

The Immediate Care and Transportation of the Injured

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THE INVITATION to present the Oration on Trauma has aroused within me many emotions, and I readily admit to the basic reaction of pride. To have my name included in the roster of distinguished men who have received this honor is thrilling indeed; yet modesty has made me search the record of my career for justification. For 30 years the field of trauma has truly been my mistress, but no one knows better than I that I have not been her master. It was the work of my subcommittee in the limited but nevertheless immensely important field of immediate care and transportation of the injured, that led the College to extend to me this privilege, and I have chosen to report on this subject which has been of great personal interest to me for many years.



Dr. Curry

WHILE WE AS CITIZENS must be concerned with all phases of human safety, the immediate care and transportation of the injured fundamentally is the responsibility of the medical profession.

From the findings of the Subcommittee on Transportation of the Injured* the opportunity was afforded to acquire much information concerning the quality of emergency care in this country.

Successful definitive management and ultimate rehabilitation of the violently injured are intimately dependent upon initial handling at the site of the accident and during transportation to the hospital. Indeed, subsequent deformity, prolonged illness or even death may be predetermined during this brief interval.

Each year approximately 100,000 persons are killed in accidents in the United States. Another 10,000,000 are injured. Immediate care is frequently given by ambulance attendants. This care is often excellent, but substandard management results when ambulance attendants are poorly trained or totally untrained. The medical profession must accept the responsibility to improve the quality of this emergency care and transporta-

*Subcommittee on Transportation of the Injured is a subgroup of the Committee on Trauma, American College of Surgeons.

tion. It is a vital phase of over-all general management and is, in reality, the overture to definitive care.

Little information is available on the immediate care and transportation of the injured in ancient times. It is likely that there was little care and less transportation.

Ambulance organization, variously modified, began in the last decade of the eighteenth century. Prior to the Napoleonic wars, wounded soldiers were either carried to the rear by comrades or left lying where they fell, unattended until the fighting ended. Surgical attention then was often too late. During these campaigns, however, Baron Dominique Jean Larrey, a French army surgeon, introduced his *ambulance volante*, or so-called "flying" field-hospitals. These units removed the wounded from the battlefields in light carriages and provided preliminary surgical treatment. About the same time Baron Pierre François Percy, another army surgeon, organized a corps of stretcher bearers to collect the wounded under fire and carry them to safety where their wounds could be dressed. Both surgeons stressed the importance of early treatment.

In the past, wars have been replete with all types of injuries, and each major conflict has stimulated advances in both care and transportation. The American Civil War marked the beginning of the modern ambulance system. Not only were horse- or mule-drawn ambulances used, but hospital trains and boats, pack animals, hand carts and ox teams were equipped to carry wounded soldiers out of the battle area. Jonathan Letterman's plan for an ambulance corps was conceived in the field in 1862 and was eventually endorsed by Congress, in an act dated March 11, 1865. Letterman was medical director for the Army of the Potomac. He planned an ambulance service for each army corps, with adequate, well disciplined personnel under the sole control of the medical director. His scheme was first used in the Battle of Antietam in September, 1863. The effectiveness of Letterman's plan was in sharp contrast to the haphazard management of casualties characteristic of earlier battles such as Bull Run, where wounded lay on battlefields as long as 36 hours before evacuation. Letterman used 300 ambulances to collect and shelter 10,000 wounded in 24 hours.

The British Ambulance Association of St. John of Jerusalem was founded 80 years ago during the reign of Queen Victoria. Its mission was to render first aid to persons in road, railway or civil accidents. Ambulance corps have subsequently been formed in most of the larger towns of Great Britain. Attendants are instructed formally in first aid and in the transportation of the sick and injured. The first Canadian local center of the St. John Ambulance Association was organized in Toronto in 1895. Since then units have been formed in London, Ontario, in 1908, and in Ottawa in 1910. Great Britain and Canada have thus played significant roles in the improvement of the immediate care and transportation of injured civilians.

