medical world news COVER STORY

In Seattle, Medic I crew aids editor whose heart stopped at January press conference. Photographer who took picture began CPR before team arrived.

EMERGENCY MEDICINE:

How far has it come, where is it going?

American Legionnaires paraded through Seattle's rain-slicked streets when, suddenly, one of the marchers collapsed on the wet pavement, the victim of coronary artery disease. But the Ferndale, Wash., delegate to the national convention was fortunate to be in Seattle when he had his heart attack, where 125,000 citizens have been trained in cardiopulmonary resuscitation (CPR). Just seconds after his fall, several bystanders were administering CPR while others dialed the 911 emergency number to alert the central dispatcher. Three minutes later, firemen who had completed the 81-hour Emergency Medical Technician-A (EMT-A) course arrived to take over resuscitation efforts; in a few more minutes one of the city's Medic I mobile intensive coronary care units was on the scene. Under standing written orders, the Medic I paramedics—trained for more than 1,000 hours in advanced life-support techniques—defibrillated and stabilized the patient, then transported him to Harborview Medical Center, where he was admitted directly to the CCU. Some weeks later, the legionnaire was back in Ferndale relating his brush with sudden death to other members of his post.

A few years ago, the outcome might easily have been death. From what the National Academy of Sciences in 1972 labeled ". . . one of the weakest links in the delivery of health care in the nation," emergency care has turned into one of medicine's major "growth industries."

Just over seven years ago, when MEDICAL WORLD NEWS began a six-part series on emergency medical services in the U.S. (MWN, Dec. 4, '70, p. 24), only 125 communities had central dispatching communication systems. Few ambulance attendants had more than basic first-aid training—some states required them only to have a valid chauffeur's license. The emergency vehicles were often converted station wagons, and many did not measure up to equipment standards published by the American College of Surgeons.

Air evacuation systems were confined largely to Vietnam battlefields. Just 2% of the nation's hospitals could claim two-way radio capability. Hospital emergency departments (EDs) were apt to be staffed by harried house officers with little training in emergency care or, worse, had no 24-hour physician coverage at all. The entire country had only one resident in emergency medicine. The EDs may or may not have been equipped with defibrillators, x-ray facilities, or even oxygen. And despite hospitals' wide disparities in ED capabilities, emergency cases were usually dropped at the nearest one.

Although the 1966 National Highway Safety Act demanded that states improve emergency medical services or lose 10% of their highway construction funds, the Department of Transportation's grant budget to help them

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do so was dispensed at a trickle—about $24 million a year—so that four years later only a few states had even taken the first steps. Compare that with the current scene:

Of the 287,000 U.S. ambulance personnel, DOT lists 262,000 trained at the EMT-A level, and another 12,000 have a minimum of 1,000 hours of advanced paramedic (EMT-P) training. At least half of the states now have laws covering ambulance attendant training, and 40 have passed paramedic legislation.

Virtually all of the 27,000 ambulance vehicles now meet ACS equipment standards, although few (20% to 25%) yet measure up to DOT's own rigid vehicular standards. There are 24 helicopter ambulance services available through the Military Assistance to Safety in Traffic (MAST), plus a host of state, municipal, and private air transport services.

Since the Department of Health, Education, and Welfare got into the act with the passage of the Emergency Medical Services Systems Act of 1973, 47 states have developed at least one intrastate region with EMS systems. One third of the 300 U.S. emergency medical service regions carved by HEW's Division of Emergency Medical Services are now operating with basic life-support systems. These are defined by division director David R. Boyd as providing areawide coverage with central access and dispatch, at least one hospital with 24-hour physician coverage in the ED, critical care facilities, and adequately equipped ambulances with radio communication and EMT-A attendants.

