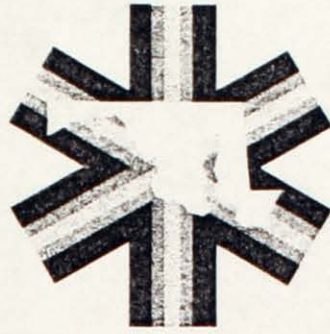


Maryland  
**EMS**  
NEWS



MARYLAND INSTITUTE FOR EMERGENCY MEDICAL SERVICES SYSTEMS VOL. 7 No. 2 April 1981



# Neonatal Program Marks Tenth Anniversary

Ten years ago, the national survival rate for infants under two pounds was only about 10 percent, according to Michael Simmons, M.D., a director of the Maryland Regional Neonatal Program. Today the survival rate for the same weight group is 60 percent; the survival rate also increases with weight—80 percent for infants weighing two to three-and-one-half pounds and 90 percent for infants weighing more than three-and-one-half pounds.

Ten years ago, the sick newborn infant (a neonate is generally defined as a newborn in its first 28 days of life), was generally given minimal medical care. Another director of Maryland's neonatal system, Ron Gutberlet, M.D., explains that with increasing knowledge about infant respiration problems, fluid and acid base problems, and nutrition, new techniques and equipment designed for infants were developed and physicians could soon respond to the sick newborn's needs.

But "in the last eight years there have been no technological advances," notes Dr. Simmons, "yet the mortality rates continue to improve significantly. I think it's because of changes in attitudes. We now assume that these tiny babies (infants under five pounds comprise approximately 80 percent of neonatal deaths) are salvageable. We are applying the same technologies that we applied to four- and five-pounders



Ron Gutberlet, M.D., checks a newborn at the University of Md. Hospital.

to those infants three pounds and under." Babies weighing even one-and-a-half pounds have lived when aggressive treatment was begun early.

This year the Maryland Regional Neonatal Program celebrates its tenth anniversary. Here the survival rates of neonates reflect the same dramatic increase seen nationally. Program directors Drs. Gutberlet, Simmons, and Ambadas Pathak feel that in Maryland, the neonatal transport system and education have had the biggest impact on survival rates (see articles on this page).

—Beverly Sopp

## Nurses Join Neonatal Transport System

Few would dispute that transport systems and ambulance and helicopter medics educated to the EMT, cardiac-rescue-technician, and paramedic levels have had a tremendous impact on increasing the survival rates of critically injured patients. In most emergency medical situations involving a trauma victim, the emphasis is on speed—stabilize the victim as quickly as possible and transport him or her to the best definitive medical care center within an hour before the irreversible stages of shock begin.

However, the emphasis is different in neonatal transports in Maryland, where neonatal nurse

clinicians now are a vital part of the transport system and where surface transport accounts for 60 percent of admissions (Med-Evac transports are used if ambulance transport time would be over 90 minutes or beyond a 100-mile radius).

"There's no rush," according to Michael Simmons, M.D., a director of the Maryland Regional Neonatal Program, "to get the baby back to the hospital. The rush is to get us to the baby."

For as Dr. Simmons points out, "Once you arrive at the hospital and make sure the baby is stabilized, you ought to be able to

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## MRNP: A Bit of History

In 1971, the neonatal intensive care units at City Hospitals and University of Maryland Hospital were designated the first statewide neonatal specialty referral centers in Maryland. Johns Hopkins Hospital also participated in the neonatal program by accepting infants from City Hospitals who needed cardiac or other surgery. (This cooperation was fostered by Alex Haller, M.D., Director of Pediatric Surgery at Hopkins.)

Under the leadership of the first program co-directors, Herman Riesenbergh, M.D., and Ron Gutberlet, M.D. (chiefs of neonatology at the respective centers), the programs quickly expanded, ensuring improved care of newborns during their transport to the hospital and improved management of newborns at the hospital.

Program growth is evident in many ways:

- Today six centers comprise the Maryland Regional Neonatal Program: City, University of Maryland, Johns Hopkins, Sinai, Mercy, and St. Agnes hospitals. Each cares for sick newborns from

its own delivery rooms and serves as a specialty referral center for other areas.

- The program directors now include Dr. Gutberlet (University of Maryland), Ambadas Pathak, M.D. (City Hospitals), and Michael Simmons, M.D. (Johns Hopkins). Rupla Eshai, M.D., is program coordinator, handling the neonatal transport system and education programs. Her assistant is Charlotte White, R.N. Working closely with Dr. Eshai, Ms. White, and the program directors is Cheryl Bowen, R.N., a nurse coordinator at MIEMSS, who presents neonatal workshops and special neonatal training for nurses and Med-Evac observers.

- In 1971, there were 72 neonatal transports; in 1976, there were 383; in 1980, there were 544.

- Physical expansion is typical of many of the Maryland neonatal centers. For example, the neonatal center at University of Maryland now includes a 20-bed intensive care nursery, four "well" baby nurseries, three special isolation rooms, a six-bed rooming-in unit for mothers and babies, and other special facilities.



Often not much larger than their parent's hands, sick newborns are constantly monitored during their stay at the neonatal centers.

## Neonatal Program Stresses Education

Staff at the Maryland neonatal centers are working to expand their education program to teach other physicians and nurses how to resuscitate and stabilize the newborn infant with special problems. Because one can never know when a premature pregnancy will occur, "every hospital in the state," according to Ron Gutberlet, M.D., a director of the Maryland Regional Neonatal Program, "must have the capability of effectively resuscitating and stabilizing an infant before he or she can be transported."

Michael Simmons, M.D., another director of the MRNP, adds that "hospitals have to be prepared to go it alone to stabilize the sickest infant you can imagine for about two hours before the baby is transported."

Nurses and physicians are offered one-day MIEMSS seminars at various medical centers throughout Maryland to update neonatal skills. If requested, 2-to-7-day observation and training courses can also be arranged at the neonatal centers.

Each year State Police Med-Evac observers spend two days in a neonatal center to refresh their skills—practicing suctioning, "bagging" a baby, hooking up equipment, and starting IVs.

More effort is also being made to educate physicians throughout the state to "see the focus of transport turned to the mother rather than the baby." Dr. Simmons would like to see an increasing emphasis on intrauterine transport rather than neonatal so that "more mothers can be transferred prior to delivery so that we can have the baby from moment one." This would help to prevent the time lag before a sick newborn can receive specialized care at a neonatal center. (See article on perinatal program.)

In addition, educational efforts are directed toward parents. Most neonates are transported from 2 to 72 hours after birth. Both infants and parents generally face severe problems.

