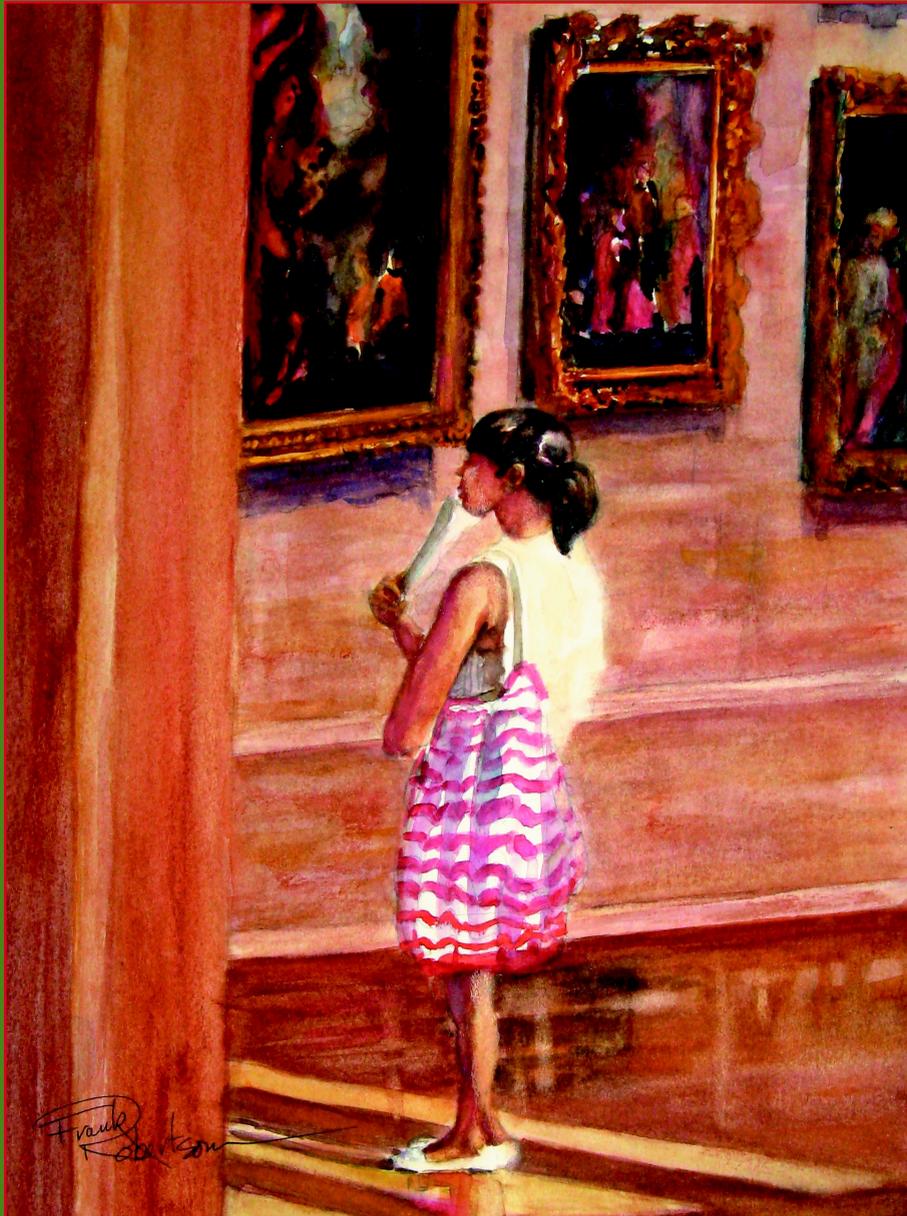


Medicine Health RHODE ISLAND

PUBLICATION OF THE RHODE ISLAND MEDICAL SOCIETY



—◆—◆—◆—

Trauma Surgery

We're not LIKE A Good Neighbor,
WE ARE
The Good Neighbor Alliance



Specializing in Employee Benefits since 1982

Health Dental Life Disability Long Term Care
Pension Plans Workers' Compensation Section 125 Plans



The Good Neighbor Alliance Corporation

The Benefits Specialist

Affiliated with

**RHODE ISLAND
MEDICAL SOCIETY**



**RIMS-INSURANCE
BROKERAGE
CORPORATION**

401-828-7800 or 1-800-462-1910

P.O. Box 1421 Coventry, RI 02816

www.goodneighborall.com

UNDER THE JOINT
EDITORIAL SPONSORSHIP OF:

The Warren Alpert Medical School of
Brown University
Edward J. Wing, MD, Dean of Medicine
& Biological Science

Rhode Island Department of Health
David R. Gifford, MD, MPH, Director

Quality Partners of Rhode Island
Richard W. Besdine, MD, Chief
Medical Officer

Rhode Island Medical Society
Diane R. Siedlecki, MD, President

EDITORIAL STAFF

Joseph H. Friedman, MD
Editor-in-Chief

Joan M. Retsinas, PhD
Managing Editor

Stanley M. Aronson, MD, MPH
Editor Emeritus

EDITORIAL BOARD

Stanley M. Aronson, MD, MPH

John J. Cronan, MD

James P. Crowley, MD

Edward R. Feller, MD

John P. Fulton, PhD

Peter A. Hollmann, MD

Anthony E. Mega, MD

Marguerite A. Neill, MD

Frank J. Schaberg, Jr., MD

Lawrence W. Vernaglia, JD, MPH

Newell E. Warde, PhD

OFFICERS

Diane R. Siedlecki, MD
President

Vera A. DePalo, MD
President-Elect

Gillian Elliot Pearis, MD
Vice President

Margaret A. Sun, MD
Secretary

Jerald C. Fingerhut, MD
Treasurer

Nick Tsiongas, MD, MPH
Immediate Past President

DISTRICT & COUNTY PRESIDENTS

Geoffrey R. Hamilton, MD
Bristol County Medical Society

Herbert J. Brennan, DO
Kent County Medical Society

Rafael E. Padilla, MD
Pawtucket Medical Association

Patrick J. Sweeney, MD, MPH, PhD
Providence Medical Association

Nitin S. Damle, MD
Washington County Medical Society

Jacques L. Bonnet-Eymard, MD
Woonsocket District Medical Society

Cover: "I Wonder," watercolor, by Frank Robertson, a retired engineer who belongs to the Rhode Island Watercolor Society, the Franklin Art Association, the Northeast Watercolor Society, and the Duxbury Art Association and has won awards at juried shows in RI and MA art association shows. E-mail: fandmrobertson@comcast.net

Medicine Health RHODE ISLAND

VOLUME 92 No. 5 May 2009

PUBLICATION OF THE RHODE ISLAND MEDICAL SOCIETY

COMMENTARIES

162 The Way Things Were, or, In the Days of the "Giants"
Joseph H. Friedman, MD

163 A Lexicographer Burdened With Life
Stanley M. Aronson, MD

CONTRIBUTIONS

SPECIAL FOCUS: Trauma Surgery

Guest Editor: Charles A. Adams Jr, MD

164 Care of the Trauma Patient: A Discipline In Flux
Charles A. Adams Jr, MD

166 Advancing Boundaries In the Care of the Trauma Patient
Daitih S. Heffernan, MD, AFRCSI, and Charles A. Adams Jr, MD

170 Pediatric Trauma Surgery: Understanding When NOT To Operate
Jeremy T. Aidlen, MD

172 The Evolution of Rhode Island Trauma System: Where Do We Stand?
Shea C. Gregg, MD, David T. Harrington, MD, FACS, and Charles A. Adams, Jr, MD

179 Burn Injuries and Burn Care
David T. Harrington, MD, FACS

181 Trauma Care of the Elderly Patient
Matthew S. Kozloff, MD, and Charles A. Adams Jr, MD

COLUMNS

182 GERIATRICS FOR THE PRACTICING PHYSICIAN – Steps To Managing Difficult Behavior In People With Dementia
Lisa F. Han, MPH, H. Edward Davidson, PharmD, MPH, Stefan Gravenstein, MD, MPH, FACP

184 PHYSICIAN'S LEXICON – The Fruitful Words of Obstetrics
Stanley M. Aronson, MD

185 HEALTH BY NUMBERS –Motorcycle Injuries In Rhode Island
Edward F. Donnelly, RN, MPH

187 IMAGES IN MEDICINE – An Incidental Finding On Plain Film Prompting the Diagnosis of Castleman's Disease
Jennifer Yates, MD, and Harry Iannotti, MD

188 THE CREATIVE CLINICAN – Acute Herpetic Infections Resulting In Acute Urinary Retention In Young Women
Sammy Elsamra, MD, and Joseph F. Renzulli II, MD

190 POINT OF VIEW – Quality Health Care and the Professional Nurse – A Physician's Perspective
Milton W. Hamolsky, MD

192 May Heritage

Medicine and Health/Rhode Island (USPS 464-820), a monthly publication, is owned and published by the Rhode Island Medical Society, 235 Promenade St., Suite 500, Providence, RI 02908, Phone: (401) 331-3207. Single copies \$5.00, individual subscriptions \$50.00 per year, and \$100 per year for institutional subscriptions. Published articles represent opinions of the authors and do not necessarily reflect the official policy of the Rhode Island Medical Society, unless clearly specified. Advertisements do not imply sponsorship or endorsement by the Rhode Island Medical Society. Periodicals postage paid at Providence, Rhode Island. ISSN 1086-5462. POSTMASTER: Send address changes to *Medicine and Health/Rhode Island*, 235 Promenade St., Suite 500, Providence, RI 02908. Classified Information: RI Medical Journal Marketing Department, P.O. Box 91055, Johnston, RI 02919, phone: (401) 383-4711, fax: (401) 383-4477, e-mail: rimj@cox.net. Production/Layout Design: John Teehan, e-mail: jateehan@eff.net.



Commentaries

The Way Things Were, or, In the Days of the “Giants”

A recent issue of *JAMA* discussed the impact of restricting resident hours per week. I suspect that the restriction is probably good for patient care, keeping sleep-deprived, stressed-out housestaff away from patients, but maybe not so good, unfortunately, for medical education. I have been struck by the requirement that restricts house-officers from spending more than 24 hours in the hospital so that they are forbidden from attending conferences after their tour of duty. Of course, if they weren't forbidden, many residency directors would simply shift work schedules to put the conferences at the end of a shift to get more work out of the resident. But, regardless of these limitations, it reminded me of my own training.

When I was in medical school, the older attendings would occasionally comment on their training. In their days the interns lived in the hospital, got free food, free laundry service, and paid no rent. They did not get paid, or if they did it was a token, not a living wage. It sounded fairly brutal, although I could certainly see a benefit to sleeping in the hospital and saving the 30-45 minute commute I had every morning and evening (when I was able to go home at night).

When I was an intern I was on call every third day, which meant working through the night and next day until the work was done, usually a bit under 36 hours straight, with a couple of hours to sleep on most nights. In the winter I got in before the sun came up and left after it went down. I do not look back fondly on those days, and aside from the number of hours worked, it appears that the stresses now are pretty much as they had been, except there are lots more things to know about these days, making it less possible than ever to feel comfortable in one's knowledge.

My residency, in neurology, was different, and I do have great feelings of nostalgia for that time, but also look back in amazement at how the educational system worked then, and shudder at how many patients paid

for my and my colleagues' education. A true anecdote I often ponder speaks to the heart of the problem back then of our medical imperiousness, a belief that doctors somehow became special when they received their degree. At our daily intake rounds with the department chair, an avuncular, well-deservingly famous man, we would give the names of each person admitted the day before, with the diagnosis. If the chief was interested in hearing more, he'd ask. Otherwise it was, "Mr. Jones, stroke. Mrs. Smith, seizure. Mr. Doe, dementia." So I listed my names and diagnoses and got to a 19 year-old young woman, "Ms. X, myasthenic crisis." So the chief, a myasthenia world expert, asked me to describe her, which I did. Because he was a famous world expert, we saw lots of cases of myasthenia, including the occasional case in crisis. To me it was a bit out of the ordinary, but not worth discussing with my colleagues as a particularly interesting or unusual case. What happened next, however, is the true story here. The chief asked me, "Who did you call?"

"Excuse me?"

"Who did you call?"

"I don't know what you mean. Who would I call?" I was the senior resident and senior residents didn't call anyone, at least so far as I was aware.

"Which attending did you call?"

"I don't understand what you mean. Which attending would I call?" "Which attending was on call last night?" "I didn't know anyone was on call. Why was someone on call? I really don't know what you're asking about."

It turned out that for three years neither I nor my colleagues knew that there were attendings on call and that we were supposed to call them about difficult cases. Perhaps we were supposed to call them about all the cases. I don't know. I had never known that. I never called anyone during my three years. And you can bet that those attendings who were on call never complained about not being called.

I never asked any to determine if any of them even knew there was a call schedule.

The consult service at our very large New York City hospital was very busy. The service consisted of two residents and students on elective. Each case was seen by one of the residents, including the student cases. We would begin rounds with the attending in the early afternoon with student cases seen first, then the interesting or challenging cases, and if it got too late, we'd break for the day with the remaining cases not seen by the attending. Some of these cases were never seen by the attending. The resident could request the attending to see a difficult case, but that choice was the resident's. Many a patient, including sick ones, would be seen by a neurology resident but not an attending.

When I moved to RI in 1982 I marveled at the practice of having an attending physician in the emergency department. That was not the standard of care at the famous hospitals in New York (I don't know about Boston). It would be considered a sign of weakness of the housestaff, rather than judiciousness, to involve attendings in decision-making, and power was never ceded without a battle. Patient care quality became a secondary consideration.

Like my colleagues, I have mixed views on the increasing limitations on the "good old days." Certainly sleep-deprived doctors make more errors and learn less than rested ones, and while we certainly need "fodder" to hone our skills, patient well-being must always be our touchstone. I shudder when I think of my past delusions of grandeur, making life and death decisions as a house officer, without a perceived "need" for experienced counsel. While it would be nice to allow some flexibility in the hour restrictions, we know that certain prestigious programs, given that option a few years ago, immediately reversed all their restrictions until their programs looked just like they used to look. Those programs were suspended, despite their prestige. We are our own worst enemy.

— JOSEPH H. FRIEDMAN, MD

Disclosure of Financial Interests

Joseph Friedman, MD, Consultant: Acadia Pharmacy, Ovation, Transoral; Grant Research Support: Cephalon, Teva, Novartis, Boehringer-Ingelheim, Sepracor, Glaxo; Speakers' Bureau: Astra Zeneca, Teva, Novartis, Boehringer-Ingelheim, GlaxoAcadia, Sepracor, Glaxo Smith Kline, Neurogen, and EMD Serono.

A Lexicographer Burdened With Life

James Boswell, the biographer, described him as follows:

”His figure was large and well formed, and his countenance of the cast of an ancient statue; yet his appearance was rendered strange and somewhat uncouth, by convulsive cramps, by the scars of that distemper which it was once imagined the royal touch could cure, and by a slovenly mode of dress. He had the use of only one eye; yet so much does the mind govern, and even supply the deficiency of organs, that his visual perceptions were quick and accurate. So morbid was his temperament, that he never knew the natural joy of a free and vigorous use of his limbs; when he walked, it was like the juggling gait of one in fetters.”

The individual pictured by James Boswell was Samuel Johnson (1709 – 1784), England’s most illustrious essayist, journalist, literary critic, moralist and, preeminently, lexicographer. No praise was too excessive to define Johnson’s literary accomplishments; yet his origins and the innumerable medical travails of his burdened life make his contributions to the English language all the more astonishing.

Johnson was born in Litchfield, about 115 miles northwest of London, to a 40 year-old mother, elderly by 18th Century standards. His frail, underweight appearance at birth gave little encouragement that he would survive the neonatal interlude. He was blind in one eye and by age three had developed tuberculosis involving the lymph nodes of his neck, a condition known then as scrofula and sometimes called the King’s Evil (said to be curable by the touch of a royal finger).

Johnson’s early education gave hints of his later eloquence and rhetorical brilliance. His father’s increasing penury, however, interrupted young Samuel’s education at Pembroke College. His attempts at securing a teaching position were unsuccessful partially because of a lack of a degree and partially because his many facial tics and involuntary grimaces were often accompanied by inarticulate utterances and loud wheezes. (Contemporary neurologists believe that Johnson had Tourette’s disease). His face was marred by innumerable scars caused by scrofula. And his gait was awkward, jerky as though prompted by invisible puppet-strings and dismaying if not frightening to watch. And so Johnson went to London to support himself by piecemeal journalism. He then married the widow of his friend, a woman 21 years old than he, a relationship that, if not passionate, was earnest until her death some 15 years later.

Life continued to be perilous for Johnson including close encounters with debtor’s prison and extended intervals of profound depression (his “black dogs”). He was further oppressed by chronic fears of impending insanity and assigned to life imprisonment in an asylum.

In 1746 a group of enterprising book-publishers asked Johnson whether he would undertake the monumental task of designing and assembling a dictionary of the English language.

He accepted the challenge; and nine years later he saw his scholarly labors consummated. It was an epic-making text with about 45,000 separate entries. Johnson’s dictionary was more than an alphabetic collection of definitions, however. To illustrate the meanings, nuances and evolving denotation of English words, Johnson appended over 114,000 quotations from the best of English writing, arbitrarily defining the mid-Sixteenth Century as the lower boundary of enduring British literature. The book rapidly became the criterion of proper English usage and was unmatched for over a century until the Oxford English Dictionary was published in 1928.

Fame, and particularly his later publication of Shakespeare’s plays, now annotated and corrected, made his life a bit more comfortable. And because of the Dictionary, Johnson was given a modest pension by King George III.

Yet, as Johnson approached his seventies, life became increasingly arduous, more of a self-defeating struggle. To a man who hungered for constant companionship, who reveled in crowded taverns for his evening suppers, who feared loneliness more than he feared any hint of insanity, these were years of terrible loss when friend after friend retreated to a quiet anonymity or died. Nor were these declining years kind to Johnson’s health: like a gathering storm he encountered further neurological problems, including a stroke which deprived him of his voice, gout which contributed more to his nights of insomnia, emphysema which made the simple task of walking to a tavern a monumental burden; and to augment all of these impediments, should his mind dare to dwell upon the fleeting thought of uninterrupted serenity, was added a testicular cancer.

Boswell added: “To Johnson, whose supreme enjoyment was the exercise of his reason, the disturbance or obscuration of that faculty was the evil most to be dreaded. Insanity, therefore, was the object of his most dismal apprehension; and he fancied himself seized by it, or approaching to it, at the very time when he was giving proofs of a more than ordinary soundness and vigour of judgment.”

Johnson died in the seventy-fifth year of a wearisome, onerous life. Before he lapsed into a terminal coma, he inquired of a friend about his burial. He was told that he might be interred in Westminster Abbey. And Johnson smiled.

– STANLEY M. ARONSON, MD

Disclosure of Financial Interests

Stanley M. Aronson, MD, has no financial interests to disclose.

CORRESPONDENCE

e-mail: SMAMD@cox.net

Care of the Trauma Patient: A Discipline In Flux

Charles A. Adams Jr, MD

It is an honor to introduce this month's *Medicine & Health/Rhode Island*. Trauma and traumatic injuries are commonplace, yet most physicians fail to recognize the truly devastating impact of trauma. Trauma is the number one killer of Americans from ages 1 to 44 and accounts for 150,000 deaths and 3 million injuries annually. More Americans succumb to trauma over this period of time than die due to cancer, heart disease, HIV or pulmonary problems *combined* and more years of potential life are lost to trauma than to any other disease in the nation. Additionally, trauma is an indiscriminate killer, cutting across racial, ethnic, socioeconomic and cultural lines. Indeed, the trauma service at Rhode Island Hospital admits a true cross-sectional representation of the population of Rhode Island from all walks of life. This is in stark contrast to the mental image that many have when they hear the word "trauma."

