

RHODE ISLAND MEDICAL JOURNAL



**DR. JOLIS
DESIGNS
MEDICAL
APPS
PAGE 60**



**INTERVIEW WITH DR. SATCHER,
FORMER SURGEON GENERAL
PAGE 57**



**DR. TAYLOR
AWARDED
INNOVATION
FELLOWSHIP
PAGE 64**



SPECIAL SECTION ORTHOPEDICS & REHABILITATION

Some things have changed in 25 years.



Some things have not.

Since 1988, physicians have trusted us to understand their professional liability, property, and personal insurance needs.

Working with multiple insurers allows us to offer you choice *and* the convenience of one-stop shopping. Call us.



800-559-6711

RIMS-INSURANCE BROKERAGE CORPORATION

MEDICAL/PROFESSIONAL LIABILITY PROPERTY/CASUALTY LIFE/HEALTH/DISABILITY



18 ORTHOPEDICS & REHABILITATION

JON MUKAND, MD, PhD
GUEST EDITOR

-
- 19** Rehabilitation for Total Joint Arthroplasty
SCOTT RITTERMAN, MD; LEE E. RUBIN, MD



-
- 23** Management of Ankle Fractures
RAYMOND Y. HSU, MD; JASON BARITEAU, MD



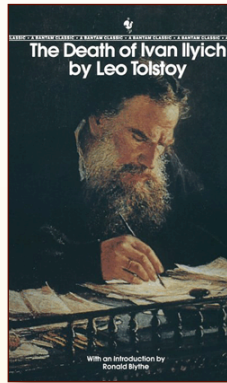
-
- 28** Essentials of Anterior Cruciate Ligament Rupture Management
STEPHEN A. KLINGE, MD; GREGORY A. SAWYER, MD;
MICHAEL J. HULSTYN, MD



-
- 33** Diagnosis and Management of Lisfranc Injuries and Metatarsal Fractures
HEATHER E. GOTHAN, MD; CRAIG R. LAREAU, MD;
TODD A. FELLARS, MD

-
- 37** Nerve Compression Syndromes of the Upper Extremity: Diagnosis, Treatment, and Rehabilitation
P. KAVEH MANSURIPUR, MD; MATTHEW E. DEREN, MD;
ROBIN KAMAL, MD

RHODE ISLAND MEDICAL JOURNAL



8 COMMENTARY

Neurological Novels

JOSEPH H. FRIEDMAN, MD

From So Simple a Beginning

STANLEY M. ARONSON, MD

100 Years Ago:
Denial of Charges

15 GUEST COMMENTARY

Spine Deformity Surgery in Ghana

ALAN H. DANIELS, MD



55 RIMS NEWS

Bike Helmet Distribution

Tar Wars Poster Contest

House Calls at
the State House



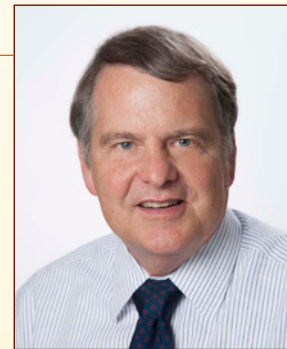
57 SPOTLIGHT

Dr. Steven A. Rasmussen:

From Brown Alum

to Department Chair

MARY KORR



72 PEOPLE

Recognition

Appointments

Obituaries



78 PHYSICIAN'S LEXICON

Words Expressing Finality

STANLEY M. ARONSON, MD

80 HERITAGE

50 Years Ago:

Mission to Algeria

MARY KORR

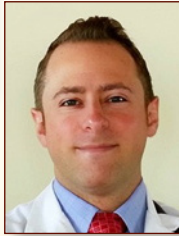


RHODE ISLAND MEDICAL JOURNAL

IN THE NEWS



DR. DAVID SATCHER 57
From Alabama
farm to Surgeon
General



ALPERT GRADUATE 60
Tim Jolis, MD
and his apps

E.D. COSTS IN U.S. 62
Analysis by
Drs. Lee & Zink



DR. LINAKIS 63
\$3.2M grant
to study teen
alcohol use

KOLLER LEAVING RI 64
Was 1st U.S. Health
Commissioner



DR. TAYLOR – 'INNOVATOR' 64
Grant to defeat 'Hep C'

RHODE ISLAND HOSPITAL 64
Adds MRI in ED

65 WESTERLY SALE OK'D
To CT. corp for \$69.1M

65 OB/GYN ASSOCIATES
Joins Women's
Collaborative

65 SOUTHCOAST
Grape Street
Orthopedics joins

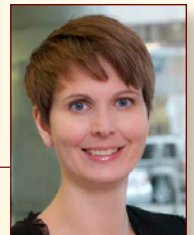
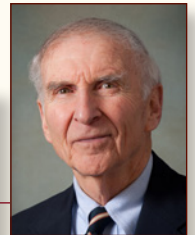
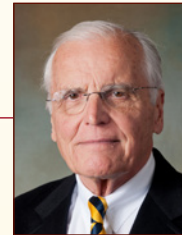
65 COASTAL MEDICAL
Adds Hillside,
South County groups

66 DR. RICH
Methadone use
in prisons

66 W&I'S DR. MATTESON
\$1.6M NIH grant

67 DR. LAFRANCE
Study on brain injuries

67 DR. MOORE
Ovarian cancer study



MAY 2013
VOLUME 96 • NUMBER 5

PUBLISHER

RHODE ISLAND MEDICAL SOCIETY
WITH SUPPORT FROM RI DEPT. OF HEALTH

PRESIDENT

ALYN L. ADRAIN, MD

PRESIDENT-ELECT

ELAINE C. JONES, MD

VICE PRESIDENT

PETER KARCZMAR, MD

SECRETARY

ELIZABETH B. LANGE, MD

TREASURER

JOSE R. POLANCO, MD

IMMEDIATE PAST PRESIDENT

NITIN S. DAMLE, MD

EXECUTIVE DIRECTOR

NEWELL E. WARDE, PhD

EDITOR-IN-CHIEF

JOSEPH H. FRIEDMAN, MD

ASSOCIATE EDITOR

SUN HO AHN, MD

EDITOR EMERITUS

STANLEY M. ARONSON, MD

PUBLICATION STAFF

MANAGING EDITOR

MARY KORR
mkorr@rimed.org

GRAPHIC DESIGNER

MARIANNE MIGLIORI

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

RHODE ISLAND MEDICAL JOURNAL (USPS 464-820), a monthly publication, is owned and published by the Rhode Island Medical Society, 235 Promenade Street, Suite 500, Providence RI 02908, 401-331-3207. All rights reserved. ISSN 2327-2228. 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. Classified Information: Cheryl Turcotte, Rhode Island Medical Society, 401-331-3207, fax 401-751-8050, cturcotte@rimed.org.

RHODE ISLAND MEDICAL JOURNAL



CASE REPORT

40 Trouble from the Tropics:

Challenges in Managing Malaria in Rhode Island

JONATHAN DWORKIN, MD; MARJORIE JANVIER, MD; DIANA TREABA, MD;
ADRIAN GARDNER, MD

CONTRIBUTIONS

43 Resident Physician Preventive Health Behaviors

and Perspectives on Primary Care

GEETIKA GUPTA, MD; MARK D. SCHLEINITZ, MD, MS; STEVEN E. REINERT, MS;
KELLY A. MCGARRY, MD

PUBLIC HEALTH

48 Health By Numbers:

Rhode Island Youth Tobacco Use:

Implications for Pediatricians and Family Physicians

CYNTHIA ROBERTS, PhD; JOHN PATENA, MA; DEBORAH N. PEARLMAN, PhD

Vital Statistics

COLLEEN FONTANA, STATE REGISTRAR

IMAGES IN MEDICINE

53 Pulmonary Cryptococcosis

CAROLYNN M. DEBENEDECTIS, MD; RUSSELL J. MCCULLOH, MD;
TERRANCE T. HEALEY, MD



Concierge Insurance Service

Are you underwhelmed by the level of care and coverage you receive from your current insurance company? Maybe it's time for a second opinion?

The Rhode Island Medical Society and Butler & Messier Insurance are offering an exclusive CONCIERGE PROGRAM for all your insurance needs. Everyone in the Rhode Island medical community is eligible for the best rates for your home and auto insurance, as well as your office policies.

For a no obligation second opinion call John Divver at 401.728.3200 or visit www.ButlerandMessier.com/RIMS



EXCLUSIVE INSURANCE PARTNERS

www.ButlerandMessier.com



Neurological Novels

JOSEPH H. FRIEDMAN, MD
joseph_friedman@brown.edu

LIKE EVERYONE ELSE, the older I get, the more frightened I become with each memory lapse. It's not hard to reassure my many elderly patients that it's normal to forget things, that their friends and relatives do this all the time and joke about their "senior moments," but it's a bit different when reassuring myself. I'm sure all of the older people reading this (and you may use your own idea of what "elderly" means) do this frequently. When you know something about the disease you worry about, you know more about what to look for, when the alarms should go off and when they shouldn't, but you also know that one of the problems with dementia is that you lose that insight that tells you when you need to really worry. Putting your car keys in the fridge may start looking like a reasonably good hiding place. So, a knowledgeable person knows that dementia can sneak up on you, especially if you tend to deny problems. It is a scary thing, perhaps the scariest. It is not something to be made into fiction unless you really can get the story right.

In preparing for a book club discussion on a story about a brain-injured victim, I first read a book by the same author about someone developing Alzheimer's disease. I usually shy away from novels in which neurological problems play a



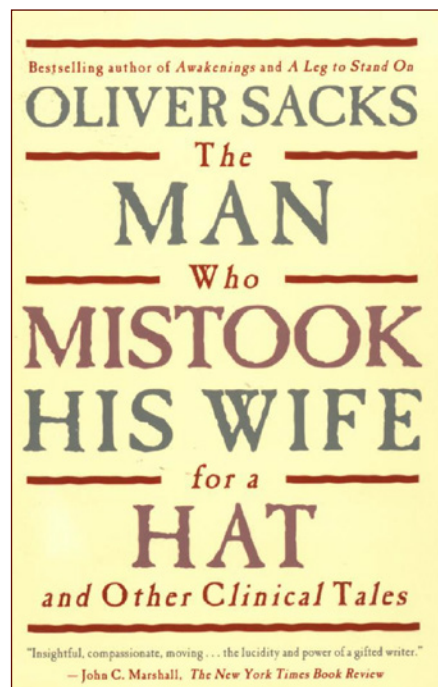
central role. I fear that I will find the description of the deficit distracting, since I'm a neurologist with a lot of years under my belt. Oliver Sacks, MD, a trained, albeit non-practicing neurologist, who writes non-fiction descriptions of real people with real, and always interesting

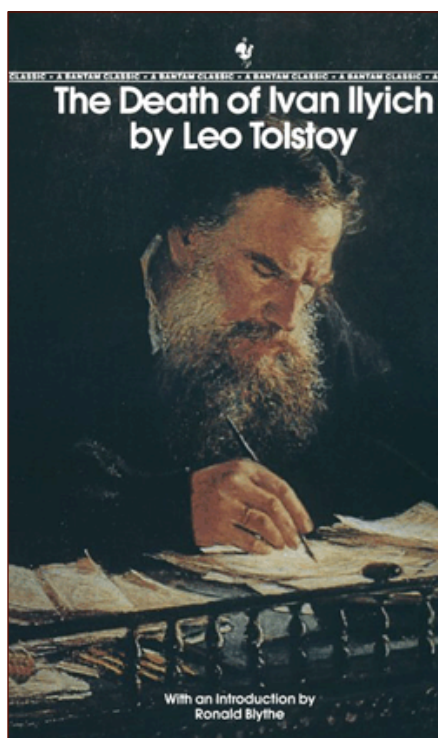
problems, is quite a different story. He accurately describes what patients look like to others, how they see themselves, and often how they think they appear to others. In this he is unsurpassed. His explanations of these frequently bizarre situations (e.g.: *The Man Who Mistook His Wife For a Hat*) are, perhaps, a bit

less insightful, but do not interfere with the amazing and wondrous true stories he has to tell. His goal, I think, is to describe how differently we all see and interact with the world, especially those whose brains work in ways different from the norm.

Novels are not true stories, although one can argue that real life is best described in fiction, and, as Oliver Sacks' works demonstrate, reality is stranger than fiction. Novels incorporating neurological problems too often miss the mark. They become science fiction, either misusing a neurological deficit, or relying on it, falsely, to make a point.

In Tolstoy's *The Death of Ivan Ilyich*, one of the great novellas of all time, the illness afflicting the main character is never specified. It's not important. His increasing disability and his impending death are the important issues. The selection to be discussed in the book club, written by a person with a PhD in neuroscience, focuses on a particular neurological deficit as its central feature. The brain damage to the right parietal region causes neglect, a form of agnosia, which results in a lack of comprehension or even appreciation for the left side of space. In the extreme situation the left half of the world doesn't exist. Imagining what it is to suffer from left neglect is like imagining what it would be like to have never been born. Oliver Sacks tells the story of the man with a right parietal stroke who is found on the floor next to his hospital bed. "How





did you get there?" asks the nurse. "I noticed a big, hairy leg in my bed so I pushed it over the side." In this extreme situation, the patient failed to recognize his own leg, and confuses it with someone else's, although, clearly that can't be the whole story, since we generally get quite alarmed at finding a leg in our bed.

Nevertheless, a book is based on a traumatic brain injury inducing left-sided neglect, and the protagonist's attempts to compensate for the problem.

Meanwhile the author insinuates the notion that this person has neglected many things in her life, and, as in the neurological problem, had no insight into these neglected parts of her life, like her children and her mother. The problem with invoking a real, well-defined syndrome, is that people, namely neurologists and neuropsychologists, will expect the syndrome to behave as it does in real life, and not morph into a literary device.

A book about Alzheimer's disease probably cannot be told from the outside in. The most frightening book I've ever read is a novel in which the central figure describes his life and the bizarre and troubling adventures and restrictions he experiences as his understanding diminishes and his world shrinks. It begins with him realizing his memory is slipping, and then describes others stopping him from going to work in the middle of the night. From his perspective we deduce what this looks like to the rest of the world. We feel his frustration when he sees his dog outside and, unable to figure out how to get to it, throws a chair through a window. The accurate description is the novel's strength. We feel the character's fear and frustration, and his inability to make sense of what is going on.

When a novel incorporates aspects of a disease, without full understanding, we get a superficial picture, which, for the unsophisticated, is merely a diminished version of what can be truly terrifying. For the sophisticated reader, it is exaggerated, annoying and artificial. When diseases are part of a story, they need to be woven in carefully and not take center stage, not unless the author is truly knowledgeable. Great novels never rely on superficial devices. v

Author

Joseph H. Friedman, MD, is a Editor-in-chief of the *Rhode Island Medical Journal*, Professor and the Chief of the Division of Movement Disorders, Department of Neurology at the Alpert Medical School of Brown University, and chief of Butler Hospital's Movement Disorders Program.

Disclosures

Lectures: Teva, General Electric, UCB
Consulting: Teva, Addex Pharm, UCB, Lundbeck

Research: MJFox, NIH: EMD Serono, Teva, Acadia, Schering Plough

Royalties: Demos Press



Local Partner, Superior Service

To understand Rhode Island medicine, patients and the standard of care, your medical professional liability insurer needs to be here, listening to you. That's how NORCAL Mutual delivers superior service to Rhode Island physicians — we're your neighbors.

Why NORCAL Mutual?

- > endorsed by the Rhode Island Medical Society since 1994
- > local risk management expert available for on-site visits
- > a flexible, fresh approach to underwriting

we want to talk with you.

For a premium estimate
or on-site office visit, contact:

> Lynn White, Account Executive
401-276-7523

lwhite@norcalmutual.com

> Harry Reissman, Sales Manager
512-289-2237

hreissman@norcalmutual.com



*Our Passion Protects
Your Practice*

From so Simple a Beginning

STANLEY M. ARONSON, MD
smamd@cox.net

YOU NEED NOT BE A tenured professor to invent a new word. Just about anyone can accomplish this task. Listen, for example, to the energetic babblings of three-year olds, the linguistic struggles of newly arrived immigrants, the inventive mentality of those in the advertising industry or even the ramblings of the chronically intoxicated adults.

A new word, a neologism, may represent the fusion of two established words, such as brunch (the merger of the words, breakfast and lunch); or it may be an acronym such as NATO; or it might be the conjunction of initial syllables of previously established scientific terms (such as aspirin, laser or radar); or even well-established words but now assembled so as to define something new, such as soccer-mom or cyberspace.

For some 50 years, the contrived words googol and googolplex hibernated...

A new word is born, typically, to fulfill an immediate, visible need; and when its purposeful mission is realized, the concocted word may then quietly disappear never to be heard from again. Sometimes, though, if the invented word is surrounded by other words of



surpassing elegance, it may survive; and with persistence or patient advocacy it may flourish and even be invited into the family of established dictionaries. Consider, for example, William Shakespeare (1564–1616) and his relentless search for new words and phrases. He knew of no simple

word to describe an infant regurgitating its food; and so he devised the word, puking. In Act II, Scene VII of *As You Like It*, Jaques says:

*They have their exits
and entrances;
And one man in his time
plays many parts,
His acts being seven ages.
At first the infant,
Mewling and puking in
the nurse's arms.*

The spontaneous new words of youngsters, never found in conventional dictionaries, are nevertheless cherished by grandparents, endlessly repeated at family gatherings and then forgotten or replaced by yet other idiosyncratic utterances. Sometimes, though, a child's new word fits a singular need beyond the family's amusement and achieves an enduring role in the canonical vocabulary of a science, or even an industry.

The story begins in New York City with an enthusiastic mathematician

named Edward Kasner (1878–1955), a gifted, intuitively inventive science teacher whose pedagogic genius provided his young students with a scientific understanding and love for basic mathematics. And so, in elaborating upon the dynamics of mathematics, Kasner often stressed the language of size and number.

In one such gathering in the 1930s, Kasner asked the assembled children: "It is raining outside. How many raindrops do you think have fallen on the school roof in the last hour?" The responses were widely varied but never exceeded 100. Gradually, though, the children began to realize the immense numbers of raindrops in an average storm. They learned the meaning of the word, million, and even the word, billion; and in so learning, they began to appreciate the enormity of the world around them: the number of grains of sand on the beaches of Coney Island, the number of miles to the nearest star and even the number of atoms in a single potato chip; and further, they began to understand that there were sums in nature far greater than a billion; that some numbers, even when astonishingly large, were nonetheless finite in amount; they just lacked proper names.

And so, while on a hike over the Palisade cliffs of the Hudson Valley, Kasner challenged his 9-year-old nephew, Milton Sirota, to construct a new name for an immense number represented by the numeral one followed by



one hundred zeros. Milton thought and then exclaimed: "A Googol!" And for an even greater number? "A Googolplex!" Accordingly, in the Kasner circle of avid students, googol and googolplex were now added to the transnational vocabulary of mathematics.

For some 50 years, the contrived words googol and googolplex hibernated, standing idly by, patiently in a few arcane mathematics texts, while awaiting

for someone to assign it to some grand purpose in life, some reason to justify its continued existence. Then, toward the end of the 20th century,

two amazingly gifted and imaginative Stanford University graduate students – Larry Page and Sergey Brin – retrieved the words, changed their spelling slightly, and created Google, Inc., and its world headquarters, Googleplex. Their unique corporation – now with 20,000 employees – has operated under the unlikely operational premise: "A healthy disregard for the impossible." Its inaugural mission? To scan all of

the world's books and thus to create an immense artificial intelligence in the best interests of humanity. Since Page and Brin launched their unique enterprise called Google, the world has not been the same. **v**

Author

Stanley M. Aronson, MD, is Editor emeritus of the *Rhode Island Medical Journal* and dean emeritus of the Warren Alpert Medical School of Brown University.

Disclosures

The author has no financial interests to disclose.

Quotes: Rx for Life



NATIONAL LIBRARY OF MEDICINE

"It is the hardest stone you can throw at a man to tell him that he is at the end of his tether and yet, put in the right way to an intelligent man, it is not always cruel."

— Sir Thomas Brown, MD, (1605–1682)

Submitted by Kenneth S. Korr, MD

Please submit your favorite quote for future publication and inspiration. Send to mkorr@rimed.org

100 Years Ago: Denial of Charges

The Providence Medical Journal

PUBLISHED BI-MONTHLY BY THE
Providence Medical Association
OFFICIAL ORGAN OF THE
Rhode Island Medical Society

Vol. 15

JANUARY, 1914

No. 1.

F. T. ROGERS, M. D., Editor

JAMES W. LEECH, M. D., Assistant Editor

FRANK E. BURDICK, M. D., Business Manager
6 Harrison Street, Providence, R. I.

During the summer in the city of Providence a girl was injured by being thrown against a shaft in a mill and suffered, besides various contusions, fracture of three ribs. She was attended by a member of the State Society and at the end of the two weeks allowed by law he sent to the insurance company a bill for \$25 for reduction of fractures and \$9 for after attendance during this period of time. Payment of this bill was denied by the insurance company on the grounds that the physician was not their regular physician employed to care for these cases and that these charges were greater than the amount they were willing to pay for similar services, and they informed the physician that if he would accept \$12 for his bill, which was the price which they had established, that they would pay it, otherwise they would not. Such an insult to the intelligence of the profession demands some action, and if for no other reason the adoption of a fee table similar to the one recommended by the committee would be of great service.

The editors of the *Providence Medical Journal*, irked by an insurer's denial of charges involving the care of an accident victim in the summer of 1913, vented their frustrations on the editorial pages of the publication and called for a just reimbursement fee schedule.

**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

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

International Rotations during Residency: Spine Deformity Surgery in Ghana

ALAN H. DANIELS, MD

ABSTRACT

International elective rotations are becoming increasingly common in residency training programs. These experiences offer a tremendous opportunity to help patients in medically underserved nations, and can enhance training by exposing participants to pathology not often encountered in developed countries. Additionally, there is emerging evidence that international training exposure develops a broader appreciation of cultural diversity in patient care, offers personal and professional development, and teaches residents to use limited resources more efficiently, giving them a unique perspective on the ordering of tests and delivery of care when they return. This paper highlights the author's experience on a volunteer trip to Ghana that was focused on treating pediatric spinal deformity, and reviews notable international medical volunteers, and highlights the evidence supporting the benefits of international residency rotations.

INTRODUCTION

Residency training has undergone tremendous transformation over the last century. More than a century ago, William Halsted, MD, the first chief of surgery at Johns Hopkins Hospital and a founder of graduate medical education in the United States, required his residents to work 362 days per year.¹ His residents served as house-staff, living in the hospital while caring for their patients 24 hours per day. Residents throughout the 20th century worked tirelessly during shifts that often lasted well over 24 hours. This tradition came to an end when the residency training system in the United States changed drastically with the implementation of Accreditation Council for Graduate Medical Education (ACGME) resident duty-hour restrictions in 2003² and the addition of additional regulations in 2011.¹ Today, interns may work no more than 16 hours per day;³

"strategic napping" is encouraged; residents log every procedure they perform, and paperwork and charting duties consume disheartening quantities of time.⁴

In addition to the greater supervision by attending physicians and duty-hour concerns in our workplace, there is commonly discussion regarding medical practice regulations, fear of malpractice litigation, and the ubiquitous concern over reduced reimbursement. In this modern healthcare environment, it is easy to forget why we chose a life of service in medicine, and it is all too common to become bogged down by the irksome tasks surrounding modern medical care.



FOCOS

Patients in Ghana.

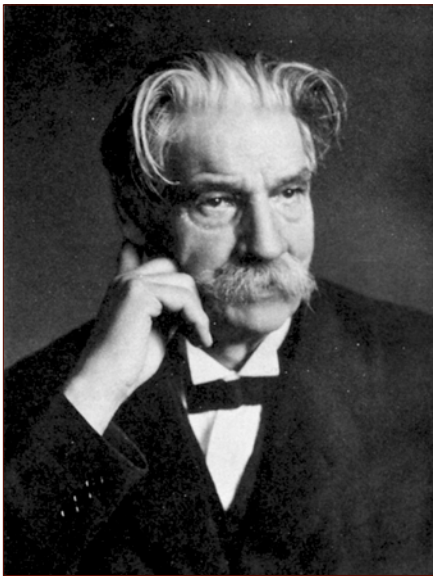
MEDICAL MISSIONARIES

Albert Schweitzer, MD

Fortunately, I recently discovered that there is still hope in medicine; it can still be a superbly rewarding experience to serve those in need. All is not lost. My rejuvenated passion for medicine came during a recent trip to Ghana, West Africa, on a volunteer medical mission trip dedicated to treating pediatric spinal deformity. I was following in the footsteps of so many great

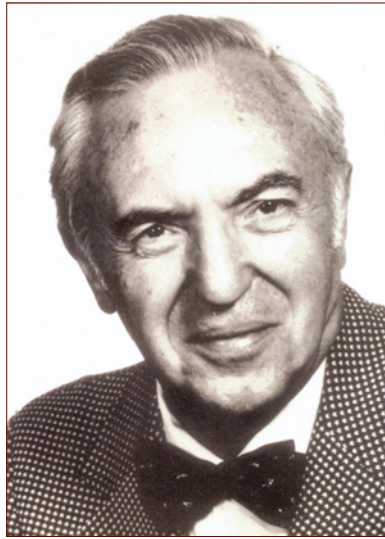
physician-volunteers and medical missionaries who came before me. As the great physician-volunteer Albert Schweitzer said, "I don't know what your destiny will be, but one thing I do know: the only ones among you who will be really happy are those who have sought and found how to serve." One has to look no further than Dr. Schweitzer to see the quintessential life of service, and to discover one very rewarding way to serve the needy: medical mission work.

Albert Schweitzer was born in Kay-sersberg, near the French-German border in 1875. The son of a minister, he graduated from medical school in 1911. His life and career were high-



Albert Schweitzer, MD

lighted not only by his medical work, but by achievements in theology, music, and philosophy as well. He founded a hospital at Lambaréné in French Equatorial Africa (present-day Gabon) in 1924, and spent the majority of his life helping the needy there. He expanded his hospital to 70 buildings which could care for >500 inpatients at one time. He was rewarded for his work with the Nobel Peace Prize of 1952. With the \$33,000 prize money, he started the Leprosarium at Lambaréné. Dr. Schweitzer died in 1965 at the age of 90, and was buried at Lambaréné.



Carol M. Silver, MD

Carol M. Silver, MD

Another hero of medical volunteerism was a locally renowned orthopaedic surgeon, Carol M. Silver, MD. Dr. Silver was born in New Britain, Connecticut, in 1913. He completed his professional training at Rush Medical School in Chicago. During World War II he was stationed for over three years in northern Africa as chief of orthopedic surgery at the 180th Station Hospital. After returning from the war, Dr. Silver set up practice in Providence in 1946, partnering with Dr. Stanley D. Simon. From 1949 to 1969, he was chief of orthopedic surgery at The Miriam Hospital. He also served as a consultant at Rhode Island Hospital, and was a clinical professor at the Brown University Medical School from 1977 to 1985.

Dr. Silver was a tireless traveler, lecturing, teaching, and serving all over the world. His medical trips took him to Egypt, Yugoslavia, Greece, Ethiopia, Hong Kong, Japan, Malaysia, Israel, Russia, China, Iran, Indonesia, Trinidad, and other areas. He travelled the world into his 90s, and passed away in 2012 at the age of 99.

Silver Fellowship to Ghana

Dr. Silver is not only an inspiration to me, but is also a major reason why I was able to travel to Ghana. I was

given this great opportunity by my residency's Silver Travelling Fellowship program, which is dedicated to sending orthopaedic residents on international electives, and made possible by a generous grant from the Silver family. Inspired by the examples of Drs. Schweitzer and Silver, and the support of the Brown orthopaedic department, I travelled to Ghana in late 2012 with the Foundation of Orthopedics and Complex Spine (FOCOS).

FOCOS was founded in 1998 by Dr. Oheneba Boachie-Adjei, a native Ghanaian who has spent his life treating complex spine deformity. It is a non-profit organization whose mission is to provide comprehensive, affordable orthopedic and spine care to underserved communities in Ghana, other West African countries and other sites around the globe. It has been sending teams to Ghana to perform pediatric spine deformity surgery for more than a decade. Baron Lonner, MD, was similarly inspired to write about his experience with FOCOS in 2003, providing an excellent overview of surgeon volunteerism in an article about his experience in Ghana.⁵

Ghana is a beautiful but extremely medically underserved country. There are only 8 physicians per 100,000 people, and less than 20 orthopaedic surgeons in a country of 25 million. Treating complex medical problems such as pediatric spine deformity requires tremendous financial resources and advanced multidisciplinary care. The medical infrastructure in Ghana is developing, but is unable to care for this challenging patient population without outside assistance.

During the two-week trip to Ghana, our FOCOS team performed 40 complex spine and scoliosis operations on children who were in severe need of surgical intervention. We worked from 6 a.m. until 10 p.m. each night. In addition to surgery, we provided care to pre- and postoperative patients, and performed countless consultations in the clinics preparing many children

for surgery to be performed during subsequent mission trips. We treated patients from Liberia, Sierra Leone, Ethiopia, Ghana, and other African countries. We also worked alongside the doctors and nurses in Ghana, teaching them how to take care of these complex postoperative patients. The overall goal of FOCOS is to develop a sustainable medical infrastructure and treatment system within Ghana and the other nations the organization serves.

The Ghanaian people taught me a great deal about working under conditions of limited resources, and about compassion and openness to new ideas. I made lasting friendships in Ghana, and I learned that medicine is a universal language. Those who have dedicated their lives to caring for those in need have an instant bond.

Travelling to Ghana was a life-changing experience which inspired me to dedicate an important part of my life to service overseas and to serving the patients who are most in need. I am sure that I will go back to Africa during my career. I was also reminded that we have underserved patients here in Rhode Island who must also be cared for with the same compassion and care that we provided in Africa.

In this time of great change in medicine, I strongly urge trainees to remember your commitment to serve those in need. International electives are a tremendous opportunity to volunteer time to underserved patients in developing nations. The experience can refresh interest in medicine, and can assuage the sometimes low morale of residency. Additionally, these experiences can greatly enhance training by exposing trainees to pathology not often encountered in developed nations, and provide the experience of working side-by-side with local physicians.⁶ There is also growing evidence that an international elective can make residents more resource efficient,⁷ help them to develop a broader appreciation of cultural diversity in patient care,



Alan H. Daniels, MD, second from right, in Ghana.

and enhance personal and professional development.⁸ Training programs themselves should also work to develop dedicated blocks of time for international electives, as applicants actively seek positions in residency programs with international opportunities.⁹

In this rapidly changing time in medicine, one thing is constant – providing care to those that need it most is rewarding and energizing. My time in Ghana reinvigorated my passion for medicine and for caring for patients. I promise you this: if you go abroad as a medical volunteer, you will not regret it.

References

1. Drolet BC, Christopher DA, Fischer SA. Residents' response to duty-hour regulations - a follow-up national survey. *N Engl J Med*. Jun 14 2012;366(24):e35.
2. Philibert I, Friedmann P, Williams WT. New requirements for resident duty hours. *JAMA*. Sep 4 2002;288(9):1112-1114.
3. Accreditation Council for Graduate Medical Education (ACGME). Common Program Requirements. July 1, 2011. Available from: http://www.acgme.org/acWebsite/home/Common_Program_Requirements_07012011.pdf.
4. Christino MA MA, Fischer S, Reinert S, DiGiovanni CW, Fadale PD. Paperwork & Patient Care – A Nationwide Survey of Residents. *Journal of Graduate Medical Education*. In press.
5. Lonner BS. Surgeon volunteerism. One orthopaedic surgeon's perspective. *Bull Hosp Jt Dis*. 2003;61(3-4):148-149.
6. Henry JA, Groen RS, Price RR, et al. The benefits of international rotations to resource-limited settings for U.S. surgery residents. *Surgery*. Dec 26 2012.
7. Oliphant JL, Ruhlandt RR, Sherman SR, Schlatter MG, Green JA. Do international rotations make surgical residents more resource-efficient? A preliminary study. *Journal of Surgical Education*. May-Jun 2012;69(3):311-319.
8. Kosasih JB, Jurisic DH, Gandini C, Sauter CN, Braza DW. Implementing a Global Integrative Rehabilitation Medicine Rotation: A Physical Medicine and Rehabilitation Residency Program's Experience. *American Journal of Physical Medicine & Rehabilitation / Association of Academic Physiatrists*. Jan 3 2013.
9. Matar WY, Trottier DC, Balaa F, Fairful-Smith R, Moroz P. Surgical residency training and international volunteerism: a national survey of residents from 2 surgical specialties. *Canadian Journal of Surgery. Journal Canadien de Chirurgie*. Aug 2012;55(4):S191-199.

Author

Alan H. Daniels, MD, is Chief resident in the Department of Orthopaedic Surgery, Warren Alpert Medical School of Brown University.