The most common problems of full-term infants include anoxia or asphyxia, congenital heart defects, and surgical problems. Infants born prematurely often have undeveloped sucking reflexes and undeveloped lungs that cannot stay inflated properly. They develop respiratory problems, an inability to control their body temperature, a water and salt imbalance, digestive malfunctions, central nervous system damage resulting in a predisposition to brain hemorrhage and to

(Continued on page 3)

# Medical Control Links Medical, CRT Personnel

It's 11:30 p.m. when the paramedic team gets the call. The problem: suspected heart attack. When the CRTs arrive on the scene, the victim, a 48-year-old man, is still conscious. They immediately hook him up to a monitor and send an electrocardiogram by radio to a previously designated hospital. There the emergency room physician reads the ECG and makes a diagnosis: premature ventricular contractions. The doctor prescribes a drug to slow down the heartbeat. The CRT team administers the drug while the patient is enroute to the hospital, where he is admitted and resting comfortably within an hour.

"Responsibility" and "accountability." Those are the key words to describe the idea of medical control, as put into practice in the case just described. What this means for paramedics, or cardiac rescue technicians (CRTs) as they are called in Maryland, is that they get on-the-scene guidance from a physician who assumes responsibility for supervising emergency situations and will answer for the team's actions. No longer are CRTs left on their own to make crucial decisions. No longer do they have to "shop around"—that is, call several emergency departments for advice, often getting confusing or conflicting instructions.

Medical control is an attempt to give leadership and to set clear standards for pre-hospital care by CRTs. It applies only to those doing advanced life support work (CRTs) and not to the basic life support activities of EMTs. CRTs are not only trained separately from physicians but also get most

of their instruction from lay people—usually in fire and ambulance training academies. Yet a close tie between medical and CRT personnel is critical for good patient care—indeed, for saving lives. Here is a basic way that medical control can establish that tie, although local variations are possible.

1. One "base hospital" emergency room in a designated geo-

graphic area is the place CRTs call for advice. There a physician or supervisory nurse is available to give instructions. This facility is responsible for coordinating communications with other hospitals, including the one where the patient is taken and any other facility involved—such as a cardiac consultation center. (In some situations, especially rural areas, the base hospital and the receiving

hospital may be the same institution.)

A variation on this approach is the medical control system in Tampa-Hillsborough County, Florida. Instead of relying on base hospitals and their emergency department doctors and nurses, Tampa has 14 trained physicians who answer portable radios on a rotating basis. So on any given day one doctor is getting all the calls. Each receives an average of seven emergency calls a day.

2. There are standard policies and techniques for CRTs to follow. These triage and treatment protocols are developed with the advice of EMS personnel and physicians from the seven clinical patient groups. The protocols should then be formally adopted by all hospitals participating in the control system and by an area's EMS operation.

Other aspects of medical control include:

- A physician is named medical director for a state or region. The medical director sets policy; helps design, administer, and monitor the medical control program; confers with EMS officials; and helps train paramedics. In short, this individual is responsible for the day-to-day operation of the area's EMS program. The person selected as medical director must be acceptable to the local medical community.

- A thorough record-keeping process ensures accountability and helps administrators evaluate and improve the system.

The idea of medical control began to take root in Maryland's five EMS regions when the 1973 EMS Act first provided funds for this kind of effort. Since then the Department of Health and Human Services has been refining its criteria for medical control, which is now a requirement for receiving EMS grants. At present MIEMSS is pushing for uniform statewide standards, since there are now different control systems in the five regions.

MIEMSS has found that CRTs support the concept of control and want the guidance it offers. However, it has sometimes been difficult to convince physicians, nurses, and hospital administrators to accept medical control. In rural areas, the main reason for this resistance is lack of personnel; it is difficult enough to provide sufficient emergency rooms, without adding extra supervisory burden of medical control.

In metropolitan areas, rotating resident staff are available but may not be consistent in their treatment protocols—such as drug administration. Thus, if medical control is to be viable, hospitals must make trained staff available and must ensure a consistent response to emergencies. Obviously this means more work for those who run hospitals.

Despite these problems, MIEMSS is trying to get more hospitals to make a commitment to medical control. It is a vital link between medic and paramedic, between hospital and prehospital care—a link that could save lives.

## CPR in Aquatic Emergencies Investigated

More than 8,000 drownings occur annually in the United States. This number is expected to increase with the growing popularity of SCUBA diving.

In aquatic situations, unconsciousness or cardiac arrest can occur as a result of trauma, drowning, or asphyxia. Unfortunately, conventional CPR cannot be initiated until the victim can be moved to a firm surface. In aquatic accidents, the time that elapses before the victim can be transported to shore, boat, or an underwater habitat is usually more than four to six minutes, which means that the accident will probably be fatal.

Although this problem has been recognized by the medical profession, neither the American Medical Association, American National Red Cross, nor the American Heart Association have yet proposed any method of CPR without back support in aquatic environments. However, research is being conducted at the University of California, where Nico March and Ric Mathews have studied a technique of placing the

victim upon the rescuer's chest and then initiating full CPR immediately on the site. Ventilations are administered using a safety-design modified SCUBA regulator. Several body and hand positions were tested on an instrumented CPR mannequin. The results showed that adequate ventilation and sufficient sternal compression depth and rate could be maintained for at least 15 minutes. Their study suggests that this method could be used successfully in aquatic emergencies.

A similar problem of administering CPR to a victim not in a supine position is the concern of commercial diving companies. Divers sometimes lose consciousness while operating out of a diving bell. The small size and configuration of most diving bells make it impossible to place a diver in the supine position used for conventional CPR.

A commercial diving company has been working on an operational schema for resuscitating a diver in an upright position once he has been retrieved into the diving bell. Using both mannequins and cadavers, Roy A. M. Myers, M.D., of MIEMSS, and Mark F. Bradley, M.D., of the Naval Medical Research Institute in Bethesda, have evaluated the diving company method together with other CPR measures that might be used in the bell. They found that in all upright positions, adequate ventilation was very difficult to achieve because the victim's head could not be adequately hyperextended. Although the diving company developed a rigid collar to hyperextend the neck, Myers and Bradley found it to be deficient, and therefore redesigned the collar to provide sufficient hyperextension. They also found that compression administered by pulling the subject's chest against the head or knee of the resuscitator as advocated by the diving company was not effective. However, they have shown that if the rescuer compresses the victim's chest with his knee with the victim sitting against a firm surface, satisfactory CPR can be performed for short periods.

The results of these experiments have led Myers and Bradley to recommend that modifications to the bell interior be made so that CPR can be done in the supine position. As an alternative, bells could be outfitted with a gas-driven mechanical cardiopulmonary resuscitator that can be used with the victim in the seated position.

—Lynn Rutkowski



Middle River Underwater Rescue Diving Unit.