Trauma surgery has experienced tremendous growth over the last few years, driven largely in response to the evolution of the basic structure of the health care system of the United States. An aging population, coupled with a graying cadre of medical providers, a shifted focus to "lifestyle" issues by most young physicians, a worsening medico-legal environment, along with changes in the financial climate all have served as powerful motors of change. Perhaps the biggest elements of change are the burgeoning medical and surgical sub-specialties combined with a dramatic increase in diagnostic technologies leading to non-operative management of many injured patients.

Previously, trauma surgery could be considered "general surgery" of the injured patient and reflected the diverse and varied practice of general surgery of that time. This practice was an extension of the training that general surgeons received in residency and covered thoracic surgery, head and neck, vascular, hepato-biliary, and gastrointestinal surgery, as well as basic plastic surgery. The trauma surgeon was regarded as the "master surgeon" who could operate effectively on the neck, chest, abdomen or any injured blood vessel.¹ Over time, the radical growth in new technologies, techniques, and concepts in these surgical subspecialties, coupled with a shift in training to post-graduate subspecialty fellowships, made it exceedingly difficult for general surgeons to be facile in all these areas. This changing practice was eventually codified as more subspecialties granted certificates of added competencies or additional board-certification. This is not to say that trauma surgeons were merely providing basic general surgery by default since their field also experienced the same tremendous growth in new technologies and techniques that impacted all of surgery. Some of this evolution in trauma surgery was bitterly earned in response to the devastation wrought by military and civilian, drug-related conflicts. In time, the concept of the "golden hour" or that crucial first hour following injury when timely medical interventions dramatically saved lives became recognized.² The American College of Surgeons declared that "trauma is a surgical disease" in order to entrench the central role of the trauma surgeon in the care of the injured patient.²

The changing face of trauma surgery coincided with changes in surgical critical care. Nearly 85% of surgical critical care surgeons are trauma surgeons. The basic philosophy of surgical criti-

cal care is that all aspects of critical care, both medical and surgical, are rendered by a surgeon with added training in critical illness. This surgeon manages the derangements in all organ systems and provides balanced care, never losing sight of what is best for the patient as a whole rather than what is best for a particular organ system. This management also recognizes the radical changes in human physiology that occur in response to surgical interventions and injury. Here too the new technologies demanded that the surgical critical care practitioner embrace all these changes in order to render state of the art care. Trauma surgery became increasingly linked to surgical critical care because in no other practice of surgery did derangements in physiology occur with such frequency or severity. The practice of trauma surgery also became more of a continuum of care beginning in the emergency room, continuing through the operating room into the **intensive care unit (ICU)**. This continuum became even more pronounced with the emergence of bedside surgery in the ICU and staged or abbreviated laparotomies or "damage control surgery."³

Damage control surgery grew out of the realization that staying in the operating room until all injuries were definitively repaired often led to the death of the patient due to irreversible hemorrhagic shock, coagulopathy, hypothermia and acidemia. This cycle of bleeding leading to acidosis and hypothermia, compounding dilutional and consumptive coagulopathy, resulting in more bleeding, etc, became known as the "death spiral" and the presence of hypothermia, acidosis and coagulopathy as the "deadly triad."⁴ The deadly triad must be avoided at all costs even if that meant having to return to the operating room in a day or two to complete the operation. Staged laparotomy or damage control became the "law of the land" in trauma surgery and led to a dramatic reduction in mortality of the most seriously injured patients. The goals of damage control are: first control hemorrhage, second limit contamination and third, preserve function and prevent further injury. The practice of damage control surgery had such a profound impact on operative mortality that it has now extended into all of general surgery whenever a patient's physiology has become so deranged that spending any additional time in the operating room would jeopardize the patient's life.

Perhaps no development has had a greater impact on trauma surgery than advanced radiological imaging. Previously the abdomen of the bluntly injured trauma patient was best considered a "black box." Physical exam of the patient who was inebriated or altered due to closed head injury was of little value. Plain x-rays were of limited utility and intravenous pyelograms, tomograms, and the like were seldom helpful. "Exploratory laparotomy" was commonplace; accordingly, trauma surgery was very heavily operative in nature. The development of **diagnostic peritoneal lavage (DPL)** by Root, et al in 1965 represented a quantum leap forward in the evaluation of the abdomen of the blunt trauma patient.⁵ This technique, consisting of a peritoneal aspirate through an intra-peritoneally placed catheter followed by a lavage of the abdomen with a liter of saline that was then analyzed for a red blood cell count, became a highly sensitive test for intra-abdominal hemorrhage. DPL

reduced the number of true abdominal exploratory laparotomies but led to many non-therapeutic laparotomies due to its high sensitivity to detect intra-abdominal blood stemming from minimal injuries. Today CT scanning has largely replaced DPL in stable patients, and ultrasound has replaced DPL in unstable patients.

(FAST) focused abdominal ultrasound for trauma (a.k.a. focused assessment with ultrasound for trauma) has largely supplanted DPL in evaluating the abdomen of the blunt trauma patient. FAST is readily available, can be done at the bedside, avoids ionizing radiation, is easily repeated and is non-invasive. Like all ultrasounds, it is largely operator-dependant and in some series has had a high incidence of false negatives; however, it has become an invaluable tool for diagnosing significant intra-abdominal hemorrhage as a source of a patient's hemodynamic instability. Dr. Daithi Heffernan discusses the impact of technological evolution in "Advancing Frontiers in the Care of the Trauma Patient." He expands upon DPL, FAST, latest generation CT scans and other diagnostic and therapeutic modalities as well as other new and emerging technologies.

Presently, most solid organ injuries in stable patients are managed without surgery; this has shifted the practice of the trauma surgeon away from a primarily operative specialty to a non-operative, critical care-based specialty. The high-resolution, multi-detector CT scans has changed trauma surgery to a less invasive, critical care oriented practice that is arguably more complex due to the many treatment options available beyond straightforward surgical interventions. Interestingly, pediatric surgeons led the way. In "Pediatric Trauma Surgery: Understanding When NOT to Operate," Dr. Jeremy Aidlen recounts the pediatric surgery experience with non-operative management of splenic injuries and alludes to the expansion of non-operative therapy to adults for nearly all solid-organ injuries as long as the patient remains hemodynamically stable. The paradigm shift from a heavily operative to a non-operative specialty continues to drive most of the recent changes in the field of trauma surgery and has led to a significant reduction in the number of surgical residents choosing Trauma/Critical Care as a career choice.

As I stated, many feel the specialty of trauma surgery is in jeopardy. A recent president of the **American Association for the Surgery of Trauma (AAST)** remarked in his presidential address that "The specialty of trauma is in trouble!"⁶ He cited the long work hours, in-house call, negative "lifestyle issues," reduced reimbursement, high medico-legal risks, disruption of elective practices, and loss of prestige. Some anxious voices have called trauma surgeons "clearly an endangered species"¹, "gasping for air" and "in danger of becoming extinct."⁷ While many of the factors affecting trauma surgery on a national level are at play in Rhode Island, the state is served by an institution, Rhode Island Hospital, committed to the care of critically ill and injured patients. Furthermore, the state has an effective trauma system, even though it is not a truly definitive, regionalized system for integrated trauma care. In "The evolution of the Rhode Island trauma system: Where do we stand?" Dr. Shea Gregg describes the Rhode Island trauma system. He discusses one of the darkest nights in the history of the state of Rhode Island: the "Station Nightclub" fire when the nascent Rhode Island trauma system was forced to respond to a mass casualty. Dr. David Harrington, Chief of Burn Surgery at Rhode Island Hospital describes the advances in burn care and burn surgery that led to that response in "Burn Injuries and Burn Care."

Lastly, in "Trauma Care in the Elderly," Dr. Matthew Kozloff offers practical advice for caring for elderly patients that all physicians should heed in order to minimize the risk of trauma in this vulnerable population. While many people imagine a "trauma patient" as a young male, caught in a violent altercation involving a knife or gun, in fact falls is the main mechanism of injury among patients admitted to the Rhode Island Hospital Trauma service. Falls in the elderly account for 70% of accidental deaths in persons 75 years of age and older.

Perhaps the biggest change in trauma surgery is the concept of **Acute Care Surgery (ACS)**. Conceptually, ACS is based on three broad concepts: Patients continue to need access to emergent surgical care in an era of decreasing availability of on-call surgeons, the costs of maintaining a full panel of on-call surgeons is becoming financially untenable and many institutions struggle to fill their panel of on-call surgical specialists. Furthermore, attracting residents to the field of trauma surgery and keeping their operative skills sharp in the face of ever-increasing non-operative management is difficult. In the fullest sense of the ACS model, the in-house trauma surgeon would be capable of a complete spectrum of surgical procedures including vascular, thoracic, abdominal surgery as well as provide critical care services but in addition would perform basic neurosurgical and orthopedic procedures.^{8,9} Such a model would expand the operative volume of the trauma surgeon beyond the old boundaries and would spread into many new disciplines. A detailed discussion of ACS is beyond the scope or purpose of this article but it is indicative of the radical changes sweeping the field of trauma surgery.

In summary, trauma surgery is at the crossroads. The old mental images of the surgeon or trauma patients are no longer applicable. This series of articles should serve as a brief introduction to the many profound changes occurring in the field of trauma.

REFERENCES

1. Ciesla DJ, Moore EE, et al. The academic trauma center is a model for the future trauma and acute care surgeon. *J Trauma* 2005; 58: 657-62.
2. American College of Surgeons Committee on Trauma. *Advanced Trauma Life Support Manual*. 7th Edition. Chicago, IL: American College of Surgeons; 2006.
3. Burch JM, Ortiz VB, et al. Abbreviated laparotomy and planned reoperation for critically injured patients. *Ann Surg* 1992; 215: 476-84.
4. DeLoughery TG. Coagulation defects on the trauma patient. *Critical Care Clinics* 2004; 20: 13-24.
5. Root H, Hauser C, et al. Diagnostic peritoneal lavage. *Surgery* 1965; 57: 633-7.
6. Cryer HM. The future of trauma care. *J Trauma* 2005; 58: 425-36.
7. Rodriguez JL, Christma AB, et al. Trauma/critical care surgeon. *J Trauma* 2005; 59: 1-7.
8. Esposito TJ, Leon L, Jurkovich GJ. The shape of things to come. *J Trauma* 2006; 60: 8-16.
9. Cothren CC, Moore EE, Hoyt DB. The US trauma surgeon's current scope of practice. *J Trauma* 2008; 64: 955-68.

Charles A. Adams Jr. MD, is Assistant Professor of Surgery, The Warren Alpert School of Medicine of Brown University, and Chief, Division of Trauma & Surgical Critical Care, Rhode Island Hospital.

Disclosure of Financial Interests

The author has no financial interests to disclose.

CORRESPONDENCE

Charles A. Adams Jr, MD
E-mail: CAdams1@lifespan.org

Advancing Boundaries In the Care of the Trauma Patient

Daithi S Heffernan, MD, AFRCSI, and Charles A. Adams Jr, MD

Trauma victims have benefited from the development of trauma systems and pre-hospital provision of care, improved abilities to diagnose injuries, advances in non-invasive management of life-threatening injuries, better **Intensive Care Units (ICU)s** and critical care medicine and advances in our understanding of the physiologic effects of trauma and how to correct these deviations.

IMAGING STUDIES

Gone are the days of the plain film radiology as the only means of diagnosing injury. Advances in **computed tomography (CT)** have allowed trauma surgeons to detect many more injuries at earlier stages, with less risk to the patient. Godfrey Hounsfield invented the first commercially available CT scanning machine at EMI laboratories in 1971, work that culminated in a Nobel Prize in medicine.¹ Legend states that money from the success of The Beatles enabled EMI to undertake the CT scan research. This original machine was incredibly slow by today's standards: a CT brain took 4 minutes for each slice, and a processing time of 2.5 hours, with poor resolution of images.

Current generations of CT machines have multiple capabilities including: observing dynamic processes such as blood flow in the heart or brain (Dynamic Volume CT); rotating images to view them from any plane to better understand the relationship of the injury to the surrounding organs (Multislice CT); rapid acquisition time – with chest, abdomen and pelvis imaging performed in 20 to 30 seconds thus moving patients out of radiology and into the operating room or ICU faster (Helical or Spiral CT); 3-dimensional reconstruction – which allows for better imaging of possible spinal trauma (MPR – Multiplanar reconstruction). A practical limitation is the hospital-to-hospital variation in both machines and processing software. To address this limitation, the American College of Surgeons is trying to cull the software into one central location, so that all CT images can be uploaded via the internet from any institution and thus si-

multaneously viewed via another, distant institution. CT scans have become so advanced that many institutions have obviated the need for MRI imaging of the cervical spine if the 3-D reconstructed Multislice CT is negative for injury.

Magnetic Resonance Imaging (MRI) has long been used for diagnosis in neurologic trauma including **diffuse axonal injury (DAI)** of the brain, as well as for ligamentous injury of the cervical spine. However, the MRI may now have a new role in the trauma patient. In the poly-trauma patient, the diagnosis of cardiac contusion at times may be difficult, especially in older patients with cardiac disease and those at risk of peri-traumatic myocardial infarction. Recent data have suggested that Cardiac MRI may be able to detect, with great accuracy, areas of cardiac contusion obviating the need for cardiac catheterization. However, this technology is in its infancy.

Ultrasound has advanced the care in the trauma bay. Previously, an unstable trauma patient with multiple possible etiologies for shock would have undergone either a laparotomy or a **diagnostic peritoneal lavage (DPL)**. Neither is without potential for complications, and the DPL can be overly sensitive for some clinically insignificant injuries. The ultrasound probe can detect intra-abdominal bleeding and help delineate whether the hypotension is due to an abdominal source requiring emergent operative intervention, or not. **FAST (Focused Abdominal Sonography for Trauma)** is safe, rapid and repeatable, even in the ICU, for the unstable patient.

ANGIOEMBOLISATION RATHER THAN OPERATE

CT scan imaging can localize the source of bleeding. Evidence of active bleeding was, previously, an almost absolute indication to operate. Earlier detection of this ongoing bleeding, and early intervention would prevent patients from exhibiting the clinical and physiological manifestations of shock. Older generations of CT scans had too much width between images to delineate smaller ac-

tive hemorrhages. However, modern multislice scanners can detect this bleeding as denoted by a blush of IV contrast. Today's **Interventional Radiology (IR)** has been able to treat many injuries that would otherwise have required operative intervention.

Ring and Athanasoulis in 1973 first described a case managed by interventional radiologic therapy when they described control of ongoing pelvic bleeding,² thus expanding the role of Angiography from diagnostic to therapeutic. Using intravascular wires and catheters, one can locate the actively bleeding vessel, and deploy one of a variety of devices or agents to stop, or embolize the bleeding vessel. The biggest impact has been seen in the management of pelvic fractures and splenic injuries. Ongoing bleeding from pelvic fractures are extremely difficult to manage operatively. Attempted packing, either intra-peritoneally or extra-peritoneally is associated with significant morbidity and mortality from the release of the tamponade effect with a laparotomy. One is often reduced to mass ligation rather than individual vessel ligation, which can lead to gluteal ischemia and impotence. Active arterial pelvic bleeding could be life-threatening; however, with the assistance of IR, the bleeding can be stopped, and the trauma physiology and coagulopathy corrected. Splenic injuries with evidence of ongoing bleeding (a blush on CT scan) have the potential to lead to exsanguination. Much literature has been published on the success of IR to embolize splenic trauma with both splenic preservation and obviating the need for a laparotomy. This technology has also been successfully extended to liver injuries with evidence of active hemorrhage.

CHANGES IN AORTIC INJURIES

Nowhere are the changes to management more evident than in the management of blunt aortic injuries.³ An injury that once was destined for major operative intervention with an ensuing high mortality and a significant risk of paraplegia from an aortic cross-clamp is now largely managed with endovascular

placement of an aortic stent. Fabian et al in 1997 attempted to document the natural history, treatments and outcomes of aortic injuries. At that stage, the only operative treatment was an open procedure via a left thoracotomy, associated with significant complications including ARDS, a significant ICU length of stay, worsening of other injuries and most notably, a very high rate of paraplegia. The worsening of other injuries was most common with bleeding from intra-peritoneal solid organ injuries and worsening intracranial hemorrhage from the systemic heparin that was administered. Paraplegia was noted with aortic cross-clamp times greater than 30 minutes.

Endovascular aortic surgery was first described for abdominal aortic aneurysms. Subsequently, many traumatic vascular injuries have been shown to be amenable to this minimally invasive approach. The paradigm in the management of aortic injuries has shifted: clinicians make liberal use of CT angiography for both screening and diagnosis, rather than chest X-ray; conventional angiography has almost disappeared; beta-blockers are widely used to control the heart rate and blood pressure; there is planned delayed operative repair predominantly with endovascular stent grafts, and, in select cases, non-operative management of aortic injuries. Whereas in 1997 immediate repair was the dictum, by 2008 our understanding of the nature of aortic injuries has defined patient populations in whom delayed operative repair is better than immediate operation. In 1997 all patients were managed with open repair; by 2008 almost 65% of aortic injuries were managed with endovascular stents, introduced via small cut downs in the groin that gains access to the bilateral femoral arteries. Using real time radiology in specially designed operating rooms, the surgeon positions the stent across the traumatic pseudoaneurysm. The dose of systemic heparin is considerably lower, thus reducing the risk of worsening other injuries. This approach, which avoids a thoracotomy, is best suited in patients with intracranial injuries and those with significant thoracic trauma, as are seen in many trauma patients. Mortality rates have fallen from 22% to 13%; the rate of paraplegia, from 8.7% to 1.6%.

DAMAGE CONTROL LAPAROTOMY

Multiply injured trauma patients are just as likely to die from their intra-operative metabolic and physiological derangements as from their injuries. **Damage Control Laparotomy (DCL)** has emerged in the last 20 years.⁴ The principles of DCL defy the traditional principles of definitive (elective) operative intervention. Stone et al first described the staged approach to the severely injured patient, based on observations that patients who survived the operating room often died from severe metabolic and physiologic derangements, associated with severe exsanguinating injuries. Profound shock with blood loss initiates the “Deadly Triad” of hypothermia, acidosis and coagulopathy. A fourth component is often added, first coined by Asensio et al, notably dysrhythmia, which usually heralds death. The onset of this deadly triad is most noted in patients who undergo prolonged operative management of their injuries. Severe hemorrhage leads to tissue hypoperfusion and diminished tissue oxygenation, leading to reduced heat generation in the setting of accelerated loss of body heat. Hypothermia can lead to cardiac dysrhythmia, decreased cardiac output, left shift of the oxygen-hemoglobin dissociation curve, induction of coagulopathy by inhibiting the coagulation cascade, and impairment of the immunological response and function. Coagulopathy occurs due to a combination of hypothermia, activation of fibrinolytic system, hemodilution and transfusion of packed red cells without transfusion of clotting factors. This coagulopathy makes any surgical attempt at blood loss control extremely difficult. When the body is under-perfused due to hypotension and blood loss, anerobic metabolism ensues with the production of lactic acid. Acidosis worsens cardiac contractility and cardiac output. Thus blood loss, hypotension, acidosis and coagulopathy create a negative feedback loop that quickly spirals out of control, leading to the exsanguination of the patient.

