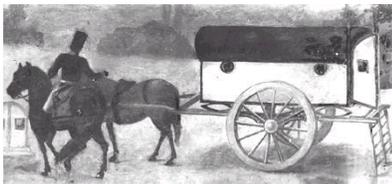


HISTORY AND BACKGROUND



Baron Dominique-Jean Larrey was Napoleon Bonaparte's respected surgeon and developed the most innovative and effective casualty transport system of his age. His "flying ambulances" not only saved countless lives during the Napoleonic Wars, but also served as a model for future emergency medical transport.

DEFINITIONS:

Morbidity: The incidence of a specific disease or ailment in a given group.

Mortality: The incidence of death in a given group.

These and other terms used in this study are defined in Appendix A "Glossary of Terms Used in Study."

This chapter provides an overview of the foundations of trauma care and the essential characteristics of trauma systems as they have been continuously refined over the past thirty years,¹ along with the history of emergency medical transport as it has led to the development of helicopter emergency medical services (HEMS).

ORIGINS OF TRAUMA CARE SYSTEMS AND EMERGENCY MEDICAL TRANSPORTATION

The organized care of injured patients has its roots in military models of trauma care going back to the Napoleonic Wars, and many of the advances in caring for major trauma patients can be attributed to the lessons learned during past military conflicts. For example, the concept of a "flying ambulance" while not connected with the unique lifesaving capabilities of the air medical helicopter, goes back to 1792. Baron Dominique Jean Larrey, a twenty-six year old French surgeon serving in Napoleon's army is credited with conceiving several advanced medical evacuation procedures.² On the battlefields of Europe it was not uncommon for wounded soldiers to have to wait for more than twenty-four hours before they could be transported to medical facilities.

The morbidity and mortality³ rates were extremely high despite the efforts of the surgeons. Larrey came up with the idea of producing small, wheeled carts similar to those used by the light artillery units of the French army to evacuate the wounded. These light artillery units were called *artillerie Volant*, or "flying artillery" because of their

¹ Adapted with permission from U.S. Department of Transportation, National Highway Transportation Safety Administration, October 2002, "Trauma System Agenda for the Future," as coordinated through the American Trauma Society.

² Norton, K. "The Helicopter in Air Medical Service." 1997. Bell Helicopter Textron Canada (BHTC).

³ These and other terms used in this study are defined in Appendix A "Glossary of Terms Used in Study."

speed and mobility.⁴ The carts designed by Larrey were also light, fast and maneuverable, and were termed *ambulances volante* (flying ambulances). The “flying ambulances” were used to carry surgeons to the battlefield and then used to transport the wounded to field hospitals. The survival rate of the wounded French soldiers significantly increased due to Larrey’s innovation.

CARE OF THE INJURED AND AIR MEDICAL TRANSPORT—THE U.S. EXPERIENCE



A “modern ambulance,” circa 1923

Technology has changed since 1792, but the need to get skilled medical help to wounded soldiers or injured civilians as quickly as possible, and to safely and quickly transport them to hospital facilities remains the same. However, the availability of new means of transporting patients has not always been met with enthusiasm. In 1903, when it was suggested that the “horseless carriage” might represent a superior means of patient transport, one critic claimed that

“Nothing has been found to equal the force of the horse for economy and safety. Patients, being probably in a nervous condition, will be alarmed at the idea of being taken off in a motor car...”⁵

Helicopters were developed in the late 1930’s and the first contract for a military helicopter was signed in January 1940.⁶ With the delivery of its first helicopter, the U.S. Army was quick to recognize its capabilities:

“Ambulance Duties: The helicopter can operate between advanced positions and base hospitals without depending on prepared landing fields. It can be of vital service transporting personnel and medical supplies.”⁷

The first recorded use of a true “flying ambulance” occurred on January 3, 1944 where a Coast Guard helicopter flew badly needed blood plasma from New York City to Sandy Hook, New Jersey to aid survivors of

⁴ Ibid.

⁵ Ibid.

⁶ Ibid.

⁷ Ibid.



Korean War-era air ambulance

World War II saw helicopters first used for medical evacuation, and the helicopters were critical for rescue operations in the Korean and Vietnam wars. Today, air ambulances are used to quickly transport critically ill patients to large specialty treatment facilities called "Trauma Centers."



Vietnam-era UH-1B "Dustoff"

"As their wounded were off-loaded to definitive care—we've watched the 'thumbs up' as their tired eyes and muddy faces grin at life given."