The Middle River Volunteer Ambulance and Rescue Company has the only underwater rescue diving unit in Baltimore County. Approximately 20-25 divers answer calls in Baltimore County and surrounding areas of Harford County and Baltimore City. The 18-foot boat, shown above, is specially equipped for underwater rescue. It was donated in memory of Leight Johnson, Jr., and his grandfather. Before his death in 1979, Leight was a CRT with the Middle River company, a member of the underwater diving team, and a scuba diving instructor.

## Region II Ambo Team Wins World Title

An ambulance team from the Community Rescue Service in Region II outdistanced 17 other such teams at the 1989 International Rescue and Emergency Care Association meet to grab the World Championship Emergency Care Team Title.

In addition, first place in the women's division of the competition went to the women's team at the 185-member volunteer ambulance service, which serves Hagerstown and the surrounding region.

The chairmanship team consisted of its Prairie captain, Don Mandeville, Mark Lane, Keith Sheldrake, and Mike Mann.

Mr. Mandeville is a member and a past president of the Region II Advisory Council, and one of two

ambulance in Washington County. Mr. Mandeville is an EMT instructor.

The members of the women's team were Donna Carey (captain), Linda Mandeville, Becky Harris, Sandy Johnson, and Shelley Kretzinger.

Each team in the meet had to work out three emergency care situations involving at least two victims for each of several problems. The teams had three minutes to read each problem and 15 minutes to complete their work.

The Community Rescue Service team also won the first world championship meet in 1989, and has placed high in the standings every year since then.

This year's meet will be held on August 27 in Toronto, Canada.

—Lynn Rutkowski

# Nurses Transport Neonates

(Continued from page 1)

transport the infant in a properly equipped vehicle, giving him care that's no different from what he would receive in the hospital. The concept is different from a patient with a gunshot wound, burn, or other trauma. You can't possibly do on the site or in the transport vehicle all the things that could be done in a multiply-equipped hospital."



Photo: Dave Esposito

The "rush" starts with a referring physician calling the "hotline" number at Baltimore City Hospitals. The receiving hospital is determined according to the distribution formula, the census of each neonatal center, and the wishes of the referring physician. An ambulance or Med-Evac helicopter is requested and the receiving center is notified.

Prior to November 1980, physician interns received the transport calls from the referring physicians, provided consultation, and escorted infants requiring respiration assistance. Since November, however, one of five neonatal nurse clinicians responds to the hospital requesting a transport, examines or stabilizes the infant, and accompanies the infant on all ground transports and on some Med-Evac transports (State Police medics on the helicopters receive special training in neonatal care, and the nurse clinician accompanies them only if there are unusual problems). Coverage is provided around-the-clock, seven days a week.

Each of the five nurses has been trained in the stabilization and emergency care of the neonate before transport. Subjects included intubation, starting an infant on a respirator, inserting arterial lines, doing initial blood work such as determining blood gases, and radiology. The training under MIEMISS nurse coordinator Cheryl Bowen, consisted of two months of didactic sessions and three months of on-the-job training at the City, University of Maryland, and Hopkins neonatal centers, and accompanying physicians on transports.

Stabilization and treatment techniques are based on protocols formulated by the neonatal program directors. Each of the five nurses—Kim Kautman, Suellen Riley, Pam Bramble, Carmel Cunningham, and Lynn Ross—had at least two years prior experience in infant intensive care units. One of the five neonatal nurse clinicians

trained initially, Charlotte White, now assistant program coordinator, also acts as a backup to the other neonatal transport nurses.

According to Ms. Bowen, the nurse clinicians have increased the efficiency of the transport system. Previously, pediatric residents were often assigned to handle neonatal transports. Because of the temporary nature of their neonatal assignments, they often



Photo: Dave Esposito

(Left) A neonate in an isolette is wheeled into the neonatal center at the University of Md. Hospital. (Right) Nurses, specially trained in neonatal skills, care for the sick newborns.

did not have time to develop extensive skills in neonatal transports or familiarity with neonatal equipment. However, the care and transport of the neonate is the primary responsibility of the neonatal nurse clinician.

Currently, EMTs from the Baltimore Volunteer Rescue Squad respond to a neonatal nurse's calls to transport her and the isolette to the referring hospital. With the help of a grant, however, they will soon have a new neonatal van, specially equipped with heating elements and a large oxygen supply and capable of transporting three infants and a nurse. The van will be designed to accommodate a stretcher if a maternal transport is needed and to ensure the nurse adequate space and equipment to perform procedures on neonates. The goal is that the quality of intensive care for the sick newborn in the neonatal van is comparable to the care the infant would receive in the hospital.

—Beverly Sapp



Photo: Dick Heiglander



# Health Personnel, Parents Learn Special Neonatal Care Skills

(Continued from page 1)

coagulation abnormalities, jaundice, and/or an increased infection rate.

The critical nature of these problems creates other problems and turns what should be a joyous occasion for parents into a fearful one. For example, parents often cannot identify with their baby; they feel guilty and frightened that they have not produced a bouncing, healthy child.

Some neonates are so small they could fit into their parent's hand—so small a gauze pad dou-

ble as a diaper. What parents often see is a tiny infant, minuscule on a radiant heat bed, intubated, on a respirator, connected to electronic cardiac- and lung-monitoring equipment. The fragility of the infant, overpowered in size by equipment, only increases the parents' fear that the condition of their child will suddenly worsen. The risk of death is constant.



Photo: Dave Esposito

An extensive nurse education program is offered by the neonatal centers.

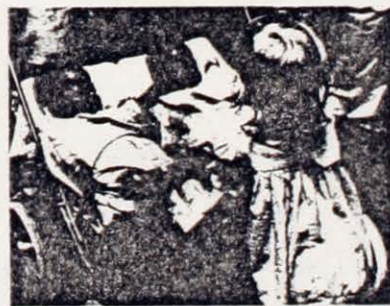
the parents, encouraging them to hold their infants and explaining how to care for them. "Bonding" between parents and child can still occur in a neonatal nursery. Visiting hours are flexible to encourage parents (including those from distant regions) to visit as frequently as possible.

Follow-up care for physical and emotional problems is also stressed. Problems often persist when the infant is brought home. For example, remembering their three-pound, fragile infant, par-

ents sometimes try to over-protect their child. Or they may treat their baby too casually as if he or she were completely normal even though the infant still needs small feedings, a warm temperature, etc.

Social workers, nurses, and physicians point out that neonates need more than sophisticated technologies and transport systems if they are to survive. They need large doses of love.

—Beverly Sapp



Neonatal centers give sick newborns a good start! (Top left) Neonatal intensive care unit at City Hospitals. (Top right, bottom left) Johns Hopkins neonate "graduates" attend a special party. (Bottom right) Michael Simmons, M.D., talks to a former patient and her mother. ("Graduate" photos courtesy of Johns Hopkins Hospital.)