The physiological guidelines that can predict the need for DCL include the following: Hypothermia with $T \leq 34^{\circ}\text{C}$, Acidosis with $\text{pH} \leq 7.2$, Serum bicarbonate of $\geq 15\text{mEq/L}$, Transfusion of $\geq 4\text{L}$ packed red cells, Transfusion of $\geq 5\text{L}$ blood and blood products, Intra-operative volume replacement $\geq 12\text{L}$, and clinical evidence

of intra-operative coagulopathy. In the operating room, DCL implies immediate operative control of life-threatening hemorrhage, control of gastrointestinal contamination with rapid resection or closures and forgoing the restoration of intestinal continuity, the use of intra-vascular shunts rather than repairs and the judicious use of abdominal packing and temporary abdominal closures. Once DCL is undertaken, the next stage begins as rapidly as possible in the ICU with correction of the metabolic acidosis, coagulopathy and hypothermia. Following correction of these, the patient is returned to the operating room for conclusion and possible definitive repair of any remaining injuries. In extreme cases, it may take two or three days of intense resuscitative efforts until the patient is stabilized sufficiently to undergo the second operation. The advent of DCL and the expanse in our understanding of the “Deadly Triad” and “Lethal Quartet” has indeed improved mortality and has resulted in a dramatic increase in survival of the most seriously injured patients.

ACTIVATED RECOMBINANT FACTOR VII

Coagulopathy in certain patients can progress to a point almost incompatible with life. In extreme coagulopathy which results from massive blood loss, which is replaced with intravenous crystalloid solutions and packed red cells, often without other blood products, coupled with hypothermia and acidosis compounded by prolonged operative interventions, results in a bleeding tendency that is unable to be corrected with conventional replacement of blood and blood products⁵. Recombinant Factor VIIa (NovoSevenTM) was originally licensed for use in haemophiliac patients with inhibitors of clotting factors. Given our advancing understanding of the coagulopathy that ensues in trauma patients, it was felt that these patients suffered from non-surgical, traumatic coagulopathy. Factor VIIa was thought to bypass much of the coagulation cascade and induce clotting in these patients, in the setting of profound hypothermia and thrombocytopenia.

In 1999 Kenet et al published the first account of the use of Factor VIIa in trauma, in a soldier with traumatic coagulopathy following a gunshot wound to the Inferior Vena Cava. Factor VIIa, an

initiator of thrombin generation, acts via two pathways to activate Factor Xa. One pathway is at the site of tissue injury complexed with Tissue Factor. Tissue Factor is present in the sub-endothelial layer of the vascular wall that is exposed following trauma. The second mechanism of action is via the surface of platelets. Factor VIIa activates factors IX and X on the platelet membrane which then progress to thrombin and fibrin formation (the Thrombin Burst). Most of the literature comes from the experience seen with the Israeli army, which relates good results in patients with severe hemorrhage and traumatic coagulopathy. The largest US experience is from the Maryland Shock Trauma Institute. While the population was mixed and the results not conclusive, the indication was that Factor VIIa might indeed be useful in patients with traumatic coagulopathy,⁶ specifically with an apparent reduction in the incidence of Multiple Organ Failure and ARDS. While Factor VIIa has been shown to work despite profound hypothermia and thrombocytopenia, it is largely ineffective in face of severe acidosis; thus it is not the panacea that it was initially thought to be. Currently, a world wide clinical trial for Factor VIIa in trauma is addressing its role and indications.

TREATING THE COMPLEX COMPLICATIONS; SEPSIS ARDS AND THE NEED FOR IMPROVED MONITORING

The hallmark of **Acute Respiratory Distress Syndrome (ARDS)** is an inability to oxygenate the patient. Mortality rates exceeded 50% in much of the original literature. ARDS affects both trauma and non-trauma patients and may be seen following prolonged abdominal operations, pancreatitis or major vascular surgical cases. Akin to other complications, there has been a rise in long term complications in trauma patients who are now surviving their initial trauma who would otherwise have previously died. We have expanded our understanding of both the pathophysiology that leads to ARDS as well as the treatment strategies. A considerable amount of resources are dedicated to explaining the cytokine, hormonal and inflammatory cascade behind ARDS, some of which is being undertaken at Rhode Island Hospital Department of Surgery. RIH has shown that an exaggerated pro-

inflammatory response is seen in the ARDS lungs. Early concepts for the management of ARDS evoked the maxim that if some is good, then more must be better. However, unfortunately over-distention of the alveoli and "Supra-Physiologic" ventilation was proven to be detrimental to the lungs. Treatment strategies, as defined in the **ARDS Research Network (ARDSnet)** protocols are directed at limiting the ongoing insult to the lungs, by decreasing tidal volumes and decreasing alveolar stretch injury due to the ventilator. This has decreased both the incidence of ARDS and the morbidity and mortality from ARDS across the country.

In 1997 all patients were managed with open repair; by 2008 almost 65% of aortic injuries were managed with endovascular stents.

Sepsis remains a significant cause of mortality in ICU patients: mortality ranges from 25 to 50%. As our care improves to allow more patients survive the initial phases of the trauma, we are seeing increasing rates of sepsis. A collaborative, the "Surviving Sepsis Campaign," was launched in Barcelona in 2002. This begins with early aggressive care in the Emergency Department, continues through the Operating Rooms with damage control laparotomy and control of abdominal contamination, into the ICU with Medical Algorithms, or "Bundles" of evidence-based patient care guidelines.

Above this, research advances have led to the introduction of Activated Protein C (Drotrecogin Alfa (Xigris)). Whilst the indications are limited to the extremely ill, Xigris has contributed to improved survival following sepsis. Unfortunately, recent operative intervention, within 48 hours, is a contra-indication to the usage of Xigris. Furthermore, Xigris has increased our understanding of the role of the coagulation system in critically ill patients. Protein C is the source of **Activated Protein C (APC)**, a naturally occurring protein in the body

that helps to regulate blood flow and control inflammation on the microvascular level. In patients with severe sepsis, Protein C levels are low and, partly due to damage to blood vessels, cannot be converted in sufficient quantities to the activated form, APC. Thereby, clotting and inflammation of the small blood vessels go out of balance which may lead to multiple organ failure and death.

There have been many tremendous advances in monitoring systems for these critically ill patient, both invasive (Swann-Ganz catheters) and minimally invasive (LiDCO and PiCCO) which can give accurate, minute-to-minute records of a patient's cardiac function, vascular resistance, tissue oxygenation and tissue oxygen debt, and intra-vascular volume status. Coupled with advances in our understanding of the mechanisms of action of inotropes and vasopressors, we continue to improve our ability to detect and correct derangements in physiology induced by trauma, shock and sepsis. Current research focuses on non-invasive, transdermal measurements of cardiac function, oxygen delivery/debt, as well as trans-dermal measurement of blood chemistry and hematology. Hopefully, this will minimize the phenomenon of ICU anemia, iatrogenically induced from repeated, necessary and unnecessary phlebotomy. The promise of the future ICU is that the labs of a patient will be available in a fashion akin to obtaining a pulse oximetry.

BASIC SCIENCE AND ANTI-INFLAMMATION

Many advances have been made in our understanding of the immunological dysregulation that ensues following traumatic critical illness. The trauma patient who survives the early causes of death still risks **Systemic Inflammatory Response Syndrome (SIRS)**, which can ultimately lead to **Multi-Organ Dysfunction Syndrome (MODS)** with its extremely high rate of death. A well recognized immune burst follows trauma. This immuno-inflammatory response is characterized by elaboration of cytokines acting as acute phase reactants and hormones, such as Interleukin-1 (IL-1), IL-2, IL-6, IL-12, tumor necrosis factor (TNF) and Interferon-Gamma (IFN). Cytokines play a critical role for signal-

ing intracellular substances that initiate, amplify and perpetuate inflammatory response both locally and systemically. Significant portions of this work have been undertaken at Rhode Island Hospital Department of Surgery.^{7, 8} IL-6 is regarded as being the most accurate prognostic marker regarding outcome of trauma patients with SIRS, sepsis or MODS. Sex hormones, specifically estrogen, have been shown to modulate this cytokine burst. There is a growing body of evidence linking the inflammatory dysfunction of trauma with the pituitary-adrenal axis suppression following trauma and critical illness. Several investigators have attempted to track cytokine level changes to determine the best time to operate in the semi-elective setting in the multiply injured patient. It is believed that if one attempts to stabilize orthopedic injuries while the patient is still acutely and severely inflamed, the patient has a significantly higher risk for MODS and death. Thus, waiting for the severe inflammatory burst to resolve may improve outcomes. In essence, certain authors have documented better sensitivity for cytokines rather than clinical parameters. This is truly translational research in practice whereby clinical entities are studied in the basic science laboratory, determinations are made, and the knowledge is brought back to the patient's bedside.

CONCLUSIONS

Trauma patient care requires well honed clinical skills, rapid diagnostic tests and studies and immediate operative intervention. These patients benefit from improved diagnosis, treatment of bleeding through minimally invasive procedures, better understanding of the physiological and coagulopathic changes induced by trauma, quick and accurate operative strategies, and improved post-operative critical care.

REFERENCES

1. Hounsfield G. Nobel lecture, 8 December 1979. Computer medical imaging. *J Radiol* 1980;61:459-68.
2. Ring E, Athanasoulis C, et al. Arteriographic management of hemorrhage following pelvic fracture. *Radiol* 1973;109:65-70.
3. Hoffer E, Forauer A, et al. Endovascular stent-graft or open surgical repair for blunt thoracic aortic trauma. *J Vascular Interventional Radiol* 2008;19:1153-64.
4. Miller R, Morris JJ, et al. Complications after 344 damage-control open celiotomies. *J Trauma* 2005;59:1365-71.
5. Beekley A. Damage control resuscitation. *Crit Care Med* 2007;36 (7 Suppl):S267-74.
6. Horton J, DeZee K, Wagner M. Use of rFVIIa in the trauma setting - practice patterns in United States trauma centers. *Amer Surgeon* 2008;74:413-7.
7. Lomas-Niera J, Perl M, et al. Shock and hemorrhage. *Shock* 2005;Suppl 1:33-9.
8. Venet F, Chung C, et al. Regulatory T cell populations in sepsis and trauma. *J Leukocyte Biol* 2008;83:523-35.

Daithi S. Heffernan, MD, AFRCSI, is Assistant Professor of Surgery, The Warren Alpert Medical School of Brown University/Rhode Island Hospital, Division of Trauma & Surgical Critical Care.

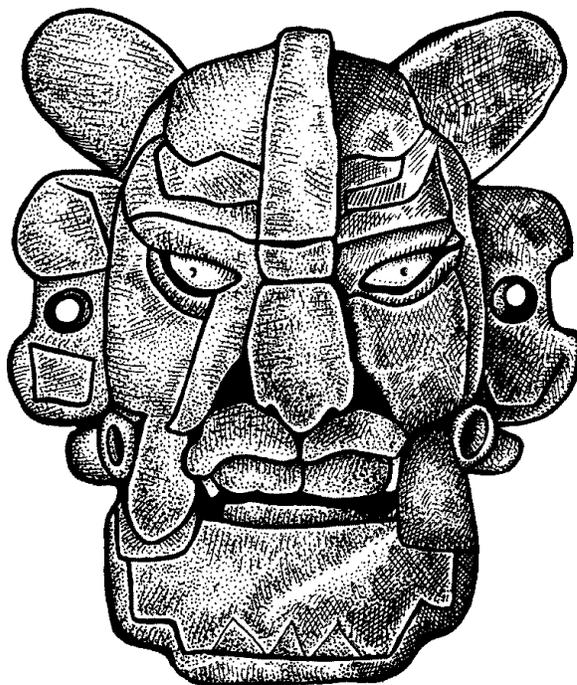
Charles A. Adams Jr. MD, is Assistant Professor of Surgery, The Warren Alpert School of Medicine of Brown University, and Chief, Division of Trauma & Surgical Critical Care, Rhode Island Hospital.

Disclosure of Financial Interests

The authors have no financial interests to disclose.

CORRESPONDENCE

Daithi S. Heffernan, MD, AFRCSI
Rhode Island Hospital
593 Eddy Street, APC 435
Providence, RI, 02903
Phone (401) 444-0369
E-mail: DHeffernan@lifespan.org



Pediatric Trauma Surgery: Understanding When NOT to Operate

Jeremy T. Aidlen, MD

Over forty years ago, long before the advent of computed tomography (CT), a pediatric surgeon suggested that not all patients who sustained blunt solid organ trauma required an operation. This was a radical departure from the surgical norms of the time. Untreated, splenic lacerations were thought to have a mortality of 90 to 100%, and trauma laparotomies were mandatory. Interestingly, the first report of a ruptured spleen which healed spontaneously dates back as far as 1881; however, it was contested and eventually dismissed by physicians of the day.¹ For years, surgeons have tried to preserve the spleen, with limited success. Stuart Thompson was the first to doubt that surgical intervention was required at all. Dr. Thomson had performed a laparotomy on a six year-old boy, and found the spleen in two halves, surrounded by adhesions and completely healed. He wondered whether a ruptured spleen could spontaneously recover.² In response, Thomson's fellows Upadhyaya and Simpson designed a clinical study. The conclusions of their review, published in 1968 were as follows: (1) Isolated splenic injury in children is well tolerated. (2) Deaths are due to associated severe injuries and not due to splenic rupture. (3) There is evidence of spontaneous healing in unoperated patients. (4) In most cases splenic bleeding had stopped at laparotomy.³ There were many skeptics initially, but eventually this strategy of surgical restraint was validated, creating a new paradigm of care for the injured child. Today, the standard treatment of the hemodynamically stable child with splenic injury is nonoperative, and this concept has been successfully applied to most blunt injuries of the liver, kidney, and pancreas as well.⁴

The trauma algorithms of the 1960s were based on physical examination, plain radiography and laboratory evaluation. Since that time, CT scans have become a readily available, non-invasive, and accurate method of identifying and qualifying the extent of traumatic injuries. Care patterns have certainly evolved

as percutaneous interventional techniques have improved, and there is no doubt that advances in three dimensional imaging techniques have helped to limit unnecessary laparotomies. CT scans have also helped us finely tune our nonoperative management algorithms. Consensus guidelines on intensive care unit (ICU) length of stay, overall length of hospital stay, use of follow-up imaging, and physical activity restriction for clinically stable children with isolated spleen or liver injuries (CT grades I to IV) have been clearly defined. (Table 1)

Today, the standard treatment of the hemodynamically stable child with splenic injury is nonoperative.

Focused Abdominal Sonography for Trauma (FAST) has become a useful screening tool for the detection of free intraperitoneal and pericardial fluid as well. Sonographic evaluation can help to limit radiation exposure from unnecessary CT scans performed for "low-likelihood" injuries. FAST is also particularly helpful in the evaluation of patients who are hemodynamically unstable. In this setting, a positive finding on FAST often prompts a surgical procedure. In doing so, FAST can help to prevent potentially

dangerous transports or delays in treatment. A lack of identifiable free fluid does not exclude a significant injury though, and CT remains the imaging modality of choice for the evaluation of the severely injured child when feasible.

While pediatric surgeons were the first to adopt a nonoperative strategy for solid organ injuries, our colleagues in adult trauma care have successfully applied many of the same methods to the management of their own patients. Likewise, pediatric surgeons rely heavily upon innovations in care developed by our adult counterparts. Young patients are quite dissimilar from adults however, anatomically, immunologically and physiologically. They do not share the same response to injury, and they do not benefit from the same patterns of treatment. Guidelines developed for pediatric patients should not be applied to young adults,⁵ and the converse is also true. According to a recent review in New England, children with splenic injuries are still twice as likely to undergo an operation if they are cared for by someone other than a pediatric surgeon.⁶ This underscores the importance of specialized pediatric care, even within a level one trauma center. A decision by the surgeon to operate on a child in this setting should be based on evidence of continued blood loss, such as low blood pressure, tachycardia, decreased urine output, falling hematocrit or failure to respond appropriately to resuscitative efforts. Surgery is not always avoidable, but the indica-

Table 1. Proposed Guidelines for Resource Utilization in Children with Isolated Spleen of Liver Injury by CT Grade

	Grade I	Grade II	Grade III	Grade IV
ICU days	0	0	0	1
Hospital stay (days)	2	3	4	5
Predischarge imaging	None	None	None	None
Postdischarge imaging	None	None	None	None
Activity restriction (weeks)*	3	4	5	6

*Return to full-contact, competitive sports should be at the discretion of the individual pediatric trauma surgeon. The proposed guidelines for return to unrestricted activity include "normal" age-appropriate activities.¹

tions have certainly changed with the times. The rates of successful nonoperative treatment of isolated blunt splenic and hepatic injury now exceed 90% in most pediatric trauma centers and in adult trauma centers with a strong pediatric commitment.⁷

Trauma kills more than 10,000 pediatric patients annually nationwide and causes some 10% of all pediatric hospitalizations.⁸ Trauma is the leading cause of mortality and morbidity in children from ages 1 to 14 years and results in more death and disability than all other childhood disease combined.⁹ A recent review of the **National Pediatric Trauma Registry (NPTR)** indicates that 8% to 12% of children with blunt trauma have an abdominal injury. Fortunately, more than 90% will survive. Although abdominal injuries are 30% more common than thoracic injuries, they are 40% less likely to be fatal.¹⁰ Advances in pediatric critical care which have developed in parallel to our surgical guidelines have helped to improve outcomes following major injuries. We have come a long way. Still, it is important not to become too dogmatic about the success of our strategies. After all, they were only developed after a surgeon doubted the prevailing wisdom of his day, and decided NOT to operate.

REFERENCES

1. Upadhyaya P. Conservative management of splenic trauma. *Pediatr Surg Int* 2003;19: 617-27.
2. Upadhyaya P, Simpson JS. Splenic trauma in children. *Surg Gynecol Obstet* 1968;126:781-90.
3. Stylianos S, Pearl R. *Abdominal Trauma: Pediatric Surgery*. Sixth Edition. – Grosfeld, 2006.
4. Mullins R, Trunkey D. Variation in treatment of pediatric spleen injury at trauma centers versus nontrauma centers. *J Amer Coll Surg* 2006;203:263.
5. Mooney D, Forbes P. Variation in the management of pediatric splenic injuries in New England. *J Trauma* 2004;56:328-33.
6. Stylianos S, Hicks B. *Abdominal and Renal Trauma: Pediatric Surgery*. Fourth Edition – Ashcraft, 2005.
7. Graves EJ. Detailed Diagnosis and Procedures, National Hospital Discharge Survey, 1989. Hyattsville, MD, National Center for Health Statistics, Vital Health Stat 13, 1991.
8. National Center for Injury Prevention and Control. *Injury Fact Book*. Atlanta, Centers for Disease Control and Prevention, 2001.
9. Cooper A, Barlow B, et al. Mortality and truncal injury. *J Pediatr Surg* 1994;29:33-8.
10. Stylianos S. APSA Trauma Committee. Evidence-based guidelines for resource utilization in children with isolated spleen or liver injury. *J Pediatr Surg* 2000; 35:164-9.

Jeremy T. Aidlen, MD, is Assistant Professor of Surgery & Pediatrics, The Warren Alpert Medical School of Brown University.

Disclosure of Financial Interests

The author has no financial interests to disclose.

CORRESPONDENCE

Jeremy T. Aidlen, MD
Rhode Island Hospital
Two Dudley Street, Suite 180
Providence, RI 02905
Phone: (401) 444-8579
e-mail: JAidlen@usasurg.org



The Evolution of the Rhode Island Trauma System: Where Do We Stand?

