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## Caring for Spinal Cord Injury

Although rare, spinal injuries can be among the most devastating of human injuries. In this edition of the *Maryland EMS News*, we have focused on the entire range of the trauma/EMS system which impacts on the care of spinal injured patients. These aspects include prehospital care of patients with suspected spinal injury, acute in-hospital care, rehabilitation of patients with these injuries, prevention programs, and the range of support services and research that is being done in these areas.

For many years, the Shock Trauma Center has been available to any person injured in Maryland and especially to those with spinal and severe head injuries. Since the inception of the Neurotrauma Center within the Shock Trauma Center in 1981, the acute services for such patients have been even more intensively concentrated. This concentration of services for a statewide pro-

gram allows not only a greater focus on patients with such severe injuries, but has allowed for trend analysis as reported in this issue. It is encouraging to note that Dr. Aizik Wolf, a Shock Trauma neurosurgeon, stated that the proportion of patients with partial spinal cord injuries, as opposed to complete spinal cord injuries, has increased. He attributes this improvement to the prehospital care provided in Maryland.

In this issue of the *Maryland EMS News*, we want to thank the prehospital care providers who have painstakingly taken the time and paid attention to detail which has led to these improved outcomes. We also report to the entire Maryland EMS community as to the range of services that are available for spinal injured patients.

—Ameen I. Ramzy, MD  
State Medical Director and  
State EMS Director



(Top, left) Suspecting spinal cord injury, prehospital care providers immobilize a patient before transport. (Top, right) In the admitting area of the Shock Trauma Center, a patient will be assessed by both the trauma and neurosurgery teams. (Bottom) A patient does arm-strengthening exercises at the Montebello Rehabilitation Hospital.

# Spinal Injuries Stabilized in the NTC

Neurosurgeons at the MIEMSS Shock Trauma Center are involved very early in the assessment and treatment of a patient with a spinal injury. As the patient's injuries are evaluated by a trauma surgeon in the admitting area, the patient is also examined by the neurosurgery team, who review X-ray films of the spinal column and conduct a neurologic exam.

The following information concerning neurosurgical treatment provided in MIEMSS' Neurotrauma Center (NTC) was described by Edwin Bellis, MD, and Aizik Wolf, MD, who are attending neurosurgeons in the NTC and assistant pro-

fessors of neurosurgery in the University of Maryland Medical School. Additional information was provided by Howard Bathon, MD, an orthopedic surgeon at the Shock Trauma Center.

"We are very aggressive about surgical stabilization," stated Aizik Wolf, MD. "This immediate intervention provides the necessary stabilization that allows the patient to be mobile enough for rehabilitation early in the hospital course."

The NTC, devoted to the care of brain- and spinal-cord-injured patients, has 16 acute care beds and 25 subacute care beds. The center is one of the first facilities of its kind in the country; it is

also the designated specialty referral center for head and spinal injury within Maryland's statewide EMS system. A team approach is used in the NTC: professionals from various disciplines coordinate their work to provide total patient care.

A summary of the kinds of spinal injuries that were treated during a 3-year period is presented in the accompanying table. The clinical staff members of the NTC provided consultation or direct care for 62 percent of the more than 2500 patients admitted to the Shock Trauma Center in fiscal year 1987 (July 1986—June 1987). (Continued on page 2)

# Hospital Treatment of Spinal Injuries



A physical therapist palpates a patient on a Stryker frame to prevent pneumonia.

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The number of patients on the unit reflects the general trends in occurrence of traumatic injury. "Our busiest times are the spring, summer, and fall, with weekend peaks," explained Dr. Wolf. "Most of the people we see have been injured in vehicular crashes, falls, assaults, or recreational sports such as diving."

The causes of spinal injury vary among age groups. The major cause in people younger than 45 is motor vehicular incidents. Sports are the second leading cause among people between 1 and 30 years of age. In the mid-40s, falls begin to increase as an etiologic factor. With increasing age, falls become the primary reason for spinal injury, climbing to a 30-percent increase over vehicular crashes in the elderly (older than 75). Dr. Wolf noted that one of the reasons that falls are so often devastating to the spine of an elderly person is related to the numerous arthritic changes of the aging process: these changes narrow the spinal canal and leave less room for the cord to move without being injured.