Correspondence

Alan H. Daniels, MD
Department of Orthopaedic Surgery
593 Eddy Street
Providence RI 02903
401-444-4030
Fax 401-444-6182
alan_daniels@brown.edu

Orthopedics & Rehabilitation

JON MUKAND, MD, PhD
GUEST EDITOR

A variety of orthopedic conditions can lead to pain and disability. As the American population ages, the prevalence of musculoskeletal disability will increase due to conditions such as osteoporosis, osteoarthritis, and trauma from falls. Recent data show that one million total hip and knee replacements are performed annually in the United States, typically because of osteoarthritis.¹ Every year, more than 325,000 people in the United States – usually women with postmenopausal osteoporosis – have hip fractures after falls, with devastating consequences: a one-year mortality rate of about 20% and in-hospital mortality of 2.7%.² One third of older adults fall each year, and 20%-30% of this group suffer moderate to severe bruises, fractures, and head injuries.³ Among workers, there are nerve entrapment syndromes related to connective tissue changes. Carpal tunnel syndrome results from compression of the median nerve as it traverses the fibroosseous carpal tunnel, and has an incidence of 3%-5%.⁴ In the younger population, traumatic injuries due to sports and accidents result in knee ligament injuries as well as fractures of the foot and ankle.



My perspective on disability is that of a rehabilitation medicine specialist and medical director of the Southern New England Rehabilitation Center (based at Fatima Hospital). My center treats people with orthopedic conditions including multiple trauma, hip fractures, amputations, spinal stenosis that requires surgery, and joint replacements. (I should note that Medicare criteria for acute inpatient rehabilitation after hip/knee arthroplasties are strict: age 85 or greater, bilateral joint replacements, or morbid obesity; in addition, patients usually have medical comorbidities. Managed care organizations also have strict admission criteria.)

As a clinician and faculty member of the Orthopedic Surgery Department at Brown University, I often collaborate with the orthopedic residents. Therefore, I'm pleased that this issue of the *Rhode Island Medical Journal* is a forum for the medical writing of these residents and fellows. They have contributed articles on hip/knee replacements, knee ligament injuries, ankle fractures, foot fractures, and upper extremity nerve compression syndromes. While working on this special issue, the authors and I have tried to provide detailed information for accurate diagnosis and management by generalist physicians. (Of course, depending on the nature of the problem, it may be wise to consult an orthopedic surgeon.)

After receiving medical and surgical treatment in the acute care hospital, some people may require intensive inpatient rehabilitation at a facility such as the Southern New England Rehabilitation Center. Disability is a struggle, and I admire my patients, their families, and their surgeons as they contend with a variety of challenges. The admission criteria and the review process are complex nowadays, but we continue to enjoy working with our surgical colleagues on behalf of people with orthopedic disabilities.

References

1. Rooks DS, et al. Effect of Preoperative Exercise on Measures of Functional Status in Men and Women Undergoing Total Hip and Knee Arthroplasty. *Arthritis Rheumatism*. 2006;55(6):700-708.
2. Bentler SE, et al. The Aftermath of Hip Fracture: Discharge Placement, Functional Status Change, and Mortality. *Am J Epidemiology*. 2009;170(10):1290-1299.
3. Tinetti ME. Performance-Oriented Assessment of Mobility Problems in Elderly Patients. *JAGS*. 1986;34:119-126.
4. Atroshi I, et al. Prevalence of carpal tunnel syndrome in a general population. *JAMA*. 1999;282(2):153-8.

Jon Mukand is Medical Director, Southern New England Rehabilitation Center and Clinical Assistant Professor of Rehabilitation Medicine at Brown University and Tufts University. He is currently working on a book titled *Renovating the Brain: Disability, Culture & Society*.

Rehabilitation for Total Joint Arthroplasty

SCOTT RITTERMAN, MD; LEE E. RUBIN, MD

ABSTRACT

Total hip and knee replacement are two of the most common and successful elective surgeries performed in the United States each year. Preoperative medical preparation and postoperative rehabilitation are equally important to a successful outcome. Physical deconditioning, tobacco use, obesity and medical co-morbidities can adversely affect outcomes and should be addressed before any elective procedure. Formal postoperative therapy is geared towards the specific surgery and is aimed at returning the patient to independent activity.

KEYWORDS: Total Joint Replacement, obesity, rehabilitation, smoking, medical management

INTRODUCTION

Total hip and knee arthroplasty (THA/TKA) are two of the most common and successful musculoskeletal surgeries in the United States, accounting for over one million procedures annually. Osteoarthritis (OA) is by far the main cause in both hip and knee disease and it is increasingly prevalent.¹ As our population becomes more obese, less active, and lives longer, many more patients are seeking medical attention for pain relief. While the causes of OA are multifactorial (genetics, activity level, diet, weight, etc.), the final result is breakdown of cartilage, leading to weight bearing on eburnated bone. Ongoing inflammation irritates the surrounding soft tissues and leads to joint effusions, soft tissue contractures, and limb deformity.

By the time that most patients reach an orthopedic surgeon's office, many have exhausted conservative care due to advanced OA. Pain, deformity, and disuse lead to decreased independence and a poor quality of life. The essential goals of THA and TKA are to reduce pain and improve quality of life.

The process of rehabilitation after total joint arthroplasty (TJA) is often an afterthought for the patient, but is essential for the overall success of the procedure. We will discuss rehabilitation concepts for the pre-, peri-, and post-operative periods.

The Pre-operative Period

Pre-habilitation or "pre-hab" starts when the patient becomes a candidate for TJA and ends the day of surgery.

Often patients will schedule a joint replacement surgery one to four months in advance. In that time there is much to accomplish, and the main goals are as follows. Patients should be educated and should have reasonable expectations regarding TJA and its postoperative course. Home preparations should be made for eventual discharge and post-op care. In conjunction with the patient's primary care physician, the surgeon should work to address modifiable medical co-morbidities that can directly affect surgical outcomes (e.g. smoking, obesity, diabetic glucose control, and immunomodulating medications.) An exercise program with specific goals will aid in the recovery process; it should include strengthening the upper extremities (for using assistive devices) and lower extremities (via non-load-bearing exercises such as cycling, aquatic aerobics). Unfortunately, less than one third of patients with arthritis are actively engaged in some formal exercise program.²

Pre-operative educational classes can help address patient concerns prior to the operation.² In this setting, patients are free to ask questions and interact with other patients who will undergo the same procedures. In some instances, patients who have undergone a joint replacement can provide "firsthand" knowledge of the subject.

Weight loss is important for overweight or obese patients considering joint replacement surgery, as obesity carries a high risk of complications. A recent meta-analysis of numerous studies that included over 15,000 knee replacements found evidence that obese patients were significantly more likely to have a superficial infection, a deep joint infection, and a revision surgery (odds ratios (OR) of 1.9, 2.38, and 1.3 respectively).³ Overweight patients will also put more stress on the implants, potentially leading to early failure from mechanical overload.

Smoking inhibits bony ingrowth into prostheses and also impairs wound healing. Smoking cessation should begin in the primary care office and should ideally lead to at least one nicotine-free month prior to TJA. In a review of 33,000 TJA patients in the Veterans Affairs system, current smokers had a greater risk of surgical site infection (OR 1.4), pneumonia (OR 1.53), stroke (OR 2.61), and one-year mortality (OR 1.63) than those who had never smoked.⁴

Optimal glycemic management is another crucial issue that should be addressed preoperatively. Up to 8% of patients undergoing a TJA are diabetic, and uncontrolled diabetes is associated with higher rates of perioperative stroke, urinary

tract infection, ileus, transfusion, infection and death.⁵ An ideal “safe” value for the Hemoglobin A_{1c} has not been established to reduce the risks of surgical complications after joint replacement, but a goal of less than 8.0 is currently a reasonable threshold for elective surgery. This important test should be included with the pre-operative screening bloodwork for patients known to be diabetic.

The Peri-operative Period

This phase extends from surgery to hospital discharge. In the immediate post-operative period, patients who receive a total joint arthroplasty (TJA) can bear weight as tolerated (in most protocols). Pain control is of utmost importance, and a “multi-modal” combination of local anesthesia (perioperative block or regional nerve block), narcotics, analgesics, and NSAIDs are utilized in combination.

A typical hospital stay is two to three days. Ambulation should begin either the night of surgery or the following morning. In fact, a recent study demonstrated that patients who were mobilized on the day of surgery as opposed to the day after were discharged a day earlier on average. Additionally, shorter hospitalizations resulted in improved short-term outcomes and quality of life as well as decreased costs.⁶ Within the perioperative period, several decisions must be made, especially the discharge destination.

During the perioperative period, surgeons and patients

strive to prevent several complications. Bladder catheters are frequently used during TJA and have been linked to complications including urinary tract infections and delirium, so they should be avoided when possible, and removed as soon as possible when used. Incentive spirometry can help prevent atelectasis and pneumonia, especially in those with pre-operative pulmonary disease.

Finally, mechanical compression stockings and boots are used in conjunction with chemical prophylaxis for one month to prevent venous thromboembolic events (VTE). Clinical guidelines from the United States Preventative Service Task Force (USPSTF), American College of Chest Physicians (ACCP), Surgical Care Improvement Project (SCIP), and the American Academy of Orthopaedic Surgery (AAOS) are utilized to guide decision making for chemical VTE prophylaxis. Active exercises of the hip, knee, and ankle in combination with early and frequent ambulation during the patient’s recovery are strongly encouraged as additional means for VTE prophylaxis.

Postoperative Period

From the hospital, patients are either discharged home, to a skilled nursing facility, or to an acute rehabilitation hospital. Medicare standards currently allow acute rehabilitation for patients with bilateral TJA, morbid obesity, or age 85 or greater. Close communication and coordination between

the receiving facility and the operating surgeon are crucial to prevent complications and readmissions. Coordination of care between the patient’s primary care physician and the operating surgeon is also important during this period. The use of electronic medical records may help facilitate the accurate and timely transmission of this information.

Total Knee Replacement

There is general agreement that rehabilitating a total knee replacement is more difficult than a hip replacement. Patients typically make their greatest functional gains within the first 6 months after a THA and the first 12 months after a TKA.² The knee is a rotating hinge joint with an extensor mechanism (quadriceps, the patella and the patellar tendon) that originates at the pelvis and proximal femur and inserts on the

A typical pattern of arthritis is seen in this series of radiographs. There is tricompartmental arthritis, most pronounced in the medial compartment. In this patient the patella was not resurfaced with a polyethylene component.



tibial tubercle. During a total or partial joint replacement, the extensor mechanism is disrupted to a certain degree. In the standard approach, the quadriceps tendon is split at or near its origin, down through the medial patella and patellar tendon to the tibial tubercle. Moving the patella laterally allows access to the knee joint. An extensor mechanism that is well-aligned, repaired, and healed is essential to a successful knee replacement.

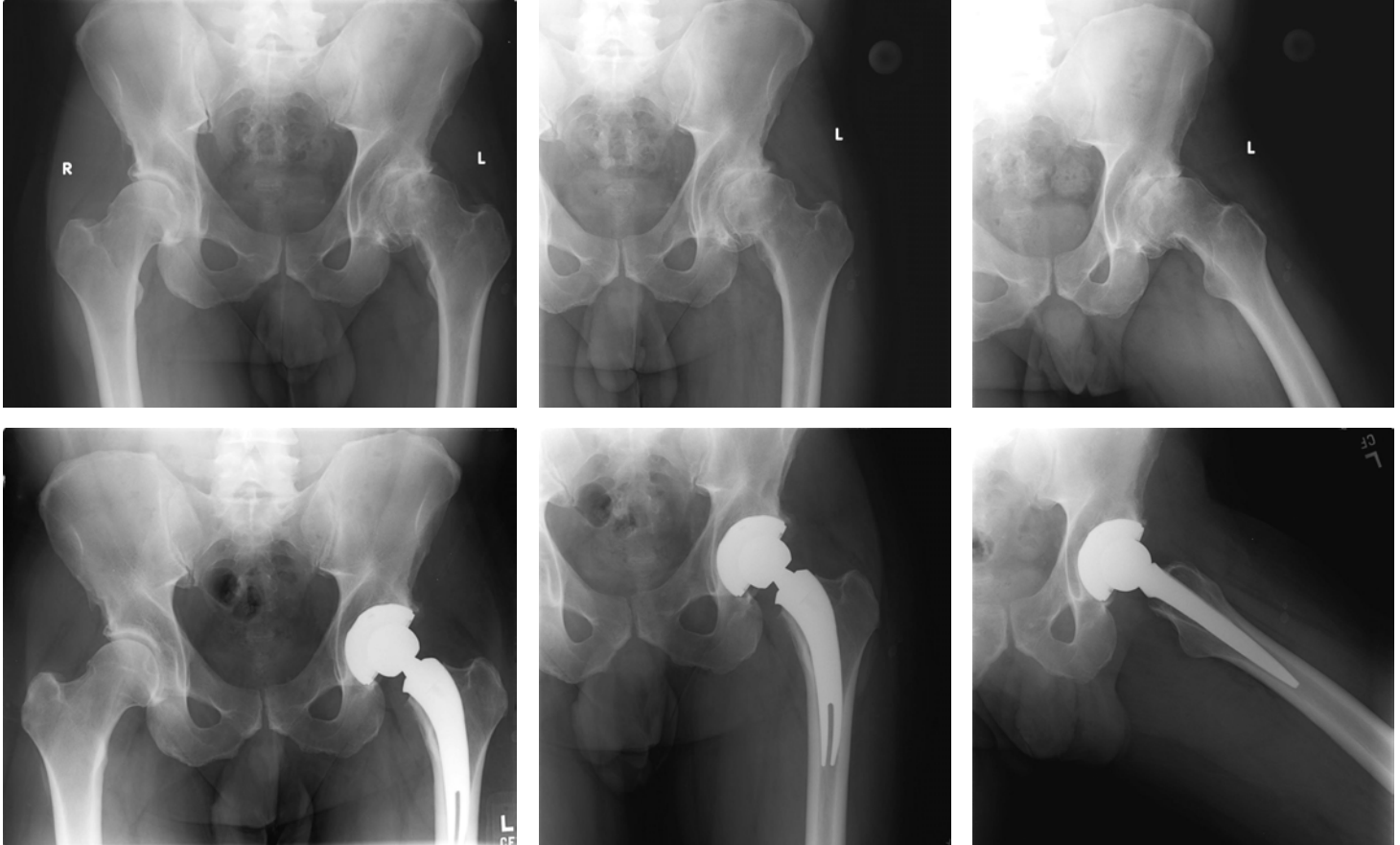
During ambulation, the knee must fully extend during the stance phase or large amounts of energy are needed to keep the body upright. Arthritis frequently results in deformity in the sagittal plane (knee flexion contracture) or in the medial to lateral plane (varus or valgus knee). A knee flexion contracture can cause a limp and concurrent quadriceps atrophy. Notably, in the month following a TKA, quadriceps strength can be reduced by up to 60%, so pre-operative strengthening is critical.⁷ At 6 months, these patients continue to have significant limitations in strength and function compared to healthy matched individuals. A weakened quadriceps muscle can decrease stair climbing ability, gait speed, coordination, and endurance. Both quadriceps neuromuscular electrical stimulation and a progressive resistive strengthening program can improve long-term strength and function.⁷

After a total knee replacement, the expected range of motion is from full extension to 90 degrees of flexion, the minimum required for most activities of daily living. Many patients will achieve 115 degrees of flexion or more.⁸ Most patients who have had a total knee replacement state that the knee did not feel “normal” until roughly a year after surgery. Swelling can persist long after surgery, especially with prolonged activity or ambulation; ice and non-steroidal anti-inflammatory medications can be used as needed during this period. Many patients may also experience “anterior knee pain” or have difficulty kneeling after TKA, which can cause functional limitations and frustration after an otherwise successful operation.

Total Hip Replacement

The hip is a ball-and-socket joint with a functional range of motion less than that of the knee. Prolonged arthritis often leads to hip joint contracture, stiffness, and limited abduction and rotation. Releasing the hip capsule contracture during surgery is often needed for the necessary access to the joint. The diseased capsular tissue is often excised, and a new pseudocapsule will ultimately form around the new prosthetic joint.

In the first three radiographs there is advanced arthritis of the left hip and degeneration of the joint space. After a total hip replacement we can see a well-reconstructed joint. In this instance a “neck-sparing” prosthesis was used, which removes less bone from the femoral neck with the intention of saving bone for future revision if needed.



The most popular approaches to the hip joint include the direct anterior, the antero-lateral, and the posterior approach. Each approach disrupts different muscle planes on the way to the hip joint. Certain exposures are considered “minimally invasive” in that minimal soft tissue is dissected from the bone. Regardless of the surgical approach, all patients must follow certain precautions to reduce the risk of hip dislocation. In the antero-lateral and the posterior approach, the abductor muscles (Gluteus Minimus and Medius) and external rotators are respectfully interrupted and then repaired after the implants are placed. These muscles must be allowed to heal for 6 to 8 weeks, followed by a strengthening regimen. Failure to heal can result in a significant limp.

The direct anterior approach (DAA) is the only truly “muscle sparing” approach to the hip joint. During DAA surgery, the muscles are “parted” between the major nerve groups, and the origin and insertion of the hip flexors, rotators, abductors and adductor groups are completely preserved. This allows the patient to utilize these muscles fully in the immediate postoperative period. A recent randomized study that compared the direct anterior and the anterolateral approaches demonstrated faster functional recovery in the DAA group up to 1 year from surgery. By 2 years, the results were the same.⁹ The long-term results of surgery (10+) years are based largely on the intrinsic durability of the implants and bearing surfaces, and have little to do with the surgical approach chosen at the time of implantation.

As mentioned previously, total hip replacement entails the risk of dislocation. The hip muscles and capsule contribute to joint stability, keeping the femoral head (native or prosthetic) within the acetabulum (or shell). When these muscles are weakened, certain leg positions can result in dislocation of the joint. This depends on the muscle tone of the patient as well as the surgical approach. For instance, hyperextension, adduction, and external rotation should be avoided after a direct anterior or antero-lateral approach. With a posterior approach, the patient should avoid flexion beyond 90 degrees, adduction, and internal rotation. These precautions are most important in the early postoperative period but should be followed permanently. Thankfully, over the past decade the rate of hip dislocations has diminished after THA, due to larger prosthetic femoral head sizes.¹⁰

SUMMARY

Joint replacement surgery remains a dynamic field in orthopedics, and there is an enormous pool of patients whose long-term outcomes can be followed. Countries such as Sweden and Australia have established total joint registries to follow long-term implant performance. Data monitoring has led to worldwide improvements in TJA outcomes. An “American Joint Replacement Registry” is currently being organized on a national level to help follow the outcomes after THA and TKA in this country.

For any joint replacement surgery, patients who are in

better physical condition stand to gain the most function and tend to be the most satisfied. In these elective surgeries, optimizing modifiable risk factors such as glycemic control, weight, and cigarette smoking is critical to obtain a satisfactory result. Successful rehabilitation spans the pre-, peri- and post-operative periods of THA and TKA, so an interdisciplinary partnership between practitioners taking care of each patient is required for a successful outcome.

References

1. Rooks DS, et al. Effect of Preoperative Exercise on Measures of Functional Status in Men and Women Undergoing Total Hip and Knee Arthroplasty. *Arthritis Rheumatism*. 2006;55(6):700-708.
2. Westby MD. Rehabilitation and Total Joint Arthroplasty. *Clinical Geriatric Medicine*. 2012;29:489-508.
3. Kerkhoffs GM, et al. The Influence of Obesity on the Complication Rate and Outcome of Total Knee Arthroplasty. *J Bone and Joint Surg Am*. 2012;94:1839-44.
4. Singh JA, et al. Smoking as a risk factor for short-term outcomes following primary total hip and total knee replacement in veterans. *Arthritis Care and Research*. 2011;63(10):1365-1374.
5. Marchant MH, et al. The Impact of Glycemic Control and Diabetes Mellitus on Perioperative Outcomes After Total Joint Arthroplasty. *J Bone and Joint Surg Am*. 2009;91(7):1621-1629.
6. Chen AF, et al. Effect of Immediate Postoperative Physical Therapy of Length of Stay for Total Joint Arthroplasty Patients. *J Arthroplasty*. 2012;27(6):851-856.
7. Bade MJ, Stevens-Lapsley JE. Restoration of physical function in patients following total knee arthroplasty: an update on rehabilitation practices. *Rheumatology*. 2012;24(2):208-14.
8. Chiu KY, et al. Review article: Knee flexion after total knee arthroplasty. *J Orthopaedic Surg*. 2002;10(2):194-202.
9. Restrepo C, et al. Prospective randomized study of two surgical approaches for total hip arthroplasty. *J Arthroplasty*. 2010;25(5):671-679.
10. Howie DW, et al. Large femoral heads decrease the incidence of dislocation after total hip arthroplasty: a randomized control trial. *J Bone and Joint Surg Am*. 2012. 94(12):1095-102.

Authors

Scott Rittman, MD, is a Resident in orthopaedic surgery at Brown University and Rhode Island Hospital.

Lee E. Rubin, MD, is Assistant professor of orthopaedic surgery, Division of Adult Reconstruction, The Warren Alpert Medical School of Brown University.

Disclosures

The authors have no financial disclosures to report.

Correspondence

Lee E. Rubin, MD

University Orthopedics Inc.

1405 South County Trail, Suite 510
East Greenwich RI 02818

401- 402-1060

Fax 401- 402-1061

lrubin@universityorthopedics.com

Management of Ankle Fractures

RAYMOND Y. HSU, MD; JASON BARITEAU, MD

ABSTRACT

Ankle fractures are a common injury across all age groups. Management may be operative or nonoperative, depending on the severity of the injury and the patient's overall health and functional status. Although imaging defines the nature of the fracture, a careful history and physical also helps determine the patient's plan of care. Initial management is focused on adequate alignment and safe immobilization of the injury. Definitive management must provide anatomic alignment of the joint as well as consideration of the surrounding soft tissues. Rehabilitation after either operative or nonoperative treatment aims at restoring range of motion, strength, proprioception, and function.

KEYWORDS: Ankle, fracture, rehabilitation, treatment

INTRODUCTION

Ankle fractures have increased in incidence over the last 30 years, affecting one in every 800 people each year, typically young active males and geriatric osteoporotic females, and accounting for 9% of all fractures.^{1,2} Management of the fracture itself ranges from nonoperative treatment with immediate weight bearing to surgery and 12 weeks of non-weight

bearing. Care of the patient includes greater considerations such as medical optimization, rehabilitation, and safe return to work and activity.

ANATOMY AND MECHANISM

The ankle is a hinge joint with the tibia and fibula proximally and the talus distally (Figure 1). Ankle fractures classically refer to malleolar injuries: the distal fibula or lateral malleolus, the distal medial tibia or medial malleolus, and the posterior distal tibia or posterior malleolus. Fractures that involve multiple sides are referred to as bimalleolar or trimalleolar. The injury may also involve the deltoid ligament medially or the syndesmotic ligaments laterally. Over 60% of ankle fractures involve only the lateral malleolus.¹ Fractures of the lateral malleolus proximal to the joint line correspond to syndesmotic injuries. The commonly used Weber classification relies solely on the level of the lateral malleolar fracture relative to the ankle joint line.³

The mechanism of injury generally involves a twisting or bending across the joint, whether low-energy as from twisting off a curb or high-energy as from a motor vehicle accident. The most commonly used Lauge-Hansen classification scheme is based on the position of the foot at the time of injury (supination or pronation) and the direction of the deforming force, external rotation, adduction, or abduction.⁴



Figure 1.

Ankle x-ray anatomy: (A) lateral malleolus, (B) medial malleolus, (C) posterior malleolus, and (D) tibial plafond.

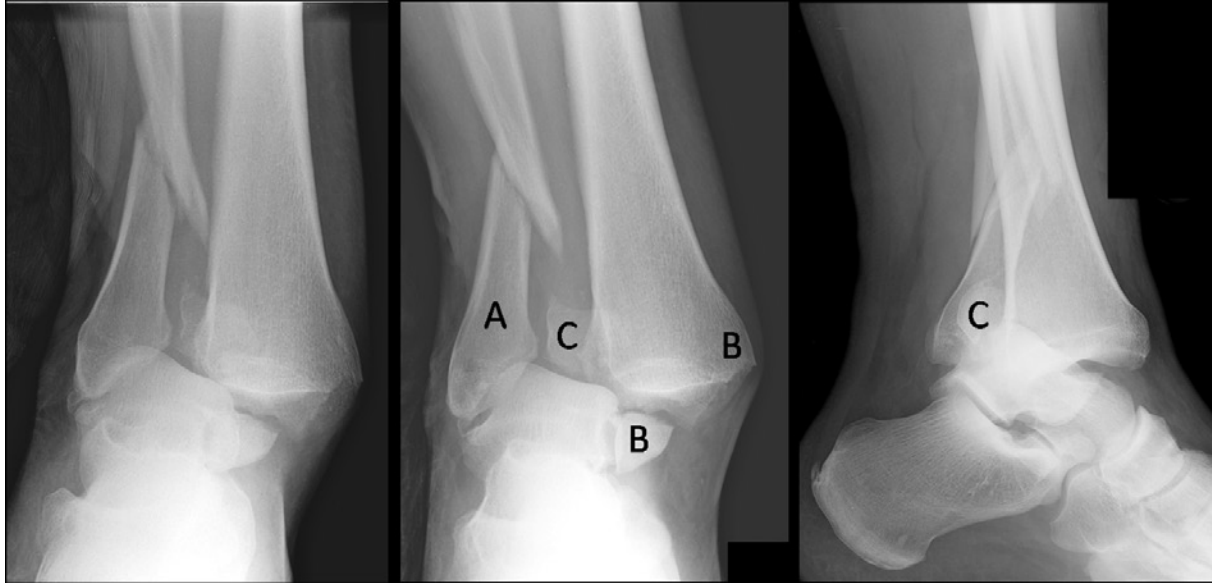


Figure 2. Trimalleolar fracture-dislocation with medial skin tenting by the medial malleolus: (A) lateral malleolus, (B) medial malleolus, and (C) posterior malleolus.

Pilon fractures, caused by an axial load, involve the plafond, the weight-bearing portion of the distal tibia. The management and prognosis of pilon fractures is completely different and will not be covered in the scope of this article.

HISTORY

The general goals of fracture management are anatomic reduction of the fracture and protection of the soft tissue envelope. Stable fractures, where the alignment of the ankle joint is preserved, rarely need surgery. Unstable fractures typically require closed reduction or open reduction and internal fixation, depending on the patient's co-morbidities and pre-injury functional status. There is an increasing trend toward operative management of unstable ankle fractures, but historically good long-term outcomes have been well documented with non-operative management.⁵

Underlying diabetes, nicotine use, peripheral neuropathy, and peripheral vascular disease are all risk factors for poor fracture healing and wound complications.^{6,7} Even without co-morbidities, foot and ankle surgery is notoriously prone to wound dehiscence, deep infection, and nonunion. These complications may lead to repeated operations, prolonged hospitalizations, and intravenous antibiotics. Although non-operative management carries an increased risk of malunion and pressure ulcers from prolonged immobilization, in select populations it is the more prudent approach. Patients whose general health precludes surgery are also candidates for closed reduction and casting as their definitive treatment. However, these same patients may be at increased risk of complications from prolonged limb immobilization and decreased mobility.

Medications that may compromise healing potential such as steroids, chemotherapy, and immune modulators should be noted. Similarly, medications that may cause increased

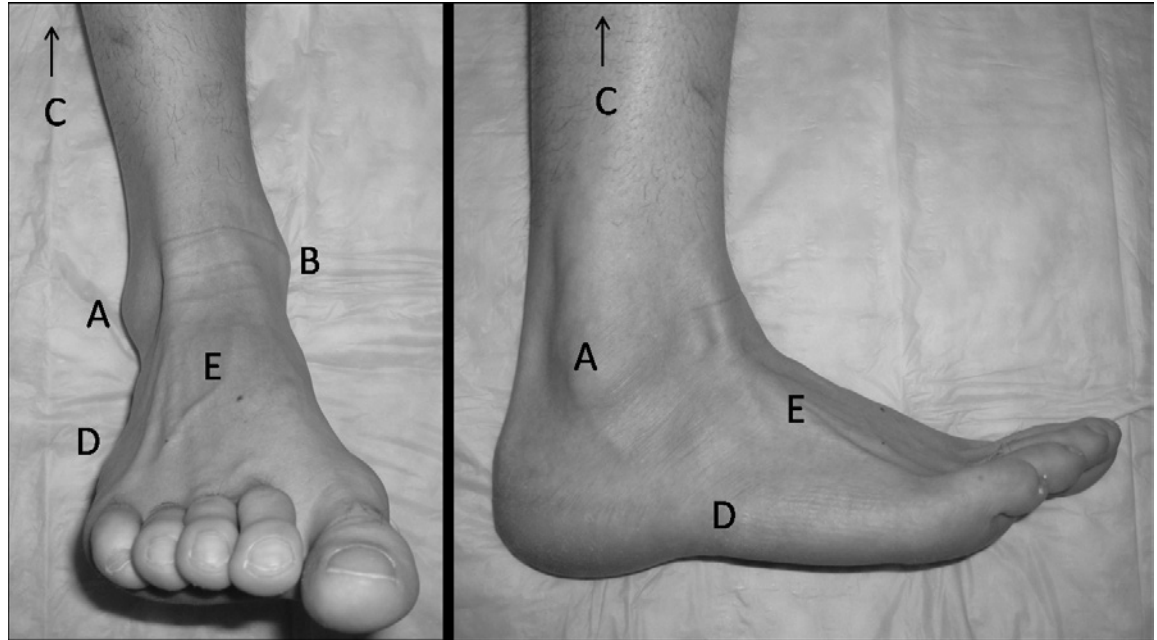
bleeding such as aspirin, warfarin, clopidogrel, and non-steroidal anti-inflammatories should be documented and possibly held preoperatively.

PHYSICAL EXAMINATION

Chronic skin changes related to vascular insufficiency, steroid use, or nicotine use should be documented. Ecchymosis may increase the suspicion of fracture but is usually not present. The degree of swelling, including whether or not skin wrinkles are present, should be noted. In general, swelling may take 24-48 hours to fully develop and 5-7 days to resolve, creating a window when surgery should be avoided. Severe swelling may progress to significant blistering. Any fracture blisters, skin tears, or abrasions over the medial and lateral malleoli should be documented before the ankle is covered and immobilized. Operative fixation, if any, may have to wait until overlying skin heals. In the setting of a fracture-dislocation, the talus most often dislocates laterally and the medial malleolus will tent and even blanch the skin medially, requiring an emergent reduction (Figure 2). Any violation of the dermis or constant bleeding regardless of size should raise concern of an open fracture.

If a fracture is diagnosed by imaging or gross deformity, provocative testing of the ankle should be deferred. Otherwise, when a fracture is suspected, the ankle should be examined using the Ottawa Ankle Rules, which have near 100% sensitivity.⁸ Ankle x-rays for a suspected ankle fracture are only necessary if either one of the following is true: (1) bony tenderness over the posterior edge or tip of the distal 6 cm of the medial or lateral malleoli or (2) inability to bear weight both immediately after injury and at time of examination. These rules should only be applied to the neurologically intact and cooperative patient with no distracting injuries and whose ankle swelling does not prevent palpation of the

Figure 3. Ankle exam surface anatomy: (A) lateral malleolus, (B) medial malleolus, (C) fibula, (D) base of fifth metatarsal, and (E) dorsal midfoot.



bony landmarks. Of note, the ability to ambulate does not exclude an ankle fracture. One of the most common fracture patterns, an isolated fracture of the lateral malleolus with intact medial and syndesmotic ligaments, is a stable injury pattern that allows many patients to ambulate.

The examination should rule out other injuries that may occur with a twisting mechanism. Tenderness just distal to the malleoli or at the base of the fifth metatarsal raises suspicion of a talar avulsion fracture or base of the fifth metatarsal fracture (Figure 3). Swelling and tenderness in the dorsal midfoot may be a sign of a navicular fracture, Lisfranc injury, or other tarsal-metatarsal injury. The entire length of the fibula should be palpated to rule out an associated proximal fracture (Maisonneuve injury). Neurovascular injury is rare but possible: distal sensation to light touch and posterior tibial and deep peroneal pulses should be assessed. Pulses may be difficult to palpate with swelling or underlying vascular disease and should be compared with the contralateral limb or assessed by Doppler. The ability to actively and passively move the toes with minimal pain should be documented. Compartment syndrome of the leg is a rare complication but should be suspected with a high-energy mechanism, significant swelling, inability to actively or passively move the toes, or pain out of proportion to the injury.^{9,10}

IMAGING

To characterize the initial fracture pattern and subsequent maintenance of adequate reduction, imaging should always include anterior-posterior, lateral, and mortise views. While the radiographic thresholds that define an unstable ankle fracture are beyond the scope of this article, for emergent treatment, the talus should be located directly underneath

the plafond of the tibia on all views. With high-energy mechanisms or an unreliable exam, initial studies should include three views of the foot (anterior-posterior, lateral, and lateral oblique), and two views of the tibia/fibula (anterior-posterior and lateral). Computed tomography may identify or better characterize injuries to the plafond and talus. Magnetic resonance imaging is rarely indicated in the acute setting.

