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On The History of Emergency Medical Services

by Peter J. Safar, M.D.
University of Pittsburgh

[Selected Excerpts from Careers in Anesthesiology – An Autobiographical Memoir, Volume V]

Introduction

This article is in response to an invitation from Dr. Doris Cope, editor of the Bulletin of Anesthesia History, *to have parallel with Dr. Eugene Nagel's fine article about the history of "emergency medicine," sections from my autobiographical memoirs[1] on my personal involvement in the history of "emergency medical services (EMS)." Placing these two articles side-by-side will illustrate how mobile intensive care units (ICU), ambulance services, and community-wide EMS systems were initiated or co-initiated by anesthesiologists after World War II, parallel with the development of ICUs in hospitals. These developments occurred almost simultaneously in the U.S.A. and abroad. In some other countries, anesthesiologists remained leaders in EMS and critical (intensive) care medicine (CCM), while in the U.S.A. our specialty lost this commitment and opportunity to serve beyond the operating room.*

History written by participants is personal. That makes it more lively, but also inevitably biased. We all stand on the shoulders of those before us. What ultimately counts is that progress was made, not who gets the credit.

Concerning the article by my friend and former EMS co-activist, Eugene Nagel, I have three slight differences in emphases:

1) *What sparked EMS? It was not the accidental rediscovery of external cardiac massage, i.e., step C of cardiopulmonary resuscitation (CPR) basic life support.[2] I believe that modern EMS would have come about without sternal compressions, namely through a coalescing of several new life-saving opportunities. They resulted in the public demanding EMS. It all began in the 1950s: Traumatologic resuscitation in World War II, pioneered by Anglo-American anesthesiologists and surgeons, was just waiting to be applied in the civilian sector. In 1956, anesthesiologist Elam[3] sparked anesthesiologist Safar into researching resuscitation and first aid. This led to the documentation that backward tilt of the head plus direct mouth-to-mouth ventilation[4] is physiologically superior to the then practiced back-pressure arm-lift methods of artificial ventilation. These steps A and B were combined with step C[2] into CPR basic life support (BLS).[5] Some anesthesiologists[6] and trauma surgeons[7] found it challenging to apply the life-support measures for the reversal of asphyxia, shock and cardiac arrest learned in the*

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History of Emergency Medicine: A Memoir

by Eugene Nagel, M.D.

A historian had written ".....For the pendant, dates are deities, worthy of worship, but for the true social historian, they are minutiae only, a shorthand, convenient reminders and no more. You do not ask a Titanic survivor, 'Let me see now, just exactly when was that?' You ask him this: 'What was it like? How did you feel?' And that is the job of the social historian: to make the past vibrant for the present; to emotionally involve those of us who were not there. And to make us understand."

Marathon Man, *William Goldman, 1974*

In the early 1960's there occurred a revolution in how civilian emergency care went from simple first aid to sophisticated pre-hospital emergency medical care. Many who witnessed or participated in that event offered a variety of reasons: (a) military care developed during the Korean war including helicopter evacuation and "MASH" types of forward hospitals; (b) a "white" paper developed by the National Academy of Sciences/National Research Council[1]; (c) the development of a newer specialist of surgery called "trauma" surgeon; (d) the sudden decrease in funeral home emergency transport participation; (e) public outcry for an improved level of emergency pre-hospital care; (f) governmental programs which produced the impetus for improved pre-hospital care; and (g) medical pioneers who saw the need and led the way for such development. As one who lived through this time period and participated in the development of the present day systems it is my view that none of the above played a highly significant or leadership role. Instead, it started with an accidental discovery of closed chest cardiac massage during experimentation on defibrillation techniques by an electrical engineer in the dog lab!

This eventually led to emergency medical service (EMS) as we know it today which is being chronicled by Dr. Safar in this issue. It is my contention that CPR came into public view in 1960-1[2-3] and the medical community and public saw that a simple procedure could provide enormous benefits if practiced widely

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I would like to dedicate this short paper to the memory of Dr. Jim Elam who was so instrumental in developing CPR and to Dr. Thomas Burnap who so enthusiastically joined in teaching this new discipline. I would also give thanks to my partner and cardiologist friend, Dr. Jim Hirschman without whose efforts none of this would have been possible. Finally to the City of Miami's Finest, the fireman and their officers who were so loyal, so dedicated, and so principled that it was easy for me to follow their example.