Dr. Bathon described the orthopedic stabilization of bony injuries of the spine. Nonsurgical treatment consists of bed rest and traction, bracing, and casting or use of a stabilizing jacket. Stryker frames or Roto-beds provide stabilization and move a patient through degrees of positions to enhance cardiopulmonary function. The Stryker frame is most commonly used at the MIEMSS Shock Trauma Center, because it gives health care

providers better access to the patient. Chairback, Jewett, and Knight-Taylor braces are used in the center to ensure proper alignment of injured bones. Through casting and use of jackets (total contact orthosis), a patient's mobility is increased and stability is provided.

Surgical approaches involve decompression and internal stabilization, which alleviate pressure on the spinal cord, improve cord perfusion, protect the cord from further injury, and allow early patient mobilization. Various "tools" are used for internal stabilization of the spine. Rod/sleeve devices are attached to the vertebrae above and below the injured

area with screws; bone grafts are sometimes used to provide rigidity. The integrity of any internal metal device must be monitored carefully, because these materials can fail and may cause damage to nearby structures such as the aorta and esophagus.

A unique treatment technique in the NTC is the placement of a Casper plate, a small metal device placed on the anterior surface of the spine, which provides early and immediate stabilization at a fracture site. With this support, the patient can be mobilized for rehabilitation early—usually in 7 to 10 days. Waiting for natural fusion to occur (without a stabilizing plate) may take months. It is hoped that the early mobilization decreases hospital morbidity and enhances the patient's long-term recovery.

In a presentation entitled "Treatment of Cervical Spinal Cord Injury at the Shock Trauma Center," Dr. Bellis described prehospital care techniques that improve the outcome of spinal-cord-injured patients. Dr. Bellis was a speaker at the conference on Physical Therapy for Trauma/Critically Ill Patients, sponsored by MIEMSS in March. "Attention to the ABCs of initial assessment is essential. Providing oxygenation to the patient increases perfusion of the spinal cord and thus minimizes additional damage. A lack of oxygen can turn an incomplete injury into a complete lesion. For maintaining a neutral spinal position, the most effective method is to use a rigid

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## Prehospital Management: SCI

Moving an injured patient before he/she has been properly assessed and stabilized can result in complicating his/her injuries. According to *The Maryland Way*, rescuers can contribute to new injuries or worsen existing injuries that occur after their arrival on the rescue scene if the patient is not managed properly.

On the other hand, proper assessment, field management, and triage can offer a patient with suspected spinal injury the best start toward definitive care. If a spinal injury is diagnosed and treated correctly, the patient's chance for recovery improves. Even the most sophisticated spine treatment center is dependent on the initial actions of the rescuers in the field.

In assessing the patient, be guided by the nature of the accident. If there is any possibility of spinal injury, assume that it did occur.

Cervical spine injury should be assumed if:

- There is head or face trauma
- The patient is unconscious
- The patient complains of pain before or after careful palpation of the cervical spine
- The mechanics of the accident suggest a spinal injury, such as a diving accident.

Complete instructions for spinal immobilization can be found in Chapter 5 of *The Maryland Way* skills manual, 1986 edition, published by MIEMSS.

# Patients Progress to Rehab Therapy

The goals of rehabilitation after spinal cord injury are to preserve the patient's remaining abilities and to compensate for lost functions. Achievement of these goals enables the patient to participate in his/her preinjury activities to the fullest extent possible. Rehabilitative therapists within MIEMSS become involved with patients very early in the hospital course. Their intensive interaction spans the critical care and rehabilitative phases, preparation for discharge, and follow-up care.

As in the medical and surgical management of spinal cord injury, rehabilitative therapists are very aggressive in their approach to the patient. Early involvement and intense activities strengthen the patient physically, emotionally, and psychologically by increasing independence and control through communication and participation.

A physical therapist evaluates a patient's strengths and functions within 24 to 48 hours of admission. Nancy Ciesla, director of physical therapy (PT) at the MIEMSS Shock Trauma Center and at the Montebello Rehabilitation Hospital, explained that PT exercises begin as soon as the patient is stabilized medically, surgically, or with external fixation devices for spinal alignment. Chest PT and early mobilization improve physiological function of nearly every body system and minimize functional disability.