Shea C. Gregg, MD, David T. Harrington, MD, FACS, and Charles A. Adams, Jr, MD

A 51 year-old male was brought by to his local hospital after being assaulted. Upon arrival, the patient was unresponsive and showed signs of head trauma. His vital signs included an elevated blood pressure and heart rate. Due to his depressed mental status, the patient was emergently intubated. A CT scan of his head to assess for intracranial injuries revealed an intracranial hemorrhage that necessitated neurosurgical consultation for possible surgical management. Due to the potential of brain herniation, and the fact that neurosurgical services were unavailable at the outside hospital, the patient had an ambulance arranged for transfer to the state's only trauma center. After all communications were conducted between the two facilities and the patient was acutely stabilized, the patient was finally enroute for definitive neurosurgical care.

Today the trauma system in Rhode Island could efficiently respond to, triage, diagnose, transfer, and ultimately treat this patient. Although this could be considered a success story, a truly efficient system that facilitates both open communication and proper education would support transferring this patient to the definitive care facility without delays for imaging given the patient's depressed mental status and need for immediate neurosurgical evaluation. Given the existence of such cases, the Rhode Island trauma system continues to be an evolving entity. An understanding of its history along with an appraisal of its status can elucidate the goals of those who remain committed to providing the best possible care for those who are injured within Rhode Island.

THE EARLY DEVELOPMENT OF EMERGENCY MEDICAL SYSTEMS (EMS)

A trauma system is an integrated, organized approach to the administration of care to all levels of injured patients in a defined geographic region.¹ Hallmarks include programs that aim to reduce the incidence of injury; ease of passage through the pre-hospital, inter-hospital, and inpatient care environments; and supports to assist in patient reintroduction into society.

Before 1966, the need for such a concept was not fully appreciated on a national level. In "Accidental Death and Disability: the Neglected Diseases of Modern Society," the **National Academy of Sciences (NAS)** reported that in 1965, 52 million people were injured and 107,000 people died as a result of accidental injuries.² In addition to delineating the magnitude of the problem, this manuscript described the deficiencies in those early "trauma systems;" e.g., first aid was not universally required for ambulance attendants; funding for pre-hospital transport depended on the community and thus varied highly; there were no standards for resuscitation or means by which to compare different management strategies; and research funding for the trauma epidemic was incongruent with the severity of the problem.² Subsequently, the National Traffic and Motor Vehicle Safety Act (1966), the Highway Safety Act (1966), and the EMS Systems Act (1973) were passed to address the short-comings of limited trauma care. From them, both national and state agencies became empowered to build more effective emergency systems.

One of the most fundamental components in the administration of emergent trauma care is that of the **emergency medical technician (EMT)**. In Rhode Island, the first EMT training program was established in 1974, using funds from the EMS Systems Act passed the previous year.³ The curriculum published in 1971 by the US Department of Transportation recommended 25 lessons involving 71 hours of classroom training with 10 hours of in hospital training.⁴ The classroom-based subjects covered airway management, management of cardiac arrest and shock, bandaging and splinting, automobile extrication, and lifting and moving patients. Didactic sessions followed by testing stations allowed for demonstration of each particular skill set. The in-hospital training program allowed participants to apply lessons learned in the classroom to the patient care environment. Those who passed the course received the designation of EMT-A and met the basic requirements for transporting the sick and injured.

Since then, numerous technological advances and evidence-based practices have been developed in the pre-hospital care arena; e.g., updated approaches to cardiopulmonary resuscitation and advanced cardiac life support; more compact monitoring/defibrillating devices; and various airway adjuncts to assist in patency. Despite the ongoing importance of training EMTs the basic principles of safe patient care and transport, it became apparent that more specialized training was necessary. Designations including EMT-Cardiac and EMT-Paramedic have been recognized and serve in Rhode Island. They administer more advanced skills including cardiac arrhythmia recognition, pharmacologic treatment, and intravenous therapy to those who may require them in the field. In addition, more complex dispatch networks now ensure efficient transport to health care facilities around the state.

THE STATION NIGHTCLUB FIRE: LESSONS LEARNED IN A MASS CASUALTY DISASTER

On February 20, 2003, one of the deadliest fires in US history took place at the Station Nightclub in West Warwick, Rhode Island: 96 people died at the scene, and 215 people were injured.⁵ After the establishment of a field triage site and activation of the state and hospital-based disaster plans, the injured patients were transported to hospitals in and around the state. With Rhode Island Hospital the state's only level one trauma center, the multiple drills that were run to educate and coordinate the response to a mass casualty incident were suddenly put to the test.

In two published reviews of the incident, the state's response to this tragedy was critically evaluated.^{5,6} Several positive components of the response were discovered in addition to actions that could be improved upon. Among the positive, the triage scene was described as "orderly" and abundant transporting agencies were available to facilitate the exodus of patients.⁵ At Rhode Island Hospital, shift change at the time of the incident produced plenty of dedicated

staff to care for the numerous patients. The structure of the response, with emergency medicine and trauma surgery working together in the emergency department, allowed for efficient triage and administration of care.⁵ In terms of physical plant, the emergency department, patient care floors, and operating rooms were transformed to accommodate the various degrees of injured patients that influxed suddenly into the system. Rhode Island Hospital succeeded in achieving a 0% mortality among the 64 patients evaluated.⁶

Despite the numerous achievements, a few systems-based shortcomings became obvious. As discovered in the 9/11 disaster, communication could have been improved. Specifically, EMS crews had limited guidelines or oversight directing the regional transport of their respective patients. As a result, matching the degrees of injury with the regional resources that could best accommodate them did not happen as efficiently as it could have.⁵ Additionally, the inter-hospital communications both inside and outside the state regarding bed and resource allocation was limited and thus resulted in facility and patient mismatches and possibly unnecessary, prolonged transport times.^{5,6} Finally, the intra-hospital movement of patients around the facility challenged the system at RIH.⁵ Although it may seem minor, moving patients in and around care areas that may not possess such fundamental items as oxygen and suction becomes extremely cumbersome when faced with a large patient surge.

Like any tragic event, the successes and difficulties have taught lessons that reinforced the importance of preparedness, coordination, and communication among members who have dedicated their careers to providing emergency care. By critically evaluating such experiences, new plans and protocols were and can be developed to improve the efficiency of the Rhode Island trauma system.

TODAY'S TRAUMA SYSTEM: THE CONFLUENCE OF YESTERDAY'S TEACHINGS

Traumatic injury continues to be one of the leading causes of morbidity and mortality in Rhode Island. Based on hospital discharges between 1998 and 2002, approximately 24,254 people were discharged from Rhode Island's hospitals

with the diagnosis of injury.⁷ When analyzing subgroups, Rhode Island hospitals admitted 14,220 patients following a motor vehicle associated injury between 1991 and 2002,⁸ 706 suicide attempts a year were evaluated between 1989 and 1998,⁹ and 28,678 falls in those older than 60 years of age presented between 1991 and 2001.¹⁰ In order to effectively respond to such statistics, more than 79 ambulance companies now service the regions throughout Rhode Island. At Rhode Island Hospital alone, our trauma team activations for the past year totaled 5,796. Every patient received a trauma team consultation which included a trauma history and physical exam, laboratory and imaging studies, and any interventions as indicated. As a result of such volume, a dedicated trauma/critical care team including attendings, residents, nurses, technicians and innumerable support staff comprise the "Trauma Service" and are available 24 hours a day for both in-hospital management and inter-hospital consultation/transfer.

At Rhode Island Hospital alone, our trauma team activations for the past year totaled 5,796.

Outside of the hospital, new technology and committees have been developed to improve communication between parties involved in providing trauma care. To address the ongoing issue of hospital capacity on a day to day basis, Rhode Island has developed computer-based capacity boards which alert both EMS and the individual facilities as to whether each hospital is accepting or diverting patients. This is updated by the state's Department of Health throughout the day. From an administrative standpoint, the Emergency Medical Services Advisory Committee (EMSAC) is an advisory council for chiefs of EMS from all serving populations to have an open discussion on how to improve relationships, and foster improved care. Members represent trauma, the emergency department, and disaster management. In terms of pre-hospital care, the EMS operations commit-

tee is a multidisciplinary group that discusses issues currently faced by the hospital and EMS communities. Finally, the LIFE-GUARD response team was established after 9/11 to efficiently transfer critically ill patients between facilities or from scenes. When activated, the transfer vehicle is staffed by an emergency medicine physician and two paramedics who are capable of delivering the highest level of emergency care at the initial patient encounter. In summary, there are more opportunities today that promote follow-up, ongoing communication, and efficient administration of patient care than ever before.

Another component of today's trauma system includes educational programs. To enhance the education of pre-hospital care providers, "Rescue Rounds" are monthly didactic sessions that cover such topics as airway management and current treatment modalities. These are open to all members of the EMS community and are typically led by members of the Trauma Surgery service. In addition to these less formal sessions, Advanced Trauma Life Support® is offered several times throughout the year to trauma care providers. This curriculum, developed by the American College of Surgeons, teaches the principles for emergent triage, evaluation, and management of trauma. Other courses, including EMT certification classes, lifeguarding courses, and cardiopulmonary resuscitation (CPR) can be found via the internet

CHALLENGES AND FUTURE DIRECTIONS

Despite the existence of pre-hospital, inpatient, and post-hospital care components in various capacities around the state, a truly established "Trauma system" with definitive regionalization of care has yet to be fully agreed upon. In a review of one aspect of regionalized care, Harrington et al. evaluated inter-facility transfers for the period of 2001-2003.¹¹ Their report described average transfer times to the definitive level one trauma center that averaged 160 minutes. Interestingly, these prolonged times were observed in those patients who were severely injured (Injury severity score < or = 40) and thus could benefit the most from the resources a level one trauma center could provide. As evidenced by our initial case report, delays in transfer included the per-

formance of unnecessary imaging directed by the primary facility when resources were not immediately available to manage the findings. Other reasons for delays included inefficiently performed indicated procedures and/or the performance of unnecessary procedures. Despite such interventions, 6% of patients arrived hypotensive and up to 10% of the patients required various immediate interventions. Although several questions arose as to why delays existed and why certain procedures were being done at the outside facilities, the absence of the requirement of ATLS training among emergency medical physicians was hypothesized to contribute to the underlying lack of appreciation of quick triage in the multiply injured patient.¹¹ To help remedy these situations, the Rhode Island Department of Health developed early interagency transfer guidelines to aid in recognizing injury patterns that would benefit from early transfer to a level one trauma center. Additionally, direction for when to request communication between transferring and receiving facilities has been established to ensure optimal safety in the patient transfer process. With the adoption of these criteria, repeat study of transfer times and outcomes is warranted.

Although transfer times between facilities are one endpoint worthy of evaluation, others need to be addressed. Given that Rhode Island is a state that is small enough to allow for efficient transport times of those most critically injured to the level one trauma center, the Rhode Island Department of Health increased the catchment area for Rhode Island Hospital to a 30 mile radius. This was done to encour-

age EMS providers to transport all levels of injury to the facility that has the broadest resources available. What has yet to be developed given the possibility of longer transport times are the regional response algorithms that dictate what agency will be backing up individual rescues when a specific rescue travels outside a coverage area. Such a plan needs to be developed to ensure true efficiency of response to all regions. In terms of patient care, another limitation continues to be resource allocation for those who are recovering and rehabilitating from various accidents. In one example, neurologic related trauma (i.e. head and spine injuries) account for several trauma admissions to our level one trauma center every year. Following the patient's acute management and in-hospital rehabilitation, if the need for long term care becomes necessary, resources remain limited. Due to this void, in-hospital costs can be increased as a result of prolonged hospitalizations in acute care facilities. By building a larger network of rehabilitation services, this patient population, and others, can potentially be better served.

SUMMARY

The Rhode Island Trauma System today has been shown to demonstrate several positive attributes in the delivery of patient care; however, ongoing efforts need to continue in the realms of field and inter-facility communication, efficiency in inter-hospital transfer, and rehabilitation services. Through ongoing dialogue and the fundamental desire to improve, it remains our goal to provide patients the best care possible during one of the most stressful times of their lives.



REFERENCES

1. Trauma Vision Steering Committee: Hoyt DB, Eastman B, et al. *Trauma System Agenda for the Future*. American Trauma Society and US Department of Transportation: NHTSA; 2002.
2. Division of Medical Sciences: Accidental Death and Disability: The Neglected Disease of Modern Society. National Academy of Sciences, National Research Council, 1966.
3. Leary P, Woolard RH. Prehospital emergency care in Rhode Island. *RI Med J* 1991; 74:361-4.
4. US Department of Transportation. Basic Training Program Guide for Emergency Medical Technicians – Ambulance, Course Guide. Washington, DC, National Highway Traffic Safety Administration, 1971.
5. Harrington DT, Biffi WL, Cioffi WG. The station nightclub fire. *J Burn Care Rehabil* 2005;26:141-3.
6. Mahoney EJ, Harrington DT, et al. Lessons learned from a nightclub fire. *J Trauma* 2005;58:487-91.
7. Buechner JS. Inpatient care for severe trauma in Rhode Island. *Med Health RI* 2004;87:115-6.
8. Presentation to Motor Vehicle/Transportation Injury Prevention Task Force, 4/22/04 (http://www.health.ri.gov/disease/saferi/injury_data.php)
9. Presentation to Injury Advisory Council, 1/8/04 (<http://www.health.state.ri.us/disease/saferi/1-8-04.ppt>)
10. Presentation to Falls Injury Prevention Task Force, 9/30/04 (<http://www.health.state.ri.us/disease/saferi/FallsTaskForce09-30-04.ppt>)
11. Harrington DT, Connolly M, et al. Transfer times to definitive care facilities are too long. *Ann Surg* 2005;241:961-6.

Shea C. Gregg, MD, is Assistant Professor of Surgery, The Warren Alpert Medical School of Brown University.

David T. Harrington, MD, FACS, is Director, Rhode Island Burn Center, and Associate Professor of Surgery, The Warren Alpert Medical School of Brown University.

Charles A. Adams, Jr, MD, is Assistant Professor of Surgery, The Warren Alpert Medical School of Brown University, and Chief, Division of Trauma & Surgical Critical Care, Rhode Island Hospital.

Disclosure of Financial Interests

The authors have no financial interests to disclose.

CORRESPONDENCE

Shea C. Gregg, MD
Rhode Island Hospital
593 Eddy Street, APC 435
Providence, RI 02903
Phone: 401-444-0369
e-mail: sgregg@lifespan.org



Turn acute ulcerative colitis flares into **complete remission***†

Lialda® with Multi Matrix System Technology (MMX®) goes beyond symptom control to induce complete remission, a stringent treatment standard comprised of both clinical and endoscopic remission¹²

*** Clinical Criteria:**

- No rectal bleeding
- No excessive stool frequency
- Physician's Global Assessment score ≤ 1

† Endoscopic Criteria:

- No friability (no bleeding upon contact)
- Sigmoidoscopic (mucosal) appearance must have improved

According to prescription data
**Lialda is
the fastest-growing
mesalamine³**

Important Safety Information

Lialda tablets are indicated for the induction of remission in patients with active, mild to moderate ulcerative colitis. Safety and effectiveness of Lialda beyond 8 weeks have not been established.

Lialda is contraindicated in patients with hypersensitivity to salicylates (including mesalamine) or to any of the components of Lialda. Caution should be exercised when treating patients with pyloric stenosis or those allergic to sulfasalazine. Mesalamine has been associated with an acute intolerance syndrome (3% of patients in clinical trials with mesalamine or sulfasalazine) that may be difficult to distinguish from a flare of inflammatory bowel disease. If acute intolerance syndrome is suspected, prompt withdrawal is required. Mesalamine-induced cardiac hypersensitivity reactions (myocarditis and pericarditis) have been reported. Reports of renal impairment have been associated with mesalamine medications. In patients with renal impairment, caution should be exercised, and Lialda should be used only if the benefits outweigh the risks. No information is available for patients with hepatic impairment.

Lialda is generally well tolerated. The majority of adverse events in the double-blind, placebo-controlled trials were mild or moderate in severity. In clinical trials (N=535), the most common treatment-related adverse events with Lialda 2.4g/day, 4.8g/day and placebo were headache (5.6%, 3.4% and 0.6%, respectively) and flatulence (4%, 2.8% and 2.8%, respectively). Pancreatitis occurred in less than 1% of patients during clinical trials and resulted in discontinuation of therapy with Lialda.

Lialda® is a registered trademark of Shire LLC.
MMX® is a registered trademark owned by Cosmo Technologies Ltd, Ireland, a wholly-owned subsidiary of Cosmo Pharmaceuticals SpA.

Please see brief summary
of Full Prescribing Information
on back page.

References: 1. Kamm MA, Sandborn WJ, Gassull M, et al. Once-daily, high-concentration MMX mesalamine in active ulcerative colitis. *Gastroenterology*. 2007;132:66-75. 2. Lichtenstein GR, Kamm MA, Boddu P, et al. Effect of once- or twice-daily MMX mesalamine (SPD476) for the induction of remission of mild to moderately active ulcerative colitis. *Clin Gastroenterol Hepatol*. 2007;5:95-102. 3. IMS Health, NPA Plus™, Q1 08-Q2 08, TRXs.

Visit Lialda.com

ONCE-DAILY

Lialda™ with MMX®
(mesalamine) 1.2g
delayed release tablets

The path to complete remission

ONCE-DAILY
Lialda[™] with MMX
 (mesalamine) 1.2g
 delayed release tablets



BRIEF SUMMARY: Consult the Full Prescribing Information for complete product information.

LIALDA[™] (mesalamine) Delayed Release Tablets **Rx only**

INDICATIONS AND USAGE

LIALDA tablets are indicated for the induction of remission in patients with active, mild to moderate ulcerative colitis. Safety and effectiveness of **LIALDA** beyond 8 weeks has not been established.

CONTRAINDICATIONS

LIALDA is contraindicated in patients with hypersensitivity to salicylates (including mesalamine) or to any of the components of **LIALDA**.

PRECAUTIONS

General: Patients with pyloric stenosis may have prolonged gastric retention of **LIALDA**, which could delay mesalamine release in the colon.

The majority of patients who are intolerant or hypersensitive to sulfasalazine can take mesalamine medications without risk of similar reactions. However, caution should be exercised when treating patients allergic to sulfasalazine.

Mesalamine has been associated with an acute intolerance syndrome that may be difficult to distinguish from a flare of inflammatory bowel disease. Although the exact frequency of occurrence has not been determined, it has occurred in 3% of patients in controlled clinical trials of mesalamine or sulfasalazine. Symptoms include cramping, acute abdominal pain and bloody diarrhea, sometimes fever, headache and rash. If acute intolerance syndrome is suspected, prompt withdrawal is required.

Mesalamine-induced cardiac hypersensitivity reactions (myocarditis and pericarditis) have been reported with other mesalamine medications. Caution should be taken in prescribing this medication to patients with conditions predisposing to the development of myocarditis or pericarditis.

Renal: Reports of renal impairment, including minimal change nephropathy, and acute or chronic interstitial nephritis have been associated with mesalamine medications and pro-drugs of mesalamine. For any patient with known renal dysfunction, caution should be exercised and **LIALDA** should be used only if the benefits outweigh the risks. It is recommended that all patients have an evaluation of renal function prior to initiation of therapy and periodically while on treatment. In animal studies with mesalamine, a 13-week oral toxicity study in mice and 13-week and 52-week oral toxicity studies in rats and cynomolgus monkeys have shown the kidney to be the major target organ of mesalamine toxicity. Oral daily doses of 2400 mg/kg in mice and 1150 mg/kg in rats produced renal lesions including granular and hyaline casts, tubular degeneration, tubular dilation, renal infarct, papillary necrosis, tubular necrosis, and interstitial nephritis. In cynomolgus monkeys, oral daily doses of 250 mg/kg or higher produced nephrosis, papillary edema, and interstitial fibrosis.