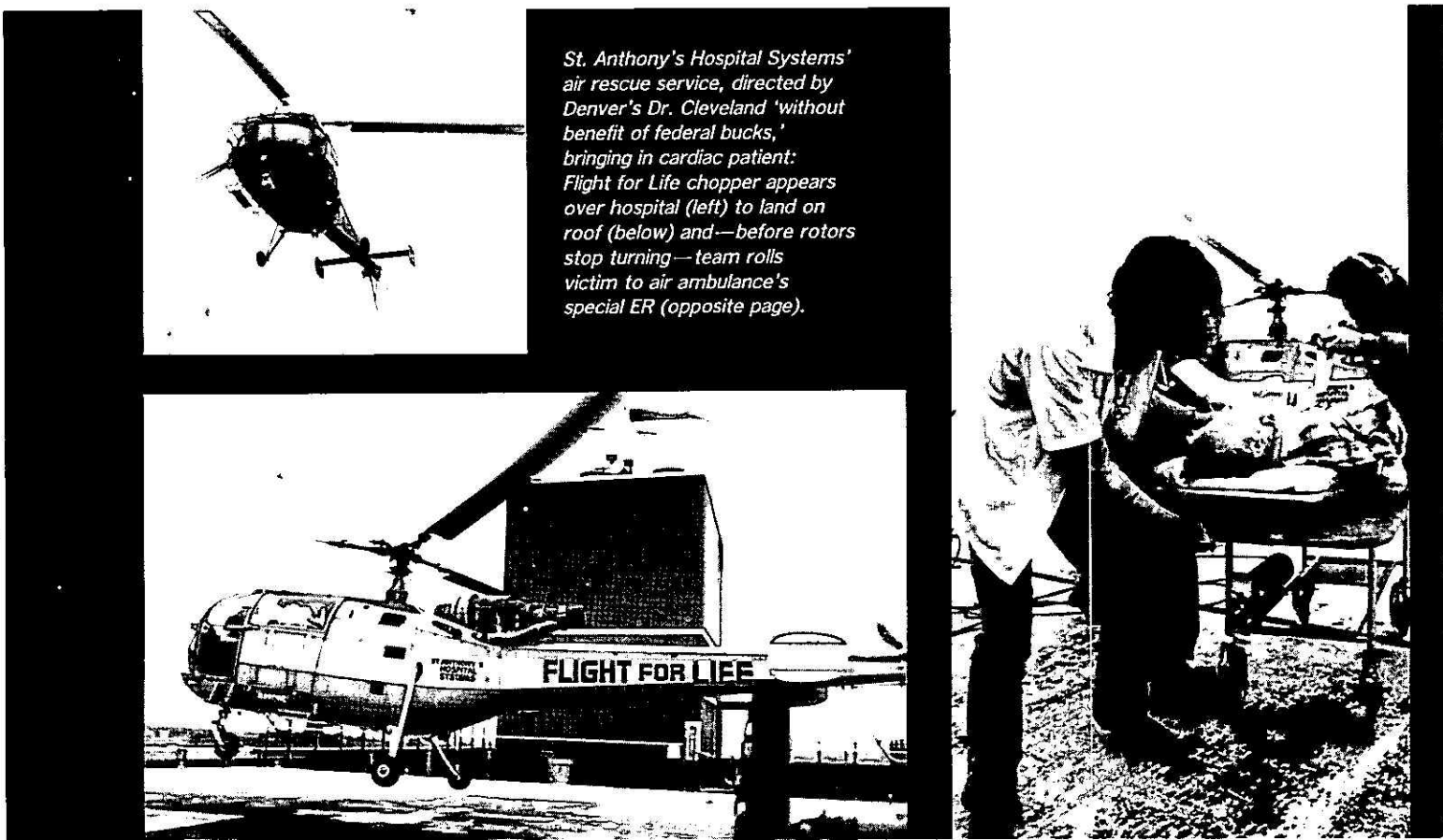
Forty regions, Dr. Boyd adds, are capable of advanced life support with specialized trauma, cardiac, neonatal, pediatric, and burn treatment facilities; mobile intensive care units; EMTs and paramedics trained in invasive medical procedures; and biomedical telemetry.