In the intensive care unit, spinal-

cord injured patients are brought, by gradations, to a sitting position as soon as possible under careful monitoring by a physical therapist or nurse. The therapist begins by elevating the head of the bed in increments and assessing the patient for dizziness. When the patient achieves a sitting posture, training begins for transfer to a chair. As recovery progresses, training extends to propelling a wheelchair and, as appropriate, to ambulation.

Beginning in the first days of hospitalization, the physical therapist works with the patient on muscle stretching and strengthening exercises. These can be performed while the patient is in a hospital bed, in the PT gym, or in a wheelchair. Therapeutic exercises may require the patient's active participation in extremity movement and bed exercises. Passive

movement of the patient's legs and arms is also used to maximize range of motion and prevent joint contractures.

Like the PT program, the speech-communication disorders program at MIEMSS has two components. Speech-language pathologists are part of the interdisciplinary treatment team at both the Shock Trauma Center and Montebello Rehabilitation Hospital. The director of this program is Roberta Schwartz.

Within 48 hours after admission, a patient is assessed by a speech-language pathologist. Special protocol evaluations are utilized to determine functional abilities in thinking, reasoning, judgment, problem solving, abstraction, communications, memory, and insight.

To assist patients in communicating

*(Continued on page 4)*

## Early Intervention Improves Outcome For Patients with Spinal Cord Injuries

*(Continued from page 2)*

spine board, with the patient's head immobilized.

"Spinal cord injury should be suspected in an alert patient who cannot move, an unconscious patient who fails to move in response to a painful stimulus, an unconscious patient with blunt trauma, someone with penetrating neck trauma, a patient with neck pain, and a person with head or facial injuries."

Dr. Wolf commended prehospital care providers for their role in effectively stabilizing spinal-cord-patients at the scene of injury and during transport to a medical facility. The proportion of patients with neurologically incomplete spinal cord injuries has increased significantly from 38 percent to 54 percent. "This indicates that the spinal stabilization techniques being used in the field are preventing a partial injury from becoming a complete severation. Prehospital care providers are doing a very good job of stabilizing these injuries during transport."

Several research projects are being conducted by clinicians in the NTC. Fred Geisler, MD, PhD, is finishing an evaluation of the effects of the drug TRH, an opiate antagonist and antagonist of leukotrienes. Dr. Wolf's research focuses on transplantation and regeneration studies in neuroregulation. In conjunction with the department of neurosurgery, Richard Broadwell, PhD, is assessing the

blood-brain barrier, which may be of future significance in the treatment of spinal cord injury. An increase in the number of studies undertaken in the NTC, particularly in the use of therapeutic drugs, is anticipated.

—Linda Kesselring

### Spinal Injuries Among Patients Admitted to the MIEMSS Shock Trauma Center (July 1983 — June 1986)

	Number	Percent
Admissions Total	5390	
Major spinal injury	805	15
Fracture and/or dislocation with deficit	308	38.2
Fracture and/or dislocation without deficit	394	48.9
Deficit without fracture and/or dislocation	103	12.8
Fracture and/or dislocation*	702	
Cervical	410	
Thoracic	170	
Lumbar	164	

\*Some patients have multiple spinal injuries.

Note: Data from MIEMSS Shock Trauma Center registry.



Following a spinal cord injury, a patient learns to type.

# Rehab Specialists Aid in Recovery



Speech-language pathologists instruct a spinal-cord-injured patient to puff or blow through the mouthpiece attached to tubing in order to communicate through the "Blink Writer."

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basic needs to the medical and nursing staff and to family members, several types of communication systems, including an innovative computer-assisted communicator, have been developed by speech-language pathologists at the Shock Trauma Center. Patients who are artificially ventilated cannot speak, although their minds are alert. They can use computer-assisted communication tools. Patients who are quadriplegic are also provided with the computer-generated system known as "Blink Writer" to enable them to communicate with people around them. This device consists of a television-like monitor, computer programs, and a sensor attached to the patient's eyebrow or glasses or connected to a tube and mouthpiece. By blinking or puffing, the patient can convert words or phrases shown on the monitor into printed messages or verbal communication created by a synthesized voice. The system is simple to operate and can be used by patients after only minutes of instruction. It allows the patient to ask questions such as "Where am I?" or "What happened to me?" Physicians' and nurses' interactions with patients are enhanced because the injured person can relay information about numbness, pain, or other physical

symptoms. Patients can also communicate with their families much more effectively utilizing the technologies of computers.