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operating room (OR), also outside the OR, and outside hospitals; this led to guidelines for community-wide EMS systems and EMS community councils, starting in Pittsburgh.[1,6] EMS is only as effective as the weakest step in the cardiopulmonary-cerebral resuscitation (CPCR) system[8] (Fig. 1) applied in the weakest link of the EMS life support chain.[6] Outcome results are still far below what they could be, because of the weakest first link, namely immediate life-supporting first aid (LSFA) skills applied by the lay public, not being available.[9] This is in spite of training aids and systems for health professionals and lay persons.[10]

2) *Who started mobile ICUs? Nagel and I have agreed since the 1960s that general mobile ICUs, for resuscitation from any cause of sudden coma or shock, will save more lives than mobile coronary care units (CCUs) for suspected myocardial infarction only. Lay persons cannot diagnose the cause of sudden coma. Physician-staffed general mobile ICUs were pioneered in Prague and Moscow (see later).*

3) *Paramedics vs physicians? In the U.S.A., training of paramedics exploded in the 1970s, mostly through efforts by anesthesiologists in Miami and Pittsburgh and cardiologists in Seattle. In the U.S.A., the reluctance of physicians to resuscitate in the field (with the exception of Pittsburgh), has made it difficult to conduct objective outcome comparisons between the two systems. There are recent data suggesting outcome benefit from physicians on mobile ICUs compared to paramedics only. That impact may be greater for trauma than cardiac cases; and greater for rural than urban EMS systems. Beyond outcome benefit, however, there is a need for EMS physician leaders to go into the field, to acquire personal experiences in this difficult environment, to guide and teach non-physicians, and to conduct research.*

Excerpts from American Society of Anesthesiologists (ASA) *Memoirs*, Volume V:[1]

The development of EMS we began in the late 1950s in Baltimore.[11] The following were obvious to me then: 1. Because of the time constraints dictated by the vulnerability of the brain and heart, we should take to the scene, inside and outside hospitals, the resuscitation and life-support measures that we have learned as anesthesiologists. 2. EMS systems must be more than ambulances; they must include resuscitation and life support at the scene and during transport to (and in) the ED, OR, and ICU of the most appropriate hospital.[6,12] These links of the EMS chain should be tied together by communication and education, and upgraded periodically, based on ongoing evaluation. 3. The EMS system is only as effective as its weakest link from scene via transport to hospital; and the weakest step of CPCR (fig. 1).[8,13] 4. EMS development should be multidisciplinary and adapted to the needs and potentials of each region.

There were no EMS systems in the 1950s. Most patients with acutely life-threatening conditions were picked up and rushed to the nearest hospital by police or firemen in station wagons or hearses, usually without an attendant at the patient's side and without life support. Some "ambulance services" were staffed by firefighters or policemen who had received first-aid training, which at that time consisted of splinting, bandaging, and giving back-pressure arm-lift artificial ventilation; this was difficult to do in the ambulance. Some ambulances were equipped with suck-and-blow pressure-cycled oxygen resuscitators or inhalators to be used via a face mask, which in our patient trials did not produce adequate ventilation. Paluel Flagg's attempt in New York to take tracheal intubation to the streets was a laudable, unique, and transient phenomenon. In New York and a few other cities where doctors rode in ambulances, they were interns without experience in life support.

In Europe, anesthesiologists developed and had been staffing general mobile ICUs since the early 1960s, starting in Magdeburg (by surgeon Werner Lembcke and anesthesiologist Wolfgang Röse), in Prague (by Bohumil Sefrna and anesthesiologists Hugo Keszler and Jiri Pokorny), in Moscow (by Negovsky's associates) and in Mainz and Ulm (by anesthesiologists Rudolf Frey, Fritz Ahnefeld and Wolfgang Dick). They all implemented Pittsburgh's guidelines[6,12] before we could. Subsequently, in the mid-1960s, an impressive program by Pantridge in Belfast has been credited for the first physician-staffed mobile ICU to deliver advanced cardiac life support (ACLS); that was a mobile coronary care unit (CCU) – not a general mobile ICU — meant mostly for preventing cardiac arrest in patients with suspected myocardial infarction.

When I moved from Baltimore to Pittsburgh in 1961, I had a plan for EMS already sketched out.[12] Then, "ambulance services" in the city of Pittsburgh were provided by policemen with only limited first-aid training, using station wagon-type vehicles. It took many years of frustrating efforts before EMS implementation was accomplished in the city of Pittsburgh.