For 30 years immediately following the American Civil War, little is known about the types and quality of emergency care and transportation of the injured in the United States. A pernicious practice in the latter part of the nineteenth century, both in Europe and America, was to send persons injured in street accidents jolting off to the hospital in a passing hack or cab, regardless of their condition. In some American cities even this "luxury" was dispensed with, and the attending policeman would hail an express wagon or truck team instead. If the trip to the hospital happened to result in a few more broken bones, it was considered unfortunate but unavoidable. In the 1890's, large New York hospitals such as the Bellevue, New York, Roosevelt and Presbyterian and others had horse-drawn ambulances. These were staffed by interns. The driver had two duties: to drive his horses at a gallop with one hand, and to bang a gong with the other, incidentally, making more noise than today's siren. There was space for two to four patients on litters and an intern sat or stood in the rear. The late Dr. William S. Darrach,* a distinguished New York surgeon, rode a Presbyterian Hospital ambulance in those days. The Presbyterian Hospital had one of the first horseless ambulances, electrically driven. This ran beautifully downhill, but when the grade was upward they frequently had to send for Chester. Chester was a horse, kept in readiness at the hospital for such an eventuality.

The automobile first appeared over 50 years ago. To Chicago belongs the honor of having the first automobile ambulance used in this country. The

*In 1931 Dr. Darrach made the third Oration on Fractures, as this address was first called, speaking on "Some Old Truths About Fractures." A list of orators is in the *Directory of the American College of Surgeons*.

The Oration on Trauma

THE TWENTY-SIXTH ORATION on Trauma was presented by Dr. George J. Curry at the American College of Surgeons' Clinical Congress, Chicago, Illinois, on October 9, 1958. Dr. Curry is chief, Section for the Surgery of Trauma, at Hurley Hospital, Flint, Michigan; and a member of the College's Committee on Trauma. For six years he headed that group's Subcommittee on Transportation of the Injured. He is a member of the A.C.S. Board of Governors.

New York Herald Tribune under a Chicago date line of February 24, 1899, carried the following news item:

"The first automobile ambulance ever constructed was presented today to Michael Reese Hospital of this city. It was built in Chicago and was the gift of five prominent business men. The ambulance weighs sixteen hundred pounds and its speed approximates sixteen miles per hour."

Shortly thereafter St. Vincent's Hospital, New York, acquired a "horseless ambulance." Ambulances for the most part, however, continued to be horse drawn until advances were made in the design and production of motor driven vehicles.

Ambulance units organized for service in World War I were assigned mule-drawn ambulances, a hangover from the Civil War. Motor driven units soon made their appearance and improvement in transportation followed.

From 1917 until the present time, ambulances have improved in design and style until they now include complete emergency equipment and incorporate many features essential for efficient, expeditious and safe transportation for an injured person.

Transportation today has been glamorized by the "whirlybird." The helicopter's* ability to land beside a wounded man, often far behind enemy lines, endeared it to our troops in Korea. Thousands of men have been extricated from exposed positions and saved. All ranks affectionately call them "angels." Captain Vic Armstrong was one of the first helicopter pilots to make a night rescue behind enemy lines. Armstrong once picked up and flew 40 desperately wounded men to rear hospitals. The

*HARVEY, H. Whirly Birds Come Into Their Own, *The Reader's Digest*, September, 1951, 86-88.

wounded lifted out by helicopter have been literally brought back to life. Captain Armstrong stated that he evacuated men so shot up that if they had been taken out by jeep or truck over the rough roads they would never have pulled through. Plans for handling mass civilian casualties in the future will include the helicopter ambulance. Indeed, the Santa Monica Hospital already has an arrangement with the California Ambulance Service, which maintains a helicopter at a nearby airport. In the event of an accident, the ambulance service dispatcher alerts the helicopter pilot and sends him to the scene. The patient is then flown to a heliport on the hospital roof.

AUTOMOBILE IS CIVILIAN "WEAPON"

Motor vehicles helped in the expansion of American industry, but also provided a new weapon causing injuries and death. Like the atom bomb, the automobile must be controlled. Improperly driven, it has become the most dangerous weapon ever placed in the hands of a civilian population. During 1957, 38,700 highway deaths were recorded as compared with 40,000 in the previous year. But that improvement was offset by an increase in injuries due to highway accidents. The year 1957's total of 2,525,000 persons who were injured in highway accidents was an increase of 157,000 over 1956. Since the turn of the last century there have been 1,300,000 deaths due to automobile accidents. Compare these figures with only 550,000 deaths incurred in all wars in which the United States has participated. In the United States, the automobile in 58 years has killed more than twice as many as have bullets and shells in the last two centuries.

During the past 10 years there has been continued improvement in the immediate care and transportation of the injured. The Subcommittee on Transportation of the Injured was first appointed in 1949, by Dr. Robert H. Kennedy of New York, as chairman of the American College of Surgeons' Committee on Trauma. He had long been interested in this important phase of the care of an injured person and was one of its leading pioneers.