INITIAL MANAGEMENT

Fractures with a subluxation of the talus relative to the tibia warrant closed reduction and a well-molded splint to hold the reduction. Intra-articular aspiration of fracture hematoma and injection of local anesthetic are helpful for this painful procedure.¹¹ Even when it is not the definitive treatment, near-anatomic reduction of the fracture decreases damage to the articular cartilage, swelling, soft tissue injury, and pain. Films prior to any manipulation are extremely useful to determine the severity of the injury. However, when the ankle is completely dislocated, the skin is threatened, or there are signs of ischemia, an emergent preliminary reduction without imaging is warranted. Applying axial traction with the knee bent at 90 degrees to relax the Achilles tendon is often sufficient. Restoring the rough alignment of the foot to the leg may save the threatened skin and restore blood flow to the foot. If pulses or Doppler signals do not return after reduction, emergency vascular surgery consultation is warranted.

Open fractures require urgent operative irrigation and debridement with definitive fixation or temporizing external fixation.¹² They should not be left subluxed or dislocated simply because operative intervention is planned. Intravenous first-generation cephalosporins should be started as soon as

the injury is identified.¹² Higher-grade open injuries may also require gentamicin and penicillin. A tetanus booster should be administered if the patient's vaccine is not up to date.

Fractures without subluxation of the talus relative to the tibia still require immobilization for stability, protection of soft tissues, and pain control. A well-padded short-leg posterior splint with side supports is typically used. Isolated, minimally displaced, lateral malleolus fractures may be placed in an Aircast boot for immediate weight bearing but non-weight bearing until follow-up will help reduce pain and swelling. Furthermore, isolated minimally displaced lateral malleolus fractures may have unidentified medial ligamentous injury, creating an unstable fracture. Follow-up x-rays of the ankle stressed in dorsiflexion and external rotation or after the patient has been bearing weight can determine stability. These are decisions that can be deferred until follow-up with the orthopaedic surgeon as there remains no consensus on how to manage these injuries.¹³

Temporary immobilization is not without complication. While immobilization decreases swelling, wrapping a splint too tightly can lead to compartment syndrome. Pressure ulcers of the posterior heel may develop in a matter of hours and are notoriously difficult to manage, so the heel should always be carefully padded. Patients should always be instructed to rest their leg on the calf and not the heel when sitting or lying down. The tendency to leave the ankle plantarflexed or in equinus causes a contracture that may require operative release. Unless not tolerated by the patient, all splints should immobilize the ankle at 90 degrees.

There are no clear guidelines for or against deep venous thrombosis prophylaxis after an ankle fracture. Prophylaxis

should be made on a case-by-case basis based on mobility and other risk factors.¹⁴ Although nicotine use and diabetes are chronic issues that predispose the patient to wound complications, smoking cessation and improved glycemic control even starting at time of injury or surgery may be beneficial.⁶

Patients should follow up with an orthopaedic surgeon in 3–7 days. In the interim, patients should ice and elevate the extremity as much as possible to decrease swelling, which contributes tremendously to pain and can prevent timely surgical intervention. Prompt follow-up care is crucial to avoid turning an operative ankle fracture with a good expected outcome into a crippling injury. Patients should also be advised to seek emergency medical care for increased pain, which may be a sign of resubluxation or compartment syndrome.

Hardware Removal

After the fracture has healed, removal of hardware is indicated only if patients are symptomatic. Some surgeons routinely remove syndesmotic fixation, as they have a tendency to break, loosen, or limit full ankle range of motion. The current literature, however, supports removal only to reduce pain or improve range of motion.¹⁵

REHABILITATION

The goal of rehabilitation is to restore or maintain range of motion, strength, proprioception, and function. Earlier and more aggressive rehabilitation may prevent stiffness and lead to faster recovery as joint motion contributes to cartilage health and non-weight bearing diminishes bone density (Figure 4). Premature rehabilitation, however, may compromise

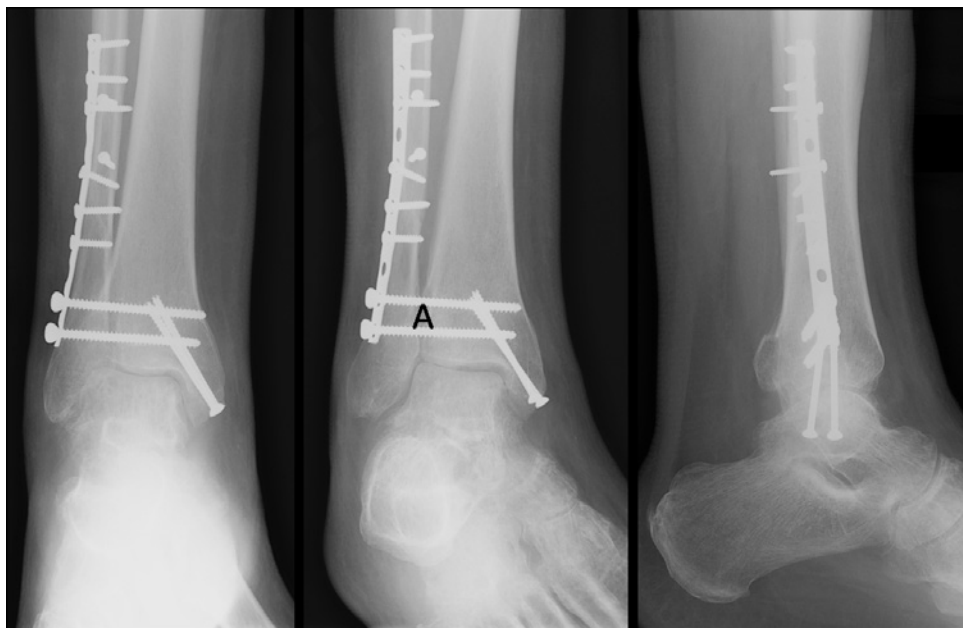
the anatomic alignment of the fracture. Unfortunately the available literature does not support any specific timing or protocol for rehabilitation.¹⁶

Patients with nonoperative stable ankle fractures are usually in some form of immobilization for approximately 6 weeks. Weight bearing may start immediately or after some initial pain improvement. Exercises for range of motion are started as soon as tolerated.

Patients with unstable ankle fractures that are being treated nonoperatively should expect to be splinted and then casted for 8–12 weeks with weight bearing beginning at approximately 6 weeks. These fractures require close weekly follow up and imaging for at least the first 4 weeks.⁵

Patients with operative ankle

Figure 4. Ankle from figure 2 after open reduction and internal fixation and three months of non-weight bearing to protect syndesmotic fixation (A). There is significant osteopenia demonstrated by increased radiolucency of bone especially on the lateral films as compared to injury films.



fractures are generally immobilized and kept non-weight bearing for 6 weeks. Once sutures are removed at 2 weeks, a removable form of immobilization may be used to allow active and active assisted range-of-motion exercises. If decreased point tenderness and callous formation is present on x-rays at 6 weeks, weight bearing and passive range of motion exercises are begun. In select patients, immediate post-operative weight bearing without immobilization may result in faster rehabilitation with only a slight increased risk of wound complications.^{17,18} Regardless, if the syndesmosis required repair, then weight bearing is usually delayed until 8 or 12 weeks. Generally, patients with diabetes, neuropathy, or who use nicotine are delayed in their weight bearing for 8 to 12 weeks as well.

When weight bearing and range-of-motion exercises are initiated, most patients are stiff from their immobilization but usually do not require formal physical therapy. Patients should advance weight bearing as tolerated but limit activities such as heavy lifting and running.

Patient Expectations

In order to have a successful outcome, patients should understand their injury and comply with their treatment plan. Regardless of how the fracture is managed, patients need to recognize that the ankle will never return to the pre-injury level of function. Even with an ideal fracture reduction, the concomitant damage to the soft tissue and cartilage causes some pain and loss of range of motion.

Patients may return to work as soon as they are able to comply with weight-bearing limitations and immobilization at work, are off narcotic pain medication, and are not a risk to themselves or others. The same rationale applies to driving. For right ankle fractures, braking response time has been shown to be delayed until approximately 9 weeks after surgery.¹⁹

CONCLUSION

Treatment of an ankle fracture involves a careful examination, appropriate imaging, understanding of the fracture pattern, and technically sound fixation or immobilization. Just as important, the patient's treatment and subsequent rehabilitation must be tailored to his or her other medical conditions and pre-injury functional status.

References

1. Rockwood CA, Green DP, Bucholz RW. *Rockwood and Green's fractures in adults*. 7th ed. Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams & Wilkins. 2010.
2. Donken CC, Al-Khateeb H, Verhofstad MH, van Laarhoven CJ. Surgical versus conservative interventions for treating ankle fractures in adults. *Cochrane Database Syst Rev*. 2012;8:CD008470.
3. Hughes JL, Weber H, Willenegger H, Kuner EH. Evaluation of ankle fractures: non-operative and operative treatment. *Clin Orthop Relat Res*. 1979;(138):111-119.
4. Lauge-Hansen N. Fractures of the ankle. II. Combined experimental-surgical and experimental-roentgenologic investigations. *Arch Surg*. 1950;60(5):957-985.
5. Wei SY, Okereke E, Winiarsky R, Lotke PA. Nonoperatively treated displaced bimalleolar and trimalleolar fractures: a 20-year follow-up. *Foot Ankle Int*. 1999;20(7):404-407.
6. Miller AG, Margules A, Raikin SM. Risk factors for wound complications after ankle fracture surgery. *J Bone Joint Surg Am*. 2012;94(22):2047-2052.
7. Bhandari M, Sprague S, Hanson B, et al. Health-related quality of life following operative treatment of unstable ankle fractures: a prospective observational study. *J Orthop Trauma*. 2004;18(6):338-345.
8. Bachmann LM, Kolb E, Koller MT, Steurer J, ter Riet G. Accuracy of Ottawa ankle rules to exclude fractures of the ankle and mid-foot: systematic review. *BMJ*. 2003;326(7386):417.
9. Piper KJ, Yen-yi JC, Horsley M. Missed posterior deep, inferior compartment syndrome in a patient with an ankle fracture: a case report. *J Foot Ankle Surg*. 2010;49(4):398 e395-398.
10. Starr AM, Swan KG, Jr., Swan KG. Isolated anterior compartment syndrome after a bimalleolar-equivalent ankle fracture in a collegiate football player. *Sports Health*. 2011;3(6):560-563.
11. White BJ, Walsh M, Egol KA, Tejwani NC. Intra-articular block compared with conscious sedation for closed reduction of ankle fracture-dislocations. A prospective randomized trial. *J Bone Joint Surg Am*. 2008;90(4):731-734.
12. Hulsker CC, Kleinveld S, Zonnenberg CB, Hogervorst M, van den Bekerom MP. Evidence-based treatment of open ankle fractures. *Arch Orthop Trauma Surg*. 2011;131(11):1545-1553.
13. Sanders DW, Tieszer C, Corbett B. Operative versus nonoperative treatment of unstable lateral malleolar fractures: a randomized multicenter trial. *J Orthop Trauma*. 2012;26(3):129-134.
14. Kadous A, Abdelgawad AA, Kanlic E. Deep venous thrombosis and pulmonary embolism after surgical treatment of ankle fractures: a case report and review of literature. *J Foot Ankle Surg*. 2012;51(4):457-463.
15. Schepers T. To retain or remove the syndesmotic screw: a review of literature. *Arch Orthop Trauma Surg*. 2011;131(7):879-883.
16. Lin CW, Donkers NA, Refshauge KM, Beckenkamp PR, Khera K, Moseley AM. Rehabilitation for ankle fractures in adults. *Cochrane Database Syst Rev*. 2012;11:CD005595.
17. Gul A, Batra S, Mehmood S, Gillham N. Immediate unprotected weight-bearing of operatively treated ankle fractures. *Acta Orthop Belg*. 2007;73(3):360-365.
18. Thomas G, Whalley H, Modi C. Early mobilization of operatively fixed ankle fractures: a systematic review. *Foot Ankle Int*. 2009;30(7):666-674.
19. Egol KA, Sheikhaazadeh A, Mogatederi S, Barnett A, Koval KJ. Lower-extremity function for driving an automobile after operative treatment of ankle fracture. *J Bone Joint Surg Am*. 2003;85-A(7):1185-1189.

Authors

Raymond Y. Hsu, MD, is an Orthopaedic resident.
Jason Bariteau, MD, is an Orthopaedic trauma fellow.

Disclosures

The authors have no financial disclosures to report.

Correspondence

Raymond Y. Hsu, MD
593 Eddy St.
Providence, RI 02903
Raymond_Hsu@Brown.edu

Essentials of Anterior Cruciate Ligament Rupture Management

STEPHEN A. KLINGE, MD; GREGORY A. SAWYER, MD; MICHAEL J. HULSTYN, MD

ABSTRACT

Anterior cruciate ligament (ACL) rupture is a common knee injury and an understanding of current medical knowledge regarding its management is essential. Accurate and prompt diagnosis requires an awareness of injury mechanisms and risk factors, common symptoms and physical/radiologic findings. Early mobilization and physical therapy improves outcomes regardless of treatment modality. Many older patients regain sufficient stability and function after non-operative rehabilitation. Early ACL reconstruction is appropriate for younger patients and those who engage in activities requiring frequent pivoting and rapid direction changes. ACL surgery involves reconstruction of the torn ligament tissue with various replacement graft options, each with advantages and disadvantages. The guidance of a knowledgeable and experienced therapist is required throughout an intensive and prolonged rehabilitation course. Generally excellent outcomes and low complication rates are expected, but treatment does not prevent late osteoarthritis.

KEYWORDS: Anterior Cruciate, Rupture, Non-Operative, Reconstruction, Rehabilitation

I. BACKGROUND

Acute rupture of the anterior cruciate ligament (ACL) is a common cause of knee instability, necessitating over 120,000 ACL reconstructions in the United States annually.¹ An understanding of current diagnostic, treatment and rehabilitation principles is essential in order to care for patients with ACL injuries.

Over two-thirds of ACL tears occur through non-contact mechanisms, including jump landings and knee hyperextension; direct contact from sports and trauma make up the remaining third.¹ Anatomic risk factors for non-contact injury include increased valgus alignment of the lower extremities (knock knees) and characteristic differences in the shape of the distal femur and proximal tibia (e.g. decreased femoral intercondylar notch width). Neuromuscular risk factors include an upright posture (reduced hip/knee flexion) and imbalanced quadriceps – hamstring muscle activation with jump landing activities. A number of these risk factors are present in females, who are significantly more likely to suffer an ACL injury compared with males.²

II. INITIAL EVALUATION AND MANAGEMENT

Patients with an acute ACL rupture state that the knee shifted or gave way during decelerating or changing direction while running. When associated with an audible “pop,” severe pain and immediate swelling (hemarthrosis), the likelihood of ACL tear is 70%.³ Other possible diagnoses for an acute hemarthrosis include patella dislocations/fractures or other osteochondral fractures; effusions associated with isolated meniscal injury typically present more slowly.³ When patients begin to ambulate normally, complaints of instability are common, particularly with pivoting. Mechanical symptoms (i.e. clicking and locking) raise suspicion for concomitant meniscal damage.⁴

During the physical examination, patients should be relaxed in order to prevent quadriceps and muscular guarding. Comparison with the contralateral extremity and a careful neurovascular examination are also crucial for any patient with possible ligamentous knee injury. The ACL is the primary restraint to anterior tibial translation, so its disruption allows abnormal anterior movement of the tibia relative to the femur. The Lachman is the most sensitive test for an ACL tear; with the distal femur stabilized and the knee in 20-30 degrees of flexion, the tibia is pulled anteriorly. Increased laxity compared to the uninjured side and the lack of an end-point indicates a positive test. The anterior drawer test also assesses tibial translation and an end-point, but at 90 degrees of knee flexion.⁴ The pivot shift test is the most specific for ACL rupture, but can be limited by patient guarding. The knee is stressed with valgus and internal rotation forces while simultaneously being ranged from full extension into flexion. With ACL rupture, the anteriorly subluxated tibia will reduce or “pivot shift” back into place as the knee is flexed.⁴ Concomitant collateral ligament injury is evaluated by applying varus/valgus stress at 30 degrees of knee flexion; while posterior cruciate ligament injury is assessed with a posterior drawer maneuver.⁴

Initial imaging includes standard anterior-posterior and lateral plain films. The Segond fracture, a tibial avulsion fracture fragment associated with anterolateral capsule sprain, is pathognomonic for an ACL tear. Tibial spine fractures resulting from ACL avulsion, though rare, are more commonly found in younger patients.⁵ Other possible diagnoses on knee radiographs include subtle findings of patella dislocation and tibial plateau fractures. Magnetic resonance imaging (MRI) demonstrates discontinuity, lack of

visualization, or an abnormal slope of the ACL.⁶ Secondary MRI signs include hemarthrosis, Second fracture, bone bruising (posterolateral tibia plateau and mid-portion of the lateral femoral condyle), anterior translation of the tibia on the femur, and impaction of the lateral femoral condyle. MRI also aids in the diagnosis of concomitant ligamentous, osteochondral and meniscal injuries (present in 40%-70%).⁵

Initial treatment should focus on decreasing pain, swelling and stiffness. Ice, elevation, compressive wraps and anti-inflammatory medications are recommended.⁷ Bracing in a knee immobilizer and crutches should be avoided beyond a few days and physical therapy should be instituted immediately, even if the knee is painful and swollen. Rehabilitation should encourage range of motion, weight-bearing as tolerated, and progressive isometric strengthening as motion improves. Early rehabilitation enhances the likelihood of success with either operative or non-operative management.⁷ To prevent further joint injury, the patient should avoid high-risk pivoting activities or a return to sports prior to full evaluation and treatment.

III. NON-OPERATIVE TREATMENT AND REHABILITATION

Several studies have classified patient demands and activity levels in an attempt to identify the best candidates for non-operative management ("copers" or "non-copers"). Non-operative treatment is reasonable for patients who can modify their activities and who require less pivoting or quick changes of direction in sports and work.⁷ In one study, 72% of potential "copers" successfully returned to pre-injury activity levels after non-operative treatment without further instability and 43% ultimately avoided ACL reconstruction.⁸

A willingness to attempt non-operative management despite initial concerns regarding knee instability can increase non-operative treatment success, as 60% of potential "copers" and 70% of potential "non-copers" became "true copers" at one year.⁹

Both patient age and willingness to modulate activity are important factors. Over 80% of patients 40-60 years of age at the time of injury had satisfactory outcomes with rehabilitation and activity adaptations; furthermore, they had mild to no radiographic progression of osteoarthritis after an average of seven years. Only a minority (17%) were dissatisfied with their ultimate functional level.¹⁰

ACL-injured patients who function well with non-operative

management can regain dynamic knee stability and return to pre-injury activity levels without ACL support through neuromuscular and proprioceptive re-training.⁸ Common non-operative ACL rehabilitation programs are graduated, initially focusing on progressive strengthening of the quadriceps/hamstring muscle groups and endurance training. Ultimately, increased general agility and sports-specific training is added. The addition of perturbation training, in which subjects learn to compensate for multi-directional movement changes, may further enhance the likelihood of return to baseline activity.¹¹

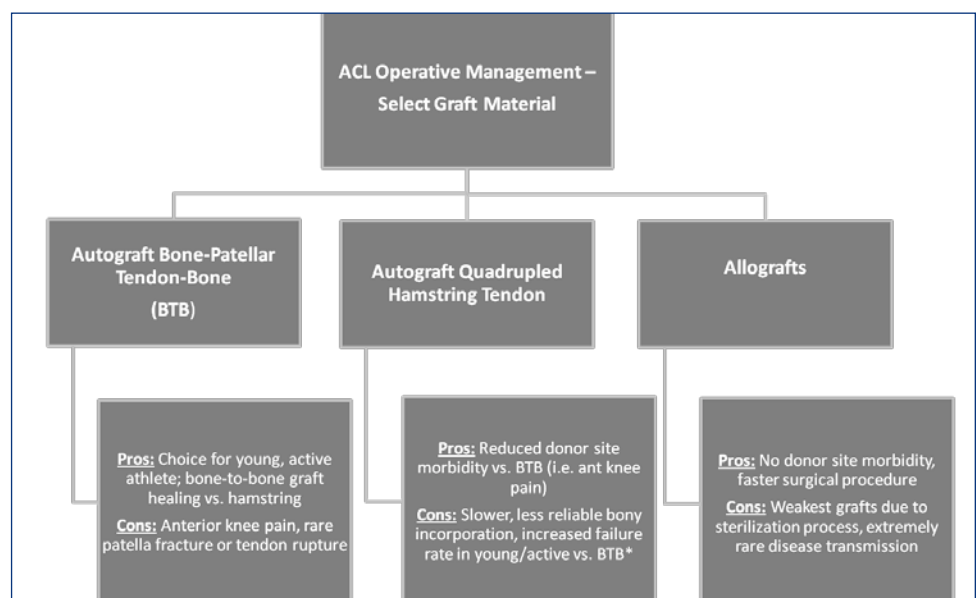
The use of off-the-shelf and custom-fitted ACL braces, though controversial, is encouraged. These braces stabilize the knee by resisting abnormal tibial subluxation and may also improve knee proprioception.¹²

IV. OPERATIVE TREATMENT AND GRAFT SELECTION

Despite rehabilitation after ACL rupture, many patients continue to experience knee instability with activities of daily living, sports or work. Operative management is recommended to restore knee stability and return these patients to their previous level of function.⁷ Current surgical intervention involves arthroscopic reconstruction using either autograft or allograft tendon tissue to replace the torn ACL.¹³ Primary ligament repair historically has poor outcomes,¹⁴ but is currently being revisited using growth hormones and cytokines to help modulate healing.¹⁵

Patients make the decision on graft choice after they research options and discuss alternatives with their surgeon [Figure 1]. Three commonly used graft options include bone-patellar tendon-bone (BTB), quadrupled hamstring, and allografts:

Figure 1. Graft Options for Anterior Cruciate Ligament Reconstruction



Legend: *Barrett, *Am J Sports Med*, 2011¹⁷

BTB Autograft

Often considered the gold standard in ACL reconstruction, BTB autograft requires harvest of the central third of the patellar tendon with attached bone blocks from both the patella and tibial tubercle. Advantages include bone-to-bone healing, ease of harvesting, and good clinical outcomes.¹⁶ Disadvantages include anterior knee pain as well as a low risk of patella fracture and patellar tendon rupture.¹⁶⁻¹⁷ BTB is the graft of choice for more active individuals under 25 years who participate in high-risk pivoting sports. BTB failure rates are less than when hamstring autograft is utilized.¹⁷

Quadrupled Hamstring Autograft

The semitendinosus and gracilis tendons are harvested from their pes anserine attachment and then folded to form a quadrupled construct. This graft has decreased donor site morbidity and greater initial biomechanical strength, which are key advantages compared to BTB. The main disadvantage for the hamstring graft is less reliable healing, because it relies on bone growth into tendinous soft tissue as opposed to bone-to-bone healing.¹⁶

Allografts

Allograft options include cadaveric patellar, quadriceps, hamstring, and Achilles tendons. These grafts eliminate donor site harvest morbidity and have good clinical results in lower demand and revision surgery patients. Despite concerns,

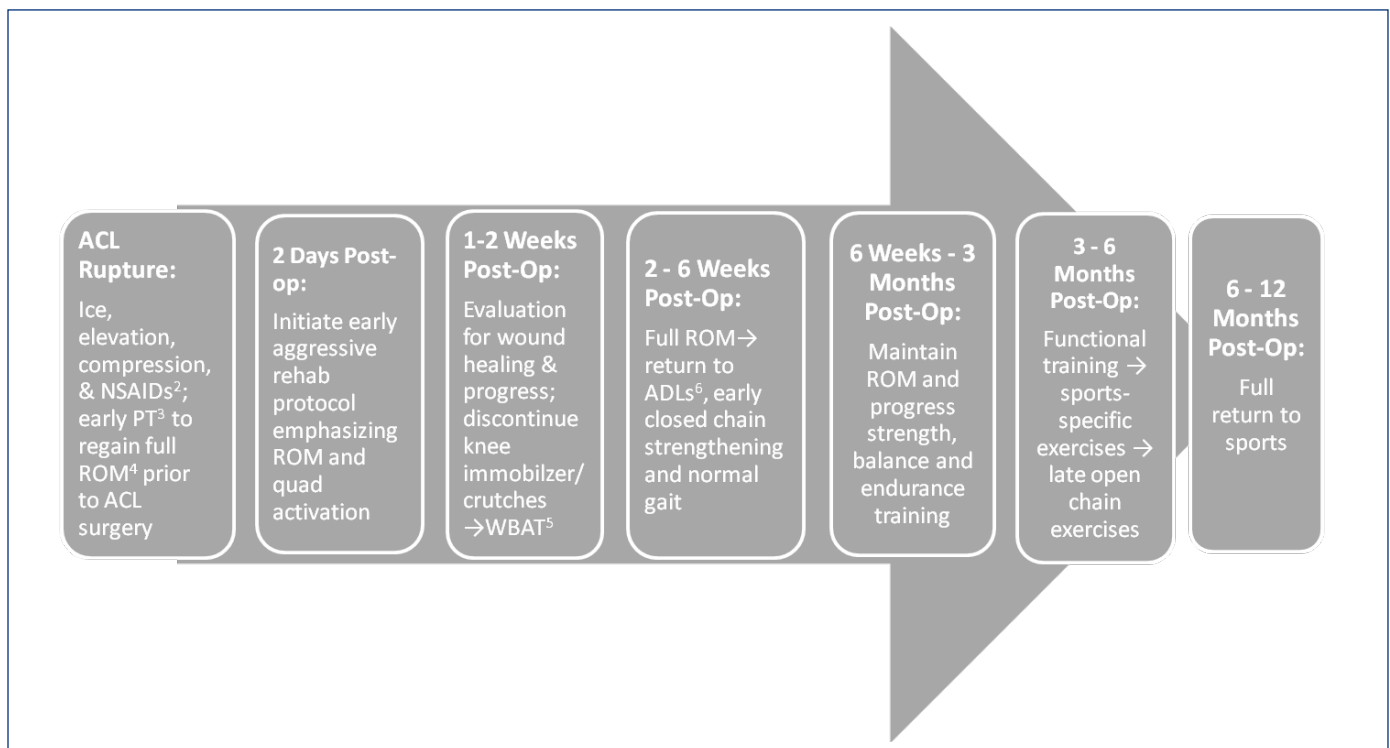
they have extremely low infectious disease transmission rates due to processing and disease testing.¹⁶ Allograft reconstructions have increased failure rates in more active individuals due to graft weakening from sterilization processes.¹⁶

V. OPERATIVE REHABILITATION

Teaming with an experienced physical therapist to guide patients through post-operative rehabilitation is essential for successful outcomes. Rehabilitation after ACL reconstruction should begin within days after surgery [Figure 2]. Key goals are restoration of joint range of motion and strength while protecting the integrity of the surgical graft.¹⁸ Patients are placed in a knee immobilizer and encouraged to begin partial or full weight-bearing with crutches. Range-of-motion exercises begin immediately, with the goal of full extension and flexion to 90 degrees within two weeks. Adjunctive exercises include isometric quadriceps strengthening and patella mobilization.¹⁸ Bracing and crutches are discontinued when there is enough quadriceps strength to allow a straight leg raise without lag. At 10-14 days, the surgeon evaluates wound healing, removes sutures and ensures that initial therapy goals are being met.

During weeks two through six after surgery, therapy should achieve full range of motion, equivalent to the contralateral extremity, through passive and active exercises. Strengthening is gradually advanced after improving range

Figure 2. Anterior Cruciate Ligament Operative Rehabilitation Time-Line¹



Legend: ¹Non-operative rehabilitation follows a similar but shorter progressive course, ²Non-steroidal anti-inflammatory medications, ³Physical therapy, ⁴Range of motion, ⁵Weight bearing as tolerated, ⁶Activities of daily living

of motion. Early routines primarily include closed-chain exercises, in which the foot is in contact with a solid surface (ie, squats or leg presses). These exercises result in effective strengthening (ie, quadriceps and hamstring co-contraction) while minimizing stress on the healing graft, which is most susceptible to failure in this early period.¹⁸

Between six weeks and three months post-operatively, as graft healing proceeds, therapy should maintain range of motion and gradually improve strength and endurance. Stationary biking without resistance and gentle elliptical training are examples of appropriate early endurance activities. After three months, functional training, jogging and swimming are added. Running, plyometrics and sports-specific exercises are added as rehabilitation progresses. Open chain strengthening exercises (eg, knee extensions) place increased stress on the graft and are introduced later. Time frames for therapy advancement should be individualized. For example, sports-specific training should begin only after patients demonstrate 70% strength in the quadriceps and hamstrings compared to the preoperative contralateral extremity. Additionally, patients should regain at least 80% of pre-injury strength before resuming full sports activities.¹⁹ Most patients can return to full sports activity between six and twelve months.¹⁹ Bracing after ACL reconstruction has not been shown to improve outcomes and remains controversial.²⁰

Following surgery and rehabilitation, the majority of patients have normal or near-normal knee function and activity outcome measurements.²¹ Nearly two-thirds of athletes return to pre-injury levels of participation, and almost half resume competitive sports. It is theorized that many athletes do not fully return to prior activity levels despite good knee function because they fear re-injury.²¹ Anterior knee pain (21%-35%) and loss of terminal extension (12%-17%) are the most common complications. Post-operative infections (3%-4%) and graft failures (4%-5%) are infrequent.²² The ACL-injured joint is at high risk for osteoarthritis. The mechanism(s) of cartilage degeneration after ACL tear remain elusive and are most likely multifactorial, including: mechanical factors (eg, kinematics, altered joint loading), biologic factors (eg, inflammation, remodeling), and the presence of associated injuries (eg, subchondral bone bruising, meniscal damage). Current conservative and surgical treatment options do not reduce osteoarthritis following ACL injury.²³

VI. CONCLUSION

ACL rupture is a common knee injury that causes instability and places the joint at risk for late osteoarthritis. A high index of suspicion and thorough history and evaluation of the patient with a "bad knee sprain" will allow a prompt and accurate diagnosis. Early rehabilitation after ACL injury enhances the likelihood of success with either operative or non-operative management, and both options can lead to good patient satisfaction and

outcomes. Patients may function well with non-operative management if they regain sufficient dynamic knee stability with or without modifying their activities. Early ACL reconstruction is appropriate for younger, active patients engaged in activities that require pivoting and rapid direction changes. Surgical treatment requires reconstruction of the ACL with donor tendon tissue, with each graft choice having advantages and disadvantages. Rehabilitation after surgery is intensive and prolonged, requiring the guidance of an experienced therapist. ACL reconstruction restores knee stability with low complication rates and has excellent clinical outcomes, but does not prevent late osteoarthritis.

References

1. Levine JW, Kiapour AM, Quatman CE, Wordeman SC, Goel VK, Hewett TE, Demetropoulos CK. Clinically Relevant Injury Patterns After an Anterior Cruciate Ligament Injury Provide Insight Into Injury Mechanisms. *Am J Sports Med.* Nov 2012. [Epub ahead of print]
2. Smith HC, Vacek P, Johnson RJ, Slaughterbeck JR, Hashemi J, Shultz S, Beynon BD. Risk factors for anterior cruciate ligament injury: a review of the literature - part 1: neuromuscular and anatomic risk. *Sports Health.* 2012;4(1):69-78.
3. Maffulli N, Binfield PM, King JB, Good CJ. Acute haemarthrosis of the knee in athletes. A prospective study of 106 cases. *J Bone Joint Surg Br.* 1993;75(6):945-9.
4. Malanga GA, Andrus S, Nadler SF, McLean J. Physical examination of the knee: a review of the original test description and scientific validity of common orthopedic tests. *Arch Phys Med Rehabil.* 2003;84(4):592-603.
5. Moore SL. Imaging the anterior cruciate ligament. *Orthop Clin North Am.* 2002;33(4):663-74.
6. Sanders TG, Miller MD. A systematic approach to magnetic resonance imaging interpretation of sports medicine injuries of the knee. *Am J Sports Med.* 2005;33(1):131-48.
7. Spindler KP, Wright RW. Clinical practice. Anterior cruciate ligament tear. *N Engl J Med.* 2008;359(20):2135-42.
8. Hurd WJ, Axe MJ, Snyder-Mackler L. A 10-year prospective trial of a patient management algorithm and screening examination for highly active individuals with anterior cruciate ligament injury: Part 1, outcomes. *Am J Sports Med.* 2008;36(1):40-7.
9. Moksnes H, Snyder-Mackler L, Risberg MA. Individuals with an anterior cruciate ligament-deficient knee classified as noncopers may be candidates for nonsurgical rehabilitation. *J Orthop Sports Phys Ther.* 2008;38(10):586-95.
10. Ciccotti MG, Lombardo SJ, Nonweiler B, Pink M. Non-operative treatment of ruptures of the anterior cruciate ligament in middle-aged patients. Results after long-term follow-up. *J Bone Joint Surg Am.* 1994;76(9):1315-21.
11. Fitzgerald GK, Axe MJ, Snyder-Mackler L. The efficacy of perturbation training in nonoperative anterior cruciate ligament rehabilitation programs for physical active individuals. *Phys Ther.* 2000;80(2):128-40.
12. Beynon BD, Ryder SH, Konradsen L, Johnson RJ, Johnson K, Renström PA. The effect of anterior cruciate ligament trauma and bracing on knee proprioception. *Am J Sports Med.* Mar-1999;27(2):150-5.
13. Yasuda K, van Eck CF, Hoshino Y, Fu FH, Tashman S. Anatomic single- and double-bundle anterior cruciate ligament reconstruction, part 1: Basic science. *Am J Sports Med.* 2011;39(8):1789-99.
14. Grøntvedt T, Engebretsen L, Benum P, Fasting O, Mølster A, Strand T. A prospective, randomized study of three operations for acute rupture of the anterior cruciate ligament. Five-year follow-up of one hundred and thirty-one patients. *J Bone Joint Surg Am.* 1996;78(2):159-68.