Since 1957, I had been an invited member of Sam Seeley's National Research Council (NRC)-National Academy of Sciences (NAS) ad hoc committees on artificial ventilation. Seeley was a former distinguished military surgeon with great spirit. He became interested in EMS improvements because of "trauma as a neglected disease."[7] In the early 1960s, he invited me to co-initiate a new NRC-NAS committee to develop national guidelines for community-wide EMS. I was the first nonsurgeon on the committee. The majority were orthopedic surgeons focusing on fractures. Open-minded trauma surgeons on the committee included John Howard. I tried to represent resuscitation potentials not only of anesthesiology but also cardiology and other nonsurgical fields. CPR became the territory of cardiologists much later. Seeley asked me to chair the subcommittees on ambulances.[14] My work with Seeley's NRC committee in Washington enabled me to clarify at the national level the difference among mere first aiders, EMT-1 level BLS ambulance attendants, and EMT-2 level (paramedics) ALS ambulance attendants.

In 1964, I drafted for the Pittsburgh metropolitan area what apparently were the first guidelines for community-wide organization of EMS. This I did with the blessing of the Allegheny County Medical Society and the Health and Welfare Association and Hospital Council of Western Pennsylvania. When I presented these guidelines in 1965 at a meeting of the International Association for Traffic Medicine in Stockholm,[12] they were well received, and some Europeans implemented them right away. Authoritarian health ministries in "socialized countries" enabled implementation of such guidelines much faster than the democratic approach in the West would permit.

Between 1961 and 1966, I felt that efforts to improve EMS in Pittsburgh were hopeless without guidelines at the national level. Everybody with vested interests started to meddle. I wanted to publish our EMS guidelines with the blessing of American anesthesiologists, so that anesthesiology would get credit.[6] Some academic leaders of anesthesiology preferred to seek recognition by publishing laboratory findings; they hesitated to step into what they perceived as the territories of trauma surgeons and orthopedic surgeons.

Some political leaders of anesthesiology seemed more interested in OR work, the source of personal income. Both gave me the impression that they were not interested in getting the specialty involved in the prehospital arena, as European anesthesiologists had done following our urging. In Europe, EMS and CCM involvement brought much social recognition to anesthesiology.

In the U.S., John Bonica was an exception. His attitude toward all of this was global, like mine. When he was ASA president in 1965, he agreed with me that the ASA needed a Committee on Acute Medicine, He asked me to chair it.[6] I sought input from the committee members on my draft of community-wide EMS organization guidelines. After a long delay, ASA powers eventually agreed to have our EMS guidelines published - in the name of the ASA Committee on Acute Medicine - in JAMA in 1968.[6] These guidelines, accepted as a goal for Pittsburgh four years earlier, became the spark for national guidelines of the EMS Systems Act for the U.S. in the 1970s. We then also stressed and recommended "regional centralization of critical trauma care." Twenty years later it is finally being promoted by the International Trauma Anesthesia and Critical Care Society (ITACCS). In the 1960s, my only outspoken supporter of EMS among anesthesiologists (besides Bonica) was Eugene Nagel, then in Miami. Nagel became a kindred spirit on EMS activism as a leader at the national level, and as my successor as chairman of the ASA Committee on Acute Medicine. Nagel pioneered the guidance of ambulance paramedics by physicians via radio. Later, Nagel and I helped Israel's EMS through assisting Nancy Caroline.

Ambulance services are only one link of the EMS chain. I learned from non-physicians in Pittsburgh, as I did in Baltimore, where I had learned from ambulance leader Captain McMahon. In Pittsburgh, I sought out Mr. Richard Brose, a past ambulance leader with first-hand experience, who was in charge of EMS programs at the Pennsylvania Department of Health in Harrisburg. He and I developed the first ambulance design modification plan for station wagons and hearses.[15,16] In 1963, I discovered that Mr. Gerald Esposito was president of the Pennsylvania Ambulance Association. He was also in charge of an ambulance service in nearby Indiana, PA, which was more advanced. Esposito and I were mission oriented. We improved the ambulance design guidelines for ALS.[17] The input from Brose and Esposito was valuable in drafting national guidelines for ambulance design and equipment and training of attendants at basic (EMT-1) and advanced (EMT-2, paramedic) levels. I drafted and pushed these guidelines through in the 1960s as chairman of the NAS-NRC EMS ambulance subcommittee of Seeley's EMS committee.[18,19]

In Pittsburgh, I had strong support throughout from my anesthesiology resident Don Benson and surgeons of town and gown, via the Allegheny County Medical Society. Hospital administrators opposed our recommendation for regionalized centralization of special critical care (which also means expensive care), particularly for severe trauma cases. Leaders of the volunteer fire department ambulance services of Western Pennsylvania, who controlled suburban ambulances, did not want to learn life-saving methods, nor did they like to lose to trained, salaried attendants their country club status in the communities. It took me quite a while to learn about the vested interests and politics of these organizations. Fighting EMS politics taught me to first try to charm them (cocktail party technique); then to bypass underlings and go to the top man (helicopter technique); and if this also failed, to threaten briefly and then move in with force (bulldozer technique).

