

COUNCIL ON RURAL HEALTH
AMERICAN MEDICAL ASSOCIATION
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"UP, UP, AND AWAY"*

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Our next topic is Project AMES - Aero Medical Evacuation Systems. This Project is basically a helicopter demonstration project conceived at Arizona State University and planned as a means of 1) Improving identification of accident sites; 2) Improving on-site emergency care for victims; and 3) Rapidly evacuating those persons to a medical facility competent to handle the type of injuries the patient may have sustained.

Included in the participating group were Arizona State University (as prime contractor), Arizona Highway Patrol, Arizona Medical Association, Arizona Hospital Association, Central Arizona Ground Ambulance Companies, as well as private companies such as Arizona Helicopters, Inc. These other groups acted as subcontractors to Arizona State University. Good Samaritan Hospital in Phoenix contributed a large amount of services and personnel to this organization. AMES was the brain-child of an Army Lieutenant Colonel who was a graduate student at Arizona State University. He chose for his master's thesis the application of Army helicopter techniques to a civilian setting. His mentor at Arizona State University was Dr. James Schamadan, a Medical Doctor who was a professor of engineering. atDr. Schamadan has a background of Army and military medical aid projects, as well as in helicopters.

As the planning for this Project developed, it became apparent that

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such a program could be adapted to a civilian population providing helicopters could also be used at times for other missions such as surveillance, riot patrol, and highway patrol. The Project was financed by the Highway Safety Bureau of the Department of Transportation. It was initially financed for a six month period and a three month extension was obtained to acquire more experience in winter and high altitude flying. The pilots of this mission were all combat-experienced helicopter pilots, formerly of the Army or Air Force. The para-medics on board the helicopters were vigorous young highway patrolmen from the Arizona State Highway Department. The Project involved the cooperation and participation of many citizens. The hospitals installed heliports, helipads, or heliscops to accept these helicopters and their patients. Medical associations worked together to develop a patient and injury rating system called SIMBOL and to assist in the planning and training of the air crews and in working out the medical procedures for rapid transfer and acceptance of these patients by the hospitals.

The emergency rooms in most hospitals, prior to the onset of AMES, rarely knew when a patient was coming, and were, therefore, unable to plan ahead in any way for the care of that particular injured person.

The AMES Project was developed in three phases. Phase one was the planning, phase two was computer simulation and computer testing, and phase three was the actual implementation of the program. In the planning stage, Colonel Sears drew data from several years of history of accidents on Arizona highways. By plotting out the actual locations according to mileposts, then converting these locations to a grid system called SYMAP, Colonel Sears was able to, in effect, put on a computer all

the accidents in Arizona history. Then, with the aid of the computer, he was able to develop maps which assisted in the location of two zones in Arizona which would cover 96.7% of all accidents in the State. These zones then were to become the planned areas of operation for the helicopters. Several kinds of helicopters were considered. Finally, it was concluded that the Fairchild Hiller F1100 Turbojet was the ideal vehicle for this mission. There were two crewmen on board and room for two litters. In addition, there was oxygen equipment, extraction equipment, and all kinds of first aid equipment. This helicopter was picked because of fuel consumption rates, air speed, and the ability to operate in all kinds of weather and at all altitudes. Actually, Arizona was an ideal State in which to perform this study. We represent all varieties of population density from the high density urban areas of Phoenix and Tucson to low density remote areas of the Indian reservations, mountainous and desert areas. We have snowy, cold winters in the high country, and hot, dry deserts in the low country.

Included in the planning of this program were the locations of the fuel dumps, installations of heliports, and the operation areas of the helicopter areas to be used. After all drawings and plans were completed, 99 theoretical missions were fed into the computer and a computer simulation and testing was accomplished. As a result of these computer studies, it was determined that this was, indeed, a feasible project. Plans were then drawn to enlist the aid of the Department of Transportation. They responded with a grant of over \$400,000 to accomplish this mission. These funds were intended as seed money to start the project going. It would then be up to the citizens of Arizona to carry on when the project was completed. Two helicopters were leased for operation in Zone 1.

The zone, by computer determination, had a center at a point called Thunderbird Field, just outside of Mesa, Arizona, and was a circle, 150 miles in radius. This was the effective operating radius of the helicopter.