Alasdair Conn, M.D. (Medical Director, Field Operations Program), Anne Smith, R.N. (Aviation Trauma Technician Coordinator), and Captain Gary Moore (Aviation Division, MSP) display the new MIEMSS-designed ATT patch. Twenty-four Med-Evac observers recently completed the ATT course, an advanced trauma-oriented program. Designed specifically for Med-Evac observers, the course consists of 120 hours of training (including 8 hours of clinical observation in the Shock Trauma Ad-

mitting Area) and increases the medic's ability to recognize and manage acute problems in the trauma patient prior to and during transport.

## Med-Evac Transports Increase

The Maryland State Police (MSP) Med-Evac helicopters that support Maryland's EMS system transported 2,278 patients in 1980. This is the largest number of transports since the program began 11 years ago and represents a 26.5 percent increase compared with last year.

The State Police Aviation Division mans helicopters fulltime at the Martin State Airport, Andrews Air Force Base, Frederick Airport, and Salisbury Airport; the areas covered include the Baltimore, Metropolitan-Washington,

Mid-Maryland, and Eastern Shore regions, respectively.

Each of the Med-Evac sections had an increase in the number of transports last year: Salisbury, 100 percent; Andrews Air Force Base, 31 percent; Martin's, 15 percent; Frederick, 8 percent. A record high of 1,032 patients were transported by Martin's Airport Med-Evac crew.

The MSP Med-Evac crews have transported 12,525 patients with life-threatening injuries since the program began in March 1970. The overall survival rate is 84.5 percent.

## National Symposium Focuses On Psychosocial Problems

The Second National Symposium on Psychosocial Factors in Emergency Medicine will be presented May 14, 15, and 16, 1981, at the Baltimore Hilton Hotel in Baltimore, Maryland.

The conference will focus on psychosocial problems that affect emergency medical patients and their families, from the time of injury through the rehabilitation process and reentry into the community. Current concepts of diagnosis and treatment, research results, and case studies on psychosocial problems of emergency medical patients and their families will be discussed.

Among the speakers at the multi-disciplinary conference will be Gerald Caplan, M.D., professor of psychiatry at the Hadassah Medical Organization in Jerusalem; Nancy Graham, a psycho-traumatologist at St. Francis Hospital in Lynwood, California; the Honorable Arthur Kaplan, a municipal court judge in Atlanta; Henry Krystal, M.D., professor of psychiatry at Michigan State University; and Howard Parad, D.S.W., professor of social work at the University of Southern California, Los Angeles.

Small group seminars will be conducted on such topics as treating the angry family, sudden death, utilizing self-help groups

in the recovery process, the alcohol abuser, intervention at the accident scene, the right to die, forensic aspects of emergency medicine, sexual adjustment after neuro-trauma, children as emergency patients, ministry in emergencies and crisis, stress management for emergency personnel, the psycho-emotional response to assault, and others.

The conference is open to psychiatrists, psychologists, social workers, vocational rehabilitation counselors, pastoral counselors, nurses, physicians, EMTs and other allied health professionals interested in the psychosocial aspects of emergency medicine. Educational credits are offered to physicians, social workers, and nurses.

MIEMSS is sponsoring the conference, in conjunction with the University of Maryland Institute for Psychiatry and Human Behavior; the University of Maryland School of Social Work and Community Planning; the L.D.S. Hospital, Salt Lake City, Utah; the U.S. Department of Health and Human Services, Emergency Medical Services Division; and the American Trauma Society.

For additional information, contact Kathy Huber, Family Services Division, MIEMSS, (301) 528-3100.

—Beverly Sapp

## Two Perinatal Centers Serve High-Risk Expectant Mothers

A woman on Maryland's Eastern Shore is seven months pregnant and diabetic, and her obstetrician strongly suspects that she will go into labor prematurely. Area facilities for premature babies are limited, and the physician must decide whether the woman should be moved immediately to a hospital that can provide appropriate nursery care.

The doctor calls a special telephone number to reach one of the two perinatal centers that are part of Maryland's EMS system—this one at the University of Maryland in Baltimore. (The other Center is also in Baltimore, at the Johns Hopkins University School of Medicine.) There a full-time faculty obstetrician is on 24-hour call for consultation in cases like this one.

The telephone conversation confirms the physician's belief that the baby's chances of survival will be greater if the woman is moved to a perinatal center now, rather than having the woman deliver her baby at her local hospital and then transporting the newborn "preemie" to a neonatal center. The obstetrician decides it is safe to move the patient, if that can be done right away, and advises her to go to the University of Maryland or Johns Hopkins hospital by ambulance that day. She complies, and two days later successfully delivers a daughter. The baby survives the crucial postnatal period, thanks to the battery of services available at this facility. Within two weeks both mother and infant are back home.

Three years ago, the University of Maryland and Johns Hopkins hospitals became Maryland's first Perinatal Centers by jointly launching a special telephone consultation service for obstetricians with high-risk patients. "High risk" means not only expectant mothers with diabetes, high blood pressure, and other diseases, but also pregnancies in which the growth of the fetus is retarded or genetic abnormalities are suspected; cases involving infection, irradiation, or drugs; and other complications of pregnancy.

Obstetricians who phone in for consultation have the option of sending their patients to either hospital, as both offer superior perinatal care. So far, premature labor is the most common problem the Centers have dealt with, although at Hopkins pregnant women with hypertension are also a major share of the caseload.

Along with round-the-clock telephone consultation, provided on a weekly alternating basis by the two hospitals, the Centers also offer seminars and special classes. These are given by teams of obstetricians, neonatologists, and nurses who visit hospitals throughout Maryland upon request.

Four physicians established the Centers in early 1978. They were Juan Granados, former Chief of Obstetrics at the University of Maryland; Ronald L. Gutberlet, Chief of Neonatology at the University of Maryland; and

John W. C. Johnson, Chief of Obstetrics, and Michael Simmons, Chief of Neonatology, both from Johns Hopkins.

Dr. Johnson had been approached earlier by MIEMSS officials, who wanted to see an obstetrical component linked to the neonatal intensive care program already underway at three Baltimore hospitals (Johns Hopkins, University of Maryland, and Baltimore City hospitals). Both Johns Hopkins and University have excellent obstetrical resources, and a telephone consultation service seemed like a good way to extend those resources throughout the State. In February 1978, the four physicians wrote to every obstetrician practicing in Maryland to announce the new service.

Carlyle Crenshaw, M.D., recently joined Drs. Gutberlet, Johnson, and Simmons as a director of the perinatal program. On

*Perinatal consultation for obstetricians is available 24 hours a day, 7 days a week by calling the EMRC telephone number: 578-8400 from Baltimore, and 1-578-8400 outside the Baltimore metropolitan area.*

November 1, 1980, Dr. Crenshaw became Professor and Chairman of Obstetrics and Gynecology at the University of Maryland. Formerly from Duke University Medical Center, Dr. Crenshaw has a special interest in perinatal care.