15. Vavken P, Fleming BC, Mastrangelo AN, Machan JT, Murray MM. Biomechanical outcomes after bioenhanced anterior cruciate ligament repair and anterior cruciate ligament reconstruction are equal in a porcine model. *Arthroscopy*. 2012;28(5):672-80.
16. West RV, Harner CD. Graft selection in anterior cruciate ligament reconstruction. *J Am Acad Orthop Surg*. 2005;13(3):197-207.
17. Barrett AM, Craft JA, Replogle WH, Hydrick JM, Barrett GR. Anterior cruciate ligament graft failure: a comparison of graft type based on age and Tegner activity level. *Am J Sports Med*. 2011;39(10):2194-8.
18. Siegel L, Vandenakker-Albanese C, Siegel D. Anterior cruciate ligament injuries: anatomy, physiology, biomechanics, and management. *Clin J Sport Med*. 2012;22(4):349-55.
19. Shelbourne KD, Klotz C. What I have learned about the ACL: utilizing a progressive rehabilitation scheme to achieve total knee symmetry after anterior cruciate ligament reconstruction. *J Orthop Sci*. 2006;11(3):318-25.
20. Kruse LM, Gray B, Wright RW. Rehabilitation after anterior cruciate ligament reconstruction: a systematic review. *J Bone Joint Surg Am*. 2012;94(19):1737-48.
21. Ardern CL, Webster KE, Taylor NF, Feller JA. Return to sport following anterior cruciate ligament reconstruction surgery: a systematic review and meta-analysis of the state of play. *Br J Sports Med*. 2011;45(7):596-606.
22. Li S, Chen Y, Lin Z, Cui W, Zhao J, Su W. A systematic review of randomized controlled clinical trials comparing hamstring autografts versus bone-patellar tendon-bone autografts for the reconstruction of the anterior cruciate ligament. *Arch Orthop Trauma Surg*. 2012;132(9):1287-97.
23. Fleming BC, Hulstyn MJ, Oksendahl HL, Fadale PD. Ligament Injury, Reconstruction and Osteoarthritis. *Curr Opin Orthop*. 2005;16(5):354-362.

Authors

Michael J. Hulstyn, MD, is an Associate professor of orthopaedics at The Warren Alpert Medical School of Brown University.
 Stephen A. Klinge, MD, is a Resident physicians affiliated with the Department of Orthopedics at Rhode Island Hospital.
 Gregory A. Sawyer, MD, is a Resident physician affiliated with the Department of Orthopedics at Rhode Island Hospital.

Disclosures

The authors have no financial interests to disclose.

Correspondence

Stephen A. Klinge, MD
 Resident Physician
 Department of Orthopedics/Rhode Island Hospital
 401-444-4030
 Fax 401-444-6182
steveklingemd@gmail.com

Diagnosis and Management of Lisfranc Injuries and Metatarsal Fractures

HEATHER E. GOTH, MD; CRAIG R. LAREAU, MD; TODD A. FELLARS, MD

ABSTRACT

Forefoot and midfoot injuries are relatively common and can lead to chronic disability, especially if they are not promptly diagnosed and appropriately treated. A focused history and physical examination must be coupled with a thorough review of imaging studies to identify the correct diagnosis. Subtle radiographic changes can represent significant ligamentous Lisfranc injury. Midfoot swelling in the presence of plantar ecchymosis should be considered to be a Lisfranc injury until proven otherwise. While most metatarsal fractures can be treated with some form of immobilization and protected weight-bearing, this article will distinguish these more common injuries from those requiring surgical intervention. We will review relevant anatomy and biomechanics, mechanisms of injury, clinical presentation, imaging studies, and diagnostic techniques and treatment.

KEYWORDS: Lisfranc joint injury, metatarsal fracture

INTRODUCTION

Injuries to the midfoot and forefoot can result from both high- and low-energy trauma and can lead to chronic disability. A thorough history and physical examination as well as careful interpretation of imaging studies are necessary to make the appropriate diagnosis. Plain radiographs are not always diagnostic because of multiple overlapping bones in the foot, particularly on the lateral view. This article will provide an overview of common traumatic foot injuries, focusing on Lisfranc joint injuries and metatarsal fractures. We will review relevant anatomy and biomechanics, mechanisms of injury, clinical presentation, imaging studies, and diagnostic techniques.

LISFRANC INJURIES

Injuries to the Lisfranc, or tarsometatarsal (TMT), joint complex occur in 1 in 55,000 persons each year in the United States, approximately 0.2% of all fractures.¹ Low-energy trauma, including falls from standing and athletic injuries, accounts for approximately one-third of Lisfranc injuries. The remaining two-thirds occur as a result of high-energy trauma (eg, motor vehicle collision, industrial accidents and falls

from heights).^{2,3} Overall, it still remains difficult to quantify the exact incidence of these injuries as nearly 20% are not accurately diagnosed on initial radiographic assessment.⁴

Anatomy and Biomechanics

The forefoot is comprised of five metatarsal bones and the phalanges of each toe. The midfoot consists of five bones: three cuneiforms (medial, middle and lateral), the cuboid, and navicular.

The Lisfranc joint consists of the articulations between the metatarsals and the three cuneiforms and cuboid. Its osseous architecture and soft-tissue connections are critical to the stability of the foot. The Lisfranc articulation can be divided into three longitudinal columns.⁵ The medial column consists of the medial cuneiform and first metatarsal. The middle column is composed of the middle and lateral cuneiforms and the second and third metatarsals. The lateral column is made up of the cuboid and fourth and fifth

Figure 1. Coronal computed tomography (CT) image demonstrating the Roman arch



Med Cun = medial cuneiform
Mid Cun = middle cuneiform
Lat Cun = lateral cuneiform
Cub = cuboid
5th MT = fifth metatarsal

metatarsals. There is limited motion in the medial and middle column, but the lateral column exhibits significantly more motion. The cuneiforms are trapezoidal, wider dorsally than plantarly, providing stability similar to a “Roman arch” (Figure 1). The second metatarsal is recessed proximally, serving as the “keystone” of the Lisfranc joint.

Soft tissue support of the TMT articulation consists primarily of capsular and ligamentous structures. The Lisfranc ligament is the most important and runs from the plantar medial cuneiform to the base of the second metatarsal. While the second through fifth metatarsals are interconnected by inter-metatarsal ligaments, there is no inter-metatarsal connection between the first and second metatarsals. Thus, the Lisfranc ligament effectively connects the medial column to the lateral four metatarsals. Injury to this ligament can destabilize the entire forefoot as well as the Lisfranc articulation.⁶

Mechanism of Injury

Lisfranc injuries result from both indirect and direct trauma. Direct injuries, including crush injuries and other high-energy mechanisms, are frequently associated with significant soft-tissue trauma, vascular compromise, and compartment syndrome. Therefore, one should have a high suspicion for Lisfranc injuries and these other entities in patients presenting with a history of crush injury to the foot.

There are two common indirect mechanisms of Lisfranc injury: forced external rotation, or twisting of a pronated foot and axial loading of the foot in a fixed equinus position. In a twisting injury, forceful abduction of the forefoot causes dislocation of the second metatarsal and lateral displacement of the lateral metatarsals. This type of injury is in sports involving use of a stirrup, such as at equestrian events. Associated “nutcracker” cuboid fractures can occur due to compression by the fourth and fifth metatarsal bases. Patients presenting with such a cuboid fracture of this nature should be suspected of having an associated Lisfranc injury. Metatarsal base fractures, particularly of the second, are not uncommon with an abduction mechanism.

Axial loading of the foot with the ankle and metatarsophalangeal (MTP) joints in plantarflexion is another mechanism for a Lisfranc injury. Examples include missing a step, catching one’s heel on a curb while stepping down, or force applied when the foot is plantarflexed and the knee is anchored on the ground. The latter usually occurs in American football players when they are kneeling or lying in a prone position and another athlete falls directly onto the heel.^{6,7}

Signs and Symptoms

Patients with Lisfranc injuries tend to present with midfoot swelling and inability to bear weight. Classic findings include forefoot and midfoot edema, and plantar arch ecchymosis, which are considered pathognomonic for Lisfranc injury. Additional findings suggestive of Lisfranc injury include diastasis between the hallux and the second toe on an

Figure 2. Anteroposterior foot x-ray demonstrating Lisfranc injury (the medial border of the second metatarsal does not line up with that of the middle cuneiform)



anteroposterior (AP) foot radiograph – a “positive gap sign.” Tenderness to palpation and inability to bear weight on the tiptoes also suggest injury to the TMT complex.^{6,7}

Stability of the TMT articulation may be assessed with maneuvers such as the “piano key test” (moving the first and second metatarsals into plantarflexion/dorsiflexion and abduction/adduction). Subluxation or discomfort with this test suggests TMT joint injury. The first and second metatarsals should also be stressed divergently.⁸ Of note, stress tests in the acute setting may be limited by patient discomfort and swelling of the foot.

Imaging

An AP view assesses the alignment of the first and second TMT joints, while the oblique view evaluates the other TMT joints; the medial border of the second metatarsal should line up with that of the middle cuneiform. On the 30-degree oblique view, the medial border of the fourth metatarsal should line up with that of the cuboid. Any displacement of these lines is diagnostic for Lisfranc injury (Figure 2). Other signs of Lisfranc injury include avulsion fractures of the second metatarsal base or medial cuneiform (“fleck sign”) and more than 2.7 mm of diastasis between the first and second metatarsals.⁹ Lateral radiographs may reveal dorsal dislocation or subluxation of the TMT joints.⁶

If a Lisfranc injury is suspected despite normal imaging, “stress views” of the foot should be obtained: an AP weight-bearing radiograph with both feet on a single cassette, as well as oblique and lateral weight-bearing radiographs of the injured extremity. One should explain the rationale behind these painful radiographs to improve compliance with equal weight distribution on both feet. The alignment of all columns should be reassessed, and any displacement is diagnostic of TMT joint instability. Diastasis between the first and second TMT joints, if greater than 2 mm compared to the contralateral side, is indicative of ligamentous Lisfranc injury.¹⁰ Lateral weight-bearing films should be examined for loss of arch height and subluxation of TMT joints.

Treatment

Unstable Lisfranc injuries should be treated with either transarticular fixation or arthrodesis, depending on age, degree of underlying arthritis, ligamentous or bony injury, and comminution. Post-operatively, patients are usually placed in a short leg cast for 3 to 4 weeks and then transitioned to a controlled ankle motion (CAM) boot, which allows ankle ROM exercises, for 3 to 5 weeks. Typically, patients do not bear weight for 8 to 12 weeks, depending on surgeon preference and patient symptoms. Patients can be transitioned to a shoe with an orthotic insert at 3 months post-operatively. Physical therapy should be initiated for balance and gait training once the patient's cast is removed.^{6,7}

Patients with stable injuries can be managed non-operatively and can bear weight as tolerated in a CAM boot for 6 to 10 weeks. After 2 weeks in the boot, weight-bearing images are obtained to monitor for any changes in alignment. A brief course of physical therapy to regain balance, strength, and ROM is recommended. After discontinuing the CAM boot, comfortable, supportive shoes should be worn and some authors also advocate the use of full-length orthotic inserts.⁶

METATARSAL FRACTURES

Forefoot Anatomy and Biomechanics

The forefoot serves two major purposes during gait: (1) the five metatarsals and two sesamoids provide a broad plantar surface for load sharing, and (2) the mobile forefoot allows the metatarsal heads to accommodate uneven ground and maintain even load distribution.¹¹ Displaced metatarsal fractures can disrupt the major weight-bearing complex of the foot. It is critical to correct both displacement in the sagittal plane and excessive shortening of any individual metatarsal. These injuries can result in metatarsalgia due to excessive pressure on one or more metatarsal heads.⁷

Metatarsal Shaft Fractures (Acute Traumatic)

In a study of the epidemiology of metatarsal fractures, 68% were found to involve the fifth metatarsal, most commonly resulting from a torsional mechanism.¹² Metatarsal shaft fractures can also occur from a direct blow to the foot, such

as dropping a heavy object onto the forefoot, causing a transverse or comminuted fracture pattern. In the setting of crush injuries, second, third and/or fourth metatarsals are usually involved.

Patients with acute metatarsal shaft fractures present with pain and swelling of the forefoot, with point tenderness over the fracture site. With multiple metatarsal fractures, a neurovascular exam and soft tissue injury assessment are essential to monitor for foot compartment syndrome.⁷ Radiographic evaluation includes standard, three-view foot x-rays. Weight-bearing x-rays should be obtained if tolerated, to assess the extent of displacement, angulation and shortening on each view. As previously mentioned, fractures at the base of the second metatarsal should raise suspicion for Lisfranc injury.

Treatment

Operative indications for metatarsal shaft fractures include greater than 10 degrees of angulation in the sagittal plane, more than 3 to 4 millimeter translation in any direction, rotational toe malalignment, and shortening that alters the distal parabolic relationship of the metatarsal heads.¹³ These structural changes can lead to metatarsalgia and painful calluses. Transverse plane displacement can lead to interdigital nerve irritation. Additionally, persistent medial or lateral displacement of a 1st or 5th MT shaft fracture can widen the foot and create shoe-wear problems, so they should be reduced and fixed.⁷

Shaft fractures with minimal or no displacement can be treated either in a short-leg walking cast for several weeks or in a hard-soled shoe if comfort allows. The advantage of a hard-soled shoe is that free ROM of the ankle is preserved. Other treatment options include a supportive shoe with a longitudinal arch support to unload the metatarsal heads. Minimally displaced or non-displaced traumatic metatarsal fractures usually heal within 3 weeks and rarely result in functional deficit. Prolonged immobilization should be avoided to prevent joint stiffness.¹⁴

Some fractures of the proximal fifth metatarsal deserve special mention, since their high risk of nonunion makes them unique among metatarsal fractures. These so-called Jones fractures occur at the metaphyseal-diaphyseal junction of the fifth metatarsal, involving the fourth-fifth metatarsal articulation. Due to the poor blood supply in this region, these fractures have a high incidence of nonunion. These fractures are common in athletes involved in contact sports. Management entails strict non-weight-bearing in a short leg cast for 6 to 8 weeks. Due to the likelihood of delayed union or nonunion, Jones fractures often require surgical intervention, particularly in elite athletes. Early surgery minimizes the risk of non-union and expedites return to sports.¹⁵

Metatarsal Stress Fractures (Subacute and Chronic)

Stress fractures of the metatarsal shaft occur as a result of repetitive forefoot stresses, and are commonly seen in athletes; they can also occur after metatarsal-shortening

forefoot procedures that alter the weight-bearing distribution among the metatarsal heads, such as a first metatarsal shortening osteotomy used for hallux valgus (bunion) correction. Stress fractures commonly occur in the second and third metatarsal necks and the fifth metatarsal shaft.¹¹ Patients with high-arched feet are predisposed to stress fractures of the fifth metatarsal since a disproportionate amount of weight is borne on the lateral aspect of the foot.

Patients with metatarsal stress fractures usually have localized pain and tenderness, sometimes without a history of trauma, but often with a recent change in the patient's activity level. The classic finding is tenderness over the affected bone, and hopping on one foot reproduces the pain. A thorough medical history may help to detect secondary causes of stress fractures, such as endocrinopathies, eating disorders, and malabsorption syndromes. A dietary history should address calcium, vitamin D, and protein intake, as well as alcohol and caffeine consumption.¹⁵

Standard three-view weight-bearing radiographs yield results that vary based on the acuity of injury. The earliest findings include subtle radiolucency or poor definition of the cortex; later findings include thickening and sclerosis of the endosteum along with periosteal new bone formation. These later findings may appear weeks to months after the onset of symptoms.^{16,17}

Since radiographic findings tend to lag behind clinical symptoms by weeks, x-rays can be negative, particularly early in the course of disease. In this setting, technetium bone scans and/or MRI can be helpful. Occult stress fractures are generally visible on bone scans days to weeks earlier than on radiographs. While a bone scan has high sensitivity for detecting stress fractures, it is not very specific, and tracer uptake will be seen in the setting of any process that involves bone remodeling, including tumor, infection and stress reaction without fracture.¹⁵ MRI is considered equally sensitive and more specific than a bone scan in diagnosing occult fractures. Diagnostic MRI findings include endosteal marrow edema and periosteal edema in the region of injury.¹⁸

Treatment

Treatment of metatarsal stress fractures involves several weeks of rest and immobilization in a CAM boot, with the duration dependent on tenderness and pain with weight-bearing. A gradual return to previous activity level should begin after the resolution of symptoms. Some institutions also recommend referral to a metabolic bone disease specialist if secondary causes of stress fracture are suspected.¹⁵

References

1. Mantas JP, Burks RT. Lisfranc injuries in the athlete. *Clin Sports Med.* Oct 1994;13(4):719-730.
2. Vuori JP, Aro HT. Lisfranc joint injuries: trauma mechanisms and associated injuries. *J Trauma.* Jul 1993;35(1):40-45.
3. Myerson MS, Fisher RT, Burgess AR, Kenzora JE. Fracture dislocations of the tarsometatarsal joints: end results correlated with pathology and treatment. *Foot Ankle.* Apr 1986;6(5):225-242.

4. Trevino SG, Kodros S. Controversies in tarsometatarsal injuries. *Orthop Clin North Am.* Apr 1995;26(2):229-238.
5. Peicha G, Labovitz J, Seibert FJ, et al. The anatomy of the joint as a risk factor for Lisfranc dislocation and fracture-dislocation. An anatomical and radiological case control study. *J Bone Joint Surg Br.* Sep 2002;84(7):981-985.
6. Watson TS, Shurnas PS, Denker J. Treatment of Lisfranc joint injury: current concepts. *J Am Acad Orthop Surg.* Dec 2010;18(12):718-728.
7. Schenck RC, Jr., Heckman JD. Fractures and Dislocations of the Forefoot: Operative and Nonoperative Treatment. *J Am Acad Orthop Surg.* Mar 1995;3(2):70-78.
8. Arntz CT, Hansen ST, Jr. Dislocations and fracture dislocations of the tarsometatarsal joints. *Orthop Clin North Am.* Jan 1987;18(1):105-114.
9. Faciszewski T, Burks RT, Manaster BJ. Subtle injuries of the Lisfranc joint. *J Bone Joint Surg Am.* Dec 1990;72(10):1519-1522.
10. Aronow MS. Treatment of the missed Lisfranc injury. *Foot Ankle Clin.* Mar 2006;11(1):127-142, ix.
11. Koval KJ, Zuckerman JD. *Handbook of fractures.* 3rd ed. Philadelphia: Lippincott Williams & Wilkins; 2006.
12. Petrisor BA, Ekrol I, Court-Brown C. The epidemiology of metatarsal fractures. *Foot Ankle Int.* Mar 2006;27(3):172-174.
13. Shereff MJ. Fractures of the forefoot. *Instr Course Lect.* 1990;39:133-140.
14. Browner BD, MD Consult LLC. Skeletal trauma basic science, management, and reconstruction. 4th ed. Philadelphia, PA: Saunders/Elsevier; 2009: <http://www.library.drexel.edu/cgi-bin/r.cgi?url=http://www.mdconsult.com/das/book/body/120058643-2/0/1867/0.html>.
15. Shindle MK, Endo Y, Warren RF, et al. Stress fractures about the tibia, foot, and ankle. *J Am Acad Orthop Surg.* Mar 2012;20(3):167-176.
16. Daffner RH, Pavlov H. Stress fractures: current concepts. *AJR Am J Roentgenol.* Aug 1992;159(2):245-252.
17. Sofka CM. Imaging of stress fractures. *Clin Sports Med.* Jan 2006;25(1):53-62, viii.
18. Kiuru MJ, Niva M, Reponen A, Pihlajamäki HK. Bone stress injuries in asymptomatic elite recruits: a clinical and magnetic resonance imaging study. *Am J Sports Med.* Feb 2005;33(2):272-276.

Author

Heather E. Gotha, MD, is a Senior orthopaedic resident, Dept. of Orthopaedics, The Warren Alpert Medical School of Brown University and Rhode Island Hospital.

Craig R. Lareau, MD, is Chief orthopaedic resident, Dept. of Orthopaedics, The Warren Alpert Medical School of Brown University and Rhode Island Hospital.

Todd A. Fellars, MD, is Orthopaedic foot and ankle fellow, Dept. of Orthopaedics, The Warren Alpert Medical School of Brown University and Rhode Island Hospital.

Disclosures

The authors have no financial disclosures to report.

Correspondence

Heather E. Gotha, MD
593 Eddy Street
Providence RI 02903
401-444-4030
hgotha@gmail.com

Nerve Compression Syndromes of the Upper Extremity: Diagnosis, Treatment, and Rehabilitation

P. KAVEH MANSURIPUR, MD; MATTHEW E. DEREN, MD; ROBIN KAMAL, MD

ABSTRACT

Nerve compression syndromes of the upper extremity, including carpal tunnel syndrome, cubital tunnel syndrome, posterior interosseous syndrome and radial tunnel syndrome, are common in the general population. Diagnosis is made based on patient complaint and history as well as specific exam and study findings. Treatment options include various operative and nonoperative modalities, both of which include aspects of hand therapy and rehabilitation.

KEYWORDS: Upper extremity, nerve compression, rehabilitation, carpal tunnel, cubital tunnel

INTRODUCTION

Upper extremity compression syndromes, including carpal tunnel syndrome, cubital tunnel syndrome, and radial tunnel syndrome, are common in the general population. Although they differ in the anatomic distribution of their symptoms, they share a similar pathophysiology and treatment.

As the nerves that control the upper extremity traverse the arm towards the hand, they pass through relatively fixed anatomical structures, or tunnels, usually as the nerve passes a joint. For instance, the carpal tunnel is bounded on three sides by the carpal bones of the wrist and on the fourth by the transverse carpal ligament; it marks the transition from the forearm to the hand. These tunnels are unable to accommodate swelling, which can occur due to renal failure, diabetes, thyroid disease, rheumatoid arthritis, and alcoholism; fractures at the site of the tunnel; and conditions involving physiologic fluid shifts, including pregnancy; most swelling, however, is idiopathic.¹ When swelling occurs within the limited volume of the tunnel, the nerve is compressed, which compromises the microvascular blood supply and leads to focal ischemia of the nerve. This in turn leads to demyelination, which disrupts nerve signal transmission; prolonged compression can lead to more permanent damage to the neurons themselves, including degeneration distal to the point of compression. The inflammation and ischemia also leads to fibrosis, which can further tether the nerve and lead to more traction injury during motion. This pathophysiologic process is experienced by the patient as pain, paresthesias, loss of sensation, and muscle weakness in the distri-

bution of the affected nerve. It is important to note that the presentation of cervical radiculopathy resembles that of peripheral nerve compression, and care must be taken to make the correct diagnosis. In some cases, the peripheral nervous system is compromised in both areas, a condition known as the double crush syndrome,² which also complicates the diagnosis and treatment.

Carpal Tunnel Syndrome

Carpal tunnel syndrome (CTS) is the most common nerve compression syndrome of the upper extremity, with an incidence of 3% to 5% in the general population.³ It is caused by compression of the median nerve as it crosses through the fibroosseous carpal tunnel at the wrist, along with the nine extrinsic flexor tendons. Most cases are idiopathic and work related, with a significantly proportion coming from occupations that involve manual force, repetition, and vibratory tools.⁴

Symptoms include loss of sensation and paresthesias in the distribution of the median nerve (thumb, index finger, middle finger, and radial half of the ring finger); a weak grip, clumsiness, and hand pain that awakens the patient at night. The clinical examination may reveal thenar atrophy, decreased sensation, and positive responses to provocative tests, including Phalen's, Durkan's, and Tinel's (Figure 1). Decreased two-point discrimination may be more prevalent in the advanced stages of the disease.⁵ Electrodiagnostic testing also has typical findings including increased motor and sensory latencies and decreased conduction velocities across the carpal tunnel.¹ Electromyography reveals signs of denervation, such as fibrillations and positive sharp waves.

Conservative management of CTS begins with splinting, as multiple studies have shown improvement with both night splints and full-time splints.⁶ Other studies have shown benefits from ultrasound treatments, yoga, and carpal bone mobilization.⁷ Corticosteroid injections into the tunnel also provide symptomatic relief; 20% of patients remain symptom-free at one year. Steroid injections may also help make the diagnosis if it remains unclear, and can serve as a useful prognostic tool, as patients that experience no initial relief after injection may not experience symptomatic relief with surgery.¹

Surgery is usually successful in treating CTS, with a 90% success rate.⁸ All surgical techniques divide the transverse carpal ligament, release the volar border of the carpal tunnel,

Figure 1. Provocative testing in Carpal Tunnel Syndrome
(a) Phalen's test, wrist hyperflexion;
(b) Durkan's test, direct compression of the median nerve;
(c) Tinel's sign, tapping over the course of the nerve elicits paresthesias



and decompress the nerve in the carpal tunnel. Endoscopic techniques have a faster recovery time and higher patient satisfaction within the first several weeks when compared to traditional open approaches, but these differences are undetectable at one year of follow-up.⁸

Cubital Tunnel Syndrome

Cubital tunnel syndrome (CuTS) is the second most common nerve compression syndrome, affecting roughly 25 out of every 100,000 people.⁹ It is caused by compression of the ulnar nerve as it crosses the elbow. The cubital tunnel is formed by Osborne's ligament and the medial collateral ligament of the elbow, but the ulnar nerve passes through other structures around the elbow, each a potential site of nerve compression: the arcade of Struthers, the medial intermuscular septum, the medial head of the triceps, the anconeus epitrochlearis, the two heads of the flexor carpi ulnaris (FCU), and the proximal edge of the flexor digitorum superficialis.¹

Patients present with numbness and paresthesias in the distribution of the ulnar nerve (the small finger and ulnar half of the ring finger); they also experience weakness of the intrinsic hand muscles (interossei, medial lumbricals), but rarely have pain.¹⁰ Advanced disease is accompanied by atrophy and progressive weakness, giving rise to a host of eponymous hand deformities, including Duchenne's sign and Wartenburg's sign (Figure 2).¹¹

As in carpal tunnel syndrome, the examination includes

many provocative maneuvers that reproduce the patient's symptoms. These include a Tinel's sign (tapping over the nerve at the elbow) and the elbow flexion test (in which the wrist is also extended, putting the ulnar nerve on maximum stretch).¹² Electrodiagnostic testing is less reliable in cubital tunnel syndrome, as the nerve compression is more intermittent than in carpal tunnel.¹³

Conservative treatment of CuTS consists of splinting the elbow in minimal flexion to take tension off the nerve, along with activity modification. Corticosteroid injections, nerve gliding, and ultrasound treatments are controversial.¹³

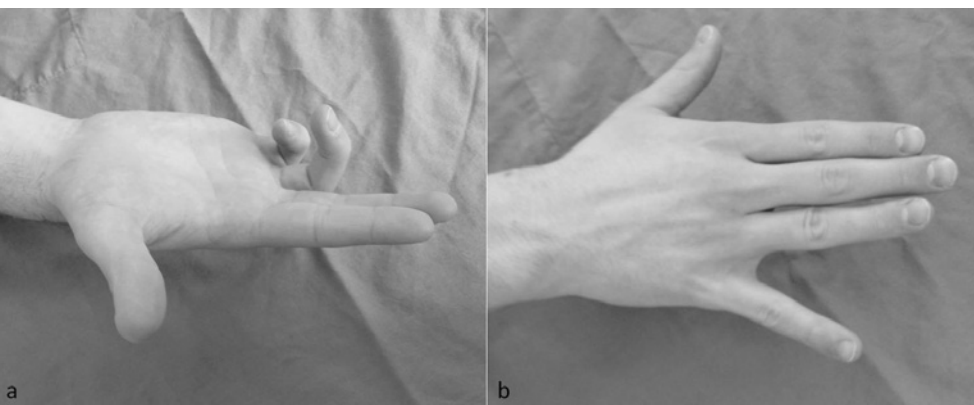
There are two surgical techniques used in the treatment of cubital tunnel syndrome. In situ decompression involves releasing the structures overlying the nerve, with the nerve left in place. With decompression and transposition, the ulnar nerve is moved anterior to the medial epicondyle. In theory, this leads to less stretching of the nerve during elbow flexion; however, studies have failed to show a significant difference in outcomes between the two techniques.¹⁴

Posterior Interosseous Nerve Compression

Radial Tunnel Syndrome (RTS) and Posterior Interosseous Syndrome (PIS) both refer to compression of the posterior interosseous nerve (PIN). The PIN branches from the radial nerve three to five centimeters distal to the lateral epicondyle; the nerve then dives under the arcade of Frohse (proximal edge of the supinator) and into the radial tunnel, consisting of the radiocapitellar capsule, supinator, and extensor carpi radialis brevis (ECRB). The vascular Leash of Henry, which is composed of branches of the recurrent radial artery, is yet another potential sites of compression of the PIN.^{1,15} It is important to note that while the PIN does have afferent fibers that transmit pain signals from the wrist, it does not carry any cutaneous sensory information, which can help distinguish a PIN palsy from cervical radiculopathy.

RTS is a controversial diagnosis, with some doubting its very existence. It is typified by point tenderness over the mobile extensor wad, without motor or sensory symptoms, and without any findings on

Figure 2. Hand deformities resulting from ulnar nerve injury (a) Duchenne's sign, clawing of the two ulnar digits resulting from loss of interossei and ulnar lumbricals; (b) Wartenburg's sign, increased passive abduction of small finger



electrodiagnostic testing. Pain can sometime be elicited by resisted forearm supination or resisted middle finger extension, but these provocative tests are not well established.¹⁶ The posterior interosseous syndrome (PIS), on the other hand, is a more conventional compression syndrome; it causes weakness in the distribution of the PIN and may yield abnormal electrodiagnostic findings.

Treatment for both syndromes is similar, beginning with splints, nonsteroidal drugs and activity modification; progressing to corticosteroid injections; and finally requiring surgical release of the proximal PIN for refractory cases. Patients with PIN syndrome tend to undergo surgical release earlier, partially because its motor symptoms lead to an easier diagnosis. Studies show generally good outcomes after release for PIN syndrome, with better outcomes for earlier releases.¹⁷ Surgical release for RTS has poorer outcomes; much of this may be due to poor patient selection in view of the difficulty in making the diagnosis.¹⁸

Rehabilitation

Occupational therapy plays an important role in the management of upper extremity nerve compression syndromes. Skillful hand therapy may help avoid surgery altogether. Conservative management includes activity modification as well as splinting the affected nerve. For patients who undergo surgical treatment, hand therapy is crucial in postoperative rehabilitation for appropriate return to normal function.

After surgery for any of the above syndromes, the basic principles of rehabilitation remain the same. Surgeries that involve any period of postoperative splint or sling immobilization of a joint (i.e, the elbow in cubital and radial tunnel releases) require therapy for range of motion. Many nerve compression syndromes have some element of weakness or atrophy preoperatively; therapy should therefore also focus on strengthening.¹⁹

Scar massage can help with collagen remodeling and with desensitization; similarly, nerve-gliding exercises are employed to prevent fibrotic adhesions from reforming around the released nerves.

CONCLUSION

Nerve compression syndromes of the upper extremity are common afflictions. The diagnosis can usually be made with a careful history and physical examination, but supplemental diagnostic studies can be useful. Conservative treatment often suffices; for refractory cases, surgical release is usually definitive. Therapists play an important role both in initial management as well as postoperative rehabilitation.

References

1. Brunton LM, Chhabra AB. Hand, Upper Extremity, and Microvascular Surgery. In: Miller M, Thompson SR, Hart JA, Cosker T, Elsayed S, eds. *Review of Orthopaedics*. Philadelphia, PA: Elsevier; 2012:517-587.
2. Osterman AL. The double crush syndrome. *Orthop Clin North Am*. Jan 1988;19(1):147-155.