Hepatic Impairment: No information is available on patients with hepatic impairment, and therefore, caution is recommended in these patients.

Information for Patients: Patients should be instructed to swallow **LIALDA** tablets whole, taking care not to break the outer coating. The outer coating is designed to remain intact to protect the active ingredient, mesalamine, and ensure its availability throughout the colon.

Drug Interaction: No investigations have been performed between **LIALDA** and other drugs. However, the following are reports of interactions between mesalamine medications and other drugs. The concurrent use of mesalamine with known nephrotoxic agents, including non-steroidal anti-inflammatory drugs (NSAIDs) may increase the risk of renal reactions. In patients receiving azathioprine or 6-mercaptopurine, concurrent use of mesalamine can increase the potential for blood disorders.

Carcinogenesis, Mutagenesis, Impairment of Fertility: In a 104-week dietary carcinogenicity study in CD-1 mice, mesalamine at doses up to 2500 mg/kg/day was not tumorigenic. This dose is 2.2 times the maximum recommended human dose (based on a body surface area comparison) of **LIALDA**. Furthermore, in a 104-week dietary carcinogenicity study in Wistar rats, mesalamine up to a dose of 800 mg/kg/day was not tumorigenic. This dose is 1.4 times the recommended human dose (based on a body surface area comparison) of **LIALDA**.

No evidence of mutagenicity was observed in an *in vitro* Ames test or an *in vivo* mouse micronucleus test.

No effects on fertility or reproductive performance were observed in male or female rats at oral doses of mesalamine up to 400 mg/kg/day (0.7 times the maximum recommended human dose based on a body surface area comparison). Semen abnormalities and infertility in men, which have been reported in association with sulfasalazine, have not been seen with other mesalamine products during controlled clinical trials.

Pregnancy:

Teratogenic Effects: Pregnancy Category B

Reproduction studies with mesalamine have been performed in rats at doses up to 1000 mg/kg/day (1.8 times the maximum recommended human dose based on a body surface area comparison) and rabbits at doses up to 800 mg/kg/day (2.9 times the maximum recommended human dose based on a body surface area comparison) and have revealed no evidence of impaired fertility or harm to the fetus due to mesalamine. There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed. Mesalamine is known to cross the placental barrier.

Nursing Mothers: Low concentrations of mesalamine and higher concentrations of its N-acetyl metabolite have been detected in human breast milk. While there is limited experience of lactating women using mesalamine, caution should be exercised if **LIALDA** is administered to a nursing mother, and used only if the benefits outweigh the risks.

Pediatric Use: Safety and effectiveness of **LIALDA** tablets in pediatric patients who are less than 18 years of age have not been studied.

Geriatric Use: Clinical trials of **LIALDA** did not include sufficient numbers of patients aged 65 and over to determine whether they respond differently from younger patients. Other reported clinical experience has not identified differences in responses between the elderly and younger patients. In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concurrent disease or other drug therapy.

ADVERSE REACTIONS

LIALDA tablets have been evaluated in 655 ulcerative colitis patients in controlled and open-label trials.

In two 8-week placebo-controlled clinical trials involving 535 ulcerative colitis patients, 356 received 2.4g/day or 4.8g/day **LIALDA** tablets and 179 received placebo. More treatment emergent adverse events occurred in the placebo group (119) than in each of the **LIALDA** treatment groups (109 in 2.4g/day, 92 in 4.8g/day). A lower percentage of **LIALDA** patients discontinued therapy due to adverse events compared to placebo (2.2% vs 7.3%). The most frequent adverse event leading to discontinuation from **LIALDA** therapy was exacerbation of ulcerative colitis (0.8%).

The majority of adverse events in the double blind, placebo-controlled trials were mild or moderate in severity. The percentage of patients with severe adverse events was higher in the placebo group (6.1% in placebo; 1.1% in 2.4g/day; 2.2% in 4.8g/day). The most common severe adverse events were gastrointestinal disorders which were mainly symptoms associated with ulcerative colitis. Pancreatitis occurred in less than 1% of patients during clinical trials and resulted in discontinuation of therapy with **LIALDA** in patients experiencing this event.

Overall, the percentage of patients who experienced any adverse event was similar across treatment groups. Treatment related adverse events occurring in **LIALDA** or placebo groups at a frequency of at least 1% in two Phase 3, 8-week, double blind, placebo-controlled trials are listed in Table 3. The most common treatment related adverse events with **LIALDA** 2.4g/day and 4.8g/day were headache (5.6% and 3.4%, respectively) and flatulence (4% and 2.8%, respectively).

Table 3. Treatment Related Adverse Events in Two Phase 3 Trials Experienced by at Least 1% of the LIALDA Group and at a Rate Greater than Placebo

Event	LIALDA 2.4g/day (n = 177)	LIALDA 4.8g/day (n = 179)	Placebo (n = 179)
Headache	10 (5.6%)	6 (3.4%)	1 (0.6%)
Flatulence	7 (4%)	5 (2.8%)	5 (2.8%)
Increased alanine aminotransferase	1 (0.6%)	2 (1.1%)	0
Alopecia	0	2 (1.1%)	0
Pruritis	1 (0.6%)	2 (1.1%)	0

The following treatment-related adverse events, presented by body system, were reported infrequently (less than 1%) by **LIALDA**-treated ulcerative colitis patients in controlled trials.

- Cardiovascular and Vascular:** tachycardia, hypertension, hypotension
- Dermatological:** acne, prurigo, rash, urticaria
- Gastrointestinal Disorders:** abdominal distention, diarrhea, pancreatitis, rectal polyp, vomiting
- Hematologic:** decreased platelet count
- Hepatobiliary Disorders:** elevated total bilirubin
- Musculoskeletal and Connective Tissue Disorders:** arthralgia, back pain
- Nervous System Disorders:** somnolence, tremor
- Respiratory, Thoracic and Mediastinal Disorders:** pharyngolaryngeal pain
- General Disorders and Administrative Site Disorders:** asthenia, face edema, fatigue, pyrexia
- Special Senses:** ear pain

DRUG ABUSE AND DEPENDENCY

Abuse: None reported.
Dependency: Drug dependence has not been reported with chronic administration of mesalamine.

OVERDOSAGE

There have been no reports of overdosage with **LIALDA**. **LIALDA** is an aminosalicylate, and symptoms of salicylate toxicity may include tinnitus, vertigo, headache, confusion, drowsiness, sweating, hyperventilation, vomiting, and diarrhea. Severe intoxication may lead to disruption of electrolyte balance and blood-pH, hyperthermia, and dehydration.

Although there has been no direct experience with **LIALDA**, conventional therapy for salicylate toxicity may be beneficial in the event of acute overdosage. This includes prevention of further gastrointestinal tract absorption by emesis and, if necessary, by gastric lavage. Fluid and electrolyte imbalance should be corrected by the administration of appropriate intravenous therapy. Adequate renal function should be maintained.

DOSAGE AND ADMINISTRATION

The recommended dosage for the induction of remission in adult patients with active, mild to moderate ulcerative colitis is two to four 1.2g tablets to be taken once daily with meal for a total daily dose of 2.4g or 4.8g. Treatment duration in controlled clinical trials was up to 8 weeks.

Store at room temperature 15°C to 25°C (59°F to 77°F); excursions permitted to 30°C (86°F). See USP Controlled Room Temperature.

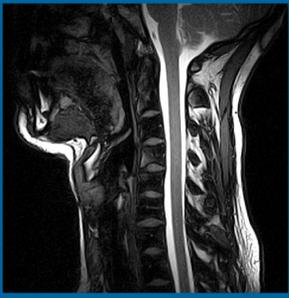
Manufactured for **Shire US Inc.**, 725 Chesterbrook Blvd., Wayne, PA 19087, USA. © 2007 Shire US Inc. U.S. Patent No. 6,773,720. by license of Giuliani S.p.A., Milan, Italy. Made in Italy. 476 1207 002B





THE IMAGING INSTITUTE

OPEN MRI • MEDICAL IMAGING



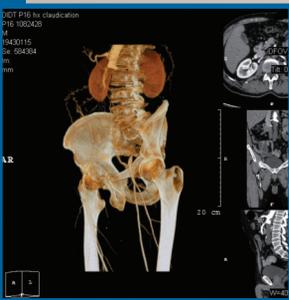
High Field MRI

- Offering both 1.5T High Field & Higher Field OPEN MRI Systems



MRA

- Advanced CT with multi-slice technology, 3D reconstruction



CT • 3D CT

- Digital Ultrasound with enhanced 3D/4D technology

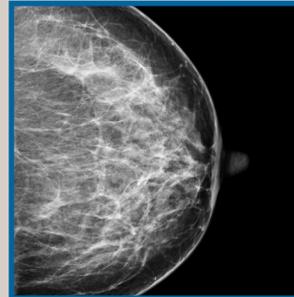


CTA

- Digital Mammography with CAD (computer assisted diagnosis)



3D Ultrasound



Digital Mammography



Digital X-Ray & DEXA

- Electronic Medical Record (EMR) Interfaces now available
- Preauthorization Department for obtaining all insurance preauthorizations
- Fellowship, sub-specialty trained radiologists
- Friendly, efficient staff and convenient, beautiful office settings
- Transportation Service for patients



Higher Field OPEN MRI

WARWICK

250 Toll Gate Rd.
TEL 401.921.2900

CRANSTON

1301 Reservoir Ave.
TEL 401.490.0040

CRANSTON

1500 Pontiac Ave.
TEL 401.228.7901

N. PROVIDENCE

1500 Mineral Spring
TEL 401.533.9300

E. PROVIDENCE

450 Vets. Mem. Pkwy. #8
TEL 401.431.0080

Better Banking for your Medical Practice

At Webster, we can provide a customized, exclusive package of banking solutions to meet the unique needs of your medical practice.

For more information, contact **Lisa Staley** at **(401) 421-1548** or at **lstaley@websterbank.com**.



Burn Injuries and Burn Care

David T. Harrington, MD, FACS

IMPROVEMENTS IN BURN CARE

The improvements in the care of the thermally injured patient exemplify modern medicine at its finest. A telling example is the reduced lethality of burns when patients are cared for in modern burn units. A simple way to describe lethality is to look at the size of burn that has a 50/50 chance of ending with mortality: the **Lethal Dose 50 – LD50**. Since mortality from thermal injury is also age-dependent, one also should account for age in any description of burn mortality. In 1950 the LD50 for a 21 year-old was 40%. Currently that number is 90% in most burn centers. The improvements in LD50 came from a commitment to excellence in burn centers and a process of examining clinical outcomes and looking for solutions with both laboratory and clinical research endeavors that began in the 1940s and 1950s.

The improvements have been incremental but steady. The understanding of the forces that drove burn edema led to the development of burn resuscitation strategies, the Parkland and Brooke formulas in the 1950s, that predicted, for instance, that a 70kg patient, with a 70% **total body surface area (TBSA)** burn would need between 10 to 20 liters of intravenous fluid resuscitation in the first 24 hours. Adoption of these guidelines essentially eliminated acute renal failure in most burn patients. With the reduction of renal failure many larger burn patients survived their initial care. With these larger percent TBSA burn patients surviving longer, gram negative sepsis arising from the burn wound became a significant cause of mortality. Again, laboratory and clinical science led to the development of effective antimicrobial creams, silver sulfadiazine and mafenide acetate in the mid to late 1960s, which reduced bacterial density of the burn wound. These improved topical antimicrobials and the recognition that patients with large burns should be placed in protective isolation to prevent cross-contamination of their bacterial flora to other patients reduced the incidence of gram negative sepsis.

Over the next 30 years many other advancements in the care of the thermally injured patient occurred. Early excision and grafting of the wound, where all full thickness eschar is removed by 2 weeks post-burn, replaced the practice of letting the wound suppurate and grafting on a granulating wound bed at 4-6 weeks after burn.

The creation of a true artificial skin has been on the mind of burn practitioners for decades...

Evolution of medical science also helped burn patients. For example, the modern blood bank was essential to the application of early excision and grafting techniques. Better understanding of the pathophysiology of smoke inhalation injury led to pharmacologic interventions and improvements in ventilatory strategies. One of the most successful ventilatory strategies was the **Volume Diffusive Respirator (VDR)**, a percussive ventilator that superimposes an oscillatory waveform on top of a pressure-cycled pressure control mode. This was the original “low-volume” ventilator. The VDR and other innovations have significantly reduced the mortality associated with inhalation injury.¹ The knowledge that burn patients often have metabolic rates 140-160% of their basal metabolic requirements led to aggressive nutritional support strategies to protect the patient’s protein stores and lean body mass.

Further improvements in care are evolving, ranging from better outpatient wound dressings to artificial skin. While burn creams are critical for the care of larger burns, they have their drawbacks when used for smaller burns (5-10%) that can be managed as an outpatient. These creams require 1-2 times a day dressing changes, which can be painful and anxiety provoking, especially to children. New silver-containing dressings are available that, with a

good initial cleaning in the burn clinic or emergency room, can be placed on the burn wound and left on until the wound is healed 7-10 days later. The creation of a true artificial skin has been on the mind of burn practitioners for decades, for the most challenging patients are those with large burns of 50-70% TBSA who have limited donor sites. Larger burns often require reharvesting of donor skin areas 4,5,6,7 times before closure of the skin can be attained. Since the donor skin can take between 7-14 days to heal, this delays reharvesting of these sites and therefore delays the definitive closure of the burn wound. Early experience with cultured autologous skin, really just a cultured bilayer of epithelium, showed good early engraftment but almost no durability or long-term skin coverage.² Dermal templates, such as human processed alodermis and manufactured dermis, have some success and application, but are cumbersome to use and prone to infection.³ This limits their applicability in the patients who need an “artificial skin” the most – patients with large TBSA burns. There has been some success with co-cultured auto-epidermis and auto-dermis that appears to have solved the problem of durability.⁴ This true “artificial skin” may soon be available.

BURN CENTER CARE IS MULTIDISCIPLINARY

Key to the success of burn centers and the improvements in the LD50 has been the concept that the care for the patient is multi-disciplinary. Since its inception in 1967 the American Burn Association, the premier society for the advancement of burn care, has involved doctors, nurses, nutritionists, respiratory therapists, psychosocial specialists, and rehabilitative therapists. This collaboration has resulted in a highly developed team. Their skills have made burn centers ideal areas to treat other challenging skin disorders. Exfoliative disorders such as Stevens-Johnson’s Syndrome / Toxic Epidermal Necrolysis, Pemphigus Vulgaris, Staphylococcal Scalded Skin Syndrome can be cared for in a burn center where climate controlled rooms, expertise in wound care, and effective pain control

practices are available.⁵ Massive soft tissue injury from trauma or necrotizing fasciitis can also be managed well in a burn center.

REHABILITATIVE PHASE OF BURN INJURY

The recovery from burn injury has both an acute phase and a chronic phase. The acute phase, addressed above, should generally last 1 day of hospitalization for each percentage of the body surface burned, i.e. a 50% TBSA burn should spend about 50 days in the burn center. It is important for the patients to realize that this burn center stay is only the first part of their recovery. Once the burn wounds are definitively closed the areas of spontaneously healed skin and the areas of grafted skin will continue to remodel for up to 1-3 years. This remodeling of scar is a process where the body shrinks the scar. Over areas of important function – flexor surfaces, around joints – and around important cosmetic areas – face and hands – this shrinking and remodeling can result in highly disfiguring scar. Interventions to minimize this contraction are meticulous care of the skin (avoidance of harsh soaps, use of moisturizing creams and avoidance of the sun for 12-18 months), scar massage, rehabilitation with active and passive range of motion, compression of the burn scar with compressive custom made garments, and silicon sheeting. Many of these therapies are painful for they involve stretching dense hypertrophic burn scar. During this period pain management with the use of narcotics is vital. Many times these measures are only partially successful and reconstructive surgery is necessary.

Though aggressive attempts at nutritional support during the acute phase of burn care is felt to have been instrumental in improving outcomes for thermally injured patients over the last 20 years, patients with significant burn still lose 10-20% of their lean body mass during their hospitalization. This loss of lean body mass makes their rehabilitation more difficult and delays patients' return to full function. The use of anabolic agents and more aggressive exercise regimens may be able to reverse some of these deficiencies.⁶

PREVENTION

The skin has multiple functions: regulation of heat exchange; prevention of fluid loss; barrier to infection and mechanical trauma; and aesthetics. Since we cannot restore skin to its original state after injury, the best treatment of injury is prevention. Efforts at prevention have made both the work place and the home environments safer (smoke detectors, fire codes, sprinkler installation, safer appliances and heaters) and overall reduction in burn injury has indirectly proven the impact of these efforts. For males the incidence of burn and fire injury for every 100,000 population dropped from 601 in 1985 to 192 in 1991 and females dropped from 647 to 158 during the same period.⁷

Further efforts are necessary. Reducing home and apartment hot water heaters to 120°F / 49°C would reduce scald injuries to children and the elderly. Careless smoking habits, especially mixed with use of alcohol, are a significant source of preventable fire etiology. Better education of the public of the dangers of kerosene and gasoline, which should not be used for cleaning or clearing brush, would reduce flame injuries. The proliferation of outdoor cooking and fire pits has increased injuries from these sources. Making homes safer to prevent slipping and falls while carrying hot liquids would reduce injuries in the aged. Elderly cooking accidents, especially in people with reduced hearing, eyesight, or ability to flee a fire, are an all too common preventable etiology of burns. Screening all burn victims for signs of domestic violence would help these patients by reducing the likelihood that they would return to an unsafe home environment and the potential for further injury.

CONCLUSION

There have been continued and steady improvements in both prevention of burns and the care of the thermally injured patient. It is a testament to generations of hard work by multidisciplinary teams dedicated to the care of these challenging patients. Future improvements are just around the corner.

REFERENCES

1. Rue LW 3rd, Cioffi WG, et al. *Arch Surg* 1993; 128(7):772-8; discussion 778-80.
2. Rue LW 3rd, Cioffi WG, et al. *J Trauma* 1993; 34: 662-7.
3. Heimbach DM, Warden GD, et al. *J Burn Care Rehab* 2003; 24:42-8.
4. Boyce ST, Kagan RJ, et al. *J Trauma* 2006; 60: 821-9.
5. Yarbrough DR 3rd. *J Burn Care Rehab* 1996; 17:30-3.
6. Jeschke MG, Finnerty CC, et al. *Ann Surg* 2007; 246: 351-60; discussion 360-2.
7. Vyrostek SB, Annett JL, Ryan GW. Surveillance for fatal and non-fatal injuries – United States, 2001. Office of Statistics and Programming, National Center for Injury Prevention and Control. 1600 Clifton Road N.E., MS K-59 Atlanta, GA. 30333, CDC/NCIPC/OSP; 2001.

David T. Harrington, MD, FACS, is Director, Rhode Island Burn Center, and Associate Professor of Surgery, Warren Alpert Medical School of Brown University.

Disclosure of Financial Interests

The author has no financial interests to disclose.