Speech-language pathologists are also involved in evaluating and improving spinal-cord-injured patients' swallowing abilities. This process involves careful evaluation through bedside and radiographic studies of swallowing. The Shock Trauma Center's team of experts is one of only a few groups of rehabilitation professionals who formally assist the ventilator-dependent patient in modified feeding and swallowing procedures. This comprehensive program has gained attention from other professionals representing progressive medical systems around the country.

The ability to communicate brings psychological benefits as well. The communication tools provided by speech-language pathologists decrease patients' frustration and depression and thus help to improve their spirit and outcome after traumatic injury.

The role of occupational therapists in the acute rehabilitation of spinal-cord-injured people is to acquire and design assistive devices that will enable the patient to gain independence in movement and activities of daily living. Special equipment is available for personal grooming, bathroom needs, and eating. Occupational therapists also supply splints that provide stability to extremities and prevent contracture of muscle groups.

The rehabilitative portion of MIEMSS' continuum of care extends beyond the hospital phase. Through home and outpatient care programs, physical and occupational therapists continue their involvement with patients after discharge. After medical stability has been achieved, spinal-cord-injured patients return to their homes or enter a rehabilitation facility such as the Montebello Rehabilitation Hospital in northeast Baltimore.

Frank Shea, MD, a physiatrist (a specialist in physical medicine and rehabilitation), is the assistant director of the trauma rehabilitation units at the Montebello Rehabilitation Hospital. The three MIEMSS units at the hospital are devoted to rehabilitation of people with spinal cord injury, ortho/polytrauma, and head injury. These units were established in 1983.

"The people who are admitted to the Montebello program are medically

stable, have identifiable rehabilitation goals, and can actively participate in their rehabilitation," stated Dr. Shea. "More than half of our patients come from the MIEMSS Shock Trauma Center. Others come from University Hospital and community hospitals in various parts of the state. In parallel with the patient population at the Shock Trauma Center, the majority of people in the Montebello program are young men."

A person who is admitted to the spinal cord injury unit at Montebello is given a complete medical exam by the director of the 24-bed unit, Leon Palacpac, MD, also a physiatrist. The patient's medical needs are assessed. If the patient still has a tracheostomy, plans are made for its discontinuation. Some patients have surgical wounds and others have respiratory problems still in the process of healing, which are resolved under the direction of the physiatrist.

The nursing staff is intimately involved with patient care. Nurses monitor patients closely for development of medical problems and complications such as hypertension and fevers and convey the necessary medical information to the physiatrist, who plans intervention. Nurses assist with patient's bathing and feeding and

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## Nat'l SCI Hotline

The National Spinal Cord Injury Hotline, which began in MIEMSS as a special project (see *Maryland EMS News*, December 1984), is now under the auspices of the American Paralysis Association (APA) although still closely allied with MIEMSS and Montebello Rehabilitation Hospital. Karen Colvin, RN, founder and director of the hotline, is on the national board of directors of the APA. Between July 1, 1986 and June 30, 1987 there were 14,000 calls to the hotline.

Originally located at the Shock Trauma Center, the hotline moved to Montebello Rehabilitation Hospital to have a more accessible facility for its volunteers. It offers the same services—referral and peer support—as before its affiliation with APA, but now it can also offer the additional resources of the network of APA chapters throughout the country. The Baltimore chapter of the APA can be accessed through the hotline office by calling Cindy Miller or Karen Colvin, at 301-328-6910.

# ... Help Maximize Patients' Abilities

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work in conjunction with the physical and occupational therapy staffs to enhance the patient's independence in these activities. Bladder and bowel control programs are needed by most patients on the unit and are taught by the nurses. An important preventive measure is monitoring patients for development of pressure ulcers; this complication is avoided by turning patients every 2 hours.

Patients at Montebello are involved in rehabilitative therapies for at least 3 hours each day. Treatments are scheduled by the therapists and posted on an activities board near the nurses' station, which facilitates coordination.

Occupational therapists, speech-language pathologists, and physical therapists at the rehab center continue the interventions that began in the early days of hospitalization at the Shock Trauma Center. The patients' residual abilities are maintained and strengthened; compensations for lost abilities are introduced.