57th Medical Detachment
(Helicopter Ambulance), RVN,
January 1964

a large explosion on a Navy destroyer.⁸ Less than ten years later, during the Korean War, an estimated 20,000 wounded were transported by helicopters to field hospitals and hospital ships equipped with helicopter landing pads (helipads).⁹ The evacuation of battlefield casualties by helicopter substantially decreased the morbidity and mortality of these patients and the helicopter now represented a quantum leap forward in the care of the wounded since Larrey's time.¹⁰

During World War II, well-developed triage systems were instituted and wounded soldiers were evacuated through tiers of increasingly capable medical care. Throughout the Korean and Vietnam wars, the time from injury to definitive treatment was sharply reduced by transporting patients with serious injuries directly to acute care field military hospitals that delivered immediate, organized trauma care.

The Vietnam War gave Americans graphic images of the value of air ambulances in saving lives. Bell UH-1 (Huey) helicopters, called "Dustoffs," were one of the primary helicopters used for medical evacuations. In addition to its speed and durability, the Huey was capable of carrying patients inside the aircraft's cabin, and in these respects was the forerunner of today's emergency medical transport helicopters. The ability to carry patients inside, along with the ability of the wounded to receive skilled medical attention while enroute to the field hospital were key to a reduction in the battlefield mortality rate.¹¹ Military helicopters transported nearly one million military and civilian casualties during the war.¹²

INTEGRATED TRAUMA AND HELICOPTER EMERGENCY MEDICAL SYSTEMS IN THE U.S.

Although the principles learned during wartime were not automatically or easily implemented at home, the military's success in dealing with severe injuries lead to heightened public expectations about trauma care and provided an impetus for the development of trauma care systems. The Vietnam experience contributed to a large

⁸ Morris, "Pioneering the Helicopter." 1945. As quoted in the above work.

⁹ Norton, 1997. *op. cit.*

¹⁰ *Ibid.*

¹¹ *Ibid.*

¹² *Ibid.*

extent to public awareness of the benefits of emergency air medical transport. It also gave rise to new standards for the transportation and care of trauma patients, including the development of specialty care hospitals (trauma centers) and the air transport of patients to the nearest appropriate medical facility based on the nature of the injury, as opposed to the nearest facility.

Trauma Centers vs. Trauma Systems



1951 Cadillac Combination Hearse/Ambulance

Until the mid-1960s, ambulances were usually converted hearses. The patient was in a prone position and there was no room for an attendant. In 1966, ambulance design went under much scrutiny to allow treatment supplies and emergency medical attendants to be within arm's reach of the patient. Today's ambulance is a moving treatment center that sometimes saves lives before the patient reaches the hospital.

The San Francisco General Hospital (SFGH) Trauma Center was dedicated on October 17, 1972 and is credited with being one of the first organized trauma centers in the United States. It is a nationally recognized leader in research and the treatment of injury, and as such, is an important resource for San Francisco and the Bay Area, as well as a significant contributor to the advancement of trauma care nationally and internationally.

The first de facto trauma centers were municipal hospitals in major urban areas that mostly provided emergency services to the uninsured, such as San Francisco General Hospital (SFGH). Because these hospitals were usually affiliated with medical schools, injured patients received timely treatment from in-house staff officers while these staff members gained expertise in dealing with injuries. This concentration of expertise and the early development of centers of excellence for trauma care contrasted sharply with the care in suburban hospitals in the same geographic area, which did not have a similar systematic response for injured patients.

A trauma center differs from other hospitals since it guarantees immediate availability of specialized surgeons, anesthesiologists, other physician specialists, nurses and resuscitation life-support equipment 24-hours a day. Within a region or a state, trauma centers are integrated into a *system* plan to allow for the best and most timely match of the hospital's resources with the needs of its patients.

Trauma *systems* have evolved since the 1970's to be a coordinated effort of specially trained pre-hospital care providers and dispatchers who triage and transport the most severely injured to the trauma center—the designated hospital best prepared to rapidly diagnose and treat traumatic injuries. The trauma system

*Historical ambulance photographs
courtesy of San Francisco Public
Library*



coordinates care among all pre-hospital providers and regional trauma centers so that efficient and prompt communication and transfer can take place according to *patient need*.

