the EMS issue. A coalition including the Hennepin County Medical Center Department of Emergency Medicine, the Hennepin County Medical Center Ambulance Service, members of Ruiz's task force, and various private ambulance service providers in the region was cobbled together and headed up by the Hennepin County Criminal Justice Council. The coalition's grant request was successful, and the Foundation awarded it \$478,000. Planning for Hennepin's 911 system began under the grant, but putting the system in place was difficult, and the actual 911 system did not become operational until December 1, 1982. When it began, it covered seven counties (including Hennepin), six phone companies, seventy-seven central telephone offices, 1.15 million phones, and 29 public safety answering points.

Today, the Hennepin County Medical Center Ambulance Service serves half a million residents in fourteen communities in a 266-square-mile area, including most of the city of Minneapolis. It responds to nearly 50,000 calls a year and is staffed by 92 full-time paramedics and eleven paramedic dispatchers. The organization maintains a website (www.hcmc.org), which includes a comprehensive history of emergency medical service in the Minneapolis area. Today, the Hennepin County Emergency Medical Services Council, established during the grant period to administer the grant funds, oversees the regional

emergency care delivery system known as Hennepin *County EMS*.¹⁵

INCREASED FEDERAL INVOLVEMENT IN EMS

Like the Robert Wood Johnson Foundation, the federal government pushed regionalization vigorously. What Blair Sadler had tried to encourage with radios, David Boyd, who ran the federal program from 1974 to 1983, required by federal mandate. The Foundation had offered grants as bait for jurisdictions to form coalitions leading to regionalized EMS; Boyd's Division of Emergency Medical Services made regionalization a prerequisite for funding. "Robert Wood Johnson was a rifle, and HEW was a shotgun," says Eugene Nagel, who had given Miami firefighters CPR training. Beyond the expenditure of \$185 million authorized by the initial legislation, a 1976 bill added \$269 million to the pot.

"We were probably one of the last categorical programs enacted." Boyd says. "Categorical programs say, 'Here are the guidelines and the regulations, and if you meet these regulations, you get the money.' EMS was a categorical program, and as the public health officer for EMS, I took this seriously. I was not rigid, but I was serious. We didn't let this money go unless we could ensure that it would improve EMS at the community level."

Boyd divided the country into 303 contiguous EMS regions—there were to be no geographic holes in EMS coverage. Like the Robert Wood Johnson Foundation's EMS program, the federal program disregarded political boundaries and defined regions according to patient flow patterns. How were these 303 regions determined? "We used the same market areas that Levi's and Sears & Roebuck used," Boyd says. Within these regions, Boyd organized from the top down, as he had in Illinois. He handpicked which medical facilities could best function as trauma centers, designated them as lead hospitals, and used them as the backbone of a reconfigured regional emergency medical care delivery system.

Because the Foundation's program had been started before the larger federal program, and because of Boyd's involvement with it, he sought out Foundation grantees, most of whom already had a leg up on regionalizing and revamping their EMS services. At a time when there were few good role models for how EMS should work, Boyd needed trailblazer projects that the rest of the country could emulate. The amount of money received by the original forty-four sites was soon augmented by federal funding. By the end of 1978, more than \$10 million in matching federal grants had been given to eighteen of the forty-four sites. "It was fortunate that Dr. Boyd was on our advisory committee as a core architect of the program," Sadler says. "When he moved to Washington to direct the federal program, it guaranteed that

the feds would be supportive of our effort. The HEW program leveraged our money at least tenfold."

Although the basic drive toward regionalization was the same, there was a difference in emphasis between the Robert Wood Johnson Foundation's program and the federal approach. The federal Division of Emergency Medical Services launched a fifteen-point program built on the trauma-based hierarchical structure that Boyd had developed in Illinois. "The Robert Wood Johnson program focused on nine or ten of those points," Sadler says. "We emphasized prehospital care, getting patients into the system quickly, and improving treatment in the field. Boyd concentrated a great deal more on the hospital aspects of EMS, especially trauma center designation, making sure people got to the right hospital."