Occupational therapists provide tools for activities of daily living. When the patient is ready for discharge, the occupational therapist determines his/her needs for assistance by family members or friends at home and provides education for those aides as needed. These therapists also assess the patient's postdischarge environment and make recommendations for providing wheelchair accessibility outside and inside the home. The director of occupational therapy at Montebello is Carol Baynor.

Speech-language pathologists continue to work on goals set during the acute phase of recovery. Specialized communication systems, developed by speech-language pathologists, are utilized by patients to communicate basic needs to the medical staff and to converse with family members. Compensation for persistent cognitive, swallowing, and communicative deficits is taught, and pertinent functional goals for discharge are established. Through innovative evaluation and treatment protocols, the speech-communication disorders program staff strives to help the patient maximize communicative proficiency.

One of the unique aspects of the MIEMSS/Montebello PT program is that the same therapist treats a patient as he/she progresses through recovery. At Montebello, physical therapists continue the work begun at the Shock Trauma



*After strengthening shoulder muscles, a quadriplegic can independently roll from side to side in bed.*

Center to maximize patients' mobility and strength. Within 24 hours after admission to Montebello, patients are given a wheelchair. Therapists teach patients and their families about transfers such as from a bed to a chair or commode and from a wheelchair to a car. Patients on the unit exercise in the PT gym and work on sitting and standing activities as abilities allow. State-of-the-art sports and power wheelchairs are specifically prescribed for individual patients, depending on the level of their spinal lesion and their preference.

One of the innovative treatment techniques employed in the spinal cord unit at Montebello is the Regys Functional Nerve Stimulation Program, which was introduced by the PT department; the specialized equipment for this modality was purchased by volunteers at the hospital in 1986. It is the first program of its kind in Maryland. Electrical impulses sent to the paraplegic patient's leg muscles cause the muscles to contract. This movement builds muscle bulk and improves pulmonary function. Dr. Palacpac and Cindy Keith, the PT supervisor of the program, have noted that it also improves patients' psychological well-being.

Dr. Palacpac described the unique studies that are being conducted with the Regys chair and stimulation electrodes. One is examining the machine's potential

to reduce osteoporosis in spinal-cord-injured people.

Some patients at Montebello have other specialized needs. The staff includes professionals in orthopedics, psychiatry, respiratory therapy, recreational therapy, social work, and vocational rehabilitation to provide appropriate treatment and activities.

The average length of stay at Montebello is 45 days. A patient is ready for discharge when his/her rehabilitation potential has reached a plateau. Most patients return to their homes. Some enter group living situations. Dr. Shea stated that only a very small percentage go to long-term care facilities.

"Our aggressive approach to rehabilitation and our early intervention in a person's recovery from spinal cord injury have produced many benefits for this population," stated Roy A.M. Myers, MD. Dr. Myers, a trauma surgeon at the MIEMSS Shock Trauma Center, is the deputy medical director of Montebello Rehabilitation Hospital and the director of hyperbaric medicine at the MIEMSS Shock Trauma Center. "Individualized treatment helps these people adjust to the tremendous changes in their lives. We provide multidisciplinary care to enable them to be as independent and productive as possible when they reenter society."

—Linda Kesseling

# Resources That Help Patients Adjust

"The word 'accept' is bandied about in relation to spinal cord injured (SCI) patients, but being paralyzed is not a situation that patients and families perceive as acceptable," says Bernice Wolfson, MSW, of the family services department of the MIEMSS Shock Trauma Center. "Patients can adjust or adapt to their situations, but acceptance is not necessarily a realistic goal."

Adjustments are as varied as the patients and families involved. The greatest determining factors for adjustment are the psychosocial makeup of the individual and family before injury, their coping strengths, and their internal resources. A history of anger or grief from unresolved losses makes a difference in how one adjusts to this new situation.

"The trickiest part of early treatment is to get the patient and family to talk about the injury. Usually, each one knows how serious it is but they are trying not to say it out loud. They have reached a big turning point when they can talk about it together. Those who can't talk about it have the hardest time adjusting," Ms. Wolfson says.