One showpiece of these emerging EMS systems is the five-year-old Maryland Division of Emergency Medical Services. By organizing facilities into echelons of care, the state ensures basic emergency services and coronary care units at 32 general hospitals. At the next level are six regional trauma centers, and higher up the ladder are university EMS trauma and specialty centers: neonatal ICUs at University of Maryland, Baltimore City, and Johns Hopkins hospitals; a burn treatment center at Baltimore City; a hand center at Union Memorial Hospital; a pediatric trauma center at Johns Hopkins; and a poison control center at the University of Maryland. Finally, at the top of the pyramid, is the Maryland Institute for Emergency Medicine, the central coordinating and consulting facility and the place where the most seriously injured—those with spinal cord trauma or multiple-system injury—are taken.

Directed by cardiac surgeon R. Adams Cowley, the institute is backed by an annual budget of $3.5 million, enough money to buy the most advanced computer terminals and medical equipment and to pay the salaries of a multidisciplinary team of doctors, nurses, and others to provide intensive care for more than 1,000 critically ill patients a year. The budget also provides funds to train everyone from ambulance drivers to surgeons, develop treatment protocols for all the other Maryland centers, and conduct basic research on the mechanisms of injury, cell death, and organ failure.

Linking this system together is a radio and telephone communication network that includes cardiac telemetry consultation centers at four Baltimore hospitals and a new, briefcase-size radio transceiver at the institute. It transmits emergency information anywhere in Maryland via satellite 22,300 miles above the Pacific Ocean.

Besides the state's public and private ground ambulance



St. Anthony's Hospital Systems' air rescue service, directed by Denver's Dr. Cleveland 'without benefit of federal bucks,' bringing in cardiac patient: Flight for Life chopper appears over hospital (left) to land on roof (below) and—before rotors stop turning—team rolls victim to air ambulance's special ER (opposite page).

services, the system can count on 24-hour helicopter service through the Maryland State Police Med-Evac program, the U.S. Park Police, or the Army's 247th Medical Detachment at Fort Meade.

It's an impressive package, unquestionably light years ahead of the state's hit-or-miss approach to emergency care less than a decade earlier. And there are others like it. HEW's Dr. Boyd cites EMS systems in San Diego and Seattle and Denver and Omaha and Fort Worth and Charlottesville and Tuskaloosa, in Illinois and Maine and Nevada—an ever-lengthening list that has the 40-year-old EMS chief convinced the nation will have "wall-to-wall" regional EMS by 1982.

Whether or not he meets that deadline, there is little doubt that EMS systems will continue to mushroom. The money is there: another $200 million from HEW alone will be allocated over the next three years, and Dr. Boyd is pushing for a ten-year, $500-million expansion program. Most regions where EMS systems already exist report a "trickle" effect in neighboring areas where publicity has generated a "we want it, too" response.

But when all that money is spent, when all 300 EMS regions are stocked with gleaming trauma units and paramedics and helicopters and telemetry, will they actually make a dent in the annual toll of 110,000 trauma deaths—including 46,000 from auto accidents—50,000 poisoning deaths, 10,000 burn deaths, or the estimated 350,000 sudden cardiac deaths? Are the new EMS systems actually saving lives and reducing morbidity? And if they are, what parts of the system are responsible?

These are all questions EMS experts are just beginning to ask as they look ahead to the years when the federal money will dry up—and wonder who's going to pick up the tab. So far, at least, the answers are only beginning to come in.

Dr. Eugene L. Nagel, the Johns Hopkins professor of anesthesiology who set up Miami's acclaimed emergency response system, discusses some of the difficulties in evaluating the effectiveness of EMS systems. "We're just learning how to measure health care delivery," he told MWN. "And while there is an increasing amount of research, it's all in the early stages. So right now we have very little in the way of controlled information to compare basic- versus advanced-level care, for example, so that local governments can determine where to put their money."

Some of the evaluation problems are obvious. Are declining cardiac deaths due to a better American diet or faster and better treatment of heart attacks? (Dr. Boyd, not entirely in jest, is ready to give emergency care all the credit.) Similarly, does the recent decrease in highway fatalities reflect better trauma care or the national 55-mph speed limit imposed to save fuel?

Yet even with the paucity of hard data, a few isolated studies are beginning to suggest that the EMS systems are having a positive impact. Says Dr. Nagel: "I have absolute confidence that lives are being saved today, and these are people who would have died ten years ago."