During the years 1949 through 1953, a nationwide survey was made by this subcommittee, which covered 62 cities, large and small, with a combined population of 30,000,000. This survey was made to ascertain the quality of transportation of the injured. Twenty eight per cent of the cities

showed a fair to poor record. One out of four communities with substandard transportation is not a record of which to be proud.

The first phase in the management of an injured person is the period from the time of injury until the casualty is delivered to the hospital through its emergency receiving department for further care. The period may be short or long. Often care is given by lay personnel.

Immediately following an accident in which injuries are sustained there is general confusion and disorganization. Well-meaning onlookers have a compulsive desire to do something. Urgency is the key word, and movement of the patient to the nearest medical facility seldom takes into consideration prevention of further damage. Well-meant efforts to move the injured may cause additional serious damage. "Let Those Crash Victims Lie," an article which appeared in the *Saturday Evening Post*, in August, 1955, emphasizes the philosophy of intelligent, protective delay until experienced help arrives.

Colonel Joseph R. Shaeffer, consultant on medical care in disaster, Institute of Research, Walter Reed

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A.C.S. 1959 DIRECTORY to Be Distributed in January

THE 1959 DIRECTORY of the American College of Surgeons will be mailed to Fellows of the College early in January, Dr. George Stephenson, assistant director in charge of the Department of Fellowship, announced in December. In addition to all Fellows of the College, the DIRECTORY will be distributed to medical school libraries and accredited hospitals, Dr. Stephenson said.

The new DIRECTORY includes names and professional affiliations of 22,500 Fellows, an increase of approximately 3,000 over the last edition, published in 1956.

The DIRECTORY also includes a section of general information about the history of the American College of Surgeons and its present scientific and educational programs.

In addition to names of Fellows who have been initiated since the last DIRECTORY was published, the new DIRECTORY includes many changes of address, appointments, and affiliations. Approximately 40 per cent of the names listed in the DIRECTORY were involved in one or another of these changes since the last publication, it was reported.

gation it can eventually eliminate the circulatory disorders following the aggregation and the organic injury and functional disorder which are probable consequences.

The aforementioned conditions would never have been studied if Knisely and his co-workers had not presented their observations on intravascular sludging and their epoch-making technique for studying this condition.

After preliminary studies with Bollman, Grotte was able with different fractions of dextran to clear up important details in the ultrastructure of the capillary walls and to study how substances of different molecular size passed through the blood-lymph barrier.

Connected with his studies is the fact that fractions of dextran can be used for determinations of the plasma volume in clinical and experimental investigations.

Wallenius has elaborated methods for studying the qualities of animal membranes by means of dextran fractions. Through studies of the glomerular filtration of dextran, fresh light has been thrown on the course of events in ultramicroscopic structures during normal and abnormal conditions.

Fractionated dextran provides excellent material for experimental and clinical research in many different fields of medicine, and we have only started to explore the many avenues of research it presents.



Dr. Gunnar Thorsén (left) of Stockholm, greets Dr. Eugene M. Bricker, St. Louis at the 1958 Congress. Dr. Richard B. Cattell, Boston (second from left) and Mr. Clifford Naunton Morgan, London, look on. All participated in various scientific sessions, Mr. Naunton being guest commentator at the Ciné Clinics.

Transportation of Injured

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Army Medical Center, states: "The word disaster implies a degree of human suffering. Irrespective of the physical destruction a disaster causes, the basic concern is with the number of lives lost, and the number of surviving injured in need of care. The concern is with those who are injured. All are in need of immediate treatment, variable in priority, and determined by the degree in which life and limb are seriously endangered. The element of time is important. Reduction of the period of awkward effort can be accomplished only by realistic planning and training, for these efforts are actions by people, and are not related to the extent of devastation, within the disaster area." Military and civilian appraisal, thus, are identical.

Injuries sustained in accidents affect every part of the human body. They range from simple abrasions and contusions to multiple complex injuries involving many body tissues. This demands efficient and intelligent primary appraisal and care, on an individualized basis, before transport. It is obvious that the services of trained ambulance attendants are essential.

Certain qualifications, commensurate with the ambulance attendant's responsibilities, should be required. These include character, knowledge, personality, health, interest and dependability. Ambulance service is provided by hospitals, rescue squads, funeral directors and independent operators. Some attendants become exceedingly proficient if the service director has enough interest and sets his standards sufficiently high. Many communities, unfortunately, require the attendant to have no special instruction. Frequent employee turnover and failure of service directors to appreciate the importance of proper training result in inadequate care.