Often patients and families know of an injured person who was misdiagnosed at some time in the past, and that leads to a power struggle with the medical staff. "It is best if families can strike a balance and participate in therapy, learn, and face their problems a little at a time. They need reality balanced with hope, and they need their defenses respected. Families use a variety of coping mechanisms, and there is a delicate balance needed by MIEMSS personnel to convey the nec-

essary information without leaving the families defenseless and hopeless. We encourage families to take one day at a time and do what needs to be done now."

Physical, speech, and occupational therapy and family counseling begin immediately in the Shock Trauma Center. The level of care is very supportive. But big problems come in the next phase: where does the patient go after discharge from the trauma center? And who will pay for it?

Most people assume that their medical insurance will pay for the cost of their rehabilitation—but it usually does not. Blue Cross/Blue Shield and many other insurance companies exclude rehabilitation services from their policies; some companies cover the costs but specify which hospitals must be used. According to Ms. Wolfson, who has testified before the legislature on this subject, a typical loophole is that a policy states "coverage for physical therapy under the care of a physician in an accredited hospital." However, they define an "accredited" hospital as one that has an operating room, which rehabilitation facilities do not have. Policies also exclude the other therapies needed for successful patient

rehabilitation. Some states have a catastrophic disability fund that pays for the care of SCI patients; other states have no-fault automobile insurance.

If the patient's income is low enough to qualify for medical assistance, inpatient rehabilitation will be paid from that source. Middle-class patients must "spend-down" their income until they are impoverished enough to qualify for medical assistance. Ms. Wolfson speculates that even the least expensive inpatient rehabilitation facility costs approximately \$380 a day and the SCI patient might expect to stay for two months.

Another problem is that the provision of rehabilitation services is fragmented. Rehabilitation is provided in various settings with different rates, and there is no uniformity of licensure or billing. This affects patient care, quality, and access. The facility of choice for SCI patients leaving the Shock Trauma Center is Montebello Rehabilitation Hospital, where the nursing, speech-communication disorders program, physical, occupational, and respiratory therapies, and orthopedic, neurosurgical, and psychology/neuropsychology services are combined

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## How and When SCI Occurs

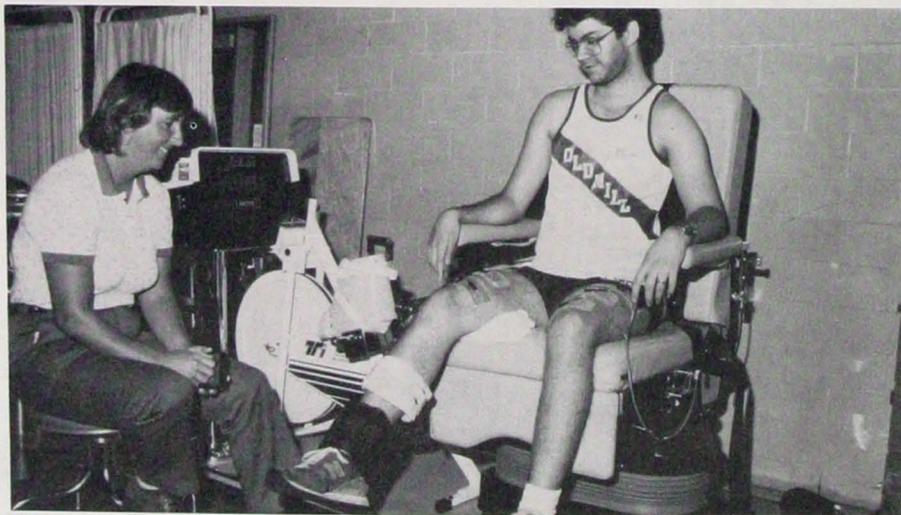
There are 10,000 new (hospitalized) cases of spinal cord injury (SCI) in the United States each year, excluding those who are brought to hospitals dead on arrival, according to the National Head and Spinal Cord Injury Survey conducted for the National Institute of

Neurological and Communicative Disorders and Stroke of the National Institutes of Health. This is a rate of 5 per 100,000 population.

Motor vehicle accidents account for twice as many SCI cases as any other cause. Other frequent causes, in the order of their occurrence, are falls or jumps, gunshot wounds, diving accidents, and motorcycle crashes. "All other causes," a mixed category, amounts to approximately the same number as falls or jumps.

Most accidents involving SCI occur on Friday, Saturday, and Sunday. This should be taken into account when considering staffing requirements for hospital emergency departments and inpatient SCI facilities.