National Priorities and Development of Trauma/HEMS Systems

The following discussion provides a summary of trauma and HEMS systems development based on the circumstances that prompted progressive development including shifts in public interest, changes in government policy, and establishment of priorities within professional associations.¹³

Community and public education regarding the status of Emergency Medical Services (EMS) and trauma care peaked in 1966 with the publication of the classic National Research Council/National Academy of Sciences white paper "*Accidental Death and Disability: the Neglected Disease of Modern Society*."¹⁴ This landmark document described gross deficiencies in pre-hospital care and proposed a long-range plan for changes in every facet of emergency care. It also provided the basic blueprint and building blocks for subsequent improvements in EMS programs nationwide, but fell somewhat short in describing the need for systems of care.

Congress responded to publication of this white paper by enacting both the National Traffic and Motor Vehicle Safety Act and the Highway Safety Act of 1966, which summoned a national commitment to reducing injuries on the nation's highways. The Department of Transportation was empowered to set motor vehicle standards, fund research and programs that promoted highway safety, provide leadership for the development of regional EMS systems, and develop standards for EMS provider training. States were required to include EMS as part of their highway safety programs. Several prototype emergency medical systems were developed under the

¹³ Adapted with permission from U.S. Department of Transportation, National Highway Transportation Safety Administration, October 2002, "*Trauma System Agenda for the Future*," as coordinated through the *American Trauma Society*.

¹⁴ National Research Council. 1966. "*Accidental Death and Disability: The Neglected Disease of Modern Society*." Washington: National Academy of Sciences.

auspices of this funding that identified the essential characteristics of regional trauma systems and provided the first indications that implementation of such systems saved lives.¹⁵ The unique design of an early system, the Illinois Trauma Program, which incorporated both urban and rural areas, utilized a controlled systems approach that profoundly influenced future trauma system development.¹⁶ Based on this original legislation from 30 years ago, the National Highway Traffic Safety Administration (NHTSA) continues to develop and implement EMS programs and other traffic safety programs today.



The *EMS Systems Act of 1973* was perhaps the single most important piece of legislation affecting the development of regional emergency and trauma care systems. The Act called for the creation of a lead agency under the Department of Health, Education and Welfare and identified fifteen components (one being trauma systems) to assist system planners in establishing area-wide or regional EMS programs. At that time, regionalizing services was viewed as one way of distributing resources more equitably while expanding access to health care systems. A substantial amount of federal funds were devoted to the establishment of an EMS infrastructure in over 300 EMS regions nationwide. A primary failure of the Act, however, was its inability to adequately stimulate initiatives to continually fund EMS at the local level.

In the *Health Planning and Resources Development Act of 1974* the regionalization of emergency medical services was designed as a national health care objective. Over the years of air medical program development many networks have evolved for the delivery of specialized medical care for many types of emergency patients. These specialty medical care networks include trauma, cardiac, spinal cord injuries, perinatal, burns, and other medical emergencies. Since time and initial definitive treatment are of the essence in

¹⁵ Cowley, R.A., Hudson, R., Scanlan, E., et al. 1973. "An Economical and Proved Helicopter Program for Transporting the Emergency Critically Ill and Injured Patient in Maryland." *Journal of Trauma*, 13:1029-1038.

Mullner, R., Goldberg, J. 1978. "Toward an Outcome-Oriented Medical Geography: An Evaluation of the Illinois Trauma/Emergency Medical Services System." *Social Sciences Medicine*, 12:103-110.

¹⁶ Boyd, D., Dunea, M., Flashner, B. 1973. "The Illinois Plan for a Statewide System of Trauma Centers." *Journal of Trauma*, 13: 24-31.

any medical emergency, a rapid intensive care transport system is essential to the full implementation of any regionalized emergency patient care network.¹⁷



In 1981, funding sharply declined when the Omnibus Budget Reconciliation Act altered the method of allocating federal EMS funds. EMS and trauma system funding was consolidated into the state preventive health block grant program. The purpose of the block grant concept was to shift responsibility of funding for EMS services to the states while still providing support for lead agencies that direct EMS services. States were given wide discretion regarding the use of health funds; many regional EMS management programs lost funding and were dismantled due to this change, while others responded by increasing their involvement in EMS system development. At the same time, several pivotal studies highlighted the relationship between untoward patient outcomes and lack of surgical support or delays in caring for injured patients, which drew public attention and accelerated progress towards systems development in some areas.¹⁸

Also in 1981, NHTSA published guidelines for air ambulance services.¹⁹ The guidelines were developed under the assumptions that emergency medical transport helicopters were not properly equipped to handle patients and that physicians needed to be very knowledgeable of the benefits of air medical transport and the physiological hazards associated with flight.²⁰ Doctor Willis Winert stated, in the forward to the report, that:

“A physician would never dream of releasing a patient from the hospital to the care of a cab driver for an unsupervised drive across town to another

¹⁷ Bell Helicopter, op. cit.