University of Maryland and Johns Hopkins hospitals report that they are each currently getting about four to six calls a month from obstetricians through the hotline number, and these calls have resulted in two to three women being brought in each month for delivery. Most come by ambulance, though a few are brought by Med-Evac helicopter. In addition, there have been requests from outlying areas (among them Frederick, Westminster, and Salisbury) for Perinatal Center staff to visit and conduct educational programs.

Why the low numbers for the consultation service? Dr. Johnson cites a reluctance by private physicians to give up direct care of their patients as part of the problem. Many physicians prefer to transport a premature baby rather than a mother they suspect will deliver early. Since it is safer for the baby to be moved before birth, the perinatal specialists hope to reverse this pattern.

—Louise Latham

### ACLS Course Equipment Supplied by MIEMSS

MIEMSS no longer coordinates the courses offered by the American Heart Association for certification of Advanced Cardiac Life Support (ACLS) providers.

However, MIEMSS will continue supplying the equipment and forms for the course. The equipment rents for \$250 and must be reserved at least three months prior to the start of the course.

A new ACLS manual, which explains how to set up and conduct the course, is available from the American Heart Association.

# Researching Cellular Response to Shock

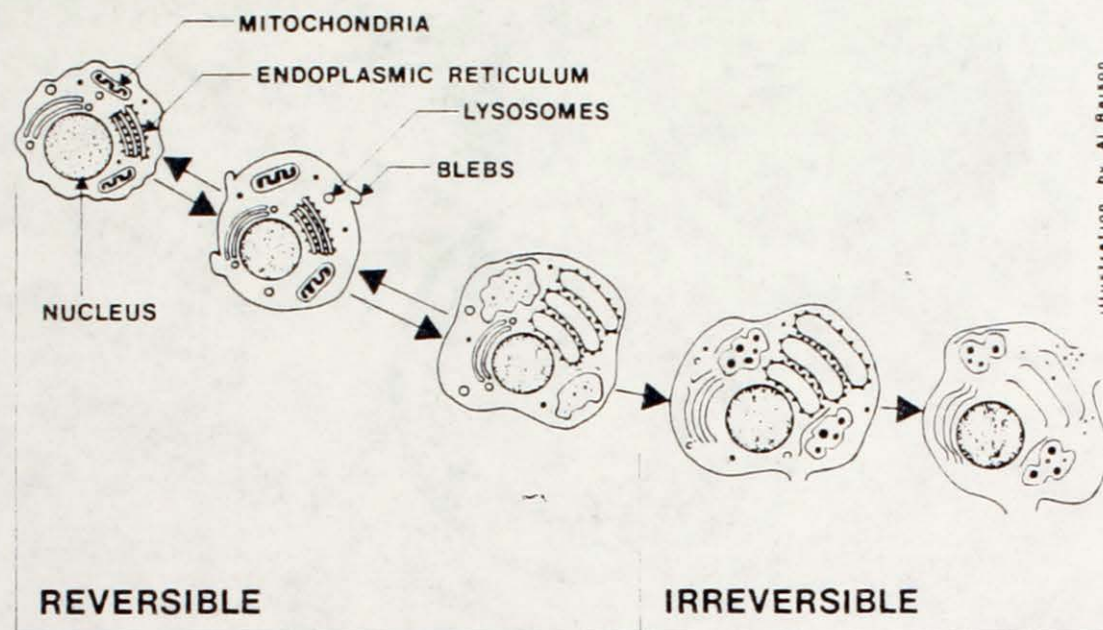


ILLUSTRATION BY AL REASON

A victim from a serious road accident, although he has multiple injuries and has lost a large volume of blood, reaches the hospital alive. Definitive care at the scene of the accident by skilled EMTs and rapid transport to the right hospital are largely responsible for his survival. Surgeons restore the lost blood, mend fractures, and close the wounds. The patient seems to be stabilized and on the way to recovery. Then, for no apparent reason, the patient's condition begins to deteriorate, and transfusion or any other type of therapy becomes incapable of saving the patient's life. The patient is said to be in the irreversible stage of shock.

Shock is a complex clinical syndrome characterized by an inadequate blood flow to critical organs in the body. It can be caused by severe injury, cardiac failure, or infection. Poor blood flow can result in tissue deterioration; this is due to a deficiency of many nutrients, especially oxygen.

## MIEMSS Decentralizes EMT Testing, Certification

All arrangements for testing, certifying, and recertifying students in the EMT Program are now located within the regional offices.

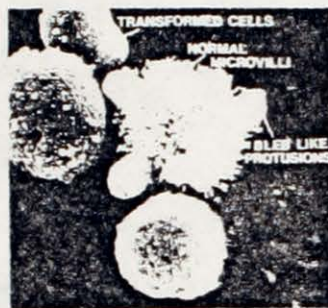
The regional offices: (1) make their own arrangements with EMT instructors in locating test sites and conducting examinations, (2) perform the administrative tasks involved in EMT certification, and (3) maintain status files on all EMTs within their jurisdictions.

In addition, all matters relating to the EMT Program, including requests for extension of EMT certification and reciprocal certification, are now discussed with regional office staff.

These responsibilities have been transferred to the regional offices by MIEMSS to help reduce operating costs and increase participation by the Regional EMS Advisory Councils.

The testing coordinators are making every effort to use EMT instructors within their own regions as evaluators.

—Dick Grauel



Changes that occur in kidney cells as a result of anoxia.

One of the foremost goals of the Research Branch at MIEMSS is to explain the functional changes (at the level of the cell, organ, and entire system) that accompany shock and to develop new therapeutic interventions. Dr. Benjamin F. Trump and his colleagues, over the past decade, have been studying the cell's response to shock. Cells taken from patients in shock (at biopsies, surgical resections, and autopsies) were examined under the electron microscope for structural changes and compared to cells in which anoxia (absence of oxygen) had been produced experimentally.

In order to study in detail the cellular response to anoxia, Dr. Trump has used an experimental cell model. Anoxia was produced by bubbling purified nitrogen through cells suspended in a liquid medium and their response was monitored under the electron microscope. Dr. Trump describes the process of cellular decay following injury in a series of seven stages. Structural changes in the cell's membrane-bound "organs" occur after injury. In the first four stages, changes are reversible; the cell can recover if the noxious agent is removed or supportive measures are taken. If anoxia continues, the cell reaches a "point of no return" and the decaying process becomes irreversible. Finally the cell is converted into a mass of debris and becomes necrotic. (See diagram for progression of cellular changes.) Data obtained from the experimental cell model correlates closely with clinical data obtained from shock patients and involves several organ

systems including the liver, kidney, pancreas, heart, and skeletal muscles.