If we are to expect maximum efficiency from ambulance attendants, a special training program must be arranged. The curriculum should include a discussion of illnesses and injuries ordinarily encountered, their emergency care and methods of transportation. This is a distinct responsibility of the medical profession. Training may be carried out in several ways. Expansion of Red Cross facilities has been successful in many localities. Instruction may be given by an organized group from hospital house staffs, or under county medical society sponsorship. There are 210 American College of Surgeons local Committees on Trauma in

the United States and Canada. Many have subcommittees on transportation of the injured whose duties are to improve and standardize this service. This is one of the major objectives of the College's Committee on Trauma, working through its Subcommittee on Transportation of the Injured. An intensified program of expansion is in progress, under the chairmanship of Dr. Oscar P. Hampton, Jr., St. Louis. The pattern should prevail at local, state and national levels.

Physicians are required to study a minimum of eight years beyond high school before they can be licensed to practice medicine. It does not seem unreasonable to require ambulance attendants to study 20 or 30 hours before they are permitted to render emergency service. Tomorrow you or I may require such service. We can only hope that the attendant who assembles and transports our battered frames will know that the ankle bone should be connected to the leg bone.

Ambulance attendants then should be obliged to take some special course of instruction, be examined yearly and be required to carry a certification card indicating proficiency. Ambulances should be inspected twice yearly for proper equipment.

Efficiency records should be kept in the emergency receiving departments of hospitals, indicating the patient's name, age, sex, diagnosis, quality of transportation, name of the ambulance and attendant. This provides a constant check on infractions. Repeated carelessness disqualifies, although the attendant may be requalified and reinstated. Twenty-seven thousand ambulance cases were transported to Hurley Hospital, Flint, Michigan, in a five-year period by 60 ambulance attendants, and 70 infractions recorded. This marked improvement followed ordinance control.

Ordinances requiring certification of proficiency for ambulance attendants are recommended. Such certificates should only be given when the attendants have successfully completed special training. This training may be affected by any interested group under enthusiastic leadership. It is the duty of the medical profession to promote these ordinances, which have appeared in an increasing number of American cities. Others have the matter under consideration. Still others give special instructional courses without ordinance control.

Two states, Louisiana (1938) and Massachusetts (1957), have such ordinances. The Louisiana law states, in part, "Be it enacted by the Legislature of Louisiana that it shall be unlawful for any person to conduct, maintain, or operate an ambulance, un-

less such ambulance shall be under the immediate supervision or direction of a person holding a first-aid certificate."

The Massachusetts law states, "No person shall transport any sick or injured person in an ambulance, and the owner or custodian of an ambulance shall not permit the transportation of a sick or injured over or upon any way, unless the following requirements are complied with: the operator of said ambulance shall have successfully completed a course of first-aid training equivalent to the Senior Red Cross course, and have been certified as having completed that course. In the event that the operator of an ambulance has not been certified as having completed a course equivalent to the Senior Red Cross course, then said ambulance shall have an attendant who has successfully completed the course in said first aid training equivalent to the Senior Red Cross course. The operator of any ambulance shall obey all traffic laws." The State of Michigan is now developing similar legislation.

The American National Red Cross is to be highly commended for placing basic first-aid information in all packages containing travel information. These emphasize intelligent delay until experienced help arrives.

A Joint Action Program aimed at preventing accidents and improving care of accident victims was announced in March, 1958, by the American College of Surgeons, the National Safety Council, and



Dr. Gunnar Gundersen (center), president, American Medical Association, converses at a Congress-time event with Dr. I. S. Ravidin, chairman, Board of Regents, A.C.S., and Mrs. Ravidin. Photograph taken at dinner in honor of Dr. L. R. Burney, who made Martin Memorial Lecture, "Physicians for Tomorrow," page 9.

the American Association for the Surgery of Trauma. The program includes six items:

1. Public education in accident prevention and handling of the injured.
2. Employment of joint and local committees of the American College of Surgeons and National Safety Council, together with other interested surgeons, safety engineers, and public officials to formulate safety plans for local committees.
3. Possible registration of unusual cases of injury.
4. Proposed investigations of emergency care of traffic injuries.
5. Model legislation to require adequate training in first aid and transportation of the injured for ambulance attendants, policemen and firemen.
6. Co-operation in the production and improvement of training materials and instructional aids dealing with problems in handling the injured.