CORRESPONDENCE

David T. Harrington, MD, FACS
University Surgical Associates
593 Eddy Street, APC 443
Providence, Rhode Island 02903
Phone: (401) 444-2892
e-mail: DHarrington@usasurg.org



Trauma Care of the Elderly Patient

Matthew S. Kozloff, MD, and Charles A. Adams Jr, MD

Trauma is the leading cause of death in the United States for individuals aged 1 to 45 years old, but its impact varies across the age spectrum. People age 65 are twice as likely to be hospitalized as a result of a traumatic injury than the general population. The mortality rate in elderly trauma victims has been estimated as 6 times greater than in their younger counterparts when controlling for the degree of injury. These facts will become increasingly important as the elderly population grows. The 2000 US census estimated that the population aged 65 years and older to be over 35 million, a 12% increase since 1990.¹ Elderly patients account for up to one third of all health care expenditures, and one quarter of all hospital expenditures on trauma.²

The combination of chronic diseases in elderly trauma victims, along with their decreased physiologic reserve, account for the increased rates of morbidity and mortality following a traumatic event. Elderly trauma patients exhibit a different, less dramatic physiologic response to injury, which may belie the seriousness of the injury. In dealing with older patients there is less room for errors in judgment than in treating younger patients.

While the elderly experience the same types of injuries as younger people, there are differences in the mechanisms and patterns of injury. Falling is extremely common: 70% of all deaths due to falls occur in the elderly population.³ Approximately one third of elderly individuals living in the community fall each year, increasing to 50% by 80 years of age.⁴ These numbers are even greater in residents of assisted living facilities. Seventy percent of the elderly trauma admissions to our center over the last five years can be attributed falls, which makes it the most common admitting diagnosis to Rhode Island Hospital's Trauma Center.

Falls in the elderly generally occur because of the physiologic changes associated with aging. Declining visual acuity, proprioception, vestibular function, coupled with hearing and memory loss all effect processes controlling balance, maintaining stability and navigating their environment. Systemic disorders frequently contribute to instability and falling as well. Falling, in fact, may be the manifestation of an acute or

chronic occult illness, which should prompt the physician to search for medical causes. Syncope, postural hypotension, venous pooling in the lower extremities, and metabolic derangements like anemia or hypoglycemia are common reasons for falls. Medications may affect the central nervous system, fluid balance, or the cardiovascular system. The number of medications a patient takes along with recent changes in dose should be reviewed. Recently added medications should also be reviewed following a patient fall, not only for side effects associated with factors contributing to falls but for drug-drug interactions due to the new medication or dosing changes. This becomes even more problematic as the patient ages since poly-pharmacy worsens with age. Finally, extrinsic factors like slippery floors, loose carpets and rugs, narrow or cluttered stairs, poorly fitting shoes, and poor lighting can contribute to mechanical falls. Thus, optimizing safety at home can reduce falls, hospitalizations and ultimately death.

Motor vehicle crashes are responsible for approximately 20% of the elderly trauma patient admissions to our center. In 1990, 13% of the total number of drivers were older than age 65.⁵ Despite the tendency to drive shorter distances, drivers over age 75 have the highest rate of fatal crashes of any age group.⁶ After age 80, the fatality rate increases from 1.2 to 4 per 100 crashes.⁷

The high crash and death rates in the elderly can also be attributed the physiologic changes of aging. Subtle changes in memory and judgment impair the ability to recognize and negotiate potentially hazardous road situations. Cognitive, musculoskeletal, hearing, and visual impairments reduce reaction time and affect the elderly driver's ability to control a vehicle. Finally, the elderly have the highest population-based fatality rate for pedestrians struck by a vehicle.⁸ Once again, decreased hearing, loss of visual acuity and peripheral vision, along with reduced reaction time make crossing a busy street a potentially hazardous, even life-threatening event.

In summary, increases in the elderly population are leading to a larger number of elderly trauma patients. While these patients are subject to the same types of trauma as their younger counterparts, they differ in

that falls constitute their leading mechanism of injury. Early identification of injuries, vigilance against being lulled by normal vital signs and a less than dramatic physiologic response to injury is necessary if errors in judgment are to be avoided. Clinicians should be very cautious when adding new medications to the patient's drug regimen and particular attention should be paid to drug interactions, waning metabolic function and decreasing physiological function. Finally, trauma prevention programs should be supported that target "fall proofing" homes and identification of at-risk elderly drivers.

REFERENCES

1. United States Census Bureau. *The 65 years and Over Population*. Washington, DC: U.S. Department of Commerce, 2000.
2. United States Special Committee on Aging. *Aging America: Trends and Projections, 1987-1988 Edition*. US Department of Health and Human Services, Washington, DC.
3. Schwab CW, Kauder DR. Trauma in the geriatric patient. *Arch Surg* 1992; 127:701.
4. Tinetti ME. Performance-oriented assessment of mobility problems in elderly patients. *J Am Geriatr Soc* 1986;34:119.
5. *Accident Facts: 1991 Edition*. Chicago: National Safety Council, 1991.
6. Reuben DB, Silliman RA, Traines M. The aging driver. *J Am Geriatr Soc* 1988;36:1135.
7. Cerrelli E. *Older drivers, The age factor in traffic safety*. Washington, DC: National Highway Traffic Safety Administration, 1989. US DOT publication HS 807402.
8. *A Decade of Progress: Fatal Accident Reporting System, 1989*. Washington DC: National Highway Traffic Safety Administration, 1991. US DOT publication HS 807071.

Matthew S. Kozloff, MD, is Assistant Professor of Surgery, The Warren Alpert Medical School of Brown University/Rhode Island Hospital.

Charles A. Adams Jr, MD, is Assistant Professor of Surgery, The Warren Alpert School of Medicine of Brown University, and Chief, Division of Trauma & Surgical Critical Care, Rhode Island Hospital.

Disclosure of Financial Interests

The authors have no financial interests to disclose.

CORRESPONDENCE

Matthew S. Kozloff, MD
593 Eddy Street, APC 435
Providence, RI 02903
Phone (401) 444-0369
e-mail: MKozloff@lifespan.org

Steps To Managing Difficult Behavior In People With Dementia

Lisa F. Han, MPH, H. Edward Davidson, PharmD, MPH, Stefan Gravenstein, MD, MPH, FACP

Both rising life-expectancy and dementia prevalence increase the likelihood of agitation and the accompanying behavioral and psychological symptoms of dementia (BPSD). Unfortunately, such behaviors result in an everyday struggle for many victims and their caregivers. Agitation has been defined as any verbal, vocal, or motor activity which is not judged by an outside observer to result directly from the needs or confusion of the agitated individual.¹ In other words, the cause of the behavior is not readily apparent.

Many clinicians manage problem behaviors by trial and error. But a systematic approach with consistent behavior documentation and sequence to a series of approaches can help establish which factors contribute to the agitation, and how the behaviors respond to each intervention. In general, we recommend a consistent approach to assessment, followed by non-pharmacologic and pharmacologic interventions, and a monitoring strategy.

ASSESSMENT

Because of the complex nature of agitation and BPSD, patients should be thoroughly assessed at the onset of a new behavior. Divide the behaviors into physically aggressive, physically nonaggressive, verbally aggressive, verbally nonaggressive, or a combination of types.¹

The documentation should include both the type of agitation and other characteristics. For example, document the specific behavior (etc., hitting, spitting, crying, etc), the frequency and timing of the behaviors, changes in routine or environment, onset and predominant pattern, as well as the con-

sequences of the behaviors. The day-to-day caregivers will likely have valuable insights.

Exclude delirium as the cause for the behavior; seniors with multiple medical problems are at high risk for delirium. Especially consider dehydration, infection, severe constipation, medication side effects, head trauma, and pain.

NON-MEDICATION TREATMENT

Caregivers and health care providers should always attempt non-medication interventions, a potentially very effective strategy often arising from simple ideas. Use the behavior assessment to come up with several strategies. (Table 1).

A pleasant and consistent demeanor provides an important basic daily approach to caregiver and patient interaction. Even body language—absent inflammatory words—of a frustrated or irritated caregiver can inadvertently anger a patient. Arguing with or correcting a patient with dementia usually does not support other strategies that improve challenging behaviors. Educating caregivers can reduce their feelings of burden and depression, and improve quality of life for caregiver and patient.²

DETERMINE IF MEDICATIONS ARE APPROPRIATE

Avoid adding medications to manage behaviors if the target symptoms do not cause harm or are tolerable. However, when the best attempts at non-medication management fail, a pharmacologic approach may be warranted. No medications are FDA-approved for treating behavioral symptoms associated with dementia.

Table 1. Possible non-medication interventions for difficult behaviors

Behavior	Possible reason for behavior	Possible nonmedication approach
Resisting help with bathing, grooming, or dressing	Task is too difficult or overwhelming	Break task into small steps, limiting choices to 1 or 2. Demonstrate the step; caregiver could reassure, distract with music or conversation
Incontinence	Difficulty undressing Forgets or can't express the need	Simplify clothing such as elastic waste bands Schedule toileting
Wandering	Restlessness, boredom	Provide personally meaningful activity consistent with patient's abilities (e.g., folding clothes, craft items, puzzles, cooking), provide opportunity for exercise (schedule routine walks)
Inappropriate sexual behavior	Need for attention, affection	Increase or meet basic need for touch and warmth, model appropriate touch; offer soothing object (stuffed animals); pet therapy; react calmly and firmly but do not confront

Several classes of medications comprise the largest body of evidence in the treatment of BPSD: antipsychotics, antidepressants, anxiolytics, and mood stabilizing agents.

ANTIPSYCHOTICS

Both typical and atypical antipsychotics have been systematically studied for treatment of BPSD. They have been tested for psychotic behaviors, or when a behavior is dangerous to the patient or others, or interferes with the patient's ability to receive care. Efficacy with antipsychotics is modest in rare trials and non-existent in most. Both atypical and typical antipsychotics carry the FDA black box warning about the increased risk of death^{3, 4}.

The FDA also requires a warning for atypical antipsychotics disclosing the potential risk for obesity, diabetes, and dyslipidemia associated with their use, although this is not truly a class effect and applies primarily to olanzapine and clozapine. The American Diabetes Association, the **American Psychiatric Association (APA)**, and others published a consensus statement in 2005 recommending selected monitoring for those receiving atypical agents. Factors to monitor include weight, waist circumference, blood pressure, and glucose. All antipsychotics excepting quetiapine and clozapine also carry the risk of movement disorders. In the elderly these are predominantly parkinsonism and to a lesser extent akathisia. Increased parkinsonism leads to increased risk of falls and wheelchair restriction so routine assessment particularly focused on gait must be performed. Although there is a risk of tardive syndromes, these are of much lesser concern.

ANTIDEPRESSANTS

Some evidence supports the benefit of antidepressants for BPSD. A **selective serotonin or serotonin-norepinephrine reuptake inhibitor (SSRI or SSNRI)** is a reasonable choice for demented individuals with behavioral and depressive symptoms. SSRIs may also help with anxiety symptoms. Owing to the adverse effect on cognitive function, tricyclic antidepressants are not recommended.

ANXIOLYTICS

Anxiolytics have little supporting evidence for their use for BPSD. Safety is a major concern, primarily with benzodiazepines. Major side effects include psychomotor impairment, disinhibition, drowsiness (contributing to falls), impaired cognitive function, and physical and psychological dependence. Discontinuing these agents may take weeks to months due to withdrawal phenomena. Anxiolytic use should be short-term and low dose, and patients should be monitored carefully for side effects.

MOOD STABILIZERS

A broad range of medications with mood stabilizing properties has been studied for BPSD. The most evidence is with carbamazepine and divalproex. Efficacy is modest, at best, and side effects are a concern. In their most recent prac-

tice guideline of the treatment of dementia, the APA states the evidence to recommend their use is insufficient.⁵

The evidence for the use of other medications in the treatment of BPSD is sparse or inconclusive. Cholinesterase inhibitors may reduce behavioral symptoms in individuals with dementia, although findings have been inconsistent across trials.

For all medications, start with low doses and titrate to the lowest effective tolerated dose. Regardless of medication choice, patients should be monitored carefully for side effects.

MONITORING THERAPY

Once medication is chosen for managing behavior, monitoring the response to determine effectiveness and assess for side effects. Consider the following:

1. Is it the right medication and dose?
2. Has the treatment trial been long enough?
3. Have all underlying medical contributors been adequately evaluated and treated?
4. Have the target behaviors been monitored and documented appropriately for frequency and intensity to allow an accurate followup assessment?

If the patient fails to respond sufficiently after an adequate trial, consider changing the approach. If a medication was used, decide if it was helpful at all or not and whether it is worth continuing, keeping in mind that the more psychoactive medications used the greater the chance of adverse effects. Generally the drug should be stopped and another tried. Change the dose, the medication, or add a medication for additive activity.

Dementia patients rarely need BPSD medications indefinitely. The **Center for Medicaid and Medicare Services (CMS)** directs nursing facilities to attempt a gradual dose reduction at specified intervals. (Table 2)

While not a requirement, this guidance provides a reasonable approach for ongoing BPSD management in outpatients, too.

In summary, behaviors associated with dementia challenge

Table 2. When to attempt dose reduction/tapering of psychoactive medications

Agent/Class	Gradual dose reduction interval (for therapy used to manage behavior, stabilize mood, or treat a psychiatric disorder)
<i>Sedatives/hypnotics</i> (includes benzodiazepines)	Approximately every 3 months
Antipsychotics	In the first year, twice in two separate quarters with at least one month between attempts. After the first year, at least once per year
Psychopharmacologic medications (depending on indication, anticonvulsants and antidepressants)	In the first year, twice in two separate quarters with at least one month between attempts After the first year, at least once per year

all parties. However, with an open discussion among caregivers and a systematic method of evaluation and treatment, effective management can be achieved.

SUGGESTED READING

Mace NL, Rabins PV. *The 36-Hour Day*. Johns Hopkins Press 1999. Baltimore, MD.

Rabins PV, Lyketsos CG, Steele CD. Eds. i. New Your: Oxford University Press;2006.

A pocket guide to dementia and associated behavioral symptoms: Diagnosis, assessment, and management. 3rd Edition. Gravenstein S, Davidson HE, Han LF, eds. Insight Therapeutics Publishing, LLC. Norfolk, VA. 2007.

REFERENCES

1. Cohen-Mansfield J, Billig N. Agitated behaviors in the elderly. I. A conceptual review. *J Am Geriatr Soc* 1986;34:711-21.
2. Teri L, McCurry SM et al. Training community consultants to help family members improve dementia care. *Gerontologist* 2005;45:802-11.
3. Wang PS, Schneeweiss S, et al. Risk of death in elderly users of conventional vs. atypical antipsychotic medications. *NEJM* 2005;353:2335-41.
4. Ray WA, Chung CP et al. Atypical antipsychotic drugs and the risk of sudden cardiac death. *NEJM* 2009; 360: 225-35.
5. Rabins PV, Blacker MD, et al and the Work Group on Alzheimer's Disease and Other Dementia. Practice Guideline for the treatment of patients with Alzheimer's disease and other dementias. DOI: 10.1176/appi.books.9780890423967.152139 American Psychiatric Association. http://www.psychiatryonline.com/pracGuide/pracGuideTopic_3.aspx.

Lisa F. Han, MPH, is a partner at Insight Therapeutics, LLC, Norfolk, VA.

H. Edward Davidson, PharmD, MPH, is Assistant Professor, Clinical Internal Medicine, Eastern Virginia Medical School, and a partner at Insight Therapeutics, LLC, Norfolk, VA.

Stefan Gravenstein, MD, MPH, FACP, is Professor of Medicine, The Warren Alpert Medical School of Brown University, and Clinical Director, Quality Partners of Rhode Island.

Disclosure of Financial Interests

The authors have no financial interests to disclose.

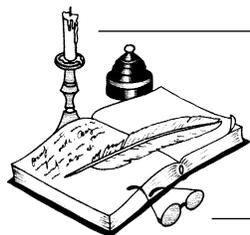
CORRESPONDENCE

Stefan Gravenstein

e-mail: sgravenstein@riqio.sdps.org

9SOW-RI-GERIATRICS-052009

THE ANALYSES UPON WHICH THIS PUBLICATION IS BASED were performed under Contract Number 500-02-RI02, funded by the Centers for Medicare & Medicaid Services, an agency of the U.S. Department of Health and Human Services. The content of this publication does not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government. The author assumes full responsibility for the accuracy and completeness of the ideas presented.



Physician's Lexicon

The Fruitful Words of Obstetrics

Each clinical discipline in medicine possesses its distinctive history, cultural milieu and terminology. Obstetrics is no different with its abundance of words pertaining to pregnancy and childbirth: terms such as gravid, gestating, parturient, fecund and pregnant.

Gravid is derived from the Latin *gravidus* meaning heavy (with child). Cognate words, such as gravity, gravitas and grave emphasize the weightiness while ignoring its obstetrical meaning. Isaac Newton coined the verb "gravitate," in the sense of moving toward something, to describe his theory of gravity, while *gravy* is an Old English word that is ultimately traced to the Latin, *granum* [grains].

The Latin word, *parere*, meaning producing or bearing, appears in obstetrical parous, parity and viviparous [producing living young; see also words such as vivid and vivisection.] Parity, from the Latin, *paritas* meaning equal, generates a word spelled the same as the obstetrical 'parity' but with a different meaning of equality (as in the phrase 'military parity.')

Parturient, meaning to be in labor, about to deliver, descends from the Latin, *parturire*, (literally, to wish to bring forth) and ultimately from *paere*, to bring forth. Cognate words include post-partum, parity, multiparous, oviparous, puerperal, parent and even repertory (*reparare*).

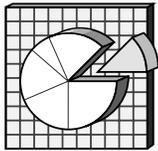
Labor, meaning to toil, to experience hardship, to work, is derived from the Latin, *labare*, meaning to totter, to slip out. Derivative words include laboratory, belabor, elaborate and collaboration.

Obstetrician, is from the Latin, *obstetricus*, literally meaning, 'she who stands before', from the Latin prefix, *ob*- [before] and *stare* [to stand]. That is, a midwife.

Midwife in an Old German term literally meaning 'with woman'; the midprefix is equivalent to the German, *mit*, meaning with.

Fecundity is from the Latin, *fecundus*, meaning fruitful, fertile; literally, "that which is produced." And fertile derives from the Latin, *fertilis* and ultimately from *ferre*, to carry to bear, to produce.

— STANLEY M. ARONSON, MD



Motorcycle Injuries In Rhode Island

Edward F. Donnelly, RN, MPH

Deaths of motorcyclists due to traffic crashes increased in the United States in each of the ten years 1998-2007. The annual number of deaths more than doubled, from 2,116 in 1997 to 5,154 in 2007.¹ This period of increased motorcycle mortality followed a period from 1980 to 1997 during which such deaths had declined steadily.

Overall, the number of motor vehicle traffic fatalities has held steady at just over 40,000 deaths per year nationally, since 1990.² Because the number of motor vehicle traffic deaths varied little in these years, motorcyclists' deaths increased steadily and dramatically as a proportion of the total traffic deaths; from 5% in 1997 to 12.6% in 2007. The age-adjusted population rate of mortality for motorcyclists as a part of motor-vehicle traffic mortality increased 62% in the 5 years from 1999 to 2004.³

METHOD

Mortality

Traffic death counts are drawn from the **Fatality Analysis Reporting System (FARS)**, a program of the **National Highway Traffic Safety Administration (NHTSA)** which lists motor vehicle traffic fatalities in the United States according to a strict case definition, with much detail about crashes, vehicles, and persons. The Rhode Island Department of Transportation collects data for FARS from police, medical examiner, and hospital records. FARS produces standard reports and data are available to all for analysis.

Rhode Island motorcycle mortality was obtained from FARS reports. The small number of motorcycle deaths reported annually in Rhode Island makes analysis difficult. An alternate approach to assess injuries is to use morbidity data. Hospital discharge data provide a case series with sufficient events for analysis during the same time period as the national findings. Hospital admission serves as a lower limit for the severity of the injury required to be included as a case.