A scanning electron microscope reveals changes that occur at the cell surface as a result of anoxia. As indicated in the photo below, the normal microvilli (finger-like projections) are replaced by large "bleb"-like protrusions until the entire surface is smooth. Several groups of investigators are studying the pathological significance of "bleb" formation. Following temporary anoxia or ischemia in the kidney, the normal, brush-like border of cells in the kidney tubule is eliminated. Large "blebs" detach, flow through the tubules, and may cause an obstruction in more distal regions. This may be one of the factors contributing to kidney failure frequently seen during shock. Similar events occur in the capillaries during anoxia. The swelling and detachment of these "blebs" from the capillary lining into the microcirculation could be severe enough that, even if the ischemia were relieved and blood flow restored, certain areas in the microcirculation might remain blocked. The so-called "no reflow" effect would be lethal in obstructed areas.

Although studies are far from complete, Dr. Trump feels confident in making the following generalizations: Stages of cellular alterations described in experimental cell models can be observed in humans. Virtually all acute injuries to the cell whether from toxic chemicals, mechanical damage, infection, or anoxia produce the same sequence of changes in the cell. In a patient with isolated head injury or relatively mild shock, changes associated with the reversible phase are seen. With severe shock, especially involving sepsis, the irreversible changes are seen. These studies also seem to suggest that anoxia and or ischemia is the key mechanism of cellular damage in human shock. It also seems clear that most patients in shock would benefit from breathing oxygen. Further studies promise to yield much more information on the cellular basis of human shock.

—Lynn Rutkowski

## MIEMSS Announces 'Update' Publication

MIEMSS announces a new format for quickly distributing medical management decisions to the field personnel in Maryland.

The "Pre-hospital Medical Management Update," printed on yellow paper for easy recognition, will be distributed to all EMTs. Others may obtain copies from the MIEMSS Regional Coordinators.

Questions regarding medical decisions will be presented to the recognized medical authority in the particular field of medicine concerned. Both the question and the answer will be printed to provide clarification.

Answers in the "Update" should not be construed as immediate changes in policy protocol; the "Update" should provide fresh insights on procedures in Maryland's emergency care program. Any changed policies and or protocols will be duly noted.

While all questions submitted may not result in an "Update," those having a direct bearing on emergency care throughout the state will be answered in Update form.

Refer your questions to Lou Jordan, P.A., or Ron Schaefer, paramedical training officers, MIEMSS, 22 S. Greene St., Baltimore, MD 21201, (301) 528-7800.

## MIEMSS Begins Psych Bed Registry

In an effort to expedite the proper placement of patients with psychiatric emergencies, MIEMSS has recently undertaken a program of maintaining a psychiatric bed registry.

The registry is maintained by SYSCOM personnel from data received from medical facilities with psychiatric beds. Physicians and hospital personnel needing to place a patient, can call SYSCOM (1-800-492-0610) to locate the nearest available bed.

The program is entirely voluntary, but the response to the service has been good. Paul McClelland, M.D., head of psychiatry at MIEMSS, hopes to expand the referral system in the future.

Acute psychiatric emergencies continue to pose problems for emergency care providers at all levels. MIEMSS, through the registry and special training programs for police and health personnel, is attempting to reduce the problems.

## Maryland EMS News

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## MIEMSS, UMBC Offer EHS Degree Program

Sixty-eight students at the University of Maryland Baltimore County (UMBC) who recently completed the course "Introduction to Emergency Health Services" have a distinction among college students—they were the first class in the first B.S. program in emergency health services (EHS) in the United States.

The EHS program was developed by MIEMSS in collaboration with UMBC to meet the growing need for professionals in emergency medical services systems. Although more than 100 EMS systems have spread across the nation, Maryland—with its state-wide, voluntary system that is

sisting of field work and an integrating seminar). These courses are incorporated in a curriculum stressing science and social science political science.

This semester "Introduction to Emergency Health Services" is being offered to 76 students. Twenty-eight students will be eligible for certification as Maryland emergency medical technicians after completing "Clinical Concepts Practice." Ron White, a paramedic from Anne Arundel County, and instructors from the Maryland Fire and Rescue Institute are assisting Jeff Mitchell in teaching several classes of the EMT course.



A Med-Evac pilot answers the questions of UMBC students enrolled in "Introduction to Emergency Health Services."

coordinated by MIEMSS—remains a role model and innovative leader in the field.

Dorothy Gordon, R.N., D.N.Sc., is the director of the EHS program. Dr. Gordon, who is Director of Education at MIEMSS, is also on the graduate faculty of the University of Maryland at Baltimore, School of Nursing, where she teaches a course in rehabilitation.

Instructor Jeff Mitchell, who holds an M.S. in counseling and clinical psychology and is a doctoral candidate, is the author of the recently published *Emergency Response to Crisis: A Crisis Intervention Guidebook for Emergency Service Personnel*. A former paramedic, he served as a regional coordinator for MIEMSS and has instructed crisis intervention workshops for EMTs.

Dr. Gordon hopes to add two fulltime positions to the EHS program next year. In the future, MIEMSS and UMBC would like to include master's and doctoral programs.

As currently mapped out, the program includes six EHS courses: Introduction to Emergency Health Services, Clinical Concepts Practice, Emergency Health Services Theory and Practice I and II, Planning Emergency Health Systems, and Emergency Health Services Practicum (con-

Although the courses offered this year have been electives open to all students, 25 EHS majors will be selected by May for the fall 1981 semester, to be part of the class of '83, the first class to receive B.S. degrees in emergency health services.

Since the EHS program was first announced last spring, there have been over 700 inquiries, with calls from every state and Canada, Puerto Rico, Virgin Islands, and Ireland. All of the courses offered this year were oversubscribed before the end of pre-registration. Approximately 20 percent of the students are directly involved in EMS; slightly more than 50 percent are in EMS-related fields, including hospitals and communications.

Although the EHS program is currently limited to 25 majors, Dr. Gordon anticipates 120 majors within five years. The curriculum would then include three tracks: management of an EMS system (the track currently offered); a technical track for the paramedic or EMT; and the education track on how to develop and teach an EMS-related curriculum and course content.

For information on EHS admission criteria, contact Dr. Dorothy Gordon at the UMBC office, (301) 455-3223.

—Beverly Sapp

## Medical Examiners Board Adopts Revised CRT Program Standards

New standards for the Cardiac Rescue Technician (CRT) Program have been adopted by the State Board of Medical Examiners after consultation with CRT instructors and the regional medical directors.