¹⁸ West, J.G., Trunkey, D.D., Lim, R.C. 1979. “Systems of Trauma Care: A Study of Two Counties.” Archives of Surgery, 114:455-460.

West, J.G. 1982. “Validation of Autopsy Method for Evaluating Trauma Care.” Archives of Surgery, 117: 1033-1035.

Newman, T.S., Bockman, M.A., Moody, P., et al. 1982. “An Autopsy Study of Traumatic Deaths: San Diego County,” 1979. American Journal of Surgery, 144:722-727.

Lowe, D.K., Gately, H.L., Goss, J.R., Grey, C.L., Peterson, C.G. 1983. “Patterns of Motor Vehicle Accident Victims: Implications for a Regional System of Trauma Care.” Journal of Trauma, 23:503-509.

¹⁹ U.S. DOT/NHTSA, “Air Ambulance Guidelines.” 1981. As quoted in Norton (BHTC).

²⁰ Ibid.

hospital and may inadvertently do much the same thing when ordering an air taxi which happens to have removable seats and is free of passengers at the moment.”²¹

It was only after the Federal Aviation Administration (FAA) adopted regulations requiring better equipment and specially trained crews was there any assurance of not getting the “air taxi” in Dr. Winert’s warning.

In 1984, Congress authorized the Emergency Medical Services for Children (EMS-C) Program to support state-of-the-art emergency medical care for injured children and adolescents. Although the program focused on the entire continuum of pediatric emergency services, the intent was to ensure that pediatric services were fully integrated into trauma systems. In addition, the National Pediatric Trauma Registry was established in 1985 to study the causes, circumstances and consequences of injuries to children. In 1986, the National Research Council and the Institute of Medicine conducted a 20-year follow-up analysis of advancements made since the 1966 white paper focused the nation’s attention on EMS. Although the authors of *"Injury in America: A Continuing Health Care Problem"* concluded that considerable funding and effort had been utilized to develop systems of care, little progress actually had been made towards reducing the burden of injury.²²

A conceptual pathway for the field of injury control was introduced in this report that called for a major investment in research related to the epidemiology of injury and development of parallel prevention programs. The committee successfully advocated for the creation of a new injury research center to lead national efforts in injury control and establish research programs related to all aspects of injury including prevention, pre-hospital care, acute care, and rehabilitation. The Centers for Disease Control (CDC) was chosen as the site for this new center because of the CDC’s strong relationship to state health departments and emphasis on research rather than regulation. Today, this program continues to fund trauma related research and support the growth of Injury Control Research Centers across the US, including

²¹ *Ibid.*

²² National Research Council. 1985. *"Injury in America: A Continuing Health Care Problem."* Washington, DC: National Academy Press.

the UCSF San Francisco Injury Center on the San Francisco General Hospital campus.

In 1988, NHTSA provided additional requisite resources for trauma system development and evaluation through establishment of the Statewide Technical Assessment Program and the Development of Trauma Systems course. The technical assessment team approach has been used by states to assess the effectiveness of individual EMS system components, as well as the interrelationship of these components in producing a comprehensive system.²³ The Development of the Trauma Systems course provided states and regions with a detailed tool for system development that was tailored to their individual needs.²⁴

The *Trauma Care Systems Planning and Development Act of 1990*, which created Title XII of the *Public Health Service Act* (PHSA), was enacted to improve emergency medical services and trauma care. From 1992-1994, funds were appropriated to carry out the responsibilities specified in this Act and administered by the Health Resources and Services Administration (HRSA). The program was not funded in FY-95. Under this program, a model trauma care system plan to use in trauma system development was written by a consensus panel of experts.²⁵ Many states were making significant progress.²⁶ when Congress failed to reauthorize resources for the program in 1995. It was funded again in FY2001 and 2002. Title XII of the PHSA is responsible for improving trauma and emergency medical care through system improvement. This goal is accomplished through: (1) a grant program available to State EMS offices to improve the trauma care component of the EMS plan; (2) a grant program to improve rural EMS care; and (3) discretionary activities including research, evaluation, and grants for special EMS/trauma initiatives.

²³ National Highway Traffic Safety Administration. 1988. *EMS System Development: Results of the Statewide EMS Technical Assessment Program.* Washington, DC: NHTSA

²⁴ National Highway Traffic Safety Administration. 1992. *Development of Trauma Systems Program.* Washington, DC: NHTSA.