"We picked up on the Robert Wood Johnson effort in the federal program in every one of those forty-four projects," Boyd says. "If a group had their radios in place, if they had their ambulance services up and running, we complemented that. We assisted these programs, and in some cases getting them modified so that they would meet all federal and state requirements. Dr. Rogers, the Johnson Foundation president, and I presented the programs at the White House and in Congress. It was a model of the public and private sectors working hand-in-hand."

EVALUATING THE PROGRAM

The Foundation arranged for two separate reviews of its EMS program in 1978, one by the National Academy of Sciences, the other by the Rand Corporation. When the reports were complete, it was as if two completely different programs had been evaluated. The Academy's critique was glowing; the review by the Rand Corporation was lukewarm at best, and the disparity between the two evaluations was both troubling and embarrassing.

The National Academy of Sciences review of the program covered all forty-four grantees. However, there was no avoiding the built-in bias of the Academy in favor of the program, as its staff had actively participated in administering the grants. Data collected by the Academy confirmed the growth in numbers of trained emergency medical personnel, improved access to a 911 system, and improved communications between hospitals and ambulances. The National Academy of Sciences found that the program had achieved its objectives, and that it had had a major impact on EMS development in the United States. It declared, "Notwithstanding the present shortage of rigorous scientific data from the 44 projects on the medical impact of EMS, EMS systems can and do effect significant reductions in accidental death and disability."¹⁶

The Rand Corporation was bothered by the "shortage of rigorous scientific data" the Academy mentioned. Rand chose seven grantees and attempted to assess the effect of full regionalization of emergency services on access to services, on speed of treatment, transfer to appropriate hospitals, and communication between hospitals and personnel in emergency vehicles. It also hoped to get some information on the lifesaving capability of such programs, although this issue was not central to the study.

In part because of Rand's methodology, and in part because of the brevity of the Robert Wood Johnson Foundation program, the outcome of the Rand investigation raised at least as many questions as it answered. David Rogers, president of the Foundation at the time, wrote in the 1978 *Annual Report*:

When planning the Rand Corporation study, the Foundation was early in its development, and our lack of experience in service programs and evaluation alike led us to make several fundamental errors. First, our goals for full regionalization were unrealistically high. Second, the time frame for the conduct of the study was wrong—we started too early and the two-year period of the evaluation was too short. Third, the appeal of the program seemed so great and its advantages so obvious to us, that we expected good data from all programs. Thus only seven of the 44 sites were selected for the Rand study. Neither the grantees nor we were aware how difficult and time consuming it would be to gather data from the multiple groups and organizations comprising regional emergency medical service systems. This resulted in three of the seven sites having such incomplete data that they were excluded from the final analysis. In retrospect, we expected too much, we looked too soon, and the sites were too few in number to obtain solid answers to the questions of most compelling interest to us.¹⁷

Even without a definitive evaluation of the Foundation's Emergency Medical Services Program—indeed, with the problems inherent in establishing control groups, obtaining accurate data from overworked EMTs, and isolating the effect of the Foundation-funded program, such an evaluation would be very difficult—it clearly has had a long-lasting and beneficial effect. The results of the 1999 survey conducted by James C. Butler and Susan G. Fowler show an impressive continuity: Forty-one of the 44 original sites are still in business, and three-quarters of the sites responding to the survey are the same organizations that received Robert Wood Johnson Foundation grants in 1974. In nearly all of the original regions, 911

is used as the universal emergency number, as it is throughout the country.

Although the federal government's program, the return of medics from Vietnam, the development of emergency medicine as a subspecialty, interest of influential groups such as the National Academy of Sciences, and public awareness through the successful television show *Emergency!* all played roles in bringing widespread emergency medical services throughout the country, the Foundation's role cannot be minimized. Taking advantage of the changing social climate, the Foundation seized on the issue of emergency services and, through its grants, guidelines, and technical assistance, helped give direction to this new field. It was able to move resources quickly and utilize the advice of those who were pioneers in this new area. Moreover, the program was a noteworthy model of public-private collaboration. The same people advising the Foundation also counseled the federal government, and the lessons from the Robert Wood Johnson Foundation program were used in developing the larger government program, which began somewhat later.