Morbidity

The eleven acute care hospitals submit person-level records for each discharge in accordance with regulations developed under licensure statutes. Discharge records include dates, charges, demographics, and clinical variables with up to twenty-five diagnostic codes, based on the **International Classification of Diseases, Ninth revision, clinical modification (ICD-9-CM)**.^{4,5}

Identified cases include an external cause of injury code (Ecode) that indicates the cause of injury as motor vehicle traffic (ICD-9-cm E810 –E819) with a fifth character of 2, indicating that the

person was a motorcycle operator or 3, indicating a motorcycle passenger. Only those cases with a date of admission in the stated years are included in the analysis. Hospitalizations are reported at the time of discharge but cases are chosen for this analysis by the date of admission, placing the event in the correct year. Misclassification due to omission of Ecode, using a less specific Ecode, or miscoding is a threat to completeness.

RESULTS

Mortality

In the ten-year period 1998-2007, 108 motorcyclists in Rhode Island died in traffic crashes, just under eleven per year. Mortality rates for motor vehicle traffic crashes in Rhode Island are lower than those found in the United States as a whole, but the annual number of deaths showed an increasing trend similar to that seen nationally.

Morbidity

During 1997-2007, 1,263 motorcyclists were identified among those who were admitted to Rhode Island hospitals, over one hundred per year. Hospital admissions for motorcycle injuries have more than doubled from 71 in 1997 to 169 in 2007. Motorcycle injuries as a percentage of all admissions due to motor vehicle traffic injuries also followed an upward trend (Figure 1) against a background of traffic injury admissions that varied about a mean of 929 admissions per year, ranging from 843 to 984.

Males (89.7%) predominated among those admitted for motorcycle crash injuries, as did Whites (88.7%). Other race categories and persons of Hispanic origin are under-represented. Males are a slightly larger majority (93.7%) when attention is limited to operators. Operators of motorcycles make up the overwhelming majority of the motorcyclists admitted (92.4%). An annual average of fewer than seven motorcycle

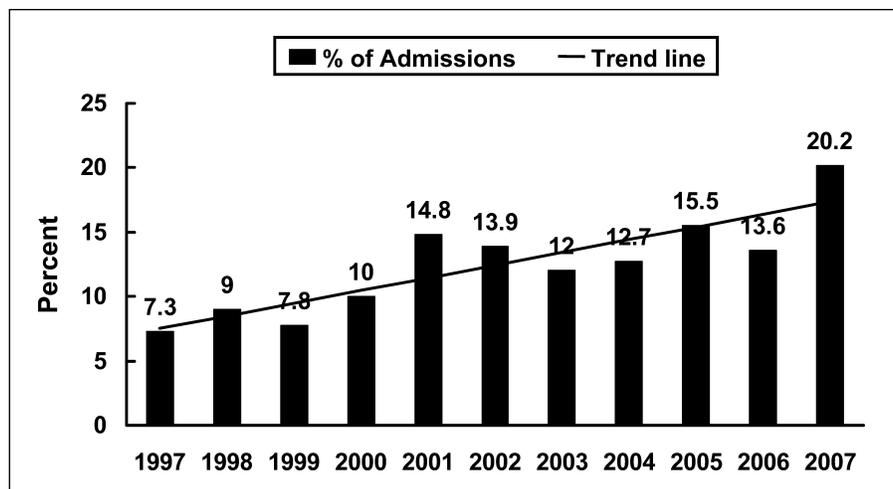


Figure 1. Motorcyclists as a percentage of motor vehicle traffic injury admissions, by year, Rhode Island 1998-2007

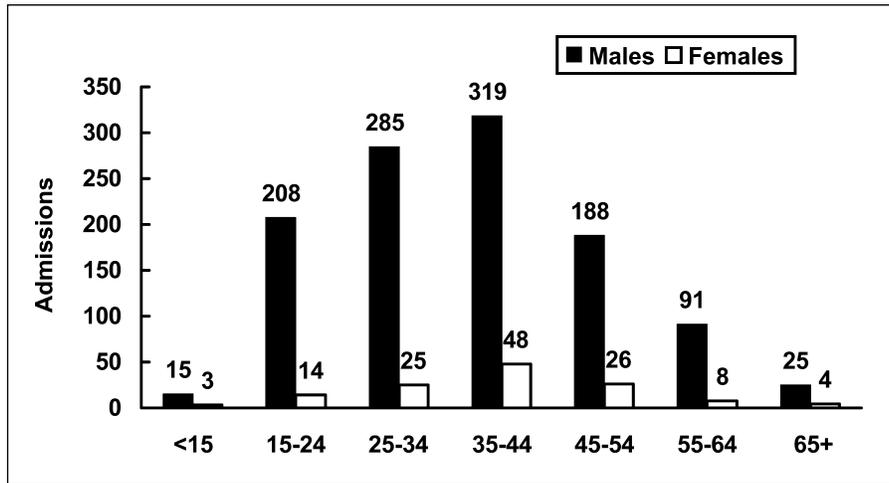


Figure 2. Number of motorcycle injury admissions by sex by age group, Rhode Island 1997-2007

passengers were admitted. Passengers in the in-patient records are more likely to be female (76.4%).

Motorcycle injury hospitalizations peak in the age group 35-44 years for males and females. (Figure 2) Over half of admitted males (53.4%) are between the ages of 25 and 44, inclusive. In Rhode Island the mean age of motorcyclists admitted with crash injuries increased from 34.2 years to 38.7 years during 1997-2007. An aspect of this age increase was an increase in the proportion of admissions who were 45 years of age or older, from 19.5% in 1998 to 32.1% in 2007.

BLACKSTONE VALLEY
COMMUNITY HEALTH CARE

We Believe
in work and life balance.

We Believe
in a friendly environment where you will
be supported in your practice of good medicine.

We Believe
in a commitment to patient care and education.

We Believe
in electronic medical records.

We Are
an expanding federally qualified community health center
recruiting for
BC/BE Family Practice Physicians.

Excellent compensation and benefits package to include •tuition loan repayment programs, •productivity incentive potential, •paid CME, •4 weeks vacation, •paid pension, •403b opportunities, •100% paid dental, •100% paid employee medical and life insurance - all this within lovely surrounding communities with bountiful recreational and cultural amenities. Don't miss out on this opportunity. To be considered email or fax a current CV with cover letter to:

Director of Human Resources, Blackstone Valley Community Health Care
42 Park Place, Pawtucket, RI 02864
E-mail: chersperger@bvchc.org,
Fax: 401-729-0438 Equal Opportunity Employer.
Not a J-1 opportunity

DISCUSSION

The increase in motorcycle traffic deaths that has occurred nationally is also seen in Rhode Island despite a small population and limited motorcycle season. The increase occurred while the number of deaths in occupants of passenger cars and light trucks steadily declined. This mortality is the most severe outcome of serious injuries, a larger number of which result in hospital admissions. Motorcycle injury admissions were highest among adult males 25-44 years of age, a different distribution than that found generally in motor vehicle crashes, where numbers peak among 15-24 year olds and decrease sharply in subsequent age groups.

sequent age groups.

Explanations for the increasing numbers of injuries include: 1) the aging of motorcyclists may make them more vulnerable to serious injury and death. In addition, those aging motorcyclists may be driving bigger bikes than the ones they learned on; 2) more are on the road, and the estimates of miles traveled have increased. This constitutes an increase in exposure; 3) motorcycle operators over age twenty-one are not required to wear helmets in Rhode Island after the first year of licensure; many do not.

Ironically, other vehicle travel had also increased through 2007, but with an accompanying decrease in mortality and hospital admissions for occupants of those vehicles.

Public health prevention efforts include support for educational and legislative efforts to increase helmet use. Primary care providers have opportunities to identify motorcyclists among their patients and to encourage safe riding.

REFERENCES

1. National Highway Traffic Safety Administration. *Motorcycles. Traffic Safety Fact Sheet (DOT-HS-810-990)*. <http://www-nrd.nhtsa.dot.gov/cats/index.aspx>
2. National Highway Traffic Safety Administration. *Traffic Safety Facts 2007*. <http://www-nrd.nhtsa.dot.gov/Pubs/TSF2007EE.PDF> accessed Feb 1, 2009.
3. CDC. QuickStats: Percentage Change in Death Rates for the Leading Causes of Unintentional Injury, by Mechanism of Injury -United States, 1999-2004. *MMWR*; 56: 309.
4. Public Health Service and Health Care Financing Administration, International Classification of Disease, 9th Revision, Clinical Modification, 6th ed. Washington: Public Health Service, 1996.
5. Buechner JS. Inpatient care for severe trauma in Rhode Island. *Med Health RI* 2004;87:115-6.

Edward F. Donnelly, RN, MPH, is Senior Public Health Epidemiologist, Center for Health Data and Analysis, Rhode Island Department of Health.

Disclosure of Financial Interest

The author has no financial interest to disclose.



Images In Medicine

An Incidental Finding On Plain Film Prompting the Diagnosis of Castleman's Disease

Jennifer Yates, MD, and Harry Iannotti, MD

A 49 year old otherwise healthy woman presented to her chiropractor with chronic back pain. As part of her evaluation, she underwent a plain film showing the findings below. Subsequent evaluation included CT of the abdomen showing a calcified soft tissue mass. A biopsy revealed small fragments of lymphoid tissue with mildly increased vascularity and increased plasma cells. She underwent exploratory laparotomy and excision of the mass, with the final pathological diagnosis of Castleman's disease (CD).

First described in the 1950s, CD can be described histologically as plasma cell variant and hyaline vascular variant. The hyaline vascular subtype is composed of multiple germinal centers with few plasma cells, while the plasma cell variant consists of continuous sheets of plasma cells. The degree of calcification within these lesions vary, but can be quite dramatic as seen in this patient. The differential diagnosis includes pheochromocytoma, lymphoma, sarcoma, and other vascular tumors.

Castleman's disease can be multicentric or unicentric. Multicentric disease usually portends a worse prognosis with systemic symptoms and a chronic clinical course. Surgical debulking for multicentric disease is often unsuccessful. Unicentric disease occurs in a younger population and is often surgically resectable; long-term outcomes are favorable. Medical

adjuvant treatments vary, ranging from chemotherapeutic agents to radiation. High dose steroids have also been used with variable success. Mortality of combined medical and surgical modalities in multicentric disease is high.

In conclusion, a plain film showing a calcified retroperitoneal mass led to the diagnosis of CD, with excellent early surgical and clinical outcomes.

REFERENCE

Bowne WB, Lewis JJ, et al. The management of unicentric and multicentric Castleman's disease. *Cancer* 1999;85:706-17.

Jennifer Yates, MD, is a Resident in Urology, The Warren Alpert Medical School of Brown University.

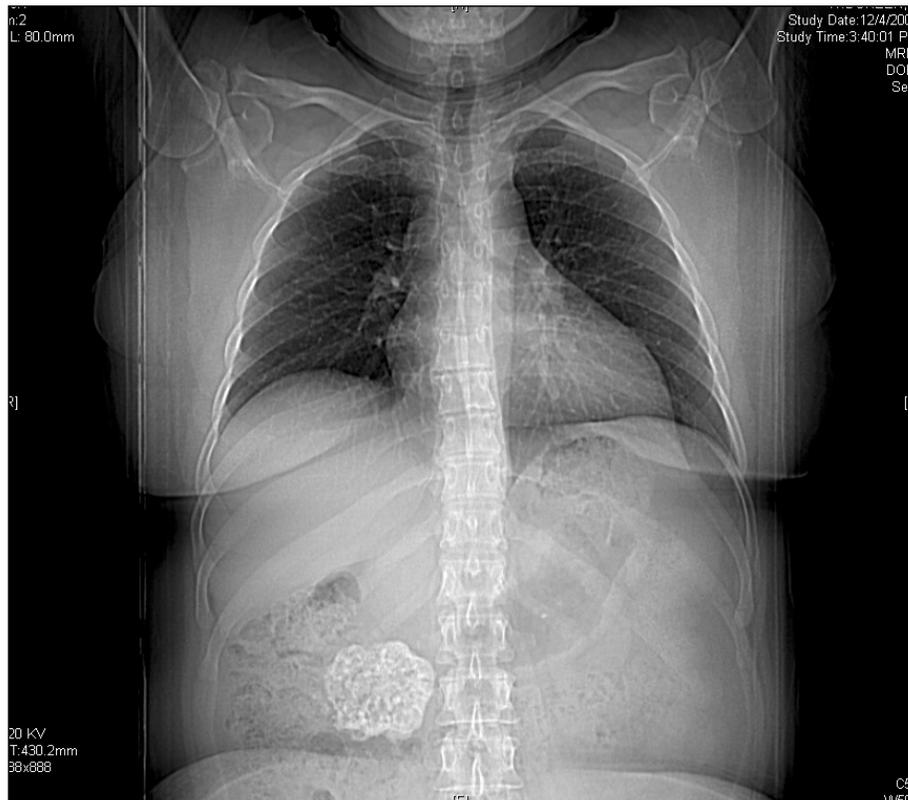
Harry Iannotti, MD, is Clinical Assistant Professor of Urology, The Warren Alpert Medical School of Brown University.

Disclosure of Financial Interests

The authors have no financial interests to disclose.

CORRESPONDENCE

Jennifer Yates, MD
e-mail: yatesnif@aol.com





The Creative Clinician

Acute Herpetic Infections Resulting In Acute Urinary Retention In Young Women

Sammy Elsamra, MD, and Joseph F. Renzulli II, MD

Case#1: A forty three year old woman presented to the emergency room in acute urinary retention. Several days previously, she noted reduction in her urinary stream and progressive difficulty voiding. She had intact sensation of bladder filling but could not voluntarily void. She denied fevers, chills, nausea, vomiting, dysuria, hematuria, urinary incontinence and constipation. She had no neurological complaints. A foley catheter was placed in the emergency department and a residual of approximately one liter was evacuated. Urine culture was sent and a lumbar MRI performed. Urine culture did not grow any bacteria, and her MRI was normal. She was referred to urology for further evaluation. The pertinent finding on physical examination was a pink, vesicular rash which was hypersensitive along the right sacral dermatomes. She noted that this rash had appeared 6 days prior to presentation and was causing an abnormal sensation in the right buttock and right lateral hip. The rash did not extend across the midline. A history of childhood chicken pox was confirmed, and she was diagnosed with acute urinary retention secondary to neurogenic bladder. The clinical diagnosis was sacral herpes zoster virus. She was taught clean intermittent catheterization and started on Famciclovir after consultation with both her neurologist and dermatologist. The patient performed clean intermittent catheterization for approximately three days and then voided spontaneously. Repeat post void residual one week later was 0cc and she had complete resolution of all signs and symptoms of herpes zoster.

Case#2: A thirty one year old woman presented to the emergency department with twenty four hours of urinary retention. Two days previously, she had developed urinary frequency and difficulty voiding. She denied fevers, chills, nausea, vomiting, dysuria, or hematuria. She did have mild suprapubic discomfort. Sensation to void remained intact but she was unable to voluntarily void. A foley catheter was placed and a volume of 500cc was drained from her bladder. Urine analysis was negative and she denied history of recurrent **urinary tract infections (UTIs)**. On questioning, she noted new painful vesicles on the right buttock region close to the anus. She also revealed that she had unprotected anal intercourse with a new partner approximately ten to twelve days prior to the appearance of the vesicles. A diagnosis of acute herpes simplex virus was made and the patient was educated on clean intermittent catheterization and started on oral Famciclovir therapy. Testing for other sexually transmitted diseases was performed, and she was referred to an infectious disease specialist. The vesicles resolved several days after initiation of therapy and she voided spontaneously after three weeks of clean intermittent catheterization.

Acute urinary retention is a common urologic problem.

The vast majority of patients are men with **benign prostatic hyperplasia (BPH)**; the evaluation and treatment algorithms for BPH are well described.¹ In women, the evaluation and treatment of urinary retention are more elusive. A recent review article outlined a myriad of potential etiologies for acute urinary retention in women including: multiple sclerosis, spina bifida occulta, tethered cord, viral sacromyeloradiculitis, lumbar disc protrusion, cauda equine syndrome, primary bladder neck obstruction, pseudoomytonia, reflex sympathetic dystrophy, and psychogenic urinary retention.² Many of these etiologies are rare and studies pertaining to these pathologic mechanisms of urinary retention are limited. In this article, we would like to detail anogenital **herpes simplex virus (HSV)** and sacral **herpes zoster virus (HZV)** as potential causes of acute urinary retention in women.

HSV 1 and 2 and HZV are common yet under diagnosed infections worldwide.³ In the United States in 2003, there were approximately 200,000 initial visits to doctors' offices for these viruses.¹ The transmission of the virus by close contact of skin or mucous membranes results in the high prevalence of

HSV. Furthermore, the virus increases the risk of susceptibility to HIV by 3-fold. Once transmitted, the herpes virus initiates cytolytic replication in epithelial cells at the site of entry. Histologically, this is manifested as intranuclear inclusions and fused cells that form multinucleated giant cells. On physical examination this translates to fluid-filled blisters that contain cellular debris, inflammatory cells, and progeny virions.⁴ This process, often referred to as the primary infection, may often have a variable constellation of clinical symptoms ranging from mild to severe. The symptomology ranges from painful oral and genital ulcers (98%), tender local lymphadenopathy (80%) to constitutional symptoms such as fever or headache (67%). Dysuria was found in the majority of patients with sacral HSV (63%). In women experiencing their first episode of primary genital herpes, 82% had HSV isolated on urethral cultures.^{5 6}

Chickenpox and herpes zoster represent the two clinical manifestations of varicella zoster virus infection.⁷ Primary infection with VZV is transmitted through airborne droplets to the nasopharyngeal lymphoid tissue. This results in a host of immunologic changes responsible for the initial infection. Preferential infection of CD4 T-cells and the subsequent down regu-

lation of MHC class I expression have been described as possible etiologies for the virus's ability to evade the immune system and enhance transport to cutaneous epithelium. Clinical manifestations, in an immunocompetent host, include fever, malaise, and pharyngitis after a 2 to 3 week viral incubation period. This is often followed by a generalized vesicular rash within 24 hours. The rash persists for approximately four days after which there is crusting of the vesicles ending the infective period. Atypical presentations may be seen in immunocompromised individuals, including absence or unusual distribution of the rash, prolongation of the prodromal period, or other associated illnesses.⁸

HZV represents a reactivation of the latent herpes varicella zoster virus. After initial infection with VZV the virions exhibit latency within the dorsal root ganglions.⁹ The virions possess several mechanisms to evade the immune system.¹⁰ Clinically, patients develop a rash of erythematous papules distributed over one dermatome, which may be preceded by a burning pain over the same distribution. These papules coalesce and form bullae.¹¹ A well-known sequela of this disease is post-herpetic neuralgia. Elliott reported that peripheral motor neuropathy, also known as segmental motor paresis occurs in 3% of those with herpes zoster and may reflect either pain or sensory abnormalities in the affected dermatome.¹¹ Involvement of the sacral dermatomes can result in acute urinary retention.