3. Atroshi I, Englund M, Turkiewicz A, Tagil M, Petersson IF. Incidence of physician-diagnosed carpal tunnel syndrome in the general population. *Arch Intern Med*. May 23 2011;171(10):943-944.
4. Barcenilla A, March LM, Chen JS, Sambrook PN. Carpal tunnel syndrome and its relationship to occupation: a meta-analysis. *Rheumatology (Oxford)*. Feb 2012;51(2):250-261.
5. Nowak M, Noszczyk B. Simple clinical tests in severe carpal tunnel syndrome. *Pol Przegl Chir*. Dec 1 2012;84(10):502-508.
6. Muller M, Tsui D, Schnurr R, Biddulph-Deisroth L, Hard J, MacDermid JC. Effectiveness of hand therapy interventions in primary management of carpal tunnel syndrome: a systematic review. *J Hand Ther*. Apr-Jun 2004;17(2):210-228.
7. O'Connor D, Marshall S, Massy-Westropp N. Non-surgical treatment (other than steroid injection) for carpal tunnel syndrome. *Cochrane Database Syst Rev*. 2003(1):CD003219.
8. Trumble TE, Diao E, Abrams RA, Gilbert-Anderson MM. Single-portal endoscopic carpal tunnel release compared with open release: a prospective, randomized trial. *J Bone Joint Surg Am*. Jul 2002;84-A(7):1107-1115.
9. Mondelli M, Giannini F, Ballerini M, Ginanneschi F, Martorelli E. Incidence of ulnar neuropathy at the elbow in the province of Siena (Italy). *J Neurol Sci*. Jul 15 2005;234(1-2):5-10.
10. Huang JH, Samadani U, Zager EL. Ulnar nerve entrapment neuropathy at the elbow: simple decompression. *Neurosurgery*. Nov 2004;55(5):1150-1153.
11. Palmer BA, Hughes TB. Cubital tunnel syndrome. *J Hand Surg Am*. Jan 2010;35(1):153-163.
12. Buehler MJ, Thayer DT. The elbow flexion test. A clinical test for the cubital tunnel syndrome. *Clin Orthop Relat Res*. Aug 1988;233:213-216.
13. Lund AT, Amadio PC. Treatment of cubital tunnel syndrome: perspectives for the therapist. *J Hand Ther*. Apr-Jun 2006;19(2):170-178.
14. Caliendo P, La Torre G, Padua R, Giannini F, Padua L. Treatment for ulnar neuropathy at the elbow. *Cochrane Database Syst Rev*. 2012;7:CD006839.
15. Awantang MN, Sherrill JM, Thomson CJ, Hunt TR. Radial Nerve Decompression. In: Wiesel SW, ed. *Operative Techniques in Orthopaedic Surgery*. Vol 3. Philadelphia, PA: Lippincott, Williams, and Wilkins; 2011:2685-2690.
16. Naam NH, Nemani S. Radial tunnel syndrome. *Orthop Clin North Am*. Oct 2012;43(4):529-536.
17. Hashizume H, Nishida K, Nanba Y, Shigeyama Y, Inoue H, Morito Y. Non-traumatic paralysis of the posterior interosseous nerve. *J Bone Joint Surg Br*. Sep 1996;78(5):771-776.
18. Dang AC, Rodner CM. Unusual compression neuropathies of the forearm, part II: median nerve. *J Hand Surg Am*. Dec 2009;34(10):1915-1920.
19. Diao E. Carpal Tunnel Release: Endoscopic, Open, and Revision. In: Wiesel SW, ed. *Operative Techniques in Orthopaedic Surgery*. Vol 3. Philadelphia, PA: Lippincott, Williams, and Wilkins; 2011:2657-2665.

Authors

P. Kaveh Mansuripur, MD; Matthew E. Deren, MD; Robin Kamal, MD, are affiliated with Rhode Island Hospital and the Department of Orthopaedics, Alpert Medical School of Brown University.

Disclosures

The authors have no financial disclosures to report.

Correspondence

P. Kaveh Mansuripur, MD
Resident, Department of Orthopaedics,
Rhode Island Hospital
593 Eddy Street, Providence RI 02903
401-444-4030
Fax 401-444-6182
pmansuripur@lifespan.org

Trouble from the Tropics: Challenges in Managing Malaria in Rhode Island

JONATHAN DWORKIN, MD; MARJORIE JANVIER, MD; DIANA TREABA, MD; ADRIAN GARDNER, MD

ABSTRACT

The authors present a case of severe falciparum malaria diagnosed in a traveler after he returned to Rhode Island from a visit to the Dominican Republic. They then review aspects of the case pertinent to our local practice environment that make diagnosis and management especially challenging.

KEYWORDS: Severe falciparum malaria

BACKGROUND

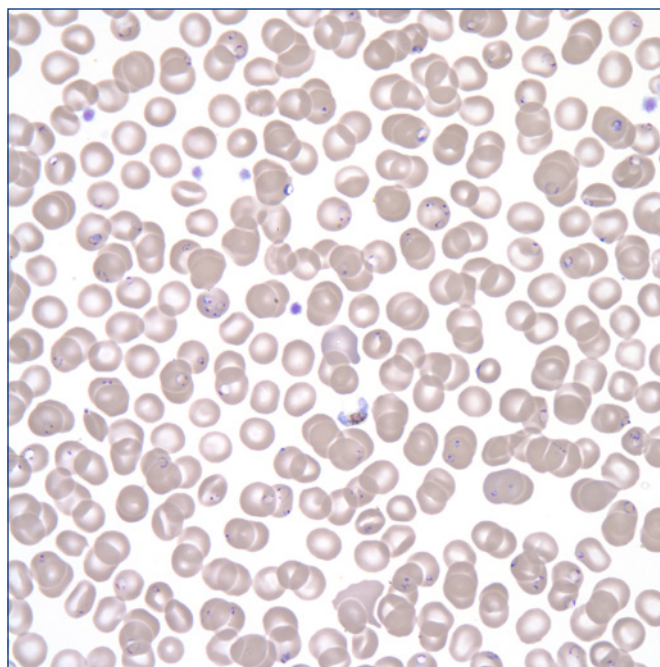
Malaria causes 350-500 million infections per year worldwide, with one million resulting in death. Between 1997 and 2006 there were 10,745 cases that occurred among U.S. residents, almost all acquired during travel.¹ In Rhode Island many residents travel to the Caribbean, where malaria remains sensitive to chloroquine. However, many travelers still do not obtain consultation with a travel medicine specialist prior to leaving the country, increasing their chances of acquiring a life-threatening infection. This case describes the challenges raised in diagnosing and managing severe malaria in a returning traveler to Rhode Island, including the controversial use of exchange transfusions to quickly reduce parasite burden.

The Case

The patient was a 57-year-old man with a medical history of hypertension, hyperlipidemia and depression who traveled to the Dominican Republic on a snorkeling vacation. He did not see a travel physician before leaving town, and he did not make use of malaria prophylaxis or mosquito repellent. He recalled no insect exposure while travelling.

A week after returning home the patient developed nightly fevers and chills. His maximum temperature exceeded 104 F. He went to an urgent care center where he was given a presumptive diagnosis of sinusitis. He received amoxicillin-clavulanate for 10 days and prednisone for 5 days. The fevers decreased in intensity, but they continued to occur every 48–72 hours.

In the days leading up to admission the patient experienced progressive fatigue and anorexia. He also experienced watery diarrhea, cough and shortness of breath. On the day of admission his wife returned from work and



Picture 1. Gametocytes present on the smear confirmed the diagnosis was falciparum malaria.

realized he couldn't get out of bed. This is when she brought him to the hospital.

In the emergency room the patient's systolic blood pressure was in the 80s. Lab tests were quickly obtained and showed a parasitemia on admission of 20.8%. Gametocytes present on the smear confirmed the diagnosis was falciparum malaria (Picture 1). He also had acute renal failure (creatinine 4.8 mg%), hyperbilirubinemia (total bilirubin 10.0 mg%), and thrombocytopenia. Blood pressure responded to saline boluses and he was admitted to the ICU.

The patient received an intravenous quinidine-loading dose upon admission, but his QTc increased by 24% after the bolus, and the team then discontinued the quinidine. After discussing the case with the on-call fellow at the CDC malaria hotline the team decided to initiate IV artesunate and red-cell exchange transfusions. The medication was sent the following morning from the CDC facility in New York City. The patient was awake and able to take PO medications on the evening of admission, so while awaiting the IV artesunate, the team administered two doses of PO artemether-lumefantrine.

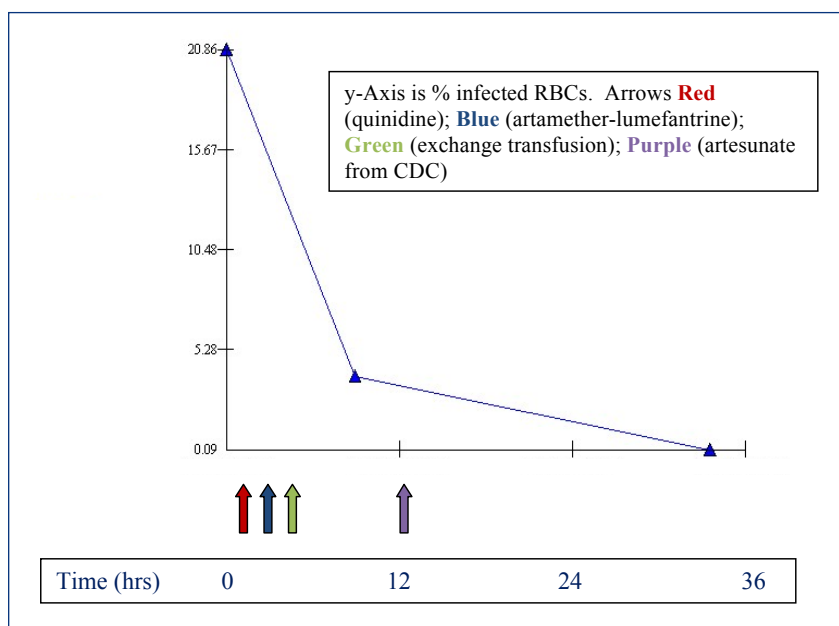


Figure 1. Over the next 48 hours the patient demonstrated significant clinical improvement. Even before starting the IV artesunate, his degree of parasitemia came down to 3.9%.

Over the next 48 hours the patient demonstrated significant clinical improvement. Even before starting the IV artesunate, his degree of parasitemia came down to 3.9% (**Figure 1**). This improvement occurred after receiving the quinidine-loading dose, two oral doses of artemether-lumefantrine, and a 12-unit red cell exchange transfusion. He then continued on the intravenous artesunate in combination with intravenous doxycycline. Two days after admission the degree of parasitemia was 0.9%. His other clinical parameters also significantly improved. He completed IV artesunate after three days, and he then received three additional days of malarone. Parasite smears were negative after completing the IV artesunate.

DISCUSSION

This case raises several points about the diagnosis and management of severe *Plasmodium falciparum* malaria in Rhode Island. First, there was a delay in diagnosis due to a low index of suspicion by a doctor working at an urgent care clinic. Second, there can be initial confusion about whether intraerythrocytic ring form parasites on a peripheral blood smear, in a region endemic for *Babesia*, represented *Plasmodium falciparum* malaria or infection with *Babesia* species. Third, there were difficulties obtaining an appropriate intravenous agent for the treatment of severe *Plasmodium falciparum* malaria. Finally there was the debate regarding the role of red-cell exchange transfusions in management of severe disease.

The missed opportunity to diagnose this infection early emphasizes the need to better integrate urgent care centers into the educational and quality improvement initiatives common at larger institutions. Easy access to patient

medical records and laboratory test results, through a statewide electronic medical system, would also enhance the ability of urgent care clinicians to identify and follow up on pertinent details of the patient's care.

Differentiation of *Plasmodium falciparum* malaria from *Babesia* is based primarily on morphological characteristics of the parasites on smear. In this case the presence of gametocytes was diagnostic of *falciparum* malaria. This required consultation with an expert pathologist during the night of admission, a resource not available in many settings.

The management of severe *falciparum* malaria in technologically advanced countries raises several issues that tend to be less relevant to practitioners in endemic areas where the disease is more common.²⁻⁴ Interestingly, intravenous artemether compounds, which are the gold standard in much of the world, are not yet licensed in the United States. Physicians here must

use intravenous quinidine as first-line therapy for severe malaria, a treatment notorious for causing electrolyte disturbances, QTc prolongation, and potentially dangerous arrhythmias. In this case dramatic QTc prolongation caused the clinical team to abandon quinidine therapy. The team was able to obtain intravenous artesunate from the CDC, but only after a significant 12-hour delay.

The role of red-cell exchange transfusions in the treatment of severe malaria is controversial. Studies looking at the utility of exchange transfusions in the past have suffered from methodological flaws and mixed results.⁵ In the developing world, where ICU support services are scarce and the blood supply is often unsafe, the strategy is less promising. However in this case, where the ICU and transfusion support services were excellent, and where intravenous artemether was not initially available, exchange transfusion formed a crucial bridge to definitive therapy. The low number of cases of severe *falciparum* malaria in the United States makes it unlikely that a randomized trial will be performed.

CONCLUSION

In conclusion, we present a case of severe *falciparum* malaria in a Rhode Island resident returning from travel to the Caribbean. The case demonstrates multiple challenges in the care of severe malaria patients intrinsic to practice in this environment. In particular the case shows the need to better integrate urgent care centers into educational and quality improvement initiatives common in other settings, the need to improve the availability of first-line treatments for severe malaria, and the promising role of exchange transfusion in resource-intensive settings where benefit almost certainly outweighs risks.

References

1. Centers for Disease Control. *Health Information for International Travel 2010: The Yellow Book*. 2009;128-143. Mosby Elsevier.
2. Sarkar P, Ahluwalia G, Vijayan V, Talwar A. Critical care aspects of malaria. *Journal of Intensive Care Medicine*. 2010;25(2):93-103.
3. Das BS. Renal failure in malaria. *J Vector Borne Disease*. 2008;45:83-97.
4. Mishra S, Newton C. Diagnosis and management of the neurological complications of falciparum malaria. *Nat Rev Neurol*. 2009;5(4):189-98.
5. Shelat S, Lott J, Braga M. Considerations on the use of adjunct red blood cell exchange transfusion in the treatment of severe Plasmodium falciparum malaria. *Transfusion*. 2010;50:875-880.

Authors

Jonathan Dworkin, MD is a Former Brown fellow in infectious diseases, and is now assistant professor of medicine at the University of Hawaii, John A. Burns School of Medicine.

Marjorie Janvier, MD was a Fellow affiliated with the Division of Infectious Diseases, Brown University.

Diana Treaba, MD is an Assistant professor of pathology at the Warren Alpert Medical School of Brown University.

Adrian Gardner, MD is a Research assistant professor of medicine at the Warren Alpert Medical School of Brown University.

Disclosures

The authors have no financial disclosures to report.

Correspondence

Jonathan Dworkin
jdworkin@hotmail.com

Resident Physician Preventive Health Behaviors and Perspectives on Primary Care

GEETIKA GUPTA, MD; MARK D. SCHLEINITZ, MD, MS; STEVEN E. REINERT, MS; KELLY A. MCGARRY, MD

ABSTRACT

Little is known about lifestyle choices and preventive healthcare seeking behaviors among resident physicians. Residents function under unusual working conditions requiring extensive duty hours. This may significantly affect attentiveness to personal health and wellness. In this study, we surveyed residents across multiple training programs to compare lifestyle choices and access to preventive healthcare.

METHODS: Resident physicians affiliated with Brown University, Providence, Rhode Island, were surveyed between February and April 2009 regarding lifestyle habits and experiences with primary care. We evaluated the relationships between training program and established primary care on health behaviors.

RESULTS: Residents were in one of 5 programs: internal medicine, medicine/pediatrics, emergency medicine, surgery or pediatrics. Respondents slept an average of 6.7 hours per day and worked an average of 70 hours per week, with surgical residents sleeping the shortest and working the longest hours ($p < 0.001$ for both). An average of 58.8% of residents indicated having a primary care physician. This rate was lowest among surgery residents at 37% ($p = 0.081$). Rates of screening with regards to blood pressure, cholesterol and cervical cancer were significantly higher among residents maintaining primary care ($p < 0.001$). A lack of time was the most common barrier to obtaining primary care.

DISCUSSION: Surgical residents may have unique barriers to healthcare seeking behaviors, such as longer work hours. Residents with established primary care had significantly higher rates of adherence to preventive screening. Residency programs should address barriers to accessing healthcare for trainees, particularly among surgical programs.

KEYWORDS: resident wellness; resident health; health behaviors

INTRODUCTION

Physicians in residency training programs constitute a unique population that is not often studied, and little is known about their personal healthcare beliefs and practices. By training, residents are highly educated and have extensive

medical knowledge. Arguably, they also have easier access to healthcare services than the average individual. Despite this, it is unclear if they are able or consider it worthwhile to maintain adequate primary care. Unique barriers to care may exist for residents, including the perception that one can sufficiently monitor his/her own health as a physician, beliefs surrounding the importance of routine primary care, time limitations from the demands of residency, or concerns about privacy.¹⁻²

In 2003, the Accreditation Council for Graduate Medical Education (ACGME) instituted limits on resident work hours to 80 per week, averaged over a 4-week period.³ Implementation of this guideline decreased work hours reported by residents, improved satisfaction with clinical education, and reduced measures of burnout.⁴⁻⁵ It is unclear if this has translated into improvements in practicing healthy habits or accessing primary care.

The majority of residents are in a period of life where preventive healthcare would have the greatest impact. In addition to health screening measures, general internists also perform routine counseling on a number of lifestyle behaviors, including diet, exercise, smoking cessation, and alcohol use. Many Americans, including residents, lack adherence to national guidelines for these behaviors,⁶ and opportunities to improve residents' lifestyles may be neglected in the absence of primary care. This is especially significant as personal lifestyle practices of residents influence the counseling they provide to patients.⁷⁻⁸

In this study, we surveyed residents across multiple training programs at one institution to examine their lifestyle choices and access to preventive healthcare. We hypothesized there would be significant need for improvement in both areas examined, especially in the more arduous and time intensive training programs. In addition, we hypothesized residents with established primary care would practice healthier habits and be more likely to obtain health screening.

METHODS

Resident physicians affiliated with Brown University in Providence, RI, were invited via email to complete an online survey between February and April 2009. The survey included limited demographic information, questions regarding residents' lifestyle behaviors such as work hours, sleep, alcohol, tobacco, drug use, and questions pertaining to their

Table 1. Baseline characteristics of residents by training program

	Medicine (n = 121)	Med/Peds (n = 15)	EM (n = 48)	Surgery (n = 56)	Pediatrics (n = 51)	Combined (n = 291)
Number of Responses	71	9	30	30	37	177
Response Rate (%)	59	60	63	54	73	61
Female (%)	65	44	50	37	76	59
Age<30 (%)	75	22	60	43	73	64

Table 2. Resident physician personal habits by training program

	Medicine	Med/Peds	EM	Surgery	Pediatrics	Combined	P value
Currently smoke (%)	0	0	0	3	0	0.6	0.30
Drink alcohol (%)	72	56	93	73	73	75	0.10
Number of drinks/week	3.2	3.6	3.4	4.9	3.3	3.5	0.24
Think should drink less (%)	8	0	7	17	0	7	0.11
Drink caffeine to improve functioning (%)	57.8	77.8	83.3	60	67.6	65.5	0.13
Use illicit drugs (%)	3	0	17	10	5	7	0.11
Number of hours sleep/day	6.7	6.8	7.2	6	6.9	6.7	<0.001
Number of hours work/week	69	68	65	79	69	70	<0.001
Number of times exercise/week	1.8	0.9	2.1	2.1	2.3	2	0.18
Body Mass Index (kg/m ²)	23.7	25	23.6	23.7	23	23.6	0.59
Consume 1000mg calcium/day (%)	33.8	44.4	33.3	46.7	48.9	39.6	0.48

*P value <0.05 indicates significant differences in resident response among training programs.

perceptions of and experience with primary care while in residency. Residents were also asked about their personal preventive screening status including blood pressure, cholesterol, and age-appropriate cancer screening. Inclusion criteria were current residents employed by the institution, all of whom had work-provided email addresses. Written consent was obtained prior to survey entry, and all responses remained anonymous. Every two weeks, an email reminder was sent to residents that had not yet responded.

Respondents were asked to identify their current training program. Those programs with low response rates (<50%) were excluded from analysis due to concern about bias. Programs with response rates <50% were used for data analysis. We compared resident lifestyle choices and access of preventive healthcare by training program and by whether or not a resident had established primary care.

In testing these relationships, we used one-way analysis of variance (ANOVA), the independent-samples t-test (with adjustment for unequal variance where appropriate), and the chi-square test. We used an alpha probability of 0.05 as the threshold for statistical significance in two-tailed comparisons. All statistics were performed with Stata v.10 (Stata Corp., College Station, TX). Our Institutional Review Board approved the study design.

RESULTS

Of 470 residents receiving the survey, 236 (50%) completed it. Due to a low response rate from certain specialties, 59 were excluded from analysis (neurology, orthopaedics, pathology, radiology, obstetrics/gynecology, and dermatology). The remaining respondents were in one of 5 training programs: internal medicine (IM), medicine/pediatrics, emergency medicine (EM), surgery or pediatrics. The surgery group included general and specialty surgery (neurosurgery, plastic surgery, urology and ophthalmology).

Table 1 reports characteristics of respondents. There were 291 total residents surveyed in these specialties and 177 completed a survey (response rate 61%). Response rates ranged from 54% in surgery to 73% in pediatrics. Women comprised 59% of the respondents.

Table 2 reports on personal habits by training program. Alcohol was used by 75% of individuals with an average of 3.5 drinks per week consumed. There was a trend towards higher rates of use among EM residents with 93% reporting alcohol consumption. Surgery residents had the highest average number of drinks per week at 4.9 along with the greatest percentage reporting they should drink less at 17%. A majority of residents (65.5%) used caffeine with the intent of improving functioning. Twelve residents (7%) reported illicit drug use. The highest rate was among EM residents

at 17%, though this was not statistically significant. The average body mass index (BMI) was 23.6 despite an average exercise frequency of 2 times per week.

Respondents slept an average of 6.7 hours per day and worked an average of 70 hours per week. There was a statistically significant relationship between each of these variables and the training program of the resident ($p < 0.001$). Surgeons-in-training slept the least and worked the most at an average of 6 hours per day and 79 hours per week, respectively.

Analyses of lifestyle choices by presence of a primary care provider demonstrated nonsignificant differences in rates of alcohol consumption, number of alcoholic drinks per week, illicit drug use, and caffeine consumption to improve performance, adequate calcium consumption, average BMI, and exercise frequency among residents with and without a primary care physician (PCP). Residents with a PCP worked significantly less (68.7 vs 72.3 hours/week, $p = 0.018$) and obtained significantly more sleep (6.86 vs 6.51 hours/day, $p = 0.009$) compared to those without a PCP.

Table 3 shares results for questions on access to primary care and preventive services. Fifty-nine percent of residents indicated having a PCP. This was lowest among surgical housestaff at 37%, though not statistically significant ($p = 0.081$). Of this group 72% had a visit with their PCP in the past year for an overall rate of 42% of residents

surveyed having seen their PCP within one year. In contrast, 71% overall had a dental visit in the past year. Among those who did not have a PCP, the majority (93%) felt they should. Eight residents (4.5%) had been evaluated in an emergency room during residency. The rates were similar among those with and without a PCP ($p = 0.61$).

Thirty-eight percent of residents had received a prescription from an individual other than a PCP during residency. Rates were lowest among medicine and surgery programs ($p = 0.01$). The rate was similar between residents with and without a PCP (42% versus 32%, $p = 0.145$). Females engaged in this practice more than males with rates of 43% versus 30%, but this was not statistically significant ($p = 0.076$).

In our study, the majority of residents had their blood pressure and cholesterol checked within the past year and 5 years, respectively. Almost 2/3 of females had a PAP smear within the past year. Rates of screening were similar across training programs. **Figure 1** examines the adherence of residents to preventive screening by whether or not they had a PCP. Rates of screening were significantly higher among residents maintaining primary care compared to those who did not. This was consistent across all variables assessed ($p \leq 0.001$).

Table 4 reports resident perceptions of barriers to establishing and maintaining primary care. By far, the most common issue cited was a lack of time, with about 1/3 of

Table 3. Resident physician access to primary care and preventive services by training program

	Medicine	Med/Peds	EM	Surgery	Pediatrics	Combined	P value
Have PCP (%)	61	78	63	37	65	59	0.08
Seen PCP in past year (%)	72	71	74	91	63	72	0.55
Have another doctor (%)	45	33	43	33	57	45	0.37
If no PCP, feel they should have one (%)	93	50	100	89	100	93	0.09
Blood pressure measured within 1 year (%)	75	78	80	77	76	76	0.99
Cholesterol checked within 5 years (%)	63	67	70	63	81	68	0.41
For females, PAP smear within 2 years (%)	89	75	93	82	92	89	0.36
Seen dentist in past year (%)	73	78	70	64	73	71	0.86
Emergency department visit (%)	4	0	10	7	0	5	0.33
Prescription from another provider (%)	30	56	60	33	54	38	0.01

*P value < 0.05 indicates significant differences in resident response among training programs.

Table 4. Resident physician perceived barriers to accessing primary care

	Number of Responses	Percent (%)
Do not have time to see PCP	55	31.1
Hard to find PCP accepting new patients	20	11.3
Other	17	9.6
Do not have health problems	10	5.7
Do not need annual exam	8	4.5
Can manage care on my own	7	4.0
Not important to have PCP	7	4.0
PCP will not be helpful	5	2.8
Too young to worry about medical care	3	1.7
Do not need preventive screening	3	1.7

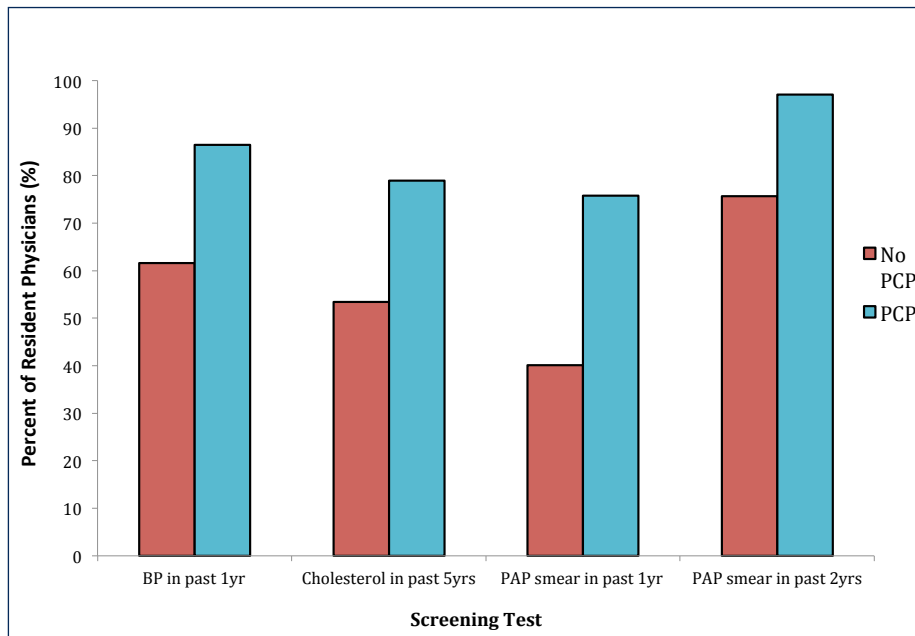


Figure 1. Age-appropriate preventive screening rates of resident physicians by status of established primary care.

* $P \leq 0.001$ for all variables

residents expressing this concern. Eleven percent of residents found it difficult to find an internist accepting new patients. Some respondents felt they were healthy and did not need a PCP, annual exam or preventive screening. Some expressed concerns about knowing whom to trust and wanting to avoid an internist who may be a supervisor in the future.

DISCUSSION

Residency training is an unusually demanding time for physicians with a high prevalence of burnout due to increased emotional stress, difficult job situations and workload.⁹ Despite the rigors of training, our results indicate that respondents were able to maintain fairly healthy lifestyle habits. Tobacco use and excessive alcohol consumption were uncommon. The average BMI was maintained within the normal range, in contrast to national average BMI of 28.4 kg/m².¹⁰ Reasons for this trend are unclear, but may include a selection bias in the medical field. Residents on an inpatient service often walk a significant amount within the hospital on a daily basis, which may contribute to weight maintenance as well.

There were several areas of concern. It is worrisome that 17% of EM residents and 7% of residents overall reported illicit drug use, which may be underreported figures. For adults, the National Sleep Foundation recommends 7 to 9 hours of sleep per night.¹¹ Residents slept less than recommended at an average of 6.7 hours of sleep per night. It is not surprising that surgery residents slept the least, given they also worked the most.

Surgery residents reported the lowest rate of having a PCP at 37%, possibly a result of increased work hours. Overall, there were a large percentage of residents without

established primary care (41%), though almost all felt it was important to have a PCP (93%). The USPSTF recommends high blood pressure screening for adults over age 18 every 1 to 2 years, lipid disorder screening for women over age 20 and those with risk factors every 5 years and cervical cancer screening for women over age 21 every 3 years.¹² Even in the era of duty hour limits, time was commonly perceived as a barrier to obtaining primary care. Adults (ages 25 to 44) in the general population have similar rates of access to primary care at 63.3%. This rate is higher among the insured with 81.5% of adults less than age 65 having a PCP.¹³

We found that residents with a PCP were significantly more likely to have had preventive screening compared to those without a PCP. This was true with regards to screening for hypertension, dyslipidemia and cervical cancer, highlighting a benefit of maintaining primary care.

Self-prescription of medications (most commonly antibiotics, allergy and asthma medications and contraceptives) among residents was common in a prior study with a rate of 52%.¹⁴ Our results also demonstrated high rates with 38% of residents receiving prescriptions from an individual not identified as their medical provider. Females were more likely to do so. This may be because female residents are more concerned about privacy issues in obtaining healthcare than male residents.¹ These rates were similar between residents with and without established primary care, so that even those housestaff that had access to a medical provider chose to obtain some prescriptions elsewhere. Reasons for this trend may be related to concerns about privacy around sensitive issues, time constraints and convenience.

There are several limitations of the study. The results are drawn from self-reported data so there may be a recall and reporting bias. Alcohol consumption and illicit drug use

may be underreported. The survey asked residents to estimate work and sleep hours, exercise frequency and other habits over a year's time that may fluctuate every month during various rotations. We performed comparisons between five training programs, but sample size may have limited power to detect differences that exist. We did not have data regarding post-graduate year (PGY) of respondents and did not factor this into our analysis. Since interns (PGY1) generally work the longest hours, it is possible they access primary care to a lesser degree than senior residents. Our sample included one institution and findings may be different at another location.

Our study adds to the literature on resident health and wellness, a uniquely important and understudied topic. One of the strengths was the inclusion of 5 different training programs, allowing for comparison and evaluation for trends particular to a specialty. We found that surgical residents may have distinct barriers to healthcare seeking behaviors given increased work and decreased sleep hours, as manifested by lower rates of established primary care. This highlights a need by residency program directors for education about and encouragement of resident attention to personal health, particularly in the surgical training programs.