The revised standards for admission to the CRT Program state that applicants must have at least one year of continuous prehospital emergency care as a Maryland-certified EMT immediately prior to enrollment. Previously, field experience was not specified clearly.

The number of ambulance runs that an EMT must have

made during the year preceding admission to the CRT Program has been changed from 300 to 150. This requirement must be verified in a letter from the department chief.

Several of the skills requirements for CRT recertification have been changed.

In addition to having their proficiency in administering IV solutions evaluated by a CRT instructor, CRTs must have administered at least five IV solutions at the scene of an emergency or in a hospital during the previous year.

However, the demonstration of IV skills to a CRT instructor is still unnecessary if a CRT has administered 20 or more IV solutions at the scene of an accident in the last year.

CRTs are now required to have monitored at least five suspected cardiac patients with associated telemeterization in the previous year. The former requirement was to monitor 10 patients with cardiac arrhythmias.

The new standards reduce from six to five the number of patients to whom a CRT must have administered parenteral drugs in a year's time. Alternatively, CRTs may have their proficiency in administering parenteral drugs evaluated by a CRT instructor.

Incidentally, CRTs will be trained to administer a wider range of drugs than they were allowed to give in the past. The approved list of medications now includes Narcan, morphine, calcium chloride, calcium gluconate, and nitroglycerine.

The new requirements increase from three to five the number of times that CRTs must have inserted esophageal obturator airways in patients during the preceding year. Demonstration of this skill to a CRT instructor may or may not be required in addition to the field experience.

Finally, CRTs must have used medical antishock trousers on at least five patients in the previous year, four more than the number formerly required.

The new continuing education requirements for CRT recertification specify for the first time the number of hours that CRTs must spend learning about new developments in their field.

Case reviews and continuing education were required previously, but now CRTs must complete four hours of local case reviews and 12 hours of continuing education classes each year.

In addition, CRTs must successfully complete at least four hours of CRT skills workshops every year. This requirement can no longer be used to satisfy the continuing education requirement.

Copies of the curricula for the continuing education programs and skills workshops must be submitted to MIEMSS two weeks in advance for review and approval.

A copy of the standards of the CRT Program may be obtained from the regional coordinators.

—Dick Granel

## Conference Scheduled On Disaster Planning

It is estimated that over 250,000 shipments classified as hazardous materials move through the transportation networks of the United States each day, and according to predictions such shipments are expected to double by the end of this decade. It is recognized that a single accident could result in community catastrophe with extraordinary injuries and fatalities.

To assist hospitals in the management of all types of disasters but especially those involving hazardous materials, the American Hospital Association (AHA) and MIEMSS are cosponsoring a conference on Disaster Planning and Emergency Preparedness for Hospitals. The conference will be held at the Baltimore Hilton Hotel, May 26-28.

Program topics are designed for hospital administrators, disaster planning coordinators, emergency department nurses and physicians, safety officers and engineers, and other personnel who are responsible for emergency preparedness.

The major topics include: strategic planning for all types of disasters; management of the disaster site; external coordination with public and private community agencies; hospital response to internal and external disasters; identification and roles of local, state, and federal resources; and compliance with Joint Commission on Accreditation of Hospitals standards.

For more information, contact Mindy Ferber, AHA Division of Ambulatory Care, (312) 280-6191 or Bennett McNeal, AHA Division of Health Facilities and Standards, (312) 280-6145.

To register, contact the Division of Education, American Hospital Association, (312) 280-6083.



A MSP Med-Evac helicopter lands on the campus of the University of Md. Baltimore County as a demonstration of Maryland's EMS transportation system.



Photos: Dick Granel

# Councils, Citizens Honored during EMS Week

Four outstanding Maryland citizens and the five regional EMS councils in Maryland were honored at the statewide awards banquet, which was the highlight of the Maryland "Emergency Medical Services Week," celebrated last November 16-22.

This special week was proclaimed by Governor Harry Hughes to recognize the state's EMS system, which has set worldwide precedents in emergency care standards.

Donald Holmes, an ambulance attendant for the Bel Air



R. Adams Covelev, M.D., and Governor Harry Hughes with the Governor's Proclamation on EMS Week.

Captain Michos, a registered nurse, worked closely with the Montgomery County Heart Association in procuring Maryland's first mobile coronary care unit, the "Heart Mobile."

Presently, Captain Michos monitors the Montgomery County CRT program, while she continues to train students who want to become CRTs. As a member of the Region V EMS Advisory Council, she has worked to establish similar training programs in other areas.

Helen Stemler, supervisor of health and physical education for the Hartford County school system, was saluted for the CPR classes she conducts for young people and the disabled.

Ms. Stemler helped start CPR instruction in the Hartford County schools in 1975. Since then, she has trained more than 15,000 students in CPR. As a result of her influence, certification in CPR has been made a requirement for graduation in Hartford County, and other school systems have implemented similar programs.

Although the primary objec-

With over half of Maryland's population and hospitals in Region III, the Council has dealt with many complex issues. To the Council's credit, Region III has become a national model for emergency care.



R. Adams Covelev, M.D., Director of MIEMSS, and Arthur Kotte, M.D., Secretary of the Board of Medical Examiners.

The Region IV Council has significantly improved emergency medical care by upgrading ambulance services to the advanced-life-support level. The Council assisted the Peninsula General Hospital Medical Center in meeting the requirements of an

areawide trauma center, and in establishing Med-Evac helicopter service.

It has also helped the hospital start training programs for EMTs and CRTs. In addition, the Council has strengthened CPR training programs, and has sponsored numerous continuing education programs for nurses and physicians.

The Region V Council established Maryland's first 9-1-1 emergency telephone service, and helped Suburban Hospital and Prince George's General Hospital and Medical Center become designated as the state's first areawide trauma centers.

In addition, Montgomery County was the first county in Maryland to train both volunteer and career ambulance attendants as cardiac rescue technicians. Charles County, with its all volunteer ambulance service, has implemented a two-tiered system for responding to medical emergencies, which has become a national model for advanced-life-support service in a rural area.

EMS Week 1981 is scheduled for October 11-17.

—Dick Grauel



Statewide EMS Week Banquet

Volunteer Fire Company was lauded for his efforts as an EMS provider and instructor.

He has served as lieutenant and captain of the Bel Air company, of which he has been a member for 28 years. During that time, he has participated in all levels of training for ambulance attendants. He became a CRT instructor in 1977. In accepting his award, Mr. Holmes said:

"Twenty-eight years ago, when we picked up a heart attack patient, all we could do was pray. Now we can monitor them, treat them with sophisticated drugs, and defibrillate them if necessary... and then we pray."

Mark A. Krieger, Jr., president and chairman of the Board of Directors of the John D. Lucas Printing Company, was cited for his outstanding services over the past three years in helping to educate Marylanders about the care rendered to critically ill and injured patients in this state.