Our and others' efforts of the 1960s led to the EMS Systems Act of the federal government, which began in the early 1970s. That act, however, influenced change only through grants, not through law. In Western Pennsylvania, Esposito and I decided to bring the vested-interest groups together for a democratic approach. In 1968, I asked county medical society president Fred Brady, a fine surgeon of Mercy Hospital, to meet with me in the plush basement restaurant of the Pittsburgh Playhouse. There, under the influence of martinis, we plotted the nation's first Community Council on EMS. In 1969, with the help of my associate Steve Galla and Veterans Administration Hospital (VAH) surgeon Francis Jackson, we created a "white paper" for EMS community councils throughout Pennsylvania, sponsored by the state medical society. Ours was the first state to set up such councils state-wide.[19] This move was made possible by the fact that an anesthesiologist, my old friend Leonard Bachman, was Secretary of Health of the Commonwealth of Pennsylvania from 1972 to 1979. He had run for U.S. Congress in 1964 but lost the election. He gave up his position as chief anesthesiologist at Children's Hospital of Philadelphia in 1972. I credit Bachman for his handling of the legionnaires disease outbreak in Philadelphia, for wise handling of federal EMS grants, and for having hired emergency physician Arnold Muller to run state EMS. Muller became Bachman's successor with the next (Republican) administration.

David Lawrence, the former mayor of Pittsburgh and former governor of Pennsylvania, was one of the finest leaders of the Democratic Party in the U.S. He was the pioneer who brought about collaboration between the labor unions and local billionaires to achieve the first renaissance of Pittsburgh, one of America's most industrialized cities. In October 1966, while in retirement, Lawrence suffered sudden cardiac death when talking to a large audience in Pittsburgh. The police ambulance service was then still staffed with policemen untrained in life support. In our ED, modern CPR resulted in excellent return of his heartbeat. In spite of excellent life support in the ICU he remained unconscious. Family and physicians agreed to let nature take its course. This event drew attention to the need for an improved local ambulance service, and led to the Freedom House ambulance project, followed by the present EMS system, both among the catalysts for U.S.-wide EMS developments. Our improvement efforts were slowed by Pittsburgh's mayor in the early 1970s, who backed the police department's jealous grip on "ambulance service."

The Freedom House Enterprise (FHE) ambulance project of 1967-1975 was something unique.[20-24] In 1967, leaders of the predominantly African-American community near Presbyterian University Hospital (PUH) asked the hospital's administrator, Edward Noroian, to advise them on the type of ambulance to buy to take sick citizens to PUH for checkups. Noroian referred them to me. Although I was not interested in elective transport for nonemergent conditions, I saw an opportunity for Pittsburgh and beyond and offered them a deal: My department would help them (gratis) to get ambulances to transport critically ill or injured patients with life support, if they would let us train attendants as a pilot project. We would try to train "unemployable Blacks" as EMTs and paramedics.[20,21] They would staff an experimental ambulance service to test the national ambulance design, equipment, and training guidelines we had just developed at the NRC committee.[14] They agreed. The project eventually included 44 African-Americans who had

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been labeled "unemployable." This program, started in 1967, occurred during times which included summer revolts in U.S. cities (outcries for civil rights, redistribution of wealth, and peace abroad), and the murders of Martin Luther King (in April 1986) and Robert Kennedy (in June 1968).

I delegated the medical direction of the FHE program to Benson and Esposito from 1967 to 1969 and to Nancy Caroline from 1973 to 1975. Benson, who in 1967 began work with the FHE during the third year of his anesthesiology/CCM training, received his stipend in part from a National Institutes of Health (NIH) anesthesiology fellowship. After fulfilling his military duties, Benson returned to us in 1970 as assistant professor and continued working with ambulances. Frustrated with the FHE program, he focused on the suburbs. There he became the first to demonstrate that volunteer fire department ambulance attendants could be trained as ALS paramedics.