Perhaps the best support for his optimism comes from the cardiologists. As early as 1974, Dr. Richard S. Crampton, professor of medicine at the University of Virginia in Charlottesville, was reporting that prehospital coronary death rates had fallen 26% and ambulance coronary death rates 62% three years after a communitywide CPR program and prehospital emergency cardiac care began there. Similar results were cited last year in Birmingham, and since 1970, Seattle's Dr. Leonard A. Cobb, professor of medicine at the

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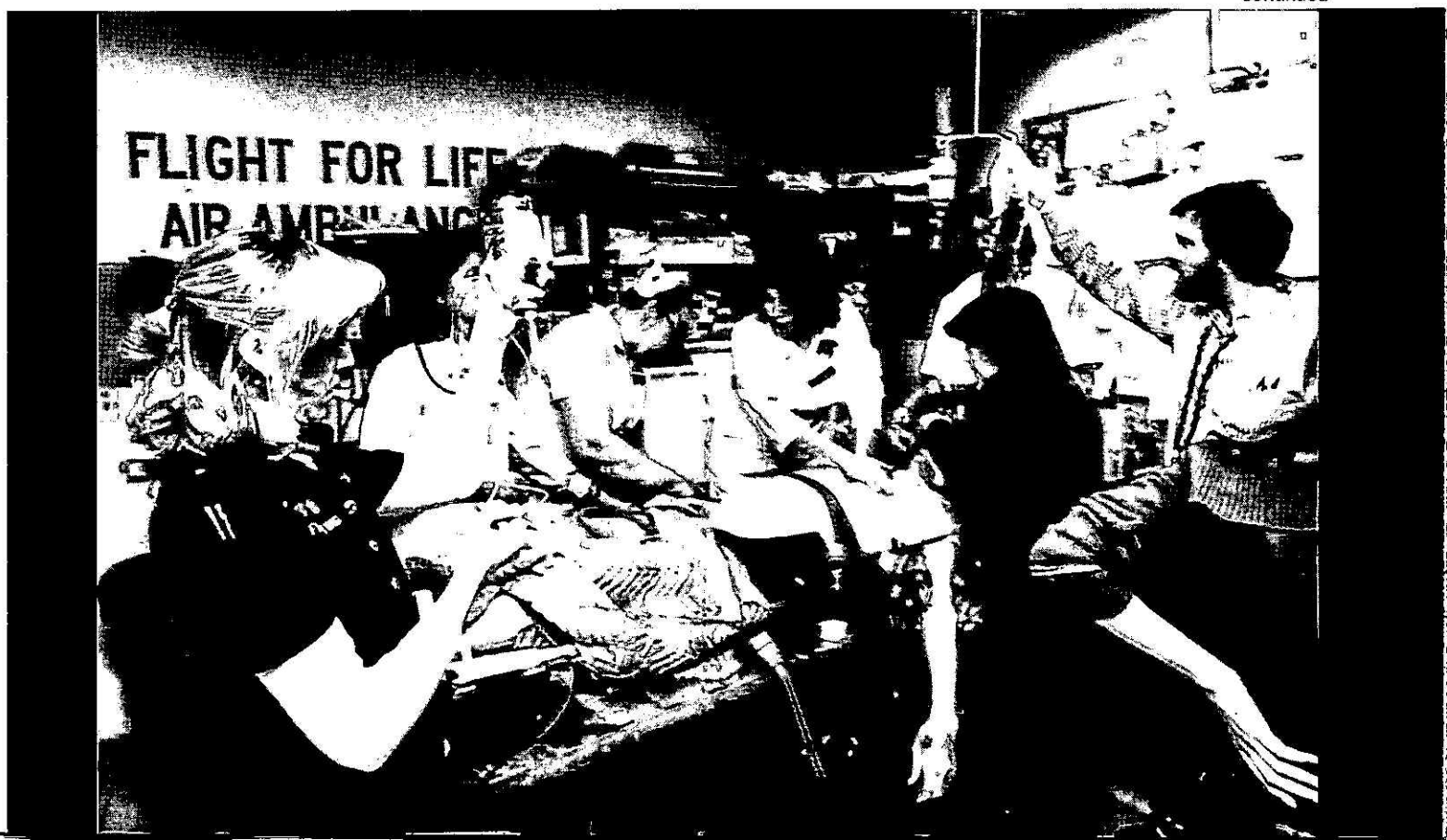

systems suggest they can reduce both the human and financial toll of medical emergencies, few see an emergency care utopia in the future. Though he clings to that 1982 deadline for a nationwide network of EMS systems, even Dr. Boyd admits their development is often slow and stormy, especially in multijurisdictional metropolitan areas.