Data show that any program designed to reduce the number of SCI cases must focus on the reduction of motor vehicle accidents and the prevention of severe associated injuries. It is estimated that the cost of medical treatment for SCI (in 1980 dollars) is in excess of \$380 million per year.



While a patient sits in the Regys chair, electrical impulses are sent to his leg muscles causing the muscles to contract. The movement promotes muscle bulk and cardiovascular fitness.

# Possible Gains with SCI Research

A clinical study to test the efficacy of a new agent to improve neurologic outcome in spinal-cord-injured patients is in its third and final year. Although investigators only have access to the raw data without knowing at this time which patients received the placebo or GM-1 Ganglioside, John H. Siegel, MD, clinical director of the MIEMSS Shock Trauma Center says, "It already seems apparent that there are many fortunate individuals in the study who have had a major return

of neurologic function. It is hoped that this study will determine whether favorable results are due to MIEMSS aggressive management of these patients or if the new drug is the cause of these improved outcomes."

The principal investigator of this prospective, randomized, internal placebo control, double-blinded spinal cord injury study is Fred H. Geisler, MD, PhD. Forty-two patients with spinal cord injuries were studied throughout their

hospital course and for a one-year neurologic follow-up, which will end in May 1988. At that time, the code will be broken and the data analyzed. The study was supported by a grant from the Fidia Pharmaceutical Company.

MIEMSS patients were entered into the study if they were 18 years of age or older, had a spinal cord injury with a major neurologic deficit, but had no other significant injuries or illnesses. Women were excluded unless they were either postmenopausal or surgically sterile. Patients with spinal cord injury received the first intravenous dose of the GM-1 study drug or the placebo within 72 hours of their injury and then received a dose daily for 20 to 30 days.

Quantification of the neurologic recovery is based on the American Spinal Injury Association (ASIA) motor score. This is a hundred-point scale that grades the motor strength in all four extremities. Multiple neurologic determinations of motor and sensory function were made throughout the acute hospital course and the one-year follow-up period. The primary variable used to sort the neurologic recovery of motor function was the change in the ASIA score from the admission value to the final outcome at the end of the year.

"Gangliosides comprise the outer covering of nerves," Dr. Geisler explains. "When GM-1 Gangliosides are injected intravenously, it is hoped that with their availability in the bloodstream the neurons will not need to manufacture additional gangliosides, thus allowing them to devote their metabolic machinery to producing other proteins necessary for neurologic recovery."

John Britten, MD, director of critical care for MIEMSS neurotrauma unit, says, "The prospect of being able to improve neurologic recovery from these terrible injuries is very exciting."

According to Daniela Kantor, research coordinator for the study, "In preliminary analysis, our patients have segmented themselves into four groups: those with no, low, medium, and high recovery of motor function. An unexpected finding is that some patients have significant recovery of motor function between 6 and 12 months. We will know whether these patients received the placebo or the GM-1 study drug when the code is broken and the data are

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## Resources Available for SCI Patients

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under the same heads as the Shock Trauma Center.

Several rehabilitation facilities in the country, although none in Maryland, have federal designation as model SCI centers because of their exceptional programs. To be awarded such designation through a highly competitive grant process, there must be an integrated system with acute care, physical and vocational rehabilitation, community outreach, and lifetime follow-up for every SCI patient.

Patients and families are interested in patient care and coping, but others are focused on finding a cure. There are organizations that provide services to the spinal cord injured, including raising money for research to find a cure for SCI: the Veterans Administration, the Spinal Cord Injury Foundation, the Paralyzed Veterans of America, and the American Paralysis Association.

MIEMSS recognized that without an accurate count of those individuals who needed service, support could not be forthcoming. In response to that need, in 1984 the Maryland General Assembly passed into law the bill establishing the Disabled Individual Reporting System and the Rehabilitation Information Service. Under this law, all patients with head injury, spinal cord injury, stroke, or amputation must be reported by their acute care hospitals to the Maryland Department of Health and Mental Hygiene (DHMH), and the DHMH must then notify the reported individuals of availability-of-service information. This registry is based at MIEMSS' department of operations research and systems analysis.