Nancy Caroline, educated at Harvard, had completed an internal medicine residency at Case Western Reserve University Medical School in Cleveland. That included some anesthesiology experience under Gravenstein. In 1973 she began a CCM fellowship with us. Her takeover from Benson of the medical leadership of our FHE ambulance program upon my (she says irresistible) offer, led her into a new career pattern and helped establish modern ALS ambulance services first at Pitt[22-24] and then in Israel. One reason for her great impact was the fact that she is a caring, dynamic, compassionate "super doctor," a Renaissance woman, and an eloquent writer. The FHE program gave Caroline the opportunity to demonstrate her exceptional skills in laying hands on victims in emergencies outside the hospital.[24] I asked Caroline to write the national curriculum for training ambulance attendants, which the Department of Transportation had asked me to prepare. Little Brown published a slightly modified form of her document as a series of books that became the most widely read EMS and paramedics' texts in the world during the first decades of the EMS movement.[24] The royalties from her writings helped Caroline support her later missions. In 1976, Caroline decided to leave Pitt and become an Israeli citizen. For five years, she was the medical director of Magen David Adom, the organization responsible for ambulance services throughout Israel. She advanced that service from BLS to ALS capability. Nagel and I visited her programs in 1978. She saved lives in terrorist events. She spent the next five years in East Africa, where she applied EMS principles to overall health care, i.e., extending the physician's impact through the hands of nonphysicians. She initiated medical and agricultural programs. Recently she returned to Israel, again changing her career; she became an innovator in palliative hospice care of terminally ill cancer patients and founded a hospice program in Galilee. It all ties together, because principles learned in CCM are again applied, in this case to titrated terminal care.

Our FHE ambulance program had suffered from lack of finances throughout its existence, i.e., from 1967 to 1975. We had to meet the dovetailing needs of providing training and employment for the black community and providing a testing ground for our national standards of prehospital EMS. Before I got into the act, the primary goal of a "Freedom House Enterprise" was to develop business ventures in the ghetto areas of Pittsburgh near PUH. The Falk Foundation, the Ford Foundation, and other local philanthropic groups, provided some financial support. My department provided EMT training and medical leadership. Initially, I personally taught some of the student EMTs in ORs and ICUs. Besides funding, other problems included: 1. Reluctance of the city's mayor to let FHE provide city-wide services; we were limited to the university district and other eastern sections of the city. 2. Suspected racial prejudices with white police officers eager to maintain control of ambulances city-wide. Our FHE ambulance program began in 1968 for African-American trainees only, but integrated in reverse in the 1970s. 3. The previously noted variable, intermittent medical direction during 1969-1973 – in part my fault. 4. Differences between medical and FHE board priorities.

Nonetheless, the service continued to render care in the eastern half of Pittsburgh and demonstrated the validity of the national guidelines for ambulance design and equipment and EMT training.[14-21] By 1974-75, under Caroline, FHE reached my original goal for the program, namely ALS capability for paramedics (EMT 2). In April 1975, the city elected to implement its own mobile ICU services. The FHE service ceased to exist in October 1975, and most FHE employees were transferred to the city service. That was directed by Glenn Cannon, a FHE trainee, in the early 1970s. Cannon rose to safety director of Pittsburgh. Other FHE trainees also made unexpected careers. For example, Mitchell Brown, FHE paramedics' instructor, rose to safety director of Cleveland and Ohio. The majority of the more than 40 trainees initially declared "unemployable," rose in educational credentials, documented the national mobile ICU guidelines as practical, and found worthwhile jobs. "The birth, crucifixion, death, and resurrection of FHE" is a complex story.[23] The nationwide impact of the FHE program was commemorated in Pittsburgh's History Museum in November 1997.

Between 1961 and 1979, I was frustratingly obsessed with the implementation gap in acute medicine (EMS and CCM). Inside and outside of hospitals, resuscitation potentials were not being applied. I therefore encouraged numerous colleagues to help advance EMS. We created an increasingly positive collaboration between town and gown. In the 1970s, our and others' EMS community programs which had become increasingly frustrating, aroused national attention. National guidelines were based on our guidelines.[6,12,17] Development in Washington of the National EMS Systems Act was led by Chicago surgeon David Boyd. I could help a little bit in that legislative move because politicking by my former anesthesiology resident Sol Edelstein had resulted in President Ford inviting me to serve on the White House Interagency Advisory Committee on EMS in the early 1970s.

My attempts to establish university leadership of regional EMS were frustrated not only by the controversy between the mayor and the FHE ambulance service, but also by the lack of a University Health Center of Pittsburgh (UHCP) director of EDs; disinterest in the prehospital arena among most UHCP anesthesiologists, surgeons, and internists; and the need for a medicopolitically skillful person who could dedicate full time to EMS negotiations. Sol Edelstein made a partially successful attempt. After his anesthesiology residency with us, he joined our staff in 1975 to devote himself to EMS negotiations. He formed the Emergency Medicine Operations Center (EMOC), based at PUH. The EMOC provided full-time medical radio command of city ambulances via radio, optional radio guidance of other ambulances in Western Pennsylvania, consultation from CCM and other specialties by radio and telephone (to influence regionalized centralization of special care), and help in EMS evalua-

tions. This was to be done as an arm of the Western Pennsylvania EMS Community Council. This dream, based on our plans of 1964, was almost accomplished by Edelstein in the early 1970s. He attracted some national EMS grants to our community. He subsequently became Medical EMS Director in Washington, DC; his service cared for President Reagan when he was shot.