More critical is UCSF trauma surgeon Donald D. Trunkey. In his view, any further reduction in accidental mortality and morbidity will await determination of each hospital's ED capabilities (termed categorization)—something that is proceeding at a snail's pace. While care at the scene has improved nearly 100% in the past decade, says Dr. Trunkey, patients who are dumped at the nearest hospital are still dying.

"What's happening now," he claims, "is that instead of dying in the ditch, they're dying in the hospitals." To back that assertion, he cites a 1977 UCSF-UCLA look at consecutive motor vehicle accident deaths in two California counties—one with a trauma center that sees all seriously injured patients, the other without.

Of the 15 deaths from hemorrhage in the trauma center county, he reports, the investigators labeled only one preventable. In contrast, he continues, 21 of the 35 deaths from hemorrhage in the county with no trauma center were labeled preventable.

Despite those findings, Dr. Trunkey is pessimistic about the prospects of categorization, both in his own state and most others. He points to efforts by the American Trauma Society, the AMA, and other groups, all of which have met with stiff resistance. "We're trying," he says, "but it's hard to fight the economics of the situation."

Still, categorization can be done, as San Diego, Maryland, Illinois, and a few other regions have shown. But even with the 1972 state law requiring that step, says Peoria's Dr. Otten, it wasn't easy. "When the 800-plus-bed St. Francis Hospital was designated the region's trauma center, over the 250-bed Proctor Community Hospital and 500-bed Methodist Medical Center of Illinois," he recalls, "there were bad feelings all around." While Proctor and Methodist hospitals feared the loss of income from trauma patients, surgeons at St. Francis worried about becoming the dumping ground for all of central Illinois. "Everybody was unhappy," he continues, "so we had to come up with some trade-offs."

'Wall-to-wall' regional EMS systems across U.S. by 1982 is goal of HEW's Dr. Boyd, director of its Division of Emergency Medical Services.

Painful or not, Peoria's ED categorization has led to some interesting fallout beyond EMS. Although 80% of the city's cancer surgery occurs at St. Francis, for example, Methodist hospital—armed with a new radiation center and a cooperative agreement between the two facilities—is responsible for cancer radiation therapy. Proctor Hospital is in the midst of improving its ED capability to the intermediate level, and all three hospitals have joined in a nonprofit corporation to buy the city's two ambulance companies.

If other communities can somehow find ways to follow Peoria's lead in categorization, most EMS experts see just one remaining obstacle to an effective nationwide EMS network—continued financing. Or, as Dr. Boyd puts it, "Is there life after the feds?"

It's a timely question. The Robert Wood Johnson Foundation demonstration grants have already been phased out, and the federal pot isn't intended to do more than supply start-up money. Everyone knows emergency medical services are expensive. California's Dr. Trunkey estimates that the annual cost of staffing a single trauma center is $3.7 million at the ACS-recommended level and $2.7 million for the Health Services Administration level, and that's at salary levels that are five years old. Yet if those centers, expensive ground and air transport systems, and other EMS components do work, someone's got to pay for them.

On that score, too, Dr. Boyd maintains an optimistic stance. "I'm waiting for it to happen," he says, "but so far we have not seen a single case where a community subsidy has been removed or a tax mill levy taken away." In fact, he adds, just the opposite appears to be happening. In San Diego, where federal funds ran out last year, Dr. Micik and her EMS associates had some uneasy moments when the county board of supervisors threatened not to continue the program. But public support for the system proved too strong, and the county finally capitulated to the tune of $400,000 for the next year. And voters in the city of San Diego demonstrated their support by approving a $3.4-million budget for paramedic training and salaries.