Resources of the three organizations are to be used in the effort to advise and assist civic groups to obtain passage of local ordinances requiring adequate training in handling of the injured by ambulance attendants, policemen and firemen. Under a proposed model ordinance, ambulance

attendants are required to have completed advanced first aid and additional training as recommended by local health departments, to carry cards indicating their qualifications and to be reexamined and certified annually for their fitness to serve. The following cities now have such ordinances: San Francisco; Minneapolis; Syracuse; Cincinnati; Philadelphia; Flint, Michigan; Kansas City, Missouri; Butte, Montana; Pontiac, Michigan; and New Orleans.

During the past few years considerable criticism has been directed toward the speeding ambulance. Panic by the uninformed is responsible for the widely held fallacy that speed in transporting an accident victim to the hospital is important. Prompt immediate care may be vital, but speed merely increases the hazard of another accident and may extend the injury. A former New York City commissioner of hospitals has been quoted as saying, "The average patient would get there soon enough by parcel post." Ambulances commonly race to the scene of an accident, since the last one arriving usually leaves empty.

In Flint, Michigan, in the summer of 1949, an ambulance ran a red light, collided with a convertible and killed a 24-year old ambulance attendant. Three weeks later an ambulance driver for



Press Conference at Clinical Congress, Chicago

Dr. Peter V. Moulder, Chicago (left), listens attentively at a Congress-time press conference to Dr. Milton Weinberg, Chicago (center), discussing his report on the natural course of infants and children with ventricular septal defects. Dr. John L. Keeley, Chicago (right), chairman, Press Relations Committee, is presiding.

the same company, traveling 70 miles per hour, ran a red light, crashed into a tank truck and killed the driver. As a result, a central dispatching system under control of the police department now assigns ambulances on all emergency calls. Independent ambulances are assigned to specific zones, and the morticians' ambulances serve as a second line of defense. Ambulances are limited to a top speed of 35 miles per hour.

Speed is not necessary to save lives. An ambulance averaging 30 miles per hour travels five miles in ten minutes. At 60 miles per hour only five minutes would be saved. In 2,500 consecutive ambulance runs in Flint this time interval would not have influenced the course of a single injury. Of these 2,500 cases, 27 were dead on arrival and 13 expired in the emergency receiving department. Necropsies convincingly indicated that no one of these would have survived had the injury occurred on the hospital doorsteps. In the 2,500 consecutive ambulance runs, haste was unnecessary in 98.2 per cent. In 1.8 per cent expeditious handling was considered necessary, but a speeding ambulance could have increased the severity of the injuries. It is recommended that ambulances transporting an injured person observe local speed laws; retain the use of sirens, for identification only; and have the right of way in traffic. The victim deserves a safe ride to the hospital.

Annual conferences attended by ambulance attendants, Red Cross instructors, city, county and state police, safety engineers, plant protection employees, members of American College of Surgeons' Trauma Committees, fire department members, and others, are recommended. A selected

panel should discuss the common types of injuries transported during the year. Time should be allotted for a question and answer period. Certification cards, bearing the name of the local health commissioner and chairman of the local A.C.S. Trauma Committee should be presented, together with "good record" stickers to be applied to the ambulance windshield. Approbation and praise commonly instill a sense of pride in the attendant.

In the past 50 years injuries have increased in number because of increased population, industrial expansion and more especially because of the automobile. Traffic deaths have become 70 per cent more numerous since 1943, and injuries have increased proportionately. A gallant effort has been made to improve the immediate care and transportation of the injured to keep pace with man's determination to exterminate himself.

The present status is a far cry from the past. There can be no doubt that we have taken great strides forward, but more need to be done. In the medical millenium, when there will be cures for many ailments affecting mankind, and some diseases, indeed, will be eliminated, people will continue to be injured. Their immediate care and transportation will always be a vital phase in management. This is a direct responsibility of the medical profession.

Are you satisfied with the way you would be transported in your town, if injured? If not, whose fault is it?



In scenes from Cine Clinics at 1958 Congress, Dr. William H. Muller, Jr. (left), Charlottesville, Virginia, closes defect in interventricular septum, utilizing extracorporeal bypass with a pump-oxygenator. Dr. Howard Ulfelder, Boston (right), performs a one-stage en bloc extirpative operation for carcinoma of the vulva.