²⁵ Health Resources and Services Administration. 1992. *Model Trauma Care System Plan.* Rockville: Health Resources and Services Administration.

²⁶ Bass, R.R., Gainer, P.S., Carlini, A. 1999. "Update on Trauma System Development in the U.S." *Journal of Trauma*, 47(3):S15-21.

Professional Associations and Trauma/HEMS Advancements

In the midst of these changes in federal policy and funding, professional health care associations have also provided guidance for trauma system development. The American College of Surgeons Committee on Trauma (ASCOT) made substantial contributions to the conceptual framework of trauma care systems by advocating for a network of trauma centers with verified capabilities. ASCOT assumed the mantle of leadership in 1976 by identifying the key characteristics for categorization of hospitals as trauma centers in the first edition of their publication, "*Optimal Resources for Care of the Seriously Injured*."²⁷ Through successive revisions, this document became recognized as the standard for trauma hospital performance.

In 1987, ASCOT developed an external review program to verify hospital capabilities, which provided further incentives for the designation of trauma centers. Recently, ASCOT published a multidisciplinary work group document entitled, "*Consultation for Trauma Systems*," which provides guidelines for evaluating trauma system development and making system enhancements.²⁸ In addition, the American College of Emergency Physicians (ACEP) published "*Guidelines for Trauma Care Systems*," which provided a detailed description of critical pre-hospital care components in a trauma system.²⁹

In 1999, the Institute of Medicine (IOM), with support from several private foundations, published its third assessment of the public and private response to injury. The report provided evidence of significant advances in trauma system development but also highlighted the profound gap between the current investment in system

²⁷ Committee on Trauma, American College of Surgeons. 1976. "*Optimal Hospital Resources for Care of the Seriously Injured*." Bulletin of the American College of Surgeons, 61:15-22.

²⁸ Committee on Trauma, American College of Surgeons. 1998. "*Consultation for Trauma Systems*." Chicago: American College of Surgeons.

²⁹ American College of Emergency Physicians. 1988. "*Guidelines for Trauma Care Systems*." Dallas: American College of Emergency Physicians

development and the magnitude of the injury problem.³⁰ The group recommended additional funding for surveillance, research, training and program evaluation by federal agencies.

Recent events have even further accelerated the momentum for the development of a nationwide trauma system. The Skamania Conference held in July 1998 reviewed the medical literature to quantify current understandings of trauma system effectiveness and proposed a plan for research in trauma. Participants included representatives of many different specialties in addition to trauma experts. A key recommendation from this conference was to use a national consensus process involving a spectrum of national committees and organizations interested in trauma care and prevention to design a vision document describing a trauma system for the future, including current status, a future vision, and an implementation strategy based on valid, reliable data. The Skamania Conference also recommended renewed federal funding for trauma system development.³¹

HELICOPTER AIR MEDICAL TRANSPORT TODAY

Considerable progress has also been made in the development of air medical helicopter transportation. Today, the specialized training of air medical helicopter crews is, at a minimum, comparable to that of the best ground ambulance crews. The ground ambulance system is comprised of two types of ambulances: ALS (Advanced Life Support) and BLS (Basic Life Support) ambulances. Trained medical personnel who can administer basic first aid and CPR (cardiopulmonary resuscitation) staff the BLS ambulance. An ALS ambulance crew consists of nurses, paramedics, or physicians capable of administering drugs, starting IV's, or performing other intrusive medical procedures.³²

Today's typical air medical crew consists of a registered flight nurse and a paramedic. The minimum requirements for a flight nurse include at least three *years experience in emergency medical care and*



A modern air medical helicopter ambulance

³⁰ Committee on Injury Prevention and Control, Institute of Medicine. 1999. "Reducing the Burden of Injury: Advancing Prevention and Treatment." Washington, DC: National Academy Press

³¹ Skamania Symposium, 1998. "Trauma Systems: Evidence, Research, Action." 47(3):S1-110.

³² Norton, 1997. *op. cit.*

advanced life support. Because of their high level of experience and intensive training most state medical practice boards allow medical flight teams to perform more sophisticated procedures than their emergency room or intensive care counterparts.³³ This high standard of care combined with the high speed of the helicopter, and resultant reduction in transport time exceeds the standard of care associated with ground transport.³⁴ This and the ability to carry the newest medical technology equipment in the cabins of today's larger helicopters have substantially reduced predicted mortality rates in severely injured patients.³⁵



SAN FRANCISCO BAY AREA AIR MEDICAL TRANSPORTATION

The San Francisco Bay Area, extending from the Wine Country to the Silicon Valley has a population of over 6.7 million people in 9 counties and 101 cities.³⁶ There is one hospital-based air ambulance program in the Bay Area; it is at Stanford University Medical Center and transports trauma and non-trauma critical patients to the Stanford Medical Center in Palo Alto. (See Table 1-1). Stanford Life Flight operates a custom-configured Eurocopter BK 117 that can fly under both visual and instrument flight rules.