There are other signs that EMS is here to stay despite withdrawal of federal support, says Dr. Boyd. "Because they've seen the results of the model systems, at least two states—West Virginia and Pennsylvania—have each agreed to pony up $2 million to develop EMS."

Finally, from Colorado comes what may be one of the most compelling arguments for emergency medicine's guaranteed future. At the ACS meeting last fall in Dallas, Denver's Dr. Henry C. Cleveland reported that the St. Anthony Hospital Systems' air rescue service he directs "without benefit of federal bucks" not only was self-supporting but actually generated income. In 1976, the cost for the helicopter and fixed-wing program was $1.1 million. But income directly from the program was $680,000, and inpatient and outpatient revenue to participating hospitals from the service totaled $2.5 million.

—JUDY ISMACH

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University of Washington, has reported lower cardiac death rates directly attributable to a rapid response system and community involvement.

From what was previously a uniformly fatal event, says Dr. Cobb, about half of all patients found in ventricular fibrillation are now being resuscitated. And 25% of those, he adds, are discharged home as long-term survivors. In its eight years of operation, the Medic I mobile CCU program he pioneered is credited with saving more than 800 lives.

For those who still worry about more damage than aid from bystander-initiated CPR, the cardiology chief at Harborview Medical Center has some additional figures. Although immediate resuscitation rates between bystander-initiated CPR and EMT or paramedic CPR were comparable, a recent University of Washington study clearly gave bystanders the edge in preventing subsequent mortality. Only 33% of those resuscitated by bystanders died, but 66% of the other group died. Moreover, the hospital course of those who were resuscitated (presumably earlier) by bystanders was far better. Consciousness returned on the first hospital day in 66% of group I (bystander) patients but in only 9% of group II patients. The numbers on prolonged disorientation were 3% and 49%, respectively.

For critics who aren't convinced by those figures, Dr. Cobb cites studies showing higher rates of rib fractures in physician-initiated CPR. And for nonbelievers who continue to fret about the dangers of a lacerated liver, he offers the perfect comeback. "Would you rather," he asks, "be dead?"

While the evidence from such programs has convinced most experts that emergency cardiac care can save lives, the same claim for trauma care is a little harder to document. Still, a few recent findings suggest that the trauma centers are doing something right.

In the past year, says Dr. Boyd, Illinois has seen a 50% decrease in motor vehicle accident mortality in all of its downstate trauma centers, a reduction he attributes directly to the state's categorization of hospital emergency departments' capabilities and improved communications and on-the-scene care.

Having started the Illinois EMS system before his stint at HEW, Dr. Boyd might be guilty of a little chauvinism in offering that example. But statistics gathered by Dr. John W. Otten, EMS director for the 16-county central Illinois region headquartered in Peoria, support his suggestion that better trauma care is responsible. In 1971, before the Illinois EMS system was in full operation, the highway death rate in that region was 93 per 1,000 life-threatening injuries. But in 1975, says Dr. Otten, it had dropped to 53 per 1,000.

Similar suggestive data come from Maryland, where in 1968 an estimated 70% of all seriously injured accident victims in Baltimore were either DOA or died during hospitalization. But in 1976, 80% of the institute's 1,105 patients—the most seriously injured—survived.

But changing mortality rates don't tell all of the story, as figures from the Midwest Regional Spinal Cord Injury Care System reveal. Now into its seventh year, MRSCICS treats an estimated 29% of all new spinal cord injuries within 200 miles of Chicago through an acute care facility at Northwestern Memorial Hospital and continuing care at the Rehabilitation Institute of Chicago. The system's first five years of operation, says its co-director, Dr. Paul R. Meyer Jr., recorded a gradual increase in mobility and self-care independence of patients at discharge, even though the level of function on admission decreased during that period (probably reflecting earlier and increased referral of the more seriously injured).