References

1. Dunn LB, Moutier C, Hammond KAG, Lehrmann J, Roberts LW. Personal health care of residents: preferences for care outside of training institution. *Academic Psychiatry*. 2008;32:20-30.
2. Rosen IM, Christie JD, Bellini LM, Asch DA. Health and health care among housestaff in four US internal medicine residency programs. *J Gen Intern Med*. 2000;15:116-121.
3. Accreditation Council for Graduate Medical Education 2000-2011 [Internet]. ACGME duty hour standards fact sheet. [updated 2011; cited 2011 Dec 10]. Available from: http://www.acgme.org/acWebsite/newsRoom/newsRm_dutyHours.asp
4. Gopal R, Glasheen JJ, Miyoshi TJ, Prochazka AV. Burnout and internal medicine resident work-hour restrictions. *Arch Intern Med*. 2005;165:2595-2600.
5. Kashner TM, Henley SS, Golden RM, Byrne JM, Keitz SA, Cannon GW, et al. Studying the effects of ACGME duty hours limits on resident satisfaction: results from VA learners' perceptions survey. *Acad Med*. 2010;85(7):1130-1139.
6. Collins J, Hinshaw JL, Fine E, Albanese MA. Diagnostic radiology resident compliance with recommended health guidelines: effect of resident work environment. *Acad Radiol*. 2008;15(8):1046-57.
7. Howe M, Leidel A, Krishnan SM, Weber A, Rubenfire M, Jackson EA. Patient-related diet and exercise counseling: do providers' own lifestyle habits matter? *Prev Cardiology*. 2010;13:180-185.
8. Schwartz JS, Lewis CE, Clancy C, Kinoshian MS, Radany MH, Akoplan JP. Internist's practices in health promotion and disease prevention: a survey. *Ann Intern Med*. 1991;14:46-53.
9. Ishak WW, Lederer S, Mandili C, Nikraves R, Seligman L, Vasa M, et al. Burnout during residency training: a literature review. *Journal of Graduate Medical Education*. 2009 December;232-242.
10. Finucane MM, Stevens GA, Cowan MJ, Danaei G, Lin JK, Paciorek CJ, et al. National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9.1 million participants. *The Lancet*. 2011;377:557-567.
11. National Sleep Foundation [Internet]. How much sleep do we really need? [updated 2011, cited 2012 Jan 20]. Available from: <http://www.sleepfoundation.org/article/how-sleep-works/how-much-sleep-do-we-really-need>.
12. U.S. Preventive Services Task Force [Internet]. The guide to clinical preventive services 2012. [updated 2012, cited 2013 March 9]. Available from: <http://www.ahrq.gov/professionals/clinicians-providers/guidelines-recommendations/guide/guide-clinical-preventive-services.pdf>.
13. US Department of Health and Human Services [Internet]. Access to health services. [updated 2013 Jan, cited 2013 March 9]. Available from : <http://www.healthypeople.gov/2020/LHI/accessCare.aspx?tab=data>.
14. Christie JD, Rosen IM, Bellini LM, Inglesby TV, Lindsay J, Alper A, et al. Prescription drug use and self-prescription among resident physicians. *JAMA*. 1998;280:1253-1255.

Authors

- Dr. Geetika Gupta is a Graduate of the general internal medicine residency program, Alpert Medical School at Brown University and works in the Division of Hospital Medicine, Rhode Island Hospital.
- Dr. Mark D. Schleinitz is an Associate professor at the Alpert Medical School at Brown University.
- Steven E. Reinert is a Research analyst at Lifespan, Providence, Rhode Island.
- Dr. Kelly A. McGarry is Associate professor, Alpert Medical School at Brown University, and program director of the school's general internal medicine residency program.

Disclosures

The authors have no financial interests to disclose.

Correspondence

Dr. Geetika Gupta
Rhode Island Hospital
593 Eddy St, Main 11
Providence, RI 02903
Phone: 401-444-3985
Fax: 401-444-3056
ggupta@lifespan.org

Rhode Island Youth Tobacco Use: Implications for Pediatricians and Family Physicians

CYNTHIA ROBERTS, PhD; JOHN PATENA, MA; DEBORAH N. PEARLMAN, PhD

INTRODUCTION

Tobacco use is the leading cause of preventable death, disease, and disability in the United States.¹ More than 80% of adult smokers begin before the age of 18.²⁻⁴ People who begin smoking during adolescence are more likely to experience smoking-related health problems. The annual adult health-related financial burden of cigarette smoking as a result of initiation of smoking during adolescence is \$193 billion.⁵ In Rhode Island, the annual health care costs directly caused by smoking totals \$506 million.⁶ Each Rhode Island household spends \$717 annually on smoking-related government expenditures.⁶

Persons working with young people know well that developmental changes during childhood and adolescence usher in an increase in risky behaviors beginning around the time of puberty. Risk-taking is often a way teens assert their independence from parents, other adults, and authority figures. Thus, for young people, the transition to adulthood is replete with both opportunities and risks. Adolescence is a critical time during which protection against tobacco use experimentation and uptake is imperative, given adolescents' propensity for risk-taking and independence asserting, and given that people who begin using tobacco at an earlier age are more likely to develop more severe levels of nicotine addiction.⁷ One of the Centers for Disease Control and Prevention's (CDC) primary and overarching tobacco control goals is preventing youth from initiating tobacco use.

METHODS

Data from the 1997-2011 Rhode Island Youth Risk Behavior Surveillance Survey (YRBS) were used to assess tobacco use rates among high school youth. The YRBS is conducted every other year in Rhode Island public high schools and middle schools and in public schools in other states across the country to assess six major risk-behavior areas, including tobacco. An in-depth description of YRBS methodology,

including weighting procedures, is described in a *Morbidity and Mortality Weekly Report* and can be accessed on the CDC's website.⁸

RESULTS

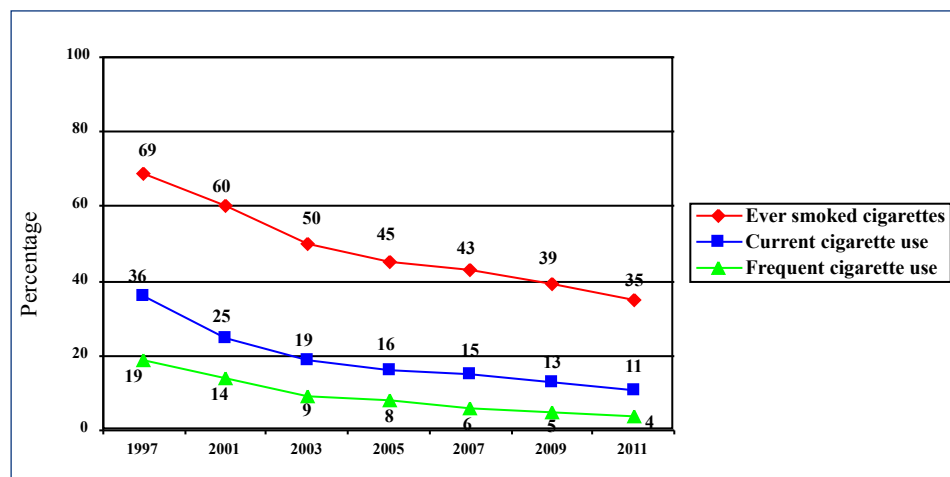
Current cigarette use among Rhode Island high school students

The percentage of Rhode Island public high school students who reported currently smoking cigarettes shows an important downward trend from 36% in 1997 to 11% in 2011 (Figure 1). There also was a significant drop in the percentage of high school students who reported ever smoking cigarettes over the past 15 years from a high of 69% in 1997 to 35% in 2011 (Figure 1). A decline in adolescent tobacco use is an encouraging sign for public health and prevention.

Current cigar use among Rhode Island high school students

Overall, 12.0% of Rhode Island public high school students have smoked cigars, cigarillos, or little cigars on at least 1 day during the 30 days before the survey (i.e., current cigar use; Table 1). The prevalence of current cigar use was higher among 17- to 18-year-old youth (15.4%) than younger

Figure 1. Trends in the percentage of Rhode Island public high school students who reported lifetime (ever) smoking, current smoking, and frequent cigarette use, 1997–2011



Data source: 1997 to 2011 Rhode Island High School Youth Risk Behavior Survey weighted data files. Rhode Island Department of Health Center for Health Data and Analysis.

age students (8.1%); higher among male (17.9%) than female (5.8%) high school students; and higher among 12th graders (15.1%) than 9th graders (8.5%). Non-Hispanic white high school students were more likely than Hispanic high school students to smoke cigars (12.9% vs. 9.3%).

Current smokeless tobacco use among Rhode Island high school students

In Rhode Island, 6.1% of public high school students have used smokeless tobacco (e.g., chewing tobacco, snuff, or dip) on at least 1 day during the 30 days before the survey (i.e., current smokeless tobacco use; Table 1). Overall, the prevalence of current smokeless tobacco use was higher among male (9.9%) than female (2.2%) high school students; and higher among 12th-graders (7.8%) than 9th-graders (4.7%).

Race/ethnicity data from the Rhode Island High School Youth Risk Behavior Survey (YRBS) are not analyzed for non-Hispanic black high school students. The number of non-Hispanic black high school students who report smoking cigarettes or using other tobacco products in the Rhode Island YRBS is too small for meaningful comparisons with non-Hispanic white and Hispanic students.

Racial/ethnic minority youth

In a larger analysis conducted by the authors for publication in an upcoming Rhode Island Department of Health burden of tobacco document, YRBS data showed that Hispanic middle school students are nearly twice as likely to smoke cigarettes as non-Hispanic white middle school students. In contrast, the percentage of non-Hispanic white high school students who currently smoke cigarettes or smoke cigars is significantly higher than for Hispanic high school students (Table 2). About 16% of non-Hispanic white high school students currently smoke cigarettes and 13% smoke cigars. Among Hispanic high school students, 8.2% currently smoke cigarettes and 9.3% smoke cigars. Both groups of high school students reported similar use of smokeless tobacco products (6% non-Hispanic

Table 1. Characteristics of Rhode Island high school youth by type of tobacco product¹, 2007–2011

Characteristics	Current Cigarette Use		Current Cigar Use		Current Smokeless Tobacco Use	
	Weighted percentages	(95% CI)	Weighted percentages	(95% CI)	Weighted percentages	(95% CI)
Total Population	13.3	11.4–15.3	12.0	10.9–13.0	6.1	5.3–6.8
Age						
12 to 14 years old	8.1	5.5–10.6	8.1	6.3–10.0	--	--
15 years old	10.0	7.9–11.9	8.0	6.8–9.2	--	--
16 years old	14.8	12.2–17.5	13.2	11.2–15.2	6.3	4.9–7.7
17 to 18 years old	16.9	13.6–20.1	15.4	13.6–17.3	7.8	6.2–9.5
Sex						
Female	12.2	10.9–14.5	5.8	4.8–6.8	2.2	1.6–2.7
Male	14.3	11.9–16.8	17.9	16.3–19.5	9.9	8.7–11.3
Grade						
9th	10.1	8.1–12.1	8.5	7.4–9.6	4.7	3.9–5.4
10th	11.5	9.2–13.8	10.3	8.6–12.0	5.2	3.7–6.6
11th	15.6	12.2–19.0	14.2	12.2–16.3	6.3	4.9–7.6
12th	16.8	13.8–19.9	15.1	12.7–17.5	7.8	5.9–9.6
Race/ethnicity						
Hispanic	8.2	5.7–10.7	9.3	6.9–11.7	6.8	5.7–7.9
Non-Hispanic black ²	--	--	--	--	--	--
Non-Hispanic white	15.5	13.8–17.3	12.9	11.9–13.9	6.2	5.0–7.3

¹ Definitions:

Current cigarette use. Smoked cigarettes on at least 1 day during the 30 days before the YRBS survey.

Current cigar use. Smoked cigars, cigarillos, or little cigars on at least 1 day during the 30 days before the survey.

Current smokeless tobacco use. Used smokeless tobacco (chewing tobacco, snuff, or dip), on at least 1 day during the 30 days before the survey.

² A dash (--) indicates that there were < 100 respondents for the subgroup and data were not weighted.

Data source: 2007, 2009 & 2011 Rhode Island High School Youth Risk Behavior Survey combined and weighted data file.

white high school students and 7% Hispanic high school students). About 8.4% of non-Hispanic white high school students report trying flavored cigarettes in the past year compared to 6.7% of Hispanic high school students.

Lesbian, gay, bisexual, unsure (LGBU) youth

Among Rhode Island high school students, tobacco use is more common among lesbian, gay, bisexual, and unsure (LGBU) high school youth than other high school students (Table 2). Current cigarette smoking is nearly three times higher (31% vs. 12%) and current cigar smoking is nearly twice as high (20.3% vs. 12.3%) among LGBU high school students. The data do not tell us why there is high use of tobacco products among LGBU high school students in Rhode Island.

Smoking may be due to stressors unique to the sexual identities and experiences of LGBU youth, including discrimination and lack of family acceptance. Nationally, LGBU youth smoke at rates much higher rates (38–59%) than all adolescents during the same time period (28–35%).⁹

Youth with disabilities

Current tobacco use is also high among Rhode Island high school youth with physical and/or emotional disabilities (Table 2). Youth with physical disabilities are more likely than those without physical disabilities to currently smoke cigarettes (20.3% vs. 12.3%), to smoke cigars (18.0% vs. 10.9%), to use smokeless tobacco products (9.7% vs. 5.4%), and try flavored cigarettes (13.3% vs. 7.1%). High school students with emotional and learning disabilities are more likely than those without these disabilities to currently smoke cigarettes (20.3% vs. 12.3%), to smoke cigars (18.0% vs. 10.9%), to use smokeless tobacco products (9.7% vs. 5.4%), and try flavored cigarettes (15.7% vs. 6.6%). Since youth with disabilities are often excluded from peer-initiated social activities and are frequently bullied, they may see smoking as a way of gaining acceptance from others. An analysis of the 2011 Rhode Island YRBS showed that high school students with a physical, mental, or learning disabilities were far more likely to be bullied than students without these disabilities (33% versus 16%). Nearly one-fourth of students with a disability who reported being recently bullied also smoked cigarettes (23.5%). The YRBS is a cross-sectional data set and causation between bullying and smoking cannot be determined. Nevertheless, whole-school antibullying/antiviolence programs that include messages to reduce other behaviors, such as smoking, are necessary to effectively address complex risk behaviors among youth.

DISCUSSION

While cigarette-smoking trends have decreased for the overall Rhode Island high school youth population, youth's use of cigars outstrips their use of cigarettes. Youth's use of cigars and cheap smokeless and other tobacco products pose a clear risk to the gains made in tobacco control in our state.

Table 2. Priority populations for tobacco prevention among Rhode Island high school youth by current tobacco use, 2007–2011

Characteristics	Current Cigarette Use		Current Cigar Use		Current Smokeless Tobacco Use	
	Weighted percentages	(95% CI)	Weighted percentages	(95% CI)	Weighted percentages	(95% CI)
Total Population	13.3	11.4–15.3	12.0	10.9–13.0	6.1	5.3–6.8
Race/ethnicity						
Non-Hispanic white	15.5	13.8–17.3	12.9	11.9–13.9	6.2	5.0–7.3
Hispanic	8.2	5.7–10.7	9.3	6.9–11.7	6.8	5.7–7.9
Non-Hispanic black ¹	--	--	--	--	--	--
Self-identify as gay, lesbian, bisexual						
No	12.0	10.1–14.0	11.2	10.1–12.4	5.6	4.8–6.3
Yes	31.6	24.8–38.5	20.7	16.3–25.1	--	--
Have physical disabilities						
No	12.3	10.5–14.0	10.9	9.8–12.0	5.4	4.7–6.1
Yes	20.3	16.6–24.1	18.0	15.6–20.4	9.7	7.4–11.9
Have emotional problems or learning disabilities						
No	11.4	9.7–13.1	10.6	9.6–11.7	5.1	4.5–5.7
Yes	25.4	21.9–29.0	18.4	16.9–20.0	10.9	8.5–13.2

¹ A dash (--) indicates that there were < 100 respondents for the subgroup and data were not weighted. Data source: 2007, 2009 & 2011 Rhode Island High School Youth Risk Behavior Survey combined and weighted data file.

Policies that are effective in delaying initiation of smoking or preventing smoking in youth can help reduce the percentage of people with smoking-related health problems in the future. One best practice advocated by the CDC is taxing tobacco products so that cigarettes and other tobacco products are equally expensive to buy. High taxes on tobacco products have been shown to prevent the initiation of smoking and get smokers to quit smoking, with the greatest impact on youth and people with limited household income.¹⁰ Rhode Island currently has the second highest cigarette tax in the United States at \$3.50 per pack.

As with cigarette smoking, smokeless tobacco use is almost always initiated and established during adolescence. Use of cigars and smokeless tobacco products is becoming more common among high school youth as the tobacco industry markets sweetened, flavored, and cheap smokeless tobacco that can taste more like candy, which make these products more appealing to young people. While the U.S. Food and Drug Administration (FDA) banned certain flavored cigarettes in 2009,¹¹ tobacco companies rebranded flavored cigarettes as “cigarillos” or “cigars” to avoid FDA regulations.

At least four policy and practice implications are relevant given CDC best and promising practices. First, considering the importance families and decision makers place on the role of physicians in our society, physician awareness of tobacco-control best practices can position pediatricians and family physicians to help build a Rhode Island that continues to reject the use of tobacco as an acceptable social norm. Second, as youth's use of smokeless, flavored, and emerging tobacco products begins to become more popular than the use of cigarettes, pediatricians and family physicians can speak with their patients and families about the dangers of these products and educate decision makers about the role high taxes on all tobacco products plays in keeping tobacco out of young people's hands. Third, physicians can be aware that young patients who identify as LGBT, have emotional and learning disabilities, or are minority youth, such as African American and Hispanic youth, may be especially vulnerable to targeted ads and promotions by the tobacco industry, and are at an increased risk for initiation of tobacco use. Being familiar with these at-risk youth populations may prove helpful during patient well visits. Finally, young people who live with a smoker, whether the smoker is a parent or sibling, are more likely to smoke. Physicians should advise all patients who smoke to quit as quitting has positive impacts not only on the individual's health but also on the health of the entire family.

References

- Centers for Disease Control and Prevention. Vital Signs: Tobacco Use, Smoking, Secondhand Smoke. Accessed at: <http://www.cdc.gov/vitalsigns/tobaccouse/smoking/>
- U.S. Department of Health and Human Services. Preventing Tobacco Use Among Young People: A Report of the Surgeon General. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Office on Smoking and Health, 1994 [accessed 2012 Feb 14].
- Campaign for Tobacco-Free Kids. The Path to Smoking Addiction Starts at Very Young Ages (PDF-93 KB). Washington: Campaign for Tobacco-Free Kids, 2009 [accessed 2012 Feb 14].
- Centers for Disease Control and Prevention. Tobacco Use Among Middle and High School Students – United States, 2000–2009. *Morbidity and Mortality Weekly Report*. 2010;59(33):1063–8. [accessed 2012 Feb 14].
- Adhikari B, Kahende J, Malarcher A, et al. Smoking-attributable mortality, years of potential life lost, and productivity losses – United States, 2000–2004. *MMWR*. 2008;57(45):1226–8. Accessed at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5745a3.htm>
- TFK burden reference
- CDC. Youth tobacco surveillance – United States, 2000. *MMWR*. 2001;50:SS-04.
- CDC. Methodology of the Youth Risk Behavior Surveillance System. *MMWR*. 2013;62(1):1–20.
- American Legacy Foundation. Tobacco and lesbian, gay, bisexual and transgender communities. 2003. Retrieved <http://www.ohio.edu/lgbt/resources/upload/Smoking%20&%20LGBT.pdf> on August 3, 2012.
- Chaloupka FJ, Yurekli A, Fong GT. Tobacco taxes as a tobacco control strategy. *Tobacco Control*. 2012;21:172–180.
- Public Law 111-31. Family Smoking Prevention and Tobacco Control and Federal Retirement Reform. June 22, 2009. Accessed at: <http://www.gpo.gov/fdsys/pkg/PLAW-111publ31/pdf/PLAW-111publ31.pdf>

Acknowledgements

This publication was supported by the Cooperative Agreement Award Number: 5U58DP001988-03 from the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the CDC.

Authors

Cynthia Roberts, PhD, is the Program Evaluator for the Rhode Island Tobacco Control Program, Division of Community, Family, Health and Equity at the Rhode Island Department of Health.

John Patena, MA, is a Master's of public health student in the Warren Alpert Medical School of Brown University, Program in Public Health.

Deborah N. Pearlman, PhD, is a Researcher affiliated with the Warren Alpert Medical School of Brown University, Program in Public Health.

Disclosure of Financial Interests

The authors and/or spouses/significant others have no financial interests to disclose.

Correspondence

Cynthia Roberts, PhD
Cynthia.Roberts@health.ri.gov



Rhode Island Monthly Vital Statistics Report

Provisional Occurrence Data from the Division of Vital Records

	REPORTING PERIOD		
VITAL EVENTS	NOVEMBER 2012	12 MONTHS ENDING WITH NOVEMBER 2012	
	Number	Number	Rates
Live Births	968	11,748	11.2*
Deaths	815	9,546	9.1*
Infant Deaths	6	76	6.5#
Neonatal Deaths	4	63	5.4#
Marriages	318	6,303	6.0*
Divorces	280	3,301	3.1*
Induced Terminations	208	3,520	299.6#
Spontaneous Fetal Deaths	8	427	36.3#
Under 20 weeks gestation	6	349	36.6#
20+ weeks gestation	2	73	6.2#

* Rates per 1,000 estimated population

Rates per 1,000 live births

	REPORTING PERIOD			
Underlying Cause of Death Category	MAY 2012	12 MONTHS ENDING WITH MAY 2012		
	Number (a)	Number (a)	Rates (b)	YPLL (c)
Diseases of the Heart	190	2,342	222.4	3,412.0
Malignant Neoplasms	168	2,192	208.1	5,639.5
Cerebrovascular Disease	42	430	40.8	560.0
Injuries (Accident/Suicide/Homicide)	58	745	70.7	9,536.5
COPD	49	513	48.7	415.0

(a) Cause of death statistics were derived from the underlying cause of death reported by physicians on death certificates.

(b) Rates per 100,000 estimated population of 1,052,567 (www.census.gov)

(c) Years of Potential Life Lost (YPLL).

NOTE: Totals represent vital events, which occurred in Rhode Island for the reporting periods listed above.

Monthly provisional totals should be analyzed with caution because the numbers may be small and subject to seasonal variation.

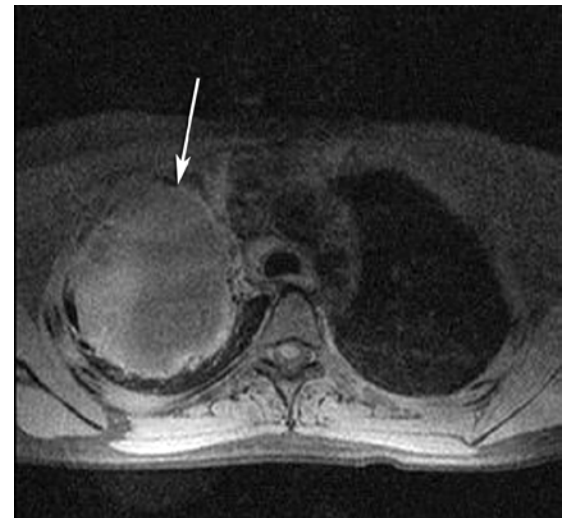
Pulmonary Cryptococcosis

CAROLYNN M. DEBENEDECTIS, MD; RUSSELL J. MCCULLOH, MD; TERRANCE T. HEALEY, MD

INTRODUCTION

A 15-year-old previously healthy female presented to the emergency room after 2 months of shortness of breath due to presumed bronchitis and new seizure activity. The patient had previously been treated with 2 courses of antibiotics, prednisone, albuterol, and montelukast. Upon admission the patient underwent a brain MRI that was normal. The patient was subsequently discharged but returned 1 week later for repeat MR of the brain which was again normal; however abnormal signal at the right lung apex suspicious was noted on the MRA (Figure 1). A subsequent first chest radiograph demonstrated a large mass within the right upper lobe with a crescentic lucency along its superior aspect and mass effect on the right mainstem bronchus and the bronchus intermedius (Figure 2). CT of the chest demonstrated a large, heterogeneous, well-circumscribed 11 cm cavitory mass in the right upper lobe with irregular areas of crescentic air along the perimeter of the cavity (Figure 4). There was mass effect on the right pulmonary artery without evidence of vascular invasion. There was also compressive atelectasis in the adjacent right middle lobe. The patient subsequently underwent bronchoscopy and biopsy that showed *Cryptococcus neoformans*.

Figure 1. Axial T1 weighted image from the MRA of the neck demonstrating a heterogeneous mass within the right upper lobe.



The patient subsequently developed increasing headaches and a ring-enhancing lesion was identified adjacent to the right caudate on a repeat brain MRI (Figure 3). Lumbar puncture showed elevated opening pressure and cerebrospinal fluid (CSF) cultures were positive for *Cryptococcus*. The patient was started on flucytosine for treatment of cryptococcal meningitis. A few weeks later the patient underwent resection of the right upper lobe cavitory

Figure 2. Chest radiograph demonstrating a large mass in the right upper lobe with multiple crescents of air at the periphery of the mass.

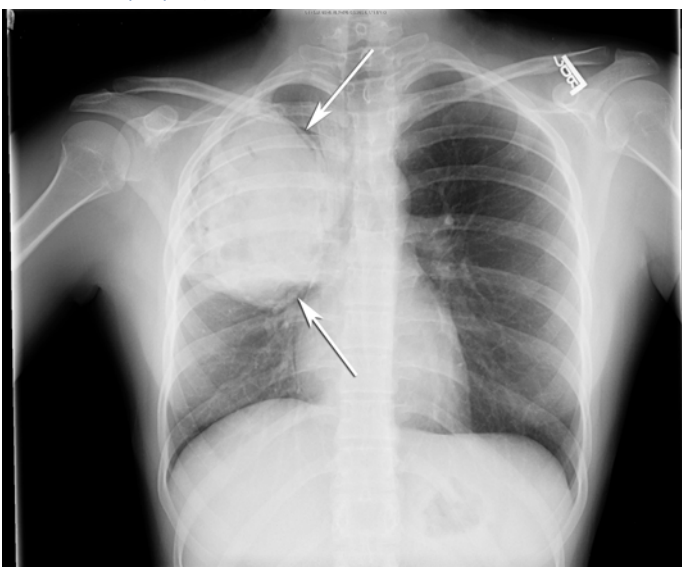


Figure 3. MR of the brain with contrast demonstrating a small ring-enhancing lesion in a perivascular space adjacent to the right caudate (white arrow).

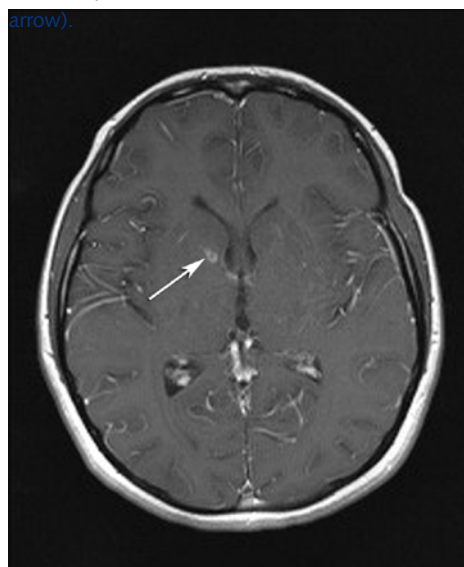


Figure 4. CT scan of the chest, abdomen, and pelvis showing the right upper lobe mass.



mass. Surgical pathology revealed a Cryptococcal fungal ball with endobronchial extension. The patient continued to improve and was sent home on six weeks of intravenous antifungal treatment.

DISCUSSION

Cryptococcus neoformans is a nonmycelial, budding encapsulated yeast that is found in soil contaminated with pigeon excreta and decaying wood. Infection usually occurs through inhalation of cryptococcal spores into the lungs.^{1,2} These spores then can undergo hematogenous dissemination resulting in central nervous system infection. Cryptococcal infection is usually seen in immunocompromised patients, especially in the setting of acquired immunodeficiency syndrome; however, infection can be seen in immunocompetent individuals as described in numerous case reports.^{3,4}

Typical findings on chest radiographs include small nodule(s), focal consolidations, and cavitary nodules/masses.^{5,6} On chest CT, single or multiple pulmonary nodules and/or masses can be seen, some of which can be cavitary.⁷ As in this case, it is not uncommon for patients to present with concomitant cryptococcal meningitis and pulmonary cryptococcal infection. The presentation of pulmonary cryptococcal infections as a single pulmonary mass has also been described previously.⁸ However, the differential diagnosis for a large pulmonary mass also includes bronchoalveolar carcinoma, metastatic disease, lymphoma, CCAM, other fungal infections and abscess.

Patients with cryptococcal pulmonary infections tend to present with nonspecific symptoms such as weight loss, fevers, cough and malaise, as was seen in this patient. Initial diagnosis is made by chest radiograph or chest CT followed by bronchoscopy and biopsy. However percutaneous biopsy and open biopsy are also options. While meningeal inflammation can be identified on MRI, positive cerebral spinal fluid (CSF) culture is required for definitive diagnosis.

Treatment of the disseminated *Cryptococcus* is usually with amphotericin B and/or flucytosine. Surgical resection of large pulmonary masses can be performed as in this case.

Figure 5. Gross specimen from right upper lobe mass resection.



References

1. Sarosi GA. Cryptococcal pneumonia. *Semin Respir Infect.* 1997;12:50-53.
2. Woodring JH, Ciporkin G, Lee C, Worm B, Woodlley S. Pulmonary cryptococcosis. *Semin Roentgenol.* 1996;31:67-75.
3. Naik-Mathuria B, Roman-Pavajean J, Leleux TM, Wall MJ. A 29-year-old immunocompetent man with meningitis and a large pulmonary mass. *Chest.* 2008; 133:1030-1033.
4. Garner EC, Gossage JR. A 36-year-old woman with a chest mass and altered mental status. *Chest.* 1997;112:836-839.
5. Bonmati J, Rogers JV, Hopkins WA. Pulmonary cryptococcosis. *Radiology.* 1956; 66:188-194.
6. Gordonson J, Birnbaum W, Jacobson G, Sargent EN. Pulmonary cryptococcosis. *Radiology.* 1974;112:557-561.
7. Lindell RM, Hartman TE, Nadrous HF, Ryu JH. Pulmonary cryptococcosis CT findings in immunocompetent patients. *Radiology.* 2005;236:326-331.
8. McAdams HP, Rosado-de-Christenson ML, Templeton PA, Lesar M, Moran CA. *Radiographics.* 1995; 15:271-286.

Authors

Carolynn M. DeBenedictis, MD, is a Radiology resident affiliated with the Department of Diagnostic Imaging at the Warren Alpert Medical School of Brown University.

Russell J. McCulloh, MD, is affiliated with the Division of Pediatric Infectious Disease, Hasbro Children's Hospital.

Terrance T. Healey, MD, is Director of Thoracic Imaging at Rhode Island Hospital and Clinical Assistant Professor of Diagnostic Imaging at the Warren Alpert Medical School of Brown University.

Make a House Call at the State House!

We invite you to make a "House Call at the State House" this legislative session. For the past several years, members of RIMS leadership have volunteered to spend an early evening at the General Assembly. With our new, online Member Portal, we are now able to welcome all RIMS members to observe the General Assembly in action.

Given the vagaries of legislative scheduling, your House Call you may offer you the opportunity to: attend a committee hearing; assist RIMS with testimony; get a tour of the State House; and hopefully meet your legislators. This has proven to be a worthwhile and informative opportunity for those RIMS members who have attended in the past.

It is impossible to overstate the importance and impact of real life physicians being at the State House. Every year, RIMS' Public Laws Committee puts together a broad legislative agenda and works with allies on health care legislation, and naturally "plays a lot of defense" on behalf of physicians and their patients. Your presence at the State House can truly make a difference in support of RIMS' efforts.

Registration is easy through the RIMS website, rimed.org. Enter the Member Portal of the RIMS website, log onto your account, and click "Events" on the Portal menu. Once you connect to this page, you may select a date on the "Event List" on this page and follow the prompts to complete the process. Should you have questions about your Member Portal log-in information, please email rimed@rimed.org.

You will not need to be at the State House until 4:30–5:00 pm. The registration page will request contact information, both email and a cell phone or pager. We will send you a reminder a few days prior to House Call date along with instructions where to meet Steve DeToy, RIMS' lobbyist, who will be your guide.

Tar Wars® Poster Contest and Bike Helmet Distribution

The Community School will host the annual Tar Wars® Statewide Poster Contest for elementary school students, and RIMS' annual bike helmet distribution for RiteCare children. Join us, volunteers are welcome to help distribute and fit helmets.

Saturday, May 11, 2013

The Community School
15 Arnold Mills Rd
Cumberland

Bike Helmet Distribution
9–11:30 am, school parking lot

Tar Wars® Statewide Poster Contest
10 am–12 pm, school gymnasium



2012 Tar Wars® Poster Contest winners



NEW Share your thoughts on RIMS "Communities" online forum

Members can now share their views on a variety of topics with their colleagues and RIMS staff. The RIMS website offers an exclusive, password-protected Member Portal with access to many convenient features and an online "Communities" forum. This is a unique opportunity to express your opinions with RIMS leadership who work to advocate on behalf of Rhode Island physicians and patients.

COMMUNITIES TOPIC-OF-THE-MONTH

A discussion of the Rhode
Island Department of Health's
RI Primary Care Trust

Save the date! RIMS Annual Banquet & Inauguration of Officers

Saturday, September 21, 2013
Warwick Country Club

Watch for your invitation in the mail.
For more information contact
Sarah Stevens at 401-331-3207.

Stay informed

Make sure RIMS has your current email address or you could be missing out on timely information of interest that most physicians are unlikely to receive as quickly from other sources.

Please contact Sarah Stevens with additions or changes, or visit RIMS' Member Portal to update your contact information.



Why You Should Join the Rhode Island Medical Society

The Rhode Island Medical Society delivers valuable member benefits that help physicians, residents, medical students, physician-assistants, and retired practitioners every single day. As a member, you can take an active role in shaping a better health care future.