He has donated his time, as well as the resources of the company he heads, for the betterment of the Maryland EMS system.

Mary Beth Michos, captain of the Montgomery County Fire and Rescue Service, was also singled out for her exemplary work as an EMS provider and instructor.

tive of Ms. Stemler's CPR instruction is to teach a skill, Ms. Stemler also helps her students understand the EMS system as citizens, consumers and participants.

Maryland's regional EMS councils were also lauded for their past accomplishments.

The Region I Council has helped establish a 9-1-1 emergency telephone service and four new ambulance stations. Under the Council's guidance, all ambulances have been brought up to basic-life-support standards of equipment and personnel, and 66 percent of those ambulances meet advanced-life-support requirements.

The Region II Council has improved emergency medical care by working to upgrade training and equipment, and developing CPR programs for school children and the general public.

With the help of the Council, the Washington County Hospital was able to meet the requirements for designation as an areawide trauma center.

The Region III Council pioneered in the establishment of a cohesive EMS system. It was the first to complete a medical communications network, and to provide advanced-life-support capability.

## Neuro-Trauma Center Treats Severe Head, Spinal Injuries

The Neuro-Trauma Center is the newest specialty referral center of Maryland's Emergency Medical Services System.

When fully operational, the Center, located at MIEMSS, will house 19 beds—14 ICU and critical care beds and 5 intermediate care beds. Patients with neurosurgical injuries are transported to the Neuro-Trauma Center directly from the accident scene or transferred from a hospital that does not have the sophisticated equipment or staff support to handle severe head and spinal injuries. Multiple trauma patients continue to be transported to the trauma center best qualified to care for the patient's primary injuries.

Thomas B. Ducker, M.D., FACS, is chief of neurosurgery and the medical director of the Center. The clinical director is Thomas G. Saul, M.D. Dr. Ducker is a staff neurosurgeon at MIEMSS and professor and head of neurosurgery at the University of Maryland Hospital. Dr. Saul is also a staff neurosurgeon at MIEMSS and instructor in neurosurgery at the University of Mary-

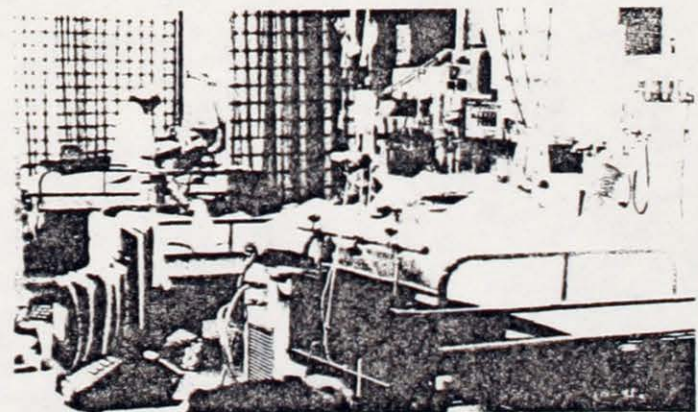
land Hospital. Roberto Bellegarri-gue, M.D., is the neurotrauma fellow at the Center.

Nursing care is supervised by Debbie Dang, R.N., clinical specialist, who has worked in the MIEMSS Shock Trauma Center for six years and also has experience as a psychiatric liaison nurse, community health nurse, discharge planner, and primary nurse. Sandy Johnson, R.N., is associate nursing supervisor.

In the Neuro-Trauma Center, the complicated and intricate management of head and spinal injuries is conducted by physicians and nurses who specialize in the care of these injuries. This specialization and the experience gained in treating only neuro-trauma patients fosters the highest quality of care for neuro-trauma patients.

Most patients are admitted to the Neuro-Trauma Center as the result of diving, traffic, gunshot, and industrial accidents. Approximately 60 percent of all Shock Trauma admissions have some type of neuro-trauma involvement.

—Beverly Sopp



Severe head and spinal cord injuries are treated at the Neuro-Trauma Center at MIEMSS.



Address Correction Requested

7215 Rolling Mill Rd./Baltimore, Md. 21224

## MIEMSS around the State

### ALS in Region V

Calvert and St. Mary's counties are developing advanced life support (ALS) programs. Both counties are modeling their ALS programs on Charles County's, which services a predominately rural community. Charles County's ALS program utilizes medic units (station wagons) that do not transport patients (a basic life support unit transports the patient, thereby freeing the paramedic to respond to other calls). Unlike Charles County, however, Calvert and St. Mary's will have career paramedic programs based at Calvert Memorial Hospital.

### Region IV New Address

The new address for the Region IV (Eastern Shore) Office is:  
331 Aurora Street  
P.O. Box 536  
Easton, MD 21601

Their office phone number remains the same at (301) 822-1799.

### National Registry for EMTs

A Maryland-certified EMT is eligible for reciprocity certification with the National Registry for EMTs for one year extending from the date of his/her successful completion of the Maryland written and practical exam. Candidates will be required to take only the written exam of the Registry.

### Region I Funding

Region I is applying for 1204-2 funding—the second year of advanced life support funding—from the Department of Health and Human Services.

### Region I Trauma Center

Memorial Hospital in Cumberland has been designated as the areawide trauma center for Region I, comprising Allegany and Garrett counties. George Simons, M.D., is medical director. Training sessions for ambulance personnel on revised triage procedures are currently underway, and Memorial Hospital is addressing protocols and staffing needs to prepare for the start-up date, scheduled for July.

### PGGH Trauma Center

Plans for Prince George's General Hospital include relocation of its helipad adjacent to the emergency department and a relocation and renovation of its trauma admitting area.

### Best Wishes

MIEMSS extends wishes for a speedy recovery to Wayne Parks, an EMT instructor from Delmar, MD, who is recuperating at Peninsula General Hospital.

### Lost Ambulance Equipment

MIEMSS would like to remind all Maryland fire and rescue or ambulance companies to clearly mark any equipment that accompanies patients brought to areawide trauma centers or specialty referral centers so it can be returned.

The Shock Trauma Center at the University of Maryland alone has accumulated over 30 pieces of equipment including pillows, blankets, backboards, cervical collars, and esophageal obturator airways with no identification. This equipment can be claimed by calling your regional coordinator.

### MIEMSS 'Smoke Team' Response

ATTENTION: Baltimore City and Baltimore, Anne Arundel, and Howard counties. The MIEMSS "Smoke Team" has temporarily discontinued responding to fires in your areas, due to modifications that are required for the carbon monoxide analyzer that is being tested. Completion of the modifications is scheduled tentatively for October. At that time the MIEMSS "Smoke Team" will resume responding to fires for the carbon monoxide analyzer study. The "Smoke Team" thanks you for your cooperation.