"There is no reason why a respiratory-dependent quadriplegic patient cannot live at home and be gainfully

employed, if given the necessary support services. Obviously, he/she would need skills, motivation, a supportive family, and an accessible home," Ms. Wolfson says. "But the biggest problems—and the most costly—are to find money for attendant care and to find persons willing to work as attendants. Major problems for this patient population include housing, transportation, and employment. Some housing is available for SCI persons in the elderly/disabled high-rise buildings, but since most SCI patients are young, there are difficulties in combining their lifestyles. Some colleges have programs for disabled students and provide accessible living, note-taking services, and attendant care if necessary. If the SCI patient has potential, persistence, and motivation, the resources are available."

The family of each SCI patient at the Shock Trauma Center is given the *Guidebook of the Neurotrauma Center at the Shock Trauma Center*. In addition to describing the roles of the nurses, physicians, social workers, speech-communication disorders specialists, and physical and occupational therapists involved in SCI care, the booklet also gives resources such as national consumer organizations and self-help groups where SCI patients and families can find literature, information, referrals, peer support, resource/benefit direction, and newsletters. They include: American Paralysis Association (APA) Spinal Cord Hotline (1-800-638-1733 in Maryland or 1-800-526-3456 nationally); Maryland chapter of the American Paralysis Association (301-328-6910); Spinal Cord Injury Association (NSCIA) (617-964-0521); and Spinal Cord Injury Network of Metropolitan Washington (301-460-3200).

—Erna Segal

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## SCI Prevention Through 'Feet First' Program



It is certainly not the lack of enthusiasm or commitment that makes it difficult for Margaret (Marty) Stevens, RN, and Nancy German, RN, to carry out their spinal cord injury (SCI) prevention programs. Instead, it is the overwhelming number of high-risk teenagers and the need for more than 24 hours in each day that slows them down. Both women are certified nurse practitioners in MIEMSS Shock Trauma neurosurgery department with expertise in SCI in acute care settings, rehabilitation, and reintegration into the community. Their knowledge of the consequences of SCI led to their involvement in prevention efforts.

With the support of Michael C. Salcman, MD, chief of the MIEMSS/University Neurological Surgery Program, the two nurses organized the Maryland version of "Feet First, First Time," a highly successful SCI prevention program that originated in Pensacola, Florida in 1980. The target audience is young people from 16 to 18 years of

age, generally 10th-grade high-school students.

In Florida the program began with teaching students not to dive headlong into shallow, unknown waters. In Maryland it has been expanded to include SCI from other causes including violence, motor vehicle and all-terrain vehicle accidents, body-surfing, hot-air balloons, gymnastics, wrestling, and skateboards. The basic premise is to teach about the consequences of taking risks.

A group of professionals—nurses, neurosurgeons, and EMTs—accompanied by a person who has experienced SCI, addresses small groups of students, preferably in a science class setting rather than in a large auditorium. This enables the students to ask questions of the professionals and the SCI victim.

"Kids are a tough audience. We have to give them a lively presentation to keep their interest," Ms. Stevens says. "We emphasize that being 16 or 17 years of age is wonderful, with so many full-of-life adventures available. But the important thing for them to remember is that certain risks carry a cost. We show a film with all kinds of wonderful activities — that ends with a look at people who are paying a terrible price for a moment of impulsiveness. It is emotionally charged."

The MIEMSS group brought its program to four high schools in the area last year, reaching approximately 1,000

students. They chose an inner city school, a school in a blue-collar area, a private school for girls, and a suburban school. The logistics of setting up the program and recruiting the personnel, who volunteer during their time off from work, require much time and effort. It is hoped that this year it will be possible to do more. The volunteers find it exhausting but gratifying.

"Young people believe that bad things can't happen to them. We hope to make them aware of the realities of life. We give out attractive T-shirts and buttons and spread the message. If only we had more staff, we could do more."

—Erna Segal

### SCI Research Gains

(Continued from page 7)  
 analyzed." Documenting the patients' recovery required Ms. Kantor to travel to rehabilitation facilities and to patients' homes in Maryland, Delaware, Pennsylvania, New Jersey, Missouri, Colorado, and Florida.

To receive FDA approval, a drug must be proven to be both efficacious and safe. MIEMSS is the only facility in the United States to have permission to test GM-1 Ganglioside in spinal cord injury, and strict guidelines had to be followed for laboratory tests and neurologic exams.

—Erna Segal