My initial goal, still elusive in the U.S. but successful abroad, has been to have physicians of multiple specialty backgrounds, with special interest and skills in life support, jointly lead and cover the emergency and critical care medicine (ECCM) continuum. That would include critical cases out-of-hospital, in the ED, and in the ICU. Multidisciplinary ECCM was defeated when the traditional base disciplines failed to cover community hospitals' emergency departments and the new base specialty emergency medicine was initiated by some general practitioners to fill the gap. Since then, academicians in emergency medicine have taken on EMS leadership. Current politics preventing emergency medicine from obtaining additional CCM subspecialty certification is wrong.

In 1979, the EMOC became the Center for Emergency Medicine (CEM) of Western Pennsylvania, led by emergency physicians Ronald Stewart and Paul Paris. Originally from Canada, Stewart was an emergency physician leader in Los Angeles in the late 1970s. Our then-new dean, Donald Leon (cardiologist) and I recruited Stewart as Caroline's successor. Stewart recruited Paris. They developed the preeminent emergency medicine residency program in the U.S. It became so attractive in part because Pittsburgh was the only city in the U.S.A. where physicians go into the field together with paramedics — a tradition established in the 1960s and 1970s by Benson and Caroline. Stewart and Paris did it through initiation of an academic emergency medicine residency, which made resuscitating on the streets appealing. Other incentives for the emergency medicine specialty included high salaries, shift work (comfortable lifestyle), and "romantic" episodic work, avoiding the long-term care of critical cases.

When I decided in 1978 to switch full-time into basic research and turn the medico-political issues over to others, I made sure that the continued leadership of intrahospital ICU programs by Grenvik and of EMS programs by Stewart were secured.

All of these EMS developments locally were catalyzed also by efforts at the national and international levels. In the U.S., I was joined only by Eugene Nagel. Around 1970, he initiated in Miami the first medical control of fire department ambulance attendants in giving ALS by radio guidance from himself and standing orders. He and I also joined forces through the Emergency and Disaster Medicine Congresses with Rudolph Frey of Mainz, Germany and the second World Congress of Emergency and Disaster Medicine in Pittsburgh. Nagel later became chairman of Anesthesiology at Johns Hopkins. The only other American anesthesiologist who has remained active in EMS until now is Roger White of the Mayo Clinic.

Much credit for cardiac EMS should go to the cardiologists of Seattle, starting with Leonard Cobb. Based at Seattle's King's County Hospital, he not only initiated paramedic training in the 1970s, but also introduced CPR courses given by the ambulance attendants, for as many laypersons as possible in Seattle. This made Seattle the first community with a relatively high proportion of CPR performed by bystanders in cases of out-of-hospital sudden cardiac death. A decade later, Mickey Eisenberg and his associate Richard Cummins expanded Cobb's work, by what was probably the first epidemiologic community-wide study approach to emergency cardiac care.

My concern for the potentially weakest link in the life-support chain, namely the bystander, first arose in Baltimore. Although we had documented the ability of untrained laypersons, from Boy Scout age up, to perform effective steps A-B on curarized human volunteers,[4] we did not test the retention of their skills. In 1964, after my friend Lind in Norway had shown that steps A-B can be taught to laypersons, using Laerdal manikins, we conducted the first research of external CPR-ABC, i.e., the ability of laypersons to acquire these skills;[25] we found self-training more effec-