RIMS offers discounts for group membership, spouses, military, and those beginning their practices. Medical students can join for free. Earn rewards for referring new members through our "Member-Get-A-Member" campaign.



APPLY FOR MEMBERSHIP ONLINE

RIMS MEMBERSHIP BENEFITS INCLUDE:

Discounts on career management resources

Insurance, collections, medical banking, and document shredding services

Discounts on Continuing Medical Education

InReach online CME program discounts;
RIMS is an ACCME accrediting agency

Powerful advocacy at every level

Advantages include representation, advocacy, leadership opportunities, and referrals

Complimentary subscriptions

Publications include *Rhode Island Medical Journal*, *Rhode Island Medical News*, annual *Directory of Members*; RIMS members have library privileges at Brown University

Member Portal on www.rimed.org

Password access to pay dues, access contact information for colleagues and RIMS leadership, RSVP to RIMS events, and share your thoughts with colleagues and RIMS



Above: State House press conference on health care, Brown MSS at the AMA, CPT update seminar, bike helmet distribution; Upper right: RIMS staff meets with physicians to discuss concerns.

Dr. David Satcher: *From Alabama Farm to the Surgeon General's Office*

BY MARY KORR
RIMJ MANAGING EDITOR

PROVIDENCE – Prior to delivering the annual Dr. and Mrs. Frederick W. Barnes, Jr. Lecture in Public Health at Brown University on April 18th, former U.S. Surgeon General David Satcher discussed his path to becoming a physician with the *Rhode Island Medical Journal*, and his views on medicine and health care today.

Born in March 1941 to Wilmer and Anna Satcher, Dr. Satcher's journey began on the family's rural Alabama farm when he was two years old and gravely ill with whooping cough. The town hospital was segregated and did not admit black children. His father sought the help of the only black physician in the vicinity of Anniston, Alabama, who came out to the farm to tend the toddler. His prognosis was dire.

Q. Who has inspired you the most in your life?

A. I should start with Dr. Fred Jackson, who came out to the farm on his day off when I was two years old and very sick with whooping cough and pneumonia. He told my parents I wasn't going to live out the week, but he did everything he could and showed them how to care for me. When I stopped breathing, my mother breathed for me.

I often heard that story from my mother. And the one thing I wanted to do was to meet Dr. Jackson. My parents promised me when I was six years old they would take me to meet him, but that year he died of a stroke at 54. From

then on, I told everyone I was going to be doctor like Dr. Jackson. I was as certain of that as I have been of anything in my life.

The leadership of Morehouse College and Benjamin Elijah Mays [president of Morehouse College 1940–1967] also played a major role in my development and getting into medical school. But I was first motivated by that near-death experience.

Q. What lessons have stayed with you from your boyhood days on the farm?

A. Our dad taught us to work in the field and a lot of other lessons about life that are still with me. He always said if you're not careful, the person who beats you out in the morning will beat you out in life. I still get up at 5 a.m. to exercise before work.

When it came time for me to go to Morehouse College in Atlanta, I remember standing at the bus stop with my dad. I was feeling kind of sorry for him. He never finished first grade. As the bus pulled up, he said to me: 'Son, I want you to promise me something. Where you are going you will meet people with more than you, and you will meet people with less than you. Promise me you will treat everyone with respect.' It's the best advice in life I've ever been given.

And on February 13 of this year, I acknowledged the 100th anniversary of the birth of Anna Curry, the 16th of 17 children. She was my mother. She has a



BRIEF BIO

DAVID SATCHER, MD, PhD

Graduated

Morehouse College in Atlanta (1963)

Case Western Reserve in Cleveland,
MD, PhD (1970)

Positions

President, Meharry Medical College
in Nashville (1982–1993)

Director of the CDC (1993–1998)

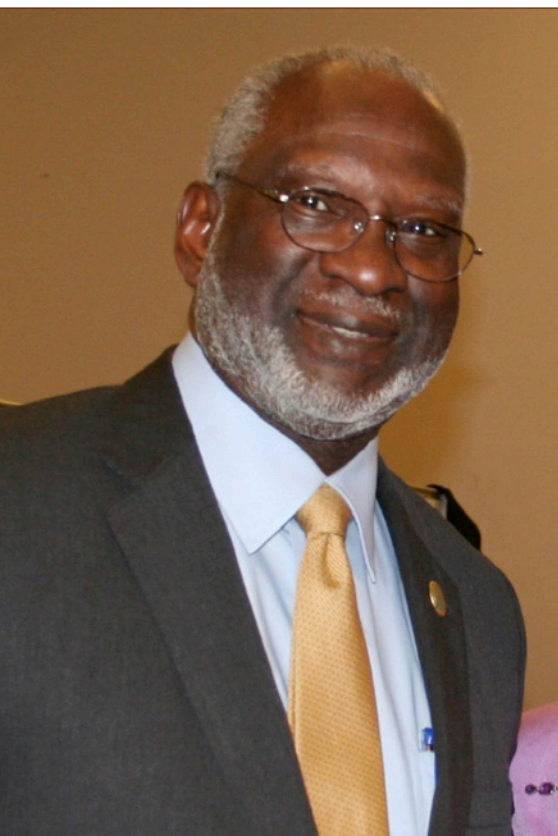
Appointed by President Clinton as
16th U.S. Surgeon General & Assistant
Secretary for Health in Dept. of Health
and Human Services (1998–2002)

President, Morehouse School of Medicine
(2004–'06)

Current

Founder & Director, The Satcher Health
Leadership Institute and Center of
Excellence on Health Disparities,
Morehouse School of Medicine

Poussaint-Satcher-Cosby Chair in Mental
Health, Morehouse School of Medicine



CORRINE GORDANI, BROWN PUBLIC HEALTH PROGRAM

lot to do with who I am. She died on the day in 1993 it was announced I was to become director of the CDC. She lived long enough to know that.

Q. You mentioned Benjamin Elijah Mays. Can you share a recollection about him from your undergraduate days at Morehouse?

A. Dr. Mays challenged students, and Martin Luther King, Jr. [1948 Morehouse graduate] was one of them, to excel in academics and in life. Some of his words of wisdom: 'It must be borne in mind that the tragedy in life doesn't lie in not reaching your goal. The tragedy lies in having no goal to reach...It isn't a calamity to die with dreams unfulfilled, but it is a calamity not to dream...It is not a disaster to be unable to capture your ideal, but it is a disaster to have no

ideal to capture...It is not a disgrace not to reach the stars, but it is a disgrace to have no stars to reach for.'

Q. In your exemplary career in medicine and public health, you have been closely associated with two of the three outstanding American medical schools associated historically with an African-American heritage (Morehouse and Meharry). The erstwhile racial barriers in other American medical schools have diminished. Do you see a continuing role for the historically black medical schools (including Howard), in the future?

A. Meharry has been around for a long time, since 1876, and for a hundred years it educated about half the black physicians in the South. During that period, its graduates went on to practice in underserved communities, mostly in primary care. In addition to race it took on another role; its graduates worked where they were most needed, much more than other medical schools. Morehouse, founded later, also assumed this role. That has nothing to do with race. It has more to do with what the country needs.

Today, Morehouse is integrated. Our faculty and students are diverse. We were ranked No. 1 in the country last year for our social mission. It is No. 1 for medical schools when it comes to graduating under-represented minorities, to sending its graduates into underserved communities, and for its graduates going into primary care. We need more primary care, and more diversity in medicine and medical education. As long as we are leading in that area there is a critical role for us.

Q. What is your assessment of the Affordable Care Act (ACA) thus far?

A. I would have liked universal access as part of ACA. I think one of the best investments we could make as a country is that everyone has access to health care as early as possible. Not only will we save unnecessary pain and suffering, but we will save money and time.

But I think it went further than ever before in terms of access and quality. I think it incentivizes primary care, quality care, and reduces costs. The ACA said you are going to be paid for the quality. I think that's a major step forward.

And all indications are that the ACA will dramatically reduce the cost of healthcare. It takes time for prevention to work but in time we can prevent many of the chronic diseases we are paying for; 75 percent of Medicare costs go for chronic diseases that are preventable.

If we can promote prevention not only in the doctor's office but also in the community, I think we are going to see a reduction in costs.

Q. Some public health actions on the local and national level are controversial, such as Mayor Michael Bloomberg's recent efforts in New York City to try and curb the sale of large sodas. What role should the Surgeon General's office play in issues such as this to achieve a healthier populace?

A. Washington D.C. is a different town when it comes to politics. Every Surgeon General has to work with an administration, and Congress, but so far, for the most part, that has not stopped the Surgeon General from leading. The Surgeon General has to be able to have a bully pulpit. It was Surgeon General Luther Terry who called attention to

smoking as a problem in health in 1964. We have now halved the number of smokers in this country in 50 years. And Dr. C. Everett Koop and his response to HIV/AIDS in the early days is another example of the relevance of the office of the Surgeon General in this country.

When I was the Surgeon General we called attention to obesity. We are beginning to see a reversal of that trend. In Mississippi, which has the highest rate of childhood obesity, it has decreased more than 10 percent. So that means a lot of lives are going to be saved if that trend continues.

I also focused attention on mental health when I was in office. Since that time we have a parity of access to mental health services, and mental health services has been integrated into the ACA.

But within the political context, when I was in office I ran into conflict with President Clinton when it came to

needle exchange. The science said that needle exchange was effective is halting the spread of HIV. But President Clinton refused to support legislation making needle exchange legal. His reality was that Congress was not ready to lift the ban on federal funding for needle exchange programs. But the role of the scientist is to state the science. They were not listening to the available science.

When I was in office, they threatened to take all the money away from the Surgeon General's office. I didn't listen to that threat. But the offices of the Surgeon General and the CDC are not always at liberty to do what they would want to do because they are dependent on Congress for funding.

Q. What are your thoughts on the corporatization of medicine?

A. Corporatization is an issue in medicine. One of the reasons that so few of

our graduates are going into primary care is that many see medicine as a business. We have created the kind of environment where a lot of our graduates feel compelled to go into specialties where you can make the most money. And they have the burden of debt.

I like the national health service corps, but as you know it has been cut back. What I would like to see is the national service aligned with community centers where young doctors can practice with the benefit of debt forgiveness.

But I think the mission of medicine is to serve. From the beginning health care has been about serving and that's why it's called health care. I don't know any other area where the word 'care' is a part of the name. You don't say business care or law care. We are about caring for people who need us. I still think most medical students go to medical school with the idea of serving. ▽



ALAN SHAN, COURTESY OF BROWN DAILY HERALD

Dr. David Satcher was the keynote speaker during Brown's Program in Public Health's annual research day. It was also sponsored by The Alpert Medical School and co-sponsored by the Dept. of Health and the R.I. Public Health Association.

Highlights of lecture

During the Dr. and Mrs. Frederick W. Barnes, Jr. Lecture in Public Health, speaker Dr. David Satcher made the following remarks:

On smoking: "50 years ago, when the first Surgeon General's report came out on smoking and health, 60 percent of doctors were smokers. When you went to a medical meeting you could hardly see the screen for the smoke. Today, only 3 percent of doctors smoke...nevertheless, I see smoking today as a pediatric disease."

On public health: "Public health is what we do collectively as a society to ensure the conditions in which people can be healthy...The science of public health is very challenging and critical. It is the credibility of that science that translates into the Surgeon General's reports and eventual public policy."

On the future of public health: "We can't leave the emergence of public health leaders to chance alone."

On the gap between science and policy: "We are struggling with that now as it relates to gun violence. You need the science, and you need advocacy at the community level to transform science into policy. The lobbyists bring in the money. The community against gun violence has to hang in there."

Alpert Graduate Leaves Campus with MD and Medical App Start-Up

MARY KORR
RIMJ MANAGING EDITOR



PROVIDENCE – This month former U.S. Army paratrooper Timothy Jolis will graduate from the Alpert Medical School of Brown University with more than a hundred other students.

While studying at Brown, he not only earned his medical degree, but also started up a biotech company to develop and market his medical apps, Jolis Biotech, which are available for iPhone, iPad, and Android devices for 99 cents. The start-up was inspired by a hospital physician, and came to fruition with the collaboration of friends and peers at Brown and the Rhode Island School of Design (RISD).

In an interview with the *Rhode Island Medical Journal*, he spoke of his app avocation.

Q. You are graduating from Alpert Medical School in May. Where will you continue your medical training and do you have an idea of what field you will practice in?

A. I'm excited to say that after graduating I will be starting work as an emergency medicine resident physician at Albany Medical Center. I plan to continue to grow Jolis Biotech. I feel like there is a great deal more we can accomplish to facilitate evidence-based decision-making and empowering patients. As a fledgling tech start-up, we always welcome support and input from others.

Q. Medical students are pretty busy. What made you take the leap from inspiration to actuality – developing medical apps and setting up a company?

A. I like to think of creativity as an essential part of my life. I'm a prolific reader; I design my own basic oncology experiments, and I love spending time

in the RISD Museum of Art. In medical school, I thought that there must be a more creative solution to disseminating all the medical knowledge that is locked up in journal articles. It seems like these articles could only be accessed through the memories of attending physicians who read them when they were originally published, or through the inevitable paywalls which pop up on the screen when a diligent medical student attempts to read them. There had to be a better way. In a conversation on this subject with the wonderful Dr. Joseph Rabatin, he suggested I make an app to manage sensitivity and specificity data. The idea stuck. With the encouragement and guidance of Dr. Kenneth Williams, I was on my way to finding better ways of getting data to doctors and patients.

Q. Who were your collaborators and what roles did they have?

A. I founded Jolis Biotech in 2012. I manage the business, invent apps, create medical content and provide "vision."

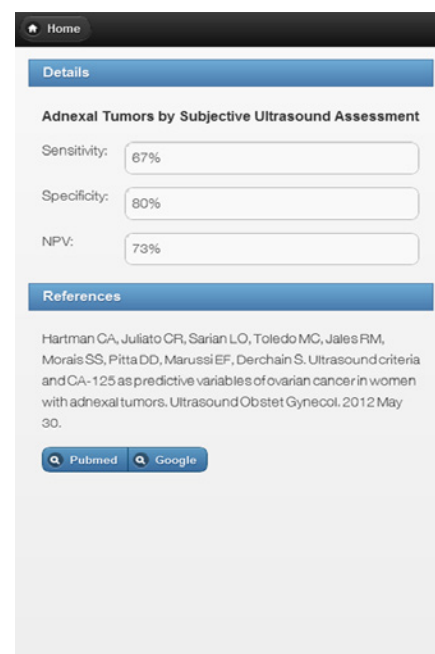
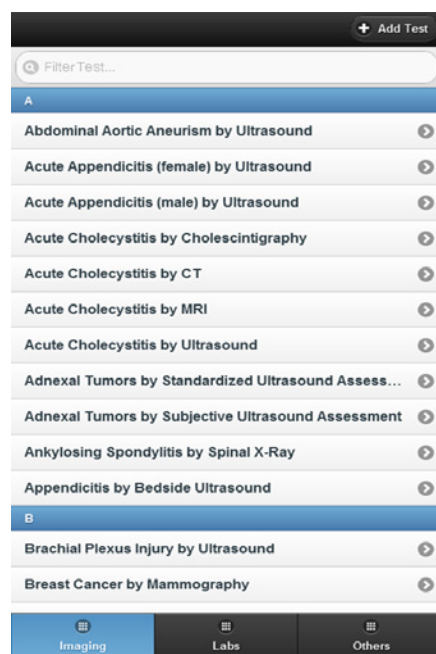
Waihong Chung is an MD/PhD student at the Alpert Medical School. His research is focused on hepatitis B and liver cancer. In his free time, he does computer programming and is a generalized very smart guy. He plans on being both a practicing physician and scientist. For Jolis Biotech, he does programming and data management. And Ivy Bradley, a graduating RISD illustration student, does interface design and illustration for Jolis Biotech.



PHOTOS: COURTESY OF TIM JOLIS

Q. What has been your best-selling app?

A. So far, Jolis Biotech has created four apps. Some are made for patients, some for nurses, and some for physicians. My best selling app for medical people is called Sensitivity & Specificity. It's very simple. It allows you to look up the sensitivity and specificity of hundreds of tests. Every value is linked to the journal article from which it came. These data are normally difficult to find, even for the most common tests. Having them readily accessible allows physicians to make side-by-side comparisons of tests. This encourages evidence-based decision-making. It also helps prevent unnecessary testing.



Q. When you develop/design an app, is it patented or copyright-protected? What is the process for doing this?

A. Part of dealing with Apple is realizing that they are all-powerful. If you spend \$20,000 building an app, they can decide not to allow you to list it in their store for any reason they like. While this does pose a challenge, their power reassures users that the apps they sell work. Apple's power also allows them to protect app makers from people infringing on their intellectual property. They even have a dedicated website that allows you to report intellectual property violations. That being said, some app developers take extra steps to protect themselves by filing patent applications.

Q. When you use your apps during your clinical rotations does it confuse the older physicians or are they pretty savvy about using information technology?

A. I've found that the more experienced physicians are actually very receptive to these new tools. They've been adapting to changing fields their entire lives. Also, most of them are fellow tinkerers, with a lot of lab experience, who get as excited as I do about the process of experimentation and invention.

Q. Other than your own apps, how many medical apps do you have on your own phone/tablet? What's your favorite as a medical student?

A. Other than my own apps, I have five other medical apps. I think my favorite is the one built by the U.S. Preventive Services Task Force called AHRQ ePSS. It allows you to stay current with ever changing recommendations for disease prevention. I also enjoy Diagnosaurus, which helps you build differentials. v

U.S. Emergency Care Costs May Be 2X Previous Estimates

Analysis published by Drs. Lee, Zink

BY DAVID ORENSTEIN
BROWN UNIVERSITY SCIENCE NEWS OFFICER

PROVIDENCE – Alternately praised in the aftermath of horrible tragedies as a heroic service and lamented in policy debates as an expensive safety net for people without primary care, emergency medicine is often a hot topic. Despite that importance, an analysis published online April 26 in the *Annals of Emergency Medicine* finds that national expenditures on emergency care are likely significantly higher than previously thought.

“The ER has become increasingly important as a place where people go for acute unscheduled care, however there has been little rigorous analysis of its cost structure,” said paper lead author Dr. Michael Lee, assistant professor of emergency medicine in the Warren Alpert Medical School and a physician at Rhode Island Hospital and The Miriam Hospital.

Dr. Lee, who had a prior career in economics and finance before training in emergency medicine, co-wrote the analysis with Dr. Brian Zink, professor and chair of the Department of Emergency Medicine at the Alpert Medical School, and Dr. Jeremiah Schuur, assistant professor at Harvard Medical School and director of quality and patient safety for the Department of Emergency Medicine at the Brigham and Women’s Hospital.

The challenge of properly accounting for the costs of emergency care, Dr. Lee said, becomes crucial as health care financing moves from a fee-for-service model to bundled payments for patient populations or episodes of care.

Clarifying costs

The analysis first examines current estimates of aggregate spending on emergency department (ED) care. The Agency for Healthcare Research and Quality’s Medical Expenditure Panel Survey (MEPS) estimates \$48.3 billion of spending on



Dr. Michael Lee

emergency care in 2010, or 1.9 percent of the nation’s total health care expenditures of \$2.6 trillion.

But Dr. Lee and his co-authors point out, based on data from other studies, that MEPS undercounts the number of ED visits and the number of ED patients who are admitted to hospitals. Adjusting for those discrepancies using data from a variety of other published sources, the authors estimate that ED costs are between 4.9 percent to 5.8 percent of total health care spending.

The authors went beyond national data sets, including the National Emergency Department Sample, to review ED spending data from a different source: a major national private insurer. The data included charges from doctors and hospitals for imaging, testing, and other procedures. But again there were accounting differences between admitted and discharged patients and a need to account fully for spending from Medicare and Medicaid. The authors’ estimate based on this data is ED spending that is 6.2 to 10 percent of

total health care spending.

Much of the debate in the academic literature around the expense of ED care has to do with whether the bulk of costs are fixed (e.g., expensive equipment and continuous staffing) or marginal (e.g., flexible staff time, expendable supplies). According to Dr. Lee, the cost structure of the ED remains poorly understood and is significantly more complex than what is modeled in existing studies.

As with assessments of total costs, the authors report, the studies vary widely even after adjusting for inflation. Across four major studies over the last three decades, the average cost per patient of an ED visit in 2010 dollars ranged from only \$134 to more than \$1,000, Dr. Lee and colleagues found. Meanwhile, the marginal cost of an ED visit (factoring out the fixed costs), ranged from \$150 to \$638.

Alternative accounting

The authors instead argue for an accounting based approach to ED costs using a methodology known as “Time-Driven

Activity Based Costing (ABC)," which has been applied to health care by Robert Kaplan and Michael Porter, professors at the Harvard Business School.

The method maps all clinical, administrative, and diagnostic steps in a patient encounter and assigns costs to each activity, explicitly accounting for the time spent on each task.

ABC accounting might provide a more realistic and transparent measure of ED costs, Dr. Lee said, because the emphasis on time is particularly relevant for

emergency medicine.

The authors acknowledge that an outcome of their analysis reporting higher overall costs for emergency care, may invite further criticism that the expense of emergency care represents unnecessary, inefficient care.

"However, we offer a more sanguine interpretation — the high share of spending affirms the importance of emergency medicine within the health care system," they wrote. "With 130 million visits, 28 percent of all acute care visits, and

accounting for nearly half of all admissions, emergency medicine should be expected to represent a large share of health care spending."

And Dr. Lee cautions, based on other studies, that efforts by private and government payers to divert ER care may not lead to large aggregate savings.

"Diverting nonemergency care may simply shift costs onto primary care offices and clinics which may not have the infrastructure to accommodate a large volume of unscheduled care," Dr. Lee said. **v**

Linakis, DeSpirito receive \$3.2M grant to study teen alcohol use

Hasbro Children's Hospital is one of 16 study sites

PROVIDENCE – Hasbro Children's Hospital emergency medicine physician James Linakis, MD, PhD, was recently awarded a five-year, \$3.2 million grant from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) at the National Institutes of Health (NIH) to validate a more efficient test to screen teenagers for future alcohol abuse and other risk behaviors. Dr. Linakis will be joined on the multi-site study by co-principal investigator Anthony Spirito, PhD.

The project, titled "Teen Alcohol Screening in the Pediatric Emergency Care Applied Research Network (PECARN)," will utilize 16 children's hospital sites to determine if the NIAAA two-question screen is an efficient and valid alcohol screening instrument among U.S. pediatric emergency department patients compared to the previously utilized more lengthy questionnaires.

"We know that the younger an individual starts to drink, the higher their risk for developing alcohol related issues later in life. We need to find the best way to catch this early," said Dr. Linakis.

Over the past few years, the NIAAA has focused on the importance of screening adolescents for alcohol problems, but the only screening tools have been relatively lengthy. A basic, two-question screening questionnaire was created that the NIAAA hopes will be predictive of both current and future alcohol problems in adolescents. It asks:

- 1.) Do you drink alcohol? How much?
- 2.) Do you have friends who drink alcohol?

"This two-question screening is based on established literature, but it has never been validated. The NIAAA is asking for PECARN hospital sites to test the two-question screener, so we can make sure that the screening system works," said Dr. Linakis.

Adolescents ages 12 to 17, who are being treated in the emergency room, will be randomly selected to take part in the questionnaire. They will be asked these questions, along with a series of others to compare them with longer questionnaires. The goal is to screen 5,000 teens over three-and-a-half years.



Dr. James Linakis is an associate professor of emergency medicine and pediatrics at The Alpert Medical School and associate director of pediatric emergency medicine at Hasbro Children's Hospital.



Anthony Spirito, PhD, co-investigator, is professor of psychiatry and human behavior at The Warren Alpert Medical School.

Researchers will then contact 1,000 of those teens and screen them again.

"We want to see if the shorter survey can just as effectively predict risky behaviors, both current and future," said Dr. Linakis. "When we follow up we will also be able to see if the questionnaire predicted drug abuse or risky behaviors, not just alcohol use."

After the study is complete, Dr. Linakis' team and the NIH hope to use this data to help develop an intervention for adolescents who drink alcohol and display other unsafe behaviors.

"The study, the data it finds, and the future intervention program will be extremely helpful for anyone who takes care of kids in a primary care setting," he said. **v**

Health Insurance Commissioner Koller leaving post

Accepts post as head of health policy foundation

PROVIDENCE – Gov. Lincoln Chafee announced on April 18 that Health Insurance Commissioner Christopher F. Koller will be stepping down to become president of the Milbank Memorial Fund, a national health policy foundation based in New York City. Koller will leave his post following the current rate factor review process, expected to be concluded at the end of June 2013.

“This is a tremendous opportunity for Commissioner Koller, and I want to sincerely thank him for his service to our state in this critically important area over the past decade,” Gov. Chafee said. “We appreciate his hard work and leadership – both locally and nationally – in implementing systemic reforms to improve health insurance in Rhode Island. I am committed to identifying a successor who will continue the excellent work of the Office and the Executive Committee for Health Care Reform.”

Koller was appointed as the country's first and only Health Insurance Commissioner in January of 2005. In this role, he has developed a comprehensive commercial health insurance rate review process, established and enforced expectations of commercial insurer efforts to reduce the underlying costs of medical care, established the nationally recognized Chronic Care Sustainability Initiative focused on improving primary care, and led the initial state applications for the Insurance Exchange planning grants. ▽

RI Foundation awards Taylor Innovation Fellowship to ‘defeat Hep C’

Will receive up to \$300,000 over the next three years



LIFESPAN

PROVIDENCE – Lynn E. Taylor, MD, an HIV and viral hepatitis specialist, primary care physician and director of the HIV/Viral Hepatitis Coinfection Program at The Miriam Hospital, is one of two recipients of the 2013 Rhode Island Innovation Fellowship, an annual program in its second year designed to stimulate solutions by Rhode Islanders to Rhode Island challenges. She is the first physician to be selected.

The Fellowship provides two individuals with up to \$300,000 over three years to develop, test, and implement innovative ideas that have the potential to dramatically improve any area of life in Rhode Island.

Dr. Taylor's project, Rhode Island Defeats Hep C, aims to make Rhode Island the first state to eradicate the Hepatitis C virus infection (HCV). She calls HCV a “time bomb in Rhode Island” and says the epidemic will peak in the state over the next two decades unless dramatic action is taken. With the medical community now on the verge of a radical, “game-changing” shift in HCV therapy, Dr. Taylor says the cure rate can potentially be 100 percent.

She proposed a comprehensive plan that includes several steps: awareness, rapid testing, linkage to care, building infrastructure for a sustainable model and evaluation.

“At no other time in history have we had such opportunity to eradicate this harmful, costly epidemic,” she said.

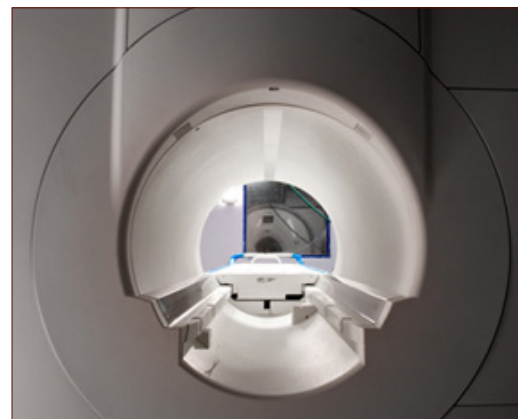
Dr. Lynae Brayboy, a fellow in obstetrics and gynecology, who proposed a smartphone app with sexual health information for girls, was a finalist for the awards. ▽

Rhode Island Hospital adds MRI unit to ER

PROVIDENCE – Rhode Island Hospital is expanding its emergency department services with the addition of a magnetic resonance imaging (MRI) unit. In doing this, Rhode Island Hospital becomes one of just a few hospitals in the country, and the first in New England, to make MRI available in the emergency department.

Prior to the launch of this unit, emergency department patients requiring an MRI had to be taken through the hospital to the Grosvenor building, often requiring travel through high-volume patient areas.

“The emergency department at Rhode Island Hospital is essentially a hospital within a hospital,” said John Cronan, MD, chief of the department of diagnostic imaging at Rhode Island Hospital. “Any diagnostic imaging test that a patient needs while in our emergency department – X-ray, ultrasound, CT scan, MRI – it can all be done right there in the ER. We are among the first in the country to bring this sophisticated technology to the emergency room patient.” ▽



LIFESPAN

Atty. Gen. Kilmartin OKs Westerly Hospital sale to Lawrence + Memorial Corp.

PROVIDENCE – R.I. Attorney General Peter F. Kilmartin announced April 17th that he has approved, with conditions, the proposed sale of Westerly Hospital and affiliated entities to Lawrence + Memorial Corporation (L+M), pursuant to the expedited review process of the Hospital Conversions Act.

The closing date of the \$69.1 million sale will happen before June 1. On June 1, the hospital will close its maternity services. The hospital has been in receivership since December 2011.

"This is the first time we have reviewed a hospital conversion under the expedited review process, reducing the number of days for review from 120 to 90. All parties recognize the critically important role Westerly Hospital plays in providing quality healthcare to the residents of the area and as an important economic engine for the region," said Kilmartin.

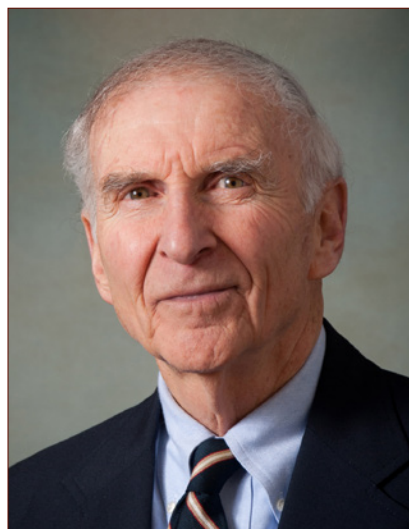
"There are currently three hospital conversions before this office in various stages. The Office is always mindful, in our role as a regulator, to the balance need to protect the interests of the community, the employees and the state with the economic realities of the rapidly-changing and highly competitive healthcare marketplace," added Kilmartin. ▽

Grape Street Orthopedic joins Southcoast Physicians Group

NEW BEDFORD, MASS. – Grape Street Orthopedic has joined Southcoast Physicians Group. The orthopedic practice includes Harry Von Ertfelda, MD, and Gilbert L. Shapiro, MD, FACS. It will now be recognized as Southcoast Physicians Group Orthopedics. ▽



Harry Von Ertfelda, MD



Gilbert L. Shapiro, MD

OB/GYN Associates Joins Lifespan's Women's Medicine Collaborative

PROVIDENCE – Lifespan's Women's Medicine Collaborative has announced a new partnership with OB/GYN Associates, Inc., one of the state's largest obstetrics and gynecology practices with locations throughout Rhode Island and Massachusetts. The partnership is expected to be finalized in August.

"This affiliation with Lifespan's Women's Medicine Collaborative will give our patients more options, while not diminishing our presence at Women & Infants' Hospital, especially as our patients will continue to deliver their babies at Women & Infants Hospital," said John Bert, MD, of OB/GYN Associates. ▽

Hillside, S. County family practices join Coastal

PROVIDENCE – Hillside Family and Community Medicine in Pawtucket and South County Family Medicine, Narragansett signed agreements in April to join Coastal Medical.

The Coastal Hillside Family Medicine physicians are Christopher Campanile, MD; Hana Hagos, MD; Barbara Jablow, MD; Christine Kennedy, MD; Cristina Mitchell, MD; Kenneth Sperber, MD, and Carla Garcia-Benoit, NP.

Coastal Narragansett Family Medicine is a four-physician practice comprised of Catherine DeGood, DO; Dariusz Koszrzewa, MD; Eileen Gonzalez, MD, and Michael Gonzalez, MD.

Coastal Medical is Rhode Island's first Medicare Shared Savings ACO. It provides predominantly primary care, along with some specialty services, to 130,000 patients in 20 medical offices across Rhode Island. Coastal also owns state-wide laboratories, an imaging center and a medical billing company. ▽

Study examines public health implications of lack of methadone treatment in prisons

PROVIDENCE – Methadone treatment for opioid dependence remains widely unavailable behind bars in the United States, and many inmates are forced to discontinue this evidence-based therapy, which lessens painful withdrawal symptoms. Now a new study by researchers from the Center for Prisoner Health and Human Rights, a collaboration of The Miriam Hospital and Brown University, offers some insight on the consequences of these mandatory withdrawal policies.

According to their research, recently published online by the *Journal of Substance Abuse Treatment*, nearly half of the opioid-dependent individuals who participated in the study say concerns with forced methadone withdrawal discouraged them from seeking methadone therapy in the community after their release.

“Inmates are aware of these correctional methadone withdrawal policies and know they’ll be forced to undergo this painful process again if they are re-arrested. It’s not surprising that many reported that if they were incarcerated and forced into withdrawal, they would rather withdraw from heroin than from methadone, because it is over in days rather than weeks or longer,” said senior author Josiah D. Rich, MD, MPH, director of the Center for Prisoner Health and Human Rights, which is based at The Miriam Hospital, and professor of medicine and epidemiology at The Alpert Medical School.