The mechanism of acute urinary retention has been debated in the setting of sacral herpetic lesions. Severe dysuria associated with HZV infection, coined herpetic cystitis, has been implicated as a possible source of urinary retention. Alternatively, in the setting of HSV and HZV infections, the viruses are harbored in the dorsal root ganglia and sacral nerve roots. This results in detrusor areflexia likely induced by a sacral myeloradiculitis.¹² This theory was originally coined as Elsberg Syndrome.¹³ Physical examination of a patient with sacral myeloradiculitis often reveals a saddle anesthesia, poor perineal muscle reflex, decreased sphincter tone, lower extremity weakness and/or parasthesias. The neurologic manifestations are typically preceded by the vesicular rash although rarely the reverse is also observed. Associated bowel dysfunction may be present in up to 50% of affected patients.² The majority of patients are not subjected to urodynamic evaluation because most of these patients will void spontaneously. However, when a cystometrogram is performed the usual diagnosis is a hypotonic or areflexic detrusor muscle. The cited bladder dysfunction almost always resolves spontaneously within 12 weeks of onset.^{14, 15}

Treatments for herpes viruses have been well established. Anti-viral therapy has been shown to decrease the severity and duration of the initial infection. Famciclovir or Valacyclovir is given two or three times daily for seven to ten days for initial infection. Both agents can also be used in shorter duration (three to five days) for recurrent infection upon detection of the first clinical sign. Further, there is utility in using either medication as a daily maintenance therapy to achieve suppression of future outbreaks.^{5, 16}

The use of **clean intermittent catheterization (CIC)** is the mainstay of management of acute urinary retention. This allows the bladder to be emptied in a timed fashion, to avoid stretch injury to the detrusor muscle and avoid potential de-

velopment of upper tract damage. Further, this allows the bladder to cycle and allows for initiation of spontaneous voiding between catheterizations. If the patient does not begin to void spontaneously within 12 weeks of presentation or the residual urinary volumes remain elevated (>250cc), urodynamics should be performed.

REFERENCES

1. Roehrborn CG, McConnell JD. Etiology, Pathophysiology, epidemiology, and natural history of benign prostatic hyperplasia. *Campbell's Urology 8th Ed*, Walsh PC, Wein AJ, et al. Saunders Elsevier, Philadelphia, PA, Volume II, Section VI, Ch 38,2002: 1297-307.
2. Smith CP, Kraus SR, Boone TB. Urinary retention in the female. AUA Update Series 1999, Lesson 10, Vol XVIII, pp 146-151.
3. Centers for Disease Control and Prevention, Division of Sexually Transmitted Diseases. Sexually Transmitted Diseases Surveillance, Other Sexually Transmitted Diseases, 2003 (www.cdc.gov/std/stats/03pdf/otherSTDs.pdf)
4. Gupta R, Warren T, Wald A. Genital Herpes. *The Lancet* 2007; Dec 22;370(9605):2127-37
5. Corey L, Adams HG, et al. Genital herpes simplex virus infections. *Ann Intern Med* 1983; 98:958-72.
6. Kimberlin DW, Rouse DJ. Clinical practice. Genital herpes. *NEJM* 2004; 350: 1970-7.
7. Lopez AS, Burnett-Hartman A, et al. Transmission of newly characterized strain of varicella-zoster virus from a patient with herpes zoster in a long-term-care facility, West Virginia, 2004. *J Infect Dis* 2008; 19: 646-53.
8. Schmader K. Herpes Zoster in older adults. *Clin Infect Dis* 2001; 32:1481-6.
9. Lungu O, Annunziato PW, et al. Reactivated and latent varicella-zoster virus in human dorsal root ganglia. *Proc Natl Acad Sci USA* 1995; 92:10980-4.
10. Ku CC, Padilla JA, et al. Tropism of varicella-zoster virus for human tonsillar CD4(+) T lymphocytes that express activation, memory, and skin homing markers. *J Virol* 2002; 76:11425-33.
11. Rowbotham M, Harden N, et al. Gabapentin for the treatment of postherpetic neuralgia. *JAMA* 1998; 280:1837-42.
12. Haanpää M, Paavonen J. Transient urinary retention and chronic neuropathic pain associated with genital herpes simplex virus infection. *Acta Obstet Gynecol Scand* 2004; 83:946-9.
13. Eberhardt O, Küker W, et al. HSV-2 sacral radiculitis (Elsberg syndrome). *Neurology* 2004; 63: 758-9.
14. Acheson J, Mudd D. Acute urinary retention attributable to sacral herpes zoster. *Emerg Med J* 2004; 21:752-3.
15. Chan JE, Kapoor A. Herpes zoster infection. *Can J Urol* 2003; 10:1912-3.
16. Shafran SD, Tyring SK, et al. Once, twice, or three times daily famciclovir compared with aciclovir for the oral treatment of herpes zoster in immunocompetent adults. *J Clin Virol* 2004; 29:248-53.

Sammy Elsamra, MD, is a resident in Surgery (Urology) at the Warren Alpert Medical School of Brown University.

Joseph F. Renzulli II, MD, is a Clinical Assistant Professor of Surgery (Urology) at the Warren Alpert Medical School of Brown University.

Disclosure of Financial Interests

The authors have no financial interests to disclose.

CORRESPONDENCE

Joseph F. Renzulli II, MD
Rhode Island Hospital
2 Dudley St, Suite 174
Providence RI 02904
Phone: (401) 444-8570
e-mail: jrenzulli@lifespan.org

Quality Health Care and the Professional Nurse – A Physician's Perspective

Milton W. Hamolsky, MD

In 1981, I testified to the National Commission on Nursing:

“...doctors, health administrators, health care planners, and resource allocators do not fully understand the roles of the professional nurse in our health care system...Society has generally accepted the...physician as the ‘captain of the health care team.’ It does not similarly accept the fundamental, independent and interdependent roles of the nurse in planning and implementation of health care...The general image of the nurse remains to too many an undifferentiated subordinate who follows the doctor’s orders, the caring individual who charts vital signs...gives the back rub and carries the bedpan. Individual physicians, of course, know that without the nurse their work would not be possible. Doctors, administrators, trustees and health care planners clearly recognize the essential role of the nurse shortly after they or their family members become hospitalized patients.” I urged “a basic change in our collective attitudes so that we do acknowledge that the nurse is an independent professional and, as such, deserves recognition and functional definition as a true partner with the doctor in medical care; and a reordering of our sensitivities, our commitments and our dedication to establish the professional nurse as a truly equal partner entitled by a long history of proven performance to equal appreciation, equal stature, equal professional standing, equal resources.”

Twenty-eight years later, let me restate my enthusiasm, and respect for, the nurse.

As a medical student, I soon suspected that the seasoned bedside nurse, and the veteran emergency department nurse, knew as much as (did I dare believe even more than?) I. During my rotation on obstetrics, which involved delivering babies “on district” (in patients’ homes), I offered silent thanks that the visiting nurse was always there before we arrived and, while assuring that everything went properly, graciously permitted us to feel that we had something to do with the miracle of the new life. As a sub-intern, I saw a beginning intern—reputed to be the top in his graduating class—become immobilized when faced with his first diabetic coma patient. I saw the nurse quickly sense, and correct, this.

As a resident, I learned that the “Head Nurse” frequently knew more about what was happening to my patients than I did. I learned never to go to the patient (except in an emergency) without touching base with the nurse, without first reading the often more informative nurses’ notes. Years later, as a clinical investigator reviewing patients’ records, I was grateful for the nurses’ notes which frequently contained important documentation for my search and—besides—were usually legible. One of my deep personal regrets is that, like most of my academic colleagues, I did not list as participating author (ess) in my publications the nurses who made essential contribu-

tions to the quality of care which made my studies possible. Today—*mirabile dictu*—we have the integrated, sequential progress notes. Again, the nurses’ documentation is often the most trenchant and informative.

As the Chief Resident, I valued the joint nurse-resident daily patient rounds. During one of my rare rotations to a community hospital, outside of the academic teaching orbit, I was surprised to witness quality care and satisfactory outcomes provided by “only the nurse and private physician.” As a reluctant patient, I was gratified by the physician attention I received (a Chief Resident is considered an important link in the medical hierarchy) but puzzled at first by the aura of comfort and security and personal relief I felt when “my nurses(s)” entered the room. During that year, I learned more forcefully the powerful teaching role of the nurse for interns and medical students.

As I climbed the institutional ladder, I observed repeatedly the quiet, selfless contributions of the nurse in guiding interns, in discovering—and correcting—the erroneous order before its implementation, in comforting the anxious patient awed by the barrage of technology, in comforting the distraught family members, in compassionately sharing with the crying patient who had just been informed of the dreaded cancer and the need for frightening surgery, in the equal management of the agitated, or depressed, or threatening, or alcoholic, or unwashed, or senile, or incontinent, or psychotic patients. I was intrigued by the idea that every young physician might benefit from a six-week stint as a nurse’s assistant early in the course of training. I gradually learned that the nurses’ contributions are the essence of “quality health care” in our system. To those who know my pride in the medical professions, I need hardly add that such judgment in no way detracts from the contributions of the good and caring physicians I have known.

As Chief of Medicine at Rhode Island Hospital for 24 years, I received numerous communications from patients and families. The critical ones virtually never criticized “the nurse(s).” The grateful writers (the vast majority) invariably praised the nurse(s), often by name. I shared the frustration of the nursing supervisors in their daily, and nightly, struggles to provide adequate staffing. I witnessed the exhausting frustration of the staff nurse who finally leaves the shift knowing she could do more, should do more for her patient, but cannot, because of the overwhelming demands. And yet they do—day after day, night after night. I marveled at the abilities of both the nurse and the resident to keep abreast of the exploding technologies, despite the primary demands of the sick patients. My department increasingly asked nurses to assume procedures and roles which were “always the doctors’ job.” I observed the Joint Practice Sub-Committee of the Medical Affairs Committee pinpoint key patient care problems, provide realistic solutions and

spearhead the implementation of improvements such as record-keeping, DNR policy, drug usage, care of the disturbed patient, reductions in septicemia from peripheral lines, etc etc.

On a personal level, during the fatal illness of my son, my family and I were overwhelmed by the nurses' care and caring, their implementation of the medical care plan, their comfort and compassion, their meticulous attention to pain relief, nutrition and hydration, management of nausea, personal hygiene and, above all, the maintenance of dignity. After his first hospitalization, he paid nursing the ultimate tribute (voiced so often by patients and families) of requesting return to the same unit when re-hospitalization was necessary.

I shared in the developments of a new medical school, an improving Department of Medicine and its subspecialties, and growing programs in ambulatory care, in community outreach, in quality assurance, utilization reviews, discharge planning, etc. None of these could have developed to any level of excellence without the essential participation of the nurse. I am puzzled by the paradox of the frequent failure to incorporate the nurse, early and continually, in the planning processes. For I witnessed again and again the contribution of the nurse's expertise and perspec-

tive in the later evolution of the programs. Lewis Thomas was right: "the institution is held together, *glued* together, enabled to function as an organism, by the nurses and nobody else." To the glue, I would add: "The nurses provide the lubricant that keeps the meshing gears going, day after day, night after night."

A personal note is in order. My first wife, now deceased, was a nurse; my daughter is a nurse; my second and current wife is a nurse; our daughter is a nurse; and our granddaughter was just accepted to URI's College of Nursing. I trust that any judgment of conflicts of interest will be balanced by the putative virtues of consistency.

Milton Hamolsky, MD, is Professor Emeritus of Medicine, The Warren Alpert Medical School of Brown University.

CORRESPONDENCE

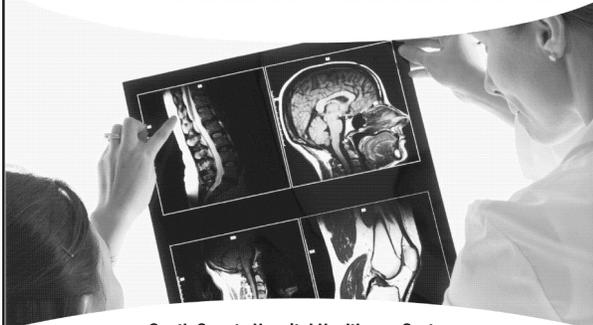
Milton Hamolsky, MD

e-mail: mhamolsky@verizon.net

Disclosure of Financial Interests

The author has no financial interests to disclose.

*South County Hospital
Medical & Wellness Center*



South County Hospital Healthcare System
is a full-service, not for profit, regional health care resource serving residents and visitors to southern Rhode Island, the state's fastest growing area. Our brand new facility in East Greenwich provides walk-in and urgent care, as well as a broad range of family and specialty medical services including Lab Services, Diagnostic Imaging, Wound Care, Anticoagulation Management, Physical and Occupational Therapy, Travel Clinic, Workers Compensation and Occupational Health.

URGENT CARE PHYSICIAN

This per diem opportunity is located in our East Greenwich Medical and Wellness Center (hours of operation: Mon-Fri, 8am-6pm and Sat, 8am-4pm). Position requires experience with Urgent Care walk-in, Occupational Health and Sports physicals/ injuries. Must be Board Certified in Family Medicine or Board Certified in Internal Medicine and Pediatrics.


SOUTH COUNTY HOSPITAL
HEALTHCARE SYSTEM
Just what the patient ordered.

To learn more about the advantages of joining our staff, contact:
Cheryl at (401) 788-1986 or cbotwick@schospital.com

www.schospital.com

EOE

If your patient
has been diagnosed with
Cancer
and they're afraid they cannot afford
healthcare,
Call Us Today!

The Affiliates of 21st Century Oncology provide a full spectrum of radiation therapy treatment modalities for cancer patients in a warm and caring environment. We treat patients regardless of their ability to pay. Let us help your patients receive the radiation therapy services they need.

 **Roger Williams Radiation Therapy
21st Century Oncology Affiliate**

For specific information regarding income requirements, have your patient call our Office Financial Manager

Roger Williams Radiation Therapy • 50 Maude Street • Providence • (401) 456-2690
Southern New England Regional Cancer Center • 115 Cass Ave., Ste 1 • Woonsocket • (401) 356-1701
South County Radiation Therapy • 142 Kenyon Avenue • Wakefield • (401) 284-0850

NINETY YEARS AGO, APRIL 1919

Because key Medical Society members staff were serving in World War I, the Society suspended publication of the Journal through 1919.

FIFTY YEARS AGO, MAY 1959

The Journal printed the talks of several presenters at the Scientific Session of the American Heart Association.

Claude S. Beck, MD, Professor of Cardiovascular Surgery, Western Reserve University, discussed "The Treatment of Coronary Heart Disease." He concluded: "Anginal pain is most effectively treated by surgical operation. This operation provides the only protection against ventricular fibrillation occurring in hearts that structurally are too good to die."

David Gelfand, MD, Assistant Professor of Cardiology, University of Pennsylvania, discussed "Cardiacs Can Work." Dr. Gelfand, Director of the Cardiac Classification Unit in Philadelphia, discussed those units, comprised of a cardiologist, psychiatrist, medical social worker, and vocational counselor. From February 1952 to December 1956, 616 patients were referred to the Philadelphia unit, 446 by industry. Most (86.2%) were working full or part-time, or on sick leave from full-time jobs. The Unit found that 15.8% of patients did not have heart disease.

W. Sterling Edwards, MD, Associate Professor of Surgery, Medical College of Alabama, discussed "Recent Advances in Arterial Surgery."

The Journal printed an abstract from "Puerperal Fever as a Private Pestilence," by Oliver Wendell Holmes, MD, Parkman Professor of Anatomy and Physiology, Harvard University. The Rhode Island Medical Library owned a copy of the essay. Dr. Holmes advised: "The disease known as puerperal fever is so far contagious as to be frequently carried from patient to patient by physicians and nurses."

TWENTY-FIVE YEARS AGO, MAY 1984

An Editorial, "The Medicare Assignment Option: The Debate Intensifies," criticized the bill, recently introduced in Congress by House Aging Committee Chairman Edward Roybal (D-CA), that would bar physicians from charging the difference between Medicare rates and "usual, customary charges" and that would require hospitals to deny staff privileges to physicians who refused Medicare assignment. The Editorial complained that Congress was renegeing on a promise to seniors, to take care of their medical expenses, and to physicians, to pay customary rates. Rates of assignment ranged from 82% in Rhode Island to 19% in Wyoming.

Michael J. Follick, PhD, Edward W. Abergner, PhD, David K. Ahern, PhD, and James R. McCartney, MD, in "The Chronic Low Back Pain Syndrome: Identification and Management," noted that "Appropriate treatment should lead to better services, improved health status, and reduction in health care costs."

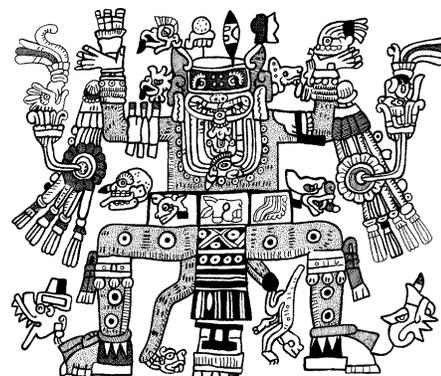
Michael Somers ('84, Program in Medicine, Brown) and Arthur I. Geltzer, MD, in "The Use of Electroretinograms (ERG) in Diagnosing Retinitis Pigmentosa and Related Visual Disorders," declared the test "dependable." "...[It] gives valuable information within the limits of its capability." The authors had studied the impact of the unit, purchased by the Rhode Island Hospital Guild for \$5,000. Nine men and 14 women, ages from 9 years to 80 years, with positive clinical symptoms, positive funduscopic findings, positive family history, and, in 2 cases, prognosis of a vitrectomy, participated.

Richard M. Cowett, MD, and Don B. Singer, MD, in "Clinicopathological Conference: Multiple Abnormalities in a Preterm Infant with Growth Retardation," traced the problem to Trisomy 18.

Fred Brosco ('84 Program in Medicine, Brown) and Tom J. Wachtel, MD, contributed "A Case of Amenorrhea and Decreased Vision." They concluded: "Apparently unrelated symptoms may be manifestations of the same disease process." The patient, a 22 year-old obese woman, had *pseudotumor cerebri*.

**Family Doctor
or Med-Ped**

PROVIDENCE, RI: Licensed community health centers seek FAMILY or Med-Ped PHYSICIAN for Asst. Medical Director. Start 6/09. Responsible for clinical care (40%), administration, program development and EMR. Candidate with 3+years of progressively responsible medical leadership sought. EEO Employer. Email CV to: SblockMD@providencechc.org or fax to 401 . 444 . 0469



The Name of Choice in MRI



'OASIS' 1.2 Tesla open-sided scanner

Open MRI

of New England, Inc.

- High Field Open-Sided and Short-Bore Systems
- Fast appointments and reports
- Insurance authorization services, physician web portal and EMR system interfaces



ADVANCED

Radiology, Inc.

- 'Multislice' CT systems
- Digital xray, bone density and ultrasound
- Insurance authorization services, physician web portal and EMR system interfaces



Multislice CT system



ADVANCED Radiology, Inc.

525 Broad St • Cumberland
T 725-OPEN (6736) F 726-2536

1002 Waterman Ave • East Providence
T 431-5200 F 431-5205

148 West River St • Providence
T 621-5800 F 621-8300

501 Great Road • North Smithfield
T 766-3900 F 766-3906

335 Centerville Rd • Warwick
T 732-3205 • F 732-3276

101 Airport Rd • Westerly
T 315-0095 F 315-0092



Does Your Insurance Company Have the Strength to Endure?

Strength and flexibility. That's what your practice needs to thrive during challenging economic times. NORCAL Mutual Insurance Company has received an "A" (Excellent) financial rating from A.M. Best, the leading provider of insurance industry ratings, for the past quarter century. Our financial stability has allowed us to return more than \$372 million in dividends to our policyholders.

Call RIMS Insurance Brokerage Corporation at
401.272.1050 to purchase your NORCAL coverage.



Our passion protects your practice.