One of the most important features of this project was the communications system. The Arizona Highway Patrol has an excellent radio communications system based on mountain-top transmitters and portable transmitters and receivers in the patrol car. This system is one of the finest in the country. The AMES Project essentially used this, plus a few twists of their own. Radios were installed in some of the selected hospitals. Arrangements were made with selected physicians to provide round-the-clock communication availability to act as consultants to paramedics aboard the helicopters. Whenever a mission was flown and a patient picked up, the hospital to which that injured person was taken was notified ahead. They were given an idea of the nature of the injury, severity, and some idea of what treatment might be required. If a paramedic needed help en route, he could contact a physician for advice and information. There was even communication with ground ambulance.

One of the early planning principles of this project was that all hospitals would have to be evaluated to determine what kind of injuries they were equipped to handle. Therefore, when an injured person or an acutely ill person was picked up, a decision could be made with regard to the hospital they would be taken to. In the case of some of the smaller remote hospitals, a person with severe burns or chest injuries might be overflown so that the patient could be immediately evacuated to a trauma center or emergency care unit completely equipped to handle these more

severe types of conditions. A firm rule was that the patient was to go to the nearest facility equipped to handle the type of injuries he had. It goes without saying then, that the communications net and its inherent advantages was one of the major items in the successful performance of the AMES mission.

The next important aspect of this program was the training program for the pilots and paramedics. All ground ambulance crews, the flying paramedics, and the flying crewmen went through a training program which included, as a starter, advanced Red Cross first aid. In addition to that, the American Academy of Orthopedic Surgery put on one of the emergency care courses for this group. Then, following that, all these crewmen were assigned to various busy emergency rooms for three weeks of on-the-job training. This included such items as starting IVs, the evaluation of an injured person, how to evaluate blood pressure, pulse, respiration, cyanosis, and many other items. The training served these men well and they did an excellent job of absorbing their lessons. Superimposed on the training of the personnel and the mission to be accomplished by AMES, a SIMBOL rating system was developed. This SIMBOL means Schamadan's index of morbidity based on logic. Many of you have heard of the Apgar rating system for newborn infants. This is a method by which a numerical value is attached to the condition of the infant so that, with a single number, a physician has an excellent idea as to the condition of the child. A similar system, but with a two number rating system, was developed for the AMES project. This was published on small cards and all crewmen, all physicians, and many other citizens had copies of the SIMBOL cards. It was easy to use and one of its many advantages was that it required a person to actually do a small physical,

or at least what might be called a physical appraisal of the person and his injuries. This was a great calming device for the person who came upon the scent of an injured person. Copies of those cards are available and, if some of you care for them, they are at the front.

Several interesting sidelights came to the fore in this project. For example, it was found that the best use for the stethoscope aboard a helicopter is to turn it around, put the ear plugs in the patient and use the bell of the stethoscope to talk to the patient while in flight. I think this demonstrates one thing which was certainly considered by the investigators of this project, i.e., that the helicopter is not always the ideal vehicle for transport of patients. There were some injuries for which a fixed-wing aircraft could do a better job. There were some instances when a ground ambulance was a better vehicle. We tried to appraise all calls as soon as they came in to determine which vehicle would be best to respond to that particular mission. It was this coordination between the various types of transport which helped to make this program successful. There was an incalculable aid to the injured person. A SIMBOL rating was taken by a paramedic at the scene, a second rating was taken in the helicopter on the way back, and a third rating was taken in the emergency room after the arrival of the patient. With this accurate attention to detail, the condition of the patient, as well as an estimate of his deterioration, made it possible to keep meaningful statistics and review of what could possibly be accomplished by the rapid evacuation of injured persons.

Another firm rule of this project was that physicians would, in general, not be used on the helicopters. Most physicians have not been trained to work well in a ditch. They need lots of things -- they need

instruments, they need nursing assistance, dressings, and often have difficulty improvising under adverse conditions. Because of this, the project founders felt that physicians were better able to serve at the hospital, and a well-trained paramedic could do a better job on the accident scene. He could administer proper emergency care and then evacuate the patient when he is in condition to be moved.

In summary, the AMES project proved to be a most helpful and valuable project to the citizens of Arizona. We have shown that in a small community concerned citizens can work together and develop a means of helping those many who are injured on our highways, as well as to help those who may need emergency care as a result of medical emergencies. With the use of AMES, accident identification can be improved, emergency communications, evacuation of the injured, can all be upgraded. It was a project which brought together the efforts of the university, of hospitals, of physicians, of highway patrol, ground ambulance companies, a helicopter company, to work together for the common good. It has proved to be a real aid to rural citizens. It is a well-known fact that the death rate in rural accidents is four times greater than in urban accidents. Probably this increased death rate is partially due to delays in getting assistance to the injured person and in getting him to competent medical services. The AMES project attempted to improve all aspects of these delays, and we in Arizona feel it has proved just that by serving this function.

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