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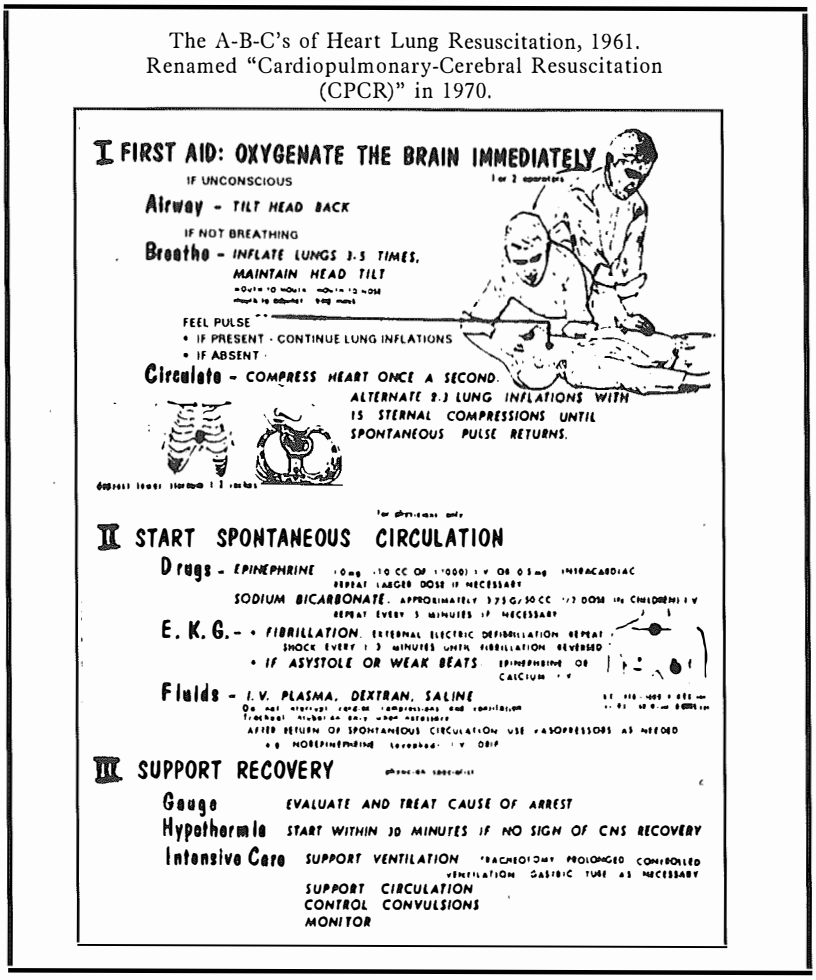

Figure 1. Heart-lung resuscitation. (Created by the author for the Pennsylvania Heart Association, 1961. From Safar with permission.

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tive than courses.[9,26-29] We inspired similar studies in developing countries, by my friend John Lane of Brazil[30,31] and others. They again confirmed the desirability of self-training by mass media.[9] I believe that every fit human being above a certain age (e.g., 10-12 years) should learn in school, continuously re-enforced by the media, the simple few steps of LSFA, including CPR steps A-B-C. Bandaging and splinting are unimportant. The LSFA concept was initiated in the 1960s jointly by Safar, Asmund Laerdal, and the Laerdal Company's Dahll, Eikeland, and Egeland.

Conclusions

Leadership in the delivery of modern resuscitation and life support outside hospitals and in the ED could be improved by greater involvement of anesthesiologists. Anesthesiologists perform resuscitation attempts outside hospitals in about one half of EMS systems in central Europe and in almost all regions of Scandinavia. Most of these anesthesiologists work in the field with mobile ICU ambulance teams, and many are in charge of the EMS system. Many European anesthesiologists have led in EMS, not only in the past (e.g., Frey, Ahnefeld, Roese, Baskett, Lust, Delooz, Hugenard, Lund), but also at present (e.g., Dick, Sefrin, Lindner, Mullie, Baskett, Vaagenes, Gisvold, Edgren, Cerchiari, Ebmeyer). In the U.S., if the National Association of EMS Physicians (NAEMSP) and its parent organization, the American College of Emergency Physicians (ACEP), prevent resuscitation-competent anesthesiologists and surgeons from performing EMS work (unless they complete an emergency medicine residency of three years), they also practice unwarranted territorialism. Every general anesthesia related components of EMS. This is a laudable trend, provided the ITACCS stands for multidisciplinary traumatology.

Concerning the future, we should ponder about lessons to be learned from the early[32] and recent[33] history of resuscitation. That teaches among other things that the public would be served better if some anesthesiologists would rekindle their interest in EMS. Numerous health professionals are needed for effective EMS. They must acquire knowledge, skills, and judgement which in the future cannot be obtained primarily in clinical practice, but rather through an introduction with simulation and education research enhanced programs, which also have been initiated by some anesthesiologists. Automatic external defibrillation and mild hypothermia will have to be included in first aid training. Therapeutic hypothermia for cardiac arrest, stroke, brain trauma, spinal cord trauma, and other emergencies should be initiated out-of-hospital. For presently unresuscitable conditions, ultra-advanced life support, like open-chest CPR, emergency portable cardiopulmonary bypass, and, in the most distant future, perhaps suspended animation, will have to be initiated in the field by physicians. For cost-effectiveness, EMS for critically ill and injured patients must be included in "the basics" of national health care systems, while ED cases should be cared for in 24-hour outpatient clinics. Ongoing resuscitation case registries should enable ongoing outcome evaluations with use of novel treatments. History has shown that EMS practiced with science, reason, and compassion can be a positive force in our striving to give more and more humans a chance to live full lives.