The Bay Area also supports two independent air ambulance programs, with helicopters based both in Concord and Santa Rosa. These companies negotiate standing contracts with Bay Area hospitals for inter-facility transfers of specialty care patients (e.g., UCSF for neonatal, pediatric and OB specialties; Children's Hospital Oakland for pediatrics) and various agreements with Bay Area county EMS Agencies for trauma and emergency scene response to 911 calls in the emergency medical systems throughout the 9 counties.

CALSTAR (California Shock Trauma Air Rescue) is a regional, public, non-profit air medical helicopter service. The company's stated mission is to "save lives, reduce disability and speed recovery for victims of trauma and

³³ Ibid.

³⁴ Ibid.

³⁵ Ibid.

³⁶ Association of Bay Area Governments (ABAG), "Bay Area Census, 2000 Data." 2002.

illness through rapid transport, quality medical care and education.” CALSTAR operates a fleet of Eurocopter MBB BO-105 and Bell 222 helicopters.



REACH is an air ambulance transport service that provides rapid assessment, intervention and safe transport of critically ill or injured patients of all ages from the scene or referring facilities. REACH helicopters are available 24 hours a day and can be airborne within four minutes after dispatch. The helicopters are full-spectrum air ambulances with adult and pediatric medical and trauma services. REACH operates twin-engine, instrument-flight capable, Agusta 109 helicopters with a cruising speed of 161 mph.

Table 1-1 Bay Area Air Ambulance Providers

Air Ambulance Provider	Response Area	Aircraft Base	Medical Crew	Aircraft type
Stanford Life Flight	9 Bay Area Counties—200 nautical mile radius of base	Stanford University Hospital	2 RNs	BK 117
CALSTAR	250 nautical mile radius of base	Gilroy, Concord, Ukiah, Auburn	2 RNs	Bell 222 BO 105
REACH	300 nautical mile radius of base	Concord, Santa Rosa, Sacramento	2 RNs	Augusta 109

In addition to these three air ambulance companies, four rescue aircraft providers also service the Bay Area, each operated by a governmental agency for public safety needs.³⁷ (See Table 1-2). These aircraft providers have various capabilities for emergency medical transport and should be considered as available to respond to 911 emergency calls depending on the nature of the emergency and the judgment of the ground emergency crew requesting assistance.



Interior of modern helicopter “flying ambulance”

CONCLUSIONS

The nation’s trauma care system has steadily evolved over the past thirty years, and since the mid-1980’s, with the emergence of managed care and increasing economic pressures on hospitals, there has been a

³⁷ California Shock Trauma Air Rescue, Inc. (CALSTAR), in *Bay Area Emergency Services Helicopter Seminar*. 2000. Burlingame, CA.

growth of independent air ambulance operators in the United States.³⁸ The bottom line is that trauma centers save lives, and helicopter air medical transport is an important life-saving component of the trauma-care system. The San Francisco Health Commission recognized this in 1985 when it adopted a resolution “to provide trauma patients with immediate access to San Francisco General Hospital by using helicopter services.”³⁹

Table 1-2 Bay Area Air Rescue Ambulances

Agency	Response Area	Aircraft Base	Medical Crew	Aircraft Type
Sonoma Co. Sheriff's Dept.	Sonoma Co.	Sonoma Co. Airport	1 EMT, 1 paramedic/rescue technician—Advanced Life Support Rescue Aircraft	Bell 407
Coast Guard Air Station	Pt. Arena-San Luis Obispo-Lake Tahoe	SF International Airport	1 EMT rescue swimmer—Basic Life Support Rescue Aircraft	HH 65, Dolphin
East Bay Regional Parks	Alameda & Contra Costa Counties	Hayward Airport	EMTs, RNs, Paramedics, MDs—Advanced Life Support Rescue Aircraft	A-Star
California Highway Patrol	9-county Bay Area region	Napa Airport	EMTs, Paramedics—Advanced Life Support Rescue Aircraft	Bell 206

³⁸ Ibid.

³⁹ San Francisco Health Commission, Resolution 033-85. August 1985.