In many ways, the EMS program demonstrates how a foundation can grasp an opportunity, and through the judicious use of resources, influence an emerging and important field. As University of Virginia emergency physician Richard Edlich notes, "We now have a Department of Emergency Medicine and the University of Virginia Hospital in Charlottesville is a Level 1 Trauma Center. The Robert Wood Johnson Foundation money helped us build the structure to become the prototype and set the example. Those grants were the catalyst. This program points the way to how we can be successful in many other areas of health care."

Notes

¹ M. S. Eisenberg, J. F. Pantridge, L. A. Cobb and J. S. Geddes. "The Revolution and Evolution of Prehospital Cardiac Care." *Journal of the American Medical Association Archives of Internal Medicine*, Aug.12–26, 1996.

² J. Kelly. "Rescue Squad." *American Heritage*, 1996, 47(3), 90–100.

³ J. Butler and others. "Neglected for Years, Emergency Medical Services Now Seem to Be Catching on in the U.S." *Robert Wood Johnson Special Report Number 2, November 1977*, page 7.

⁴ A. M. Sadler Jr., B. L. Sadler and S. B. Webb Jr. *Emergency Medical Care: the Neglected Public Service*. Cambridge, Mass.: Ballinger, 1977.

⁵ The term "Golden Hour" was coined by Dr. R. Adams Cowley, a former Army surgeon and founder of the nation's first shock trauma center in Baltimore, Maryland, later named the Maryland Institute for Emergency Medical Services. Cowley believed that most trauma patients died of shock and its aftereffects. Shock is the result of sluggish or nonexistent circulation; patient survival after more than an hour of shock is increasingly unlikely.

⁶ Trauma is defined as a physical injury caused by an external force to the body. Causes of trauma include automobile accident, gunshot, stabbing, and fall from height.

⁷ The Robert Wood Johnson Foundation. *Regional Emergency Medical Communications Systems: Program Fact Sheet*. Princeton, N.J.: The Robert Wood Johnson Foundation, 1975.

⁸ National Academy of Sciences. *Accidental Death and Disability: The Neglected Disease of Modern Society*. Washington, D.C.: National Academy of Sciences, National Research Council, Division of Medical Sciences, 1966.

⁹ National Academy of Sciences. *Roles and Resources of Federal Agencies in Support of Comprehensive Emergency Systems*. Washington, D.C.: National Research Council, Mar. 1972, p. 3.

¹⁰ Charlottesville-Albermarle Rescue Squad. "The History of EMS."

¹¹ Two subsequent amendments to the Act were passed in 1976 and 1979, which allocated additional money to the program.

¹² The Robert Wood Johnson Foundation. National Competitive Program of Grants for Regional Emergency Medical Communications Systems, Request for Proposals, 1973.

¹³ Dr. J. Frank Pantridge of Royal Victoria Hospital, Belfast, developed a rapid response system for dealing with cardiac emergencies. A special ambulance stocked with medications to stabilize heart rhythm and a makeshift portable defibrillator was staffed by a physician and a nurse. By carrying emergency coronary care into the community, Pantridge was able to resuscitate patients in cardiac arrest. Dr. Crampton in Charlottesville and Dr. William Grace at St. Vincent's Hospital in New York were the first physicians in the United States to use Pantridge's method.

¹⁴ Crampton also helped promote paramedic use of the chest thump. In 1970, the Charlottesville-Albemarle Rescue Squad was transporting a patient with an unstable cardiac rhythm in what was then called a Mobile Coronary Care Unit. When the vehicle inadvertently hit a speed bump in a shopping center parking lot, the patient's normal heart rhythm was restored. Further research confirmed that chest thumping patients with life-threatening arrhythmias could save lives.

¹⁵ When the Foundation-funded program ended in 1977, the Hennepin County EMS Project became a department of the Hennepin County Medical Center; it now focuses on training EMS personnel.

¹⁶ *Final Report of the Committee on Regional Emergency Medical Communications Systems*. Washington, D.C.: National Academy of Sciences, Apr. 1978, page v.

¹⁷ D. Rogers. "The President's Statement." *The Robert Wood Johnson Foundation Annual Report 1978*. Princeton, N.J.: The Robert Wood Johnson Foundation, 1978.