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MedNuggets

by Fred J. Spielman, M.D.
Department of Anesthesiology, University of North Carolina

Thank God, in the 1860's we had one great boon- Anesthesia! My elders have described to me the horrible ordeal an operation was for patient, surgeons, and witnesses before 1846. The screams and struggles of the patient were heartrending.

—W.W. Keen
Boston Medical and Surgical Journal, 187:592, 1922

We are just not getting our story over to the patient and to the public. Let's make anesthesiology a part of the practice of medicine--not limit it to the operating or delivery room.

—H. Boyd Stewart
Anesthesiology, 10:223, 1949

For myself, I am repaid for the anxiety and often wretchedness which I have experienced since I first discovered and introduced the anesthetic qualities of ether, by the consciousness that I have thus been the instrument of averting pain from thousands and thousands of maimed and lacerated heroes, who have calmly rested in a state of anesthesia while undergoing surgical operations, which otherwise have given them intense torture.

—William T.G. Morton
May, 1864 (Civil War memoir)

The necessity of enlarging the field of regional and local anesthesia cannot be emphasized too much. To my mind it should take the place of general anesthesia wherever this is feasible and I know I do not stand alone in this demand.

—Willy Meyer
American Journal of Surgery, 1:63, 1926

While surgeons know that a competent anaesthetist is one of the important factors in the operating-room for his own comfort, as well as that of his patient, there is no class of work that has so little encouragement, and few are willing to follow this line of work long enough to become familiar with the first requirements of a good anaesthetizer.

—Alice Magraw
Surgery, Obstetrics and Gynecology, 3:795, 1906

The only completely safe procedure for the control of pain during labor is psychotherapy or hypnosis; there is some danger associated with the use of any drug, even in small doses.

—L.E. Arnold
Texas State Journal of Medicine, 37:211, 1941

To make all patients fit one type or agent of anesthesia is as stupid as making the patient fit an operation instead of adapting the procedure to the individual patient.

—Allen O. Whipple
Surgery, 25:172, 1949

The patient is taking a greater risk in the hands of the poorly trained and inexperienced anesthetist than he is at the hand of the amateur surgeon.

—Frances E. Haines
Anesthesia and Analgesia, 6:25, 1927

Comparatively few members of the medical or legal profession sufficiently realize that women, during the induction period of narcosis, are subject to hallucinatory and delusional sensations, identical with the eroticism and orgasm associated with the sexual act.

—F. Hoeffer McMechan
Annals of Surgery, 58:956, 1913

The skill and experience of the anesthetist will determine his choice of anesthetic agent and technic. It is safer for him to adopt the method with which he is most skillful rather than to attempt to follow the rule of someone else.

—Ralph M. Waters, M.D.
American Journal of Surgery, 39:470, 1938

It has not been possible to find in the literature any subjective account of the effect of intramuscular suxamethonium and intubation in the conscious patient. Therefore, it was felt that the experiences of a trained medical observer under the influence of intramuscular suxamethonium, but unanaesthetised, would be of value and one of us acted as a subject of the experiment to be described.

—J. T. Davidson
Anaesthesia, 16:227, 1961

Unless the indications for a spinal anaesthetic are very definite don't use it in fat, flabby, or dehydrated patients.

—E. Hill Falkner
British Journal of Anaesthesia, 15:142, 1937-8

The present-day utilization of new anesthetic agents, modern gas machines, improved technics and certain combinations of agents has given general anesthesia a flexibility and safety indicative of important progress in recent years.

—Leo P. Zentgraf
New England Journal of Medicine, 22:437, 1943

Anesthesiologists are, in the main, a group of young physicians. It is their responsibility to acquaint themselves with the trends in the economic aspects of medicine and to participate actively and positively in the formulation of a suitable plan for the provision of self-supporting medical service to the low income group.

—Editorial
Anesthesiology, 5:193, 1944

Anesthesia greatly needs investigators capable of working in the basic sciences. As long as anesthesia leads a parasitic existence, scientifically speaking, depending as it does almost wholly on scientists in other fields for fundamental developments, it can hardly have much stature among other and stronger medical disciplines.

—Henry K. Beecher
Journal of the American Medical Association, 172:449, 1960

History. . .

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