In addition, the Chicago team has been able to document some clear advantages of early admission to the system. During that same 1972-1976 period, Dr. Meyer relates, the number of patients admitted within 72 hours of injury increased a whopping 425%, and the postinjury admission "half time" dropped from 45 days in 1972 to just 12 hours in 1976. Comparing matched pairs of early- and delayed-entry patients, the spinal cord trauma experts found that early-entry patients averaged 33% fewer decubitus ulcers and spent 16% fewer days in the hospital during their first year after injury. In 1976, says Dr. Meyer, the cost savings advantage amounted to $6,600 per patient.

Earlier admission has also been a major thrust of Virginia's burn treatment system, a three-year-old effort to link together all hospital EDs with the three advanced burn centers in Charlottesville, Norfolk, and Richmond. "When we first started the system," recalls Dr. Richard F. Edlich, director of the Charlottesville center and associate professor of plastic surgery at the University of Virginia, "we saw

Emergency physicians: How soon official specialty status?

Dr. Wilbur, head of Council of Medical Specialty Societies, sees conjoint board in the offing.

In 1970, when the fledgling American College of Emergency Physicians (ACEP) got together with the Emergency Department Nurses Association (EDNA), the national meeting drew a grand total of 32 professionals. Last November, 3,400 delegates registered for their combined meetings in San Francisco.

As those attendance figures attest, the explosive growth of U.S. emergency medical services is rapidly producing a brand-new medical specialty. In its brief ten-year history, ACEP has seen its membership swell to more than 9,000. Eight years ago only one medical school, the University of Cincinnati, offered a residency program in emergency medicine. Today the ACEP counts 40, plus a host of postgraduate training programs for practicing ED physicians.

Last October, with the aid of the Office of Medical Education, Research, and Development at Michigan State University, ACEP field-tested its certification examination at its home base in Lansing. The college

prolonged delays before seriously burned patients were transferred to the burn facilities. So we developed a pretreatment protocol, complete with indications for transfer and transfer of medical records, and now every ED in the state has a checklist for burn treatment."

Since much of Virginia is rural and full-time ED physician coverage is nonexistent in many small hospitals, the three urban centers also sent nurse-educators into the field to train hospital nursing staffs. Those efforts, coupled with an air transport system that relies on fixed-wing commercial aircraft, have reduced the transfer time to less than eight hours, Dr. Edlich reports.

Meanwhile, in California's San Diego and Imperial counties, EMS doctors have been gathering data on yet another common cause of accidental death and disability—poisoning. Like their spinal cord injury colleagues in Chicago, they're discovering that a systems approach can save money.

"Of the 30,000 annual calls to the Regional Poison Center," says Dr. Sylvia Micik, chief of San Diego's EMS division, "20,000 involve actual poisoning. Yet we've been able to manage 85% of those over the telephone."

When a call comes in, poison center staff members first determine the severity of poisoning to guide them in deciding whether home management is possible. "Many are kids who have been caught in the act of swallowing something like 12 phenobarbital tablets," she explains, "so they're usually asymptomatic when the parent calls." In those cases, the parent is usually instructed to induce vomiting and observe the child for symptoms. (A public education campaign has resulted in a surprising number of San Diego households having syrup of ipecac on hand.) Center staff members then call back after 20 minutes, at one hour, four hours, and 24 hours to keep track of the victim's status; if symptoms do develop, they arrange for hospital care.

The results? In 1971, before the system began, 6.1% of the county's ED visits involved poisoning of children under 12 years of age. But in 1976 that figure had dropped to just 1.9% of ED visits, and the county also saw a 40% drop in hospital admissions for accidental poisoning.

While the results of these and other experiments in EMS

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plans to give the first cycle of the exam this spring.

There's only one hitch in all that precocious activity: so far, the American Board of Medical Specialties has failed to bestow official specialty status on the emergency physicians. The three-year-old American Board of Emergency Medicine's application for recognition was submitted to the specialty board last summer and apparently now lies in limbo. "It was not really denied," says Dr. Richard Wilbur, head of the Council of Medical Specialty Societies. But neither was it accepted as presented.

Still, most observers believe official recognition isn't far off. The emergency physicians were granted provisional section status by the AMA in 1973, and two years later its House of Delegates went on record in support of emergency medicine as a new specialty. Dr. Wilbur suspects that what will emerge when both boards reconsider the application is a conjoint board with family physicians and perhaps other specialties.