He points out that methadone is one of the only medications



LIFESPAN

that is routinely stopped upon incarceration. “Given that opioid dependence causes major health and social issues, these correctional policies have serious implications,” he said.

Additionally, methadone therapy has been shown to reduce the risk of criminal activity, relapse, infectious disease transmission (including HIV and hepatitis) and overdose death.

In the study, Dr. Rich and colleagues surveyed 205 people in drug treatment in two states – Rhode Island and Massachusetts – that routinely enforce methadone withdrawal in correctional facilities. They found nearly half of all participants reported concern regarding forced methadone withdrawal during incarceration.

“We should examine the impact of incarceration itself, and what happens behind bars, on public health and public safety outcomes, and tailor our policies appropriately,” Dr. Rich said. ▽

W&I physician awarded \$1.6M grant

PROVIDENCE – Kristen A. Matteson, MD, MPH, of the Department of Obstetrics and Gynecology at Women & Infants Hospital and assistant professor of obstetrics and gynecology at The Warren Alpert Medical School of Brown University, has earned a \$1.6 million grant from the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health to study the effectiveness of two treatments options for heavy menstrual bleeding.

“Heavy menstrual bleeding is one of the most common gynecologic problems women encounter,” explained Dr. Matteson. “It is such an important problem to study because heavy menstrual bleeding has a negative impact



WOMEN & INFANTS HOSPITAL

on a woman’s quality of life, often leading women to utilize expensive medical resources.”

There are two commonly prescribed non-surgical treatments for heavy menstrual bleeding – combined oral contraceptives and the levonorgestrel intrauterine system (the use of an intrauterine device (IUD) with progestogen). However, studies comparing these treatments are extremely limited.

The primary goal of the study is to determine the relative effectiveness of both treatment options in improving the quality of life in women with heavy menstrual bleeding. The study will also compare rates of treatment failure (defined as stopping the treatment and/or request for surgery).

Enrollment in the study will begin in the fall. ▽

Traumatic brain injury in patients with nonepileptic seizures ups risk for psychiatric disorders

PROVIDENCE – A new study by a Rhode Island Hospital researcher has found that traumatic brain injury (TBI) can significantly increase the odds of having major depression, personality impulsivity and post-traumatic stress disorder (PTSD) in patients with psychogenic nonepileptic seizures (PNES). The

paper, by W. Curt LaFrance Jr., MD, MPH, director of neuropsychiatry and behavioral neurology, was published in the April edition of the journal *Epilepsia*.

“Some patients who sustain a TBI develop seizures,” Dr. LaFrance said. “Very often, these seizures are believed to be epileptic in nature, and the patient, therefore, is treated for epilepsy. Later the seizures are found to be PNES. This study demonstrates the prevalence of co-morbid mild TBI and PNES, which could suggest that

some patients are being inappropriately treated for epilepsy with antiepileptic drugs, while not being treated for their actual illness: nonepileptic seizures.”

The study underscores the importance of identifying and addressing the impact of TBI in patients with seizure disorders to ensure appropriate and effective treatment.

“Another significant finding from the study was that if a patient had both PNES and TBI, the combination resulted in 2.75 odds increase of having PTSD, and triple the odds increase of having a history of trauma/abuse,” Dr. LaFrance said. “This finding illustrates the importance of the ‘double hit’ of emotional and physical traumatic experiences that may occur with abuse and/or a head injury commonly found in the PNES population. This study shows that TBI and PNES are significantly associated with a cluster of diagnoses including depression and PTSD, personality, and/or trauma/abuse history, all of which could have an impact on functioning.”

Mild TBI appears to be a significant risk factor in patients with PNES, and is associated with increased psychiatric co-morbidity, symptom severity, poor functioning and increased disability. v



BROWN

Research links chemoresponse assays, improved ovarian cancer survival rates

PROVIDENCE – A team of researchers has released results from an eight-year study that shows improved survival rates for women diagnosed with ovarian cancer who undergo cancer tumor testing to determine the best treatment.

Part of the team was Richard G. Moore, MD, director of the Center for Biomarkers and Emerging Technologies and a gynecologic oncologist with the Program in Women's Oncology at Women & Infants Hospital of Rhode Island.

“Essentially, we have demonstrated that by using a tissue sample from the patient's tumor and a chemoresponse assay, we are able to determine which treatment may or may not work for her,” Dr. Moore explains of the study, which was presented at a recent meeting of the Society of Gynecologic Oncology and in the journal *Cure*.

“This study shows that a woman with recurrent ovarian cancer could benefit from having a biopsy and chemosensitivity testing. The results from such testing will allow for the identification of chemotherapeutics that are active against the patient's disease and those that are not resulting in decreased toxicity from ineffective treatments. Learning that personal directed therapies may improve overall survival for these patients made this the first study in two decades to show a significant increase in survival in recurrent ovarian cancer.”

The study, launched in 2004, included 283 women. Of those, 262 had successful biopsies which were tested in vitro, or in a test tube. The assay ChemoFx®, by Precision Therapeutics, tested up to 15 approved treatment regimens on the samples, identifying chemotherapy drugs and regimens to which each tumor might be sensitive. The study was non-interventional, meaning that physicians chose the treatment regimens without knowing of the assay results. The researchers then evaluated the assay's result against actual patient outcomes.

“The assay identified at least one treatment to which the tumor would be sensitive in 52% of patients in the study,” Dr. Moore says. “Overall, median survival was 37.5 months for patients with treatment-sensitive tumors, compared to 23.9 months for intermediate and resistant tumors.”

Assay-directed therapy has long been debated among oncologists, he continues. Such debate provided the impetus for this study. v



WOMEN & INFANTS HOSPITAL

Bridging Neurology & Psychiatry: Movement Disorders

Saturday, October 12, 2013

The Joseph B. Martin Conference Center
at Harvard Medical School
Boston, Massachusetts

This full day course is aimed at reviewing the interface between neurology and psychiatry to enhance the clinician's ability to recognize and classify movement disorders in psychiatric patients and psychiatric problems in movement disorder patients. Behavior problems are the major determinants of quality of life in Parkinson's disease yet they are often not recognized. Similarly, movement disorders caused by antipsychotics frequently go unrecognized.

World renowned experts in movement and psychiatric disorders will review drug-induced movement disorders, psychogenic movement disorders and movement disorders associated with primary psychiatric disorders.



This course is designed for neurologists, psychiatrists, primary care physicians, nurses, psychologists, pharmacists, physician assistants, social workers, medical students and fellows.

Click to download the Course Program.

Register Online: <http://www.worldwide-medicalexchange.org/content/movement-disorder-course>



MAY

3rd Annual Rhode Island Stroke Conference

Keynote Speaker: **Mark J. Alberts, MD, FAHA**

May 3, 2013, 7:15am

Crowne Plaza Providence-Warwick

[Conference Agenda and Registration Information](#)

Rhode Island Medical Women's Association

2013 Annual Meeting & 32nd Anniversary Celebration

Wednesday, May 13, 2013

Providence Marriott Hotel, One Orms Street

6:30 pm Reception, 7 pm Dinner and Program

This meeting is open to medical and non-medical communities.

Public Health Grand Rounds Webcast Event

(CME credit)

May 16, 2013, 8:30 am–9:30 am

Lessons Learned about Shared Decision Making: The Group Health Story

Ben Moulton, JD, MPH

Dr. Moulton is the senior legal adviser at the Foundation for Informed Medical Decision Making. He provides health law oversight and guidance to all foundation activities to support sustainable models of health care that include informed medical decision making and improved quality of medical decisions. In addition, Dr. Moulton is an adjunct professor of health law at the Boston University Law School and the Harvard School of Public Health. [Pre-register online](#)

Innovative Approaches to Medication Management

Networking Dinner and Panel Discussion

May 22, 2013, 5:30pm

Location: 235 Promenade Street, Suite 500

[Register](#)

JUNE

Scope of Pain

Safe and Competent Opioid Prescribing Education

June 8, 2013, 7:30 am–1:30 pm

Warren Alpert Medical School

To register, visit www.scopeofpain.com

Collaborative Office Rounds 2012–2013 Series

(CME credit)

Motivational Interviewing for Adolescent Alcohol and Marijuana Use

All are welcome to attend sessions at South County Hospital and Westerly Hospital or participate online via webcast.

Wednesday, June 12, 2013

7:30 a.m.–9:45 a.m.

Anthony Spirito, PhD, ABPP

Professor of Psychiatry & Human Behavior

Director, Division of Clinical Psychology

Warren Alpert Medical School of Brown University

Webcasted and Live

<http://med.brown.edu/cme/brouchure/COR-2013%20Sessions.pdf>

Asphalt Paving and Sealcoating

Northern R.I.'s Premiere Pavement Company



ESTABLISHED 1987

Call Nu-Look today for all of your driveway and parking lot needs.
We provide free detailed estimates and guarantee our work.



COMMERCIAL



RESIDENTIAL

Installation / Repairs / Maintenance

Visit our website to learn more about our company.
Easily request an estimate online 24/7 at

WWW.NULOOKINC.COM

R.I. Contractor's License #13445

(401) 232-0795



A+ rating

Classified Advertising

Office space for sale or lease

Medical office space for lease or sale in Providence, in an established building in a prime location across from Women & Infants Hospital. 1600 sf, first floor, ample parking. Lab and x-ray on premises. \$25/sf. Hines Dermatology Associates, Inc. Please call Cheryl at 508-222-9966, Monday-Friday, 7am-3pm.

Searching for a physician assistant to join your practice?



The Rhode Island Academy of Physician Assistants can help you find a qualified PA. Visit the RIAPA Career Center to advertise and view the CVs of the best and brightest PAs. Go to www.RhodeIslandPA.org and click on Career Center to start your search. RIMS members are eligible for a 15% discount on ads. For questions and details of how to obtain the discount contact: Megan Turcotte, mturcotte@rimed.org, 401-331-3207.

Opportunity—Medical Director

Blue Cross & Blue Shield of Rhode Island is need of a Medical Director to provide leadership and guidance to organization related to the administration of medical services; ensure quality of medical care, efficiency, quality, and affordability of healthcare services. Perform utilization review functions for plan; ensure organization is compliant with federal, state, and local laws, along with accreditation standards. Serve as lead on organization Credentialing and Medical Policy Committees. Enhance and maintain relationships with the provider community. To apply, please visit our careers page: <https://www.bcbsri.com/about-us/careers>

At Blue Cross & Blue Shield of Rhode Island (BCBSRI), diversity and inclusion are central to our core values and strengthen our ability to meet the challenges of today's healthcare industry. BCBSRI is an equal opportunity, affirmative action employer. We provide equal opportunities without regard to race, color, religion, gender, age, national origin, disability, veteran status, sexual orientation, gender identity or expression.

Dr. Steven A. Rasmussen: From Brown Alum to Department Chair

MARY KORR
RIMJ MANAGING EDITOR

PROVIDENCE – Dr. Steven A. Rasmussen, the newly appointed chair of the Department of Psychiatry and Human Behavior at The Warren Alpert Medical School of Brown University, recently reflected on his more than three decades at Brown.

In an interview with the *Rhode Island Medical Journal* at his office on the Butler Hospital campus he recalled his early years in the 1970s as an undergraduate, when the “new” curriculum was new, and Stanley M. Aronson, MD, was dean of the fledgling medical program.

Q. You are a '74 Brown alum, and a '77 graduate of Brown's medical program. What was it like to be a student in those years and during the formative era of the medical school under Dean Aronson?

A. Back then, before the 8-year Program in Liberal Medical Education was formed, it was a seven-year program and students received a master's in medical science and an MD. I was working on my master's thesis as an undergraduate and was able to take advantage of the best Brown had to offer, when the ‘new’ curriculum was still new. The emphasis was on working to determine your own path. Some of the best professors I had were from the English department. An interest in psychiatry, poetry and literature often go together. You learn about human life through reading novels and poetry. Michael Harper in the English Department was a formative influence for me in terms of my own personal development.

Stan embodied the medical program's principles—to train physicians in providing excellence in care guided by humanistic values.

Q. Did you have an early professional mentor who was key to the path you have followed in your career?

A. I did my residency at Yale. At the time there were many leading figures in academic psychiatry teaching there. George Heninger was a mentor to just about all of us. Once, somehow, we got on the topic of fate and Moby Dick and we argued about whether Ahab was a villain or hero. He always took the outrageous position about things to make you think and react to a position that was contrary to the way you thought. He was a very original thinker; he had a metaphor for everything.

In addition, he was a truly outstanding scientist, devoted to figuring out ways to relieve human suffering. He had a tireless motivation to help people suffering with mental illness.

Q. As chair of psychiatry at Lifespan, Brown, and Care New England, you have to be a bridge builder. How do you build collaborations across separate entities?

A. Working for separate organizations is like working for Coke and Pepsi. Each system has its mission and definition of what it wants to become. But when



BROWN

you look carefully at the healthcare systems and Brown, their missions are not that disparate. You look for areas where the visions coincide. When you put together collaborations, you can achieve something greater than a single system couldn't do it on its own and that can really benefit health in Rhode Island in general.

I think the job that I have is more to say that we really have an opportunity to pull all the healthcare systems and Brown together in certain arenas where it's going to pay to work together and develop best practices across the systems.

Q. You are a pioneer in developing the use of gamma knife surgery to treat obsessive-compulsive disorder and deep brain stimulation to treat

depression. What treatments and/or technological advances do you hope to see in these areas?

A. The hope is to develop a new range of noninvasive neuromodulatory devices. Right now we are looking at the effects of transcranial magnetic stimulation, with both transcranial direct current stimulation (TDCS), and transcranial alternating current stimulation (TACS), at the Providence VA through a \$1 million (renewable each year) center grant for five years.

What we are trying to do is develop ways to influence rhythms in brain structures that are thought to be involved in the pathogenesis of pain, depression, and other psychiatric disorders, using OCD, where the neurocircuitry is better understood, as a window.

The hope is that we are going to be able to use the great basic science infrastructure at Brown to help bioengineer new generation of devices to be able to treat some of these conditions.

Q. Do you anticipate that Butler Hospital will be developing its own imaging and biochemistry laboratories for the detection of biochemical or structural changes underlying the neurodegenerative disorders associated with dementia?

A. At Butler, one of the clinical groups is involved in the early testing of drugs for neurodegenerative disorders that is recognized nationally as one of the best in the country. The three focus areas we've prioritized are neurodevelopmental

diseases, neurorestoration and neurodegeneration. It's hard to know if additional facilities would be developed at Butler or in a collaborative type of consortium. In order for us to be a national leader we need to work together with Brown, CNE and Lifespan to develop a critical mass.

Q. Should there be a major component of neurology based at Butler, for the outpatient care of such disorders as multiple sclerosis?

A. There is a real intersection between the compassionate and behavioral health side of dealing with people who have these neurodegenerative disorders and the scientific side, working on advances that might affect the course of the disease. In the interim there is a tremendous crush in how we are going to manage neurodegenerative diseases in this country. We are getting better at people living longer and longer; as a result more and more people are going to have these neurodegenerative diseases for which there is no known cure. There's a very important role in trying to bring together neurology and psychiatry to optimize treatment and help patients maintain and restore function to as great a degree as possible.

Q. In your 36 years as a physician, what is the biggest change you've seen in the practice of medicine?

A. Business has taken over medicine. And it has had major effects on the ways physicians practice. The necessity

of having to do things quickly and efficiently has had, I think, a negative impact on the way that physicians have traditionally been seen as healers. We don't have the time to spend to get into people's lives in the way we used to. The vast majority of psychiatric practice is no longer psychotherapy; it's prescribing medications for the major psychiatric illnesses.

Most doctors didn't go into medicine to make money. They wanted to help people. The whole notion of how do you make a profit is contrary to the way most doctors think. v

Recognition

CDC names Hasbro's Dennehy Childhood Immunization Champion

Rhode Island professor and infectious disease specialist **PENELOPE DENNEHY, MD**, director of pediatric infectious diseases at Hasbro Children's Hospital, has been selected as the state's 2013 Centers for Disease Control and Prevention (CDC) Childhood Immunization Champion.

CDC launched this annual award program to honor immunization champions in each of the 50 states and the District of Columbia during National Infant Immunization Week.

Dennehy was nominated from a pool of healthcare professionals and other immunization leaders, all of whom have made significant contributions to childhood immunization in Rhode Island. Dennehy is the director of the Division of Pediatric Infectious Diseases at Hasbro Children's Hospital and a professor of Pediatrics at Brown University's Warren Alpert Medical School.

"I am honored to be named Rhode Island's CDC Childhood Immunization Champion. We owe the success that we have had in immunizing infants and children in Rhode Island to thousands of committed, dedicated healthcare professionals in our state," said Dennehy. "We will continue to work together to make sure that all Rhode Island children are fully immunized against every vaccine-preventable disease."

Dennehy sits on numerous boards and panels that aim to improve immunization rates in Rhode Island, including the Rhode Island Department of Health's Vaccine Advisory Committee, the Rhode Island Hospital Immunization Task Force, and the Rhode Island Chapter of the American Academy of Pediatrics. Additionally, she is renowned for her research in the epidemiology and etiology of viral gastroenteritis and viral respiratory disease, rotavirus disease and prevention, and the testing of vaccines and immunobiologics for prevention of rotavirus, influenza, and respiratory syncytial virus.

"Through her lifelong passion for childhood immunization, Dennehy is an inspiration to her colleagues in healthcare," said Michael Fine, MD, director of HEALTH. "Her work as a researcher and on the front lines at Hasbro Children's Hospital is protecting children and saving lives." ▼

Neurology Academy honors LaFrance for epilepsy research

PROVIDENCE – **W. CURT LAFRANCE JR., MD, MPH**, director of neuropsychiatry and behavioral neurology at Rhode Island Hospital, has received the American Academy of Neu-

rology's (AAN) Dreifuss-Penry Epilepsy Award. Established in 2001, the award recognizes physicians in the early stages of their careers who have made outstanding, independent contributions to epilepsy research.

"Dr. LaFrance has done seminal work on non-epileptic seizures. His work has not only identified the risk factors and markers for such events, but also he has pioneered innovative treatments

that are improving the patients' symptoms and quality of life," said Shlomo Shinnar, MD, PhD, the ANN chair of the epilepsy subcommittee.

The award was presented to Dr. LaFrance at the 2013 AAN annual meeting in San Diego for his work largely done through the collaboration between Rhode Island Hospital's division of neuropsychiatry and behavioral neurology and the hospital's comprehensive epilepsy program. He presented his research on neuropsychiatric aspects of epilepsy and nonepileptic seizures (NES), describing the research on the diagnosis and treatment of NES.

"My interest in seizure disorders was sparked while attending the J. Kiffin Penry Epilepsy Minifellowship Program during my combined neurology psychiatry residency at Brown Medical School," Dr. LaFrance said. "I am indebted to Dr. Penry's legacy for the experience and exposure that launched my research and am honored to receive this award in his name."

Board-certified in both in neurology and psychiatry, LaFrance examines the overlap between brain and behavior in his clinic and in research. One of LaFrance's areas of expertise is in the neuropsychiatric aspects of epilepsy with a research focus on treatment and diagnosis of patients with NES.

"Many treatments exist for epilepsy, but few exist for NES. Given the great need for NES treatments, my aim is to provide hope for this challenging population with NES and equip clinicians with effective treatment for this disabling and difficult to manage disorder, so often seen in our patients and epilepsy programs across the world," he said. ▼



RHODE ISLAND HOSPITAL



"In healthcare, the
security of patient
information is critical.
Shred-it gets it."

Doctor-patient confidentiality is no longer just a professional promise. It's now a legal requirement.

Shred-it document destruction services can help you meet your compliance obligations with reliable, on-time service.

We can help you prevent identity theft and security breaches, and safeguard your patients' privacy so you can focus on other priorities.

Schedule your Free Security Assessment

Contact Shred-it today.

800 69.Shred

www.shredit.com/providence



This offer will expire on December 31, 2013.

Making sure **it's secure.**TM

Recognition

RI Heritage Hall of Fame inducts Dr. Charles J. McDonald

PROVIDENCE – **CHARLES J. McDONALD, MD**, was inducted into the Rhode Island Heritage Hall of Fame April 19.



He is the founding chairman of the Department of Dermatology at Alpert Medical School, physician-in-chief of the department of dermatology at Rhode Island

Hospital, past president of the American Cancer Society, and author and researcher.

Dr. McDonald graduated from North Carolina Agricultural and Technical University with a bachelor of science degree in chemistry and later received a master's in biology from the University of Michigan. He earned a medical degree at Howard University College of Medicine.

Dr. McDonald completed his internal medical residency training at the Hospital of St. Raphael and dermatology residency training at Yale New Haven Medical Center. He remained at the New Haven Medical Center for a clinical pharmacology/oncology fellowship.

His professional interests include: mycosis fungoides and lymphomas of skin, chemotherapy of psoriasis, dermatology of black skin, cytotoxic and immunosuppressive therapy in skin diseases, cutaneous reactions to cancer chemotherapy, scleroderma and critical care dermatology. v

National Appointments

Borkan named ACE Fellow

PROVIDENCE – **DR. JEFFREY BORKAN**, chair of the Department of Family Medicine at Brown and assistant dean for Primary Care-Population Health Program Planning at the Alpert Medical School, has been named one of 50 members of the American Council on Education's 2013-14 class of ACE Fellows.

The program prepares medical faculty – specifically family medicine physicians – for leadership positions at medical schools and academic health centers. During the ACE fellowship, Dr. Borkan said, he will explore two kinds of programs at other medical schools that can inform efforts at Brown: One would be programs similar to the Primary Care - Population Health track that the Alpert Medical School is planning. The other will be primary care institutes and centers that combine clinical, educational, research, and advocacy work in new ways that better serve the health of the populations they serve. v



BROWN UNIVERSITY

W&I's Frishman named to board, deputy editor of specialty journal

PROVIDENCE – **GARY N. FRISHMAN, MD**, a physician with the Center for Reproduction and Infertility at Women & Infants Hospital of Rhode Island, was selected to serve a term on the Board of Directors for the AAGL and Society of Reproductive Surgeons Fellowship in Minimally Invasive Gynecologic Surgery (MIGS).

AAGL is the leading association promoting minimally invasive gynecologic surgery among surgeons worldwide.

Dr. Frishman, who is also program director for the Obstetrics and Gynecology Residency at Women & Infants and associate division director for the Division of Reproductive Medicine, is a nationally respected authority on minimally invasive gynecologic surgery.

In addition to this appointment, Dr. Frishman was recently named deputy editor on the editorial board of the *Journal of Minimally Invasive Gynecology*. He had previously served as a contributing editor before being named to the editorial board's number two slot. v



WOMEN & INFANTS HOSPITAL

Cancer Commission names Pricolo liaison for Southcoast

CHICAGO – **VICTOR PRICOLA, MD, FACS**, chief of general surgery and colorectal surgery at Southcoast™ Health System, has received a three-year appointment from the Commission on Cancer (CoC) as cancer liaison physician.


Dr. Pricolo will be responsible for providing leadership for CoC initiatives within the Southcoast Hospitals Group program, and for collaborating with agencies such as the American Cancer Society on behalf of Southcoast. He will also evaluate, interpret and report data to the National Cancer Data Base (NCDB).

Dr. Pricolo received his medical degree from the University of Milan, Italy, and completed a surgical residency at Rhode Island Hospital.



SOUTHCOST

Pain-free **BANKING.**

Whether it's a customized cash management solution or 100% financing for EHR and healthcare IT, our healthcare business bankers specialize in providing the right banking solutions your practice needs to manage your cash flow. We call it delivering pain-free banking. And it's part of Webster's *Type*  *Personality.*

To learn more, contact:
Dev Singh, Healthcare Financial Services
401.688.3314 or asingh@websterbank.com.



Area Appointments

CNE names Rardin director of minimally invasive surgery

PROVIDENCE — **CHARLES RARDIN, MD**, a urogynecologist at Women & Infants who has been director of the Robotic Surgery Program for Women since its inception, was recently named director of minimally invasive surgery for the entire Care New England Health System. ▽



CNE

Southcoast names Hyder chief medical information officer

NEW BEDFORD, MASS.—**MICHAEL HYDER, MD, MPH**, has been named chief medical information officer for Southcoast Health System.

In addition to his current role as vice president of population health within Southcoast Physicians Network, Dr. Hyder will

partner with Southcoast's chief information officer to manage the conversion to a system-wide integrated information technology network.

Dr. Hyder will provide a strategic clinical vision for Southcoast during the transition from a health care system to a care management system. He will also lead the efforts to implement new technology into clinical and administrative areas across Southcoast. Dr. Hyder is a cardiac electrophysiologist and will continue to see patients in his clinical practice. ▽



SOUTHCOST

Obituaries

WARWICK — **CHRISTOS H. ERINAKES, MD**, 70, passed away surrounded by his loving family on Saturday, April 13, 2013 at Kent Hospital. He was the beloved husband of 46 years to Susan J. (Allard) Erinakes.

Dr. Erinakes graduated from Dean Jr. College and the University of Rhode Island. He completed his medical studies and earned his degree from the University of Padua, Italy. Dr. Erinakes was an obstetrician/gynecologist who began his practice in 1981 under the title Tollgate OB/GYN on Tollgate Road in Warwick and he was instrumental in bringing the first midwifery group to Kent Hospital.

Besides his wife, he leaves his children, Christina I. Erinakes Dooley (Peter) of Cranston, Nicole J. Chauvette (Derek) of Shaker Heights, OH; Alexandra N. McSparren (Steven) of Warwick and Nicholas H. Erinakes (Nicole) of Warwick; two brothers, James H. Erinakes (Kathleen) of West Warwick and Charles H. Erinakes of North Kingstown and his 12 grandchildren.

Memorial donations made in his name to: KEEP (Kent Employee Emergency Program), 455 Tollgate Rd., Warwick RI 02886.



NAPLES, FL. — **FRANK GIUNTA, MD**, died at his residence in Naples, Florida on April 12, 2013 at the age of 93. He was a graduate of Classical High School, Brown University, and Tufts University. Dr. Giunta practiced pediatrics in Providence from 1949 until his retirement in 1992.

He graduated from Tufts Medical School in 1943, served an internship at Rhode Island Hospital and was an officer in the Army Medical Corps from 1944 to 1946 during WW II in the Pacific theater fighting on Okinawa and later with the occupation troops in Japan.

Upon retiring from service he helped establish a two-year residency program in pediatrics at Rhode Island Hospital with the Providence



Lying In, Chapin and Bradley Hospitals.

While at the Providence Lying In (Women and Infants) Hospital he did the first exchange transfusion in Rhode Island for a child with neonatal jaundice.

After his residency, he was a solo practitioner for 20 years and later joined Pediatrics Associates, from which he retired in 1992.

He was clinical Associate Professor of Pediatrics, Brown University, Division of Biology and Medicine and for a time Associate Chief of Pediatrics at Women and Infants Hospital.

He is survived by his wife of 64 years, Elizabeth (O'Neil) Giunta, a son F. Stephen Giunta of Middletown, RI; one daughter, Elizabeth Giunta Foley of Lynnfield, MA; three grandchildren and one sister, Mary Giunta Alessandro of Rhode Island. A memorial mass was held on April 20.

In lieu of flowers, donations may be made in his name to Avow Hospice, 1095 Whippoorwill Lane, Naples, FL 34105.

Discounted COLLECTIONS!

I.C. System offers RIMS Members 20% OFF all collection programs. A contingency-fee option (NO up-front fees and NO Collection, NO Charge) is available. Call 800-279-3511 today!

FREE RESOURCES; visit www.icmemberbenefits.com to:

- Watch the *Nice People* Webinar to prevent past-due accounts
- Download *THE IN\$IDE FACT\$*, a booklet of collection tips

Why I.C. System?

- **75 YEARS** of experience and thousands of medical/healthcare clients
- **Skilled, certified medical collectors** calling days, evenings, and weekends
- **Custom programs** for early-stage (soft) through intensive recoveries
- **NATIONAL** credit bureau reporting, legal services, and more



IC System

75
Years

Receivables Management
Solutions 1938 - 2013



RIMS has offered I.C. System's collection services since 1987.

Words Expressing Finality

STANLEY M. ARONSON, MD

EACH LANGUAGE DEVISES ITS OWN WAY OF EXPRESSING THE AGING, the closure or the termination of events or persons. Thus, the Greek prefix, *paleo-*, defines an assortment of English words denoting such aging phenomena as fossil plants (paleobotany), ancient geologic epochs (eg, Paleocene), the study of ancient life (paleozoology, paleontology); but, with the exception of paleopathology and a few neuroanatomic terms (eg, paleothalamus), there are few *paleo-* words that pertain to medicine.

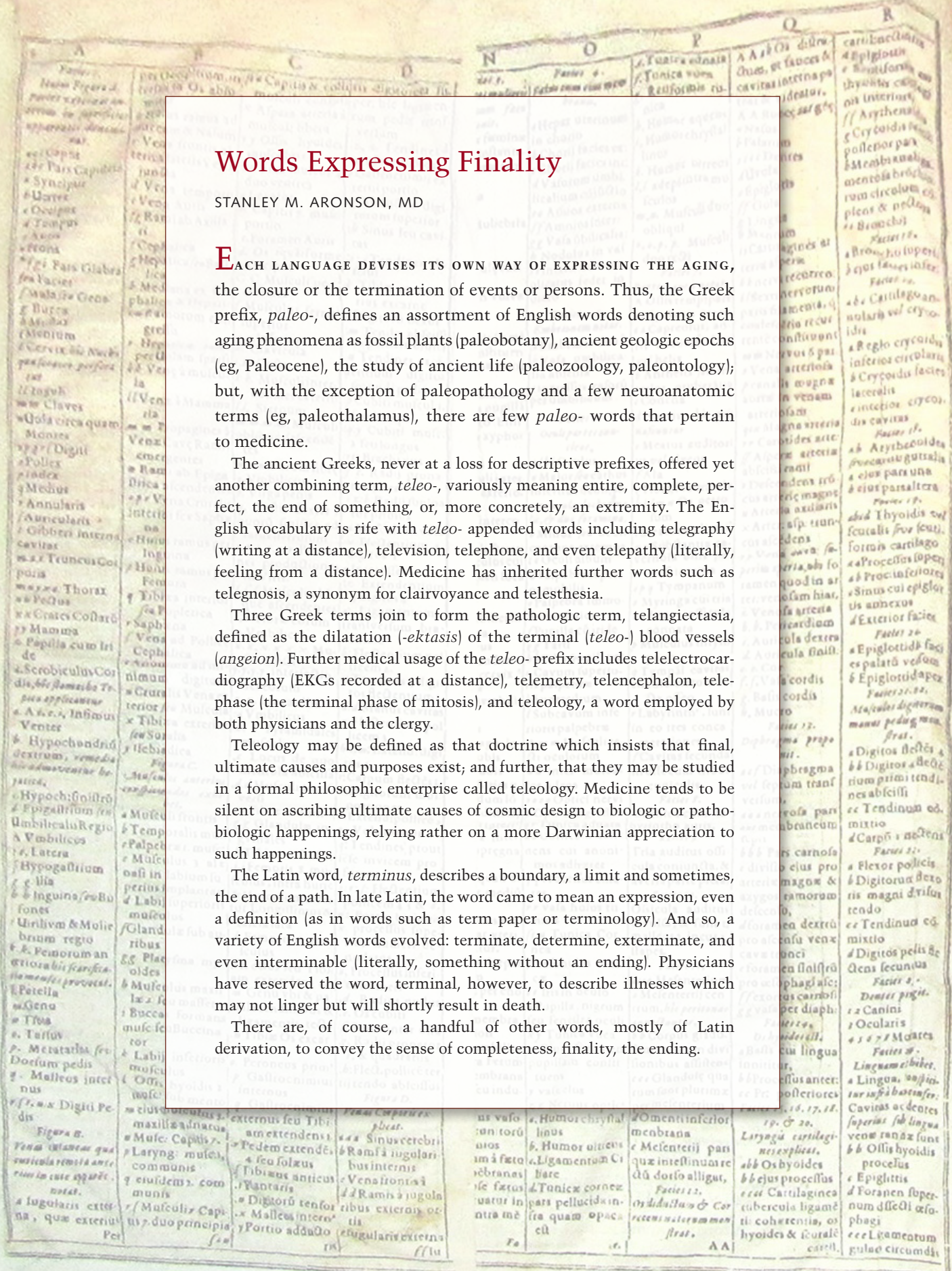
The ancient Greeks, never at a loss for descriptive prefixes, offered yet another combining term, *teleo-*, variously meaning entire, complete, perfect, the end of something, or, more concretely, an extremity. The English vocabulary is rife with *teleo-* appended words including telegraphy (writing at a distance), television, telephone, and even telepathy (literally, feeling from a distance). Medicine has inherited further words such as telegnosis, a synonym for clairvoyance and telesthesia.

Three Greek terms join to form the pathologic term, telangiectasia, defined as the dilatation (*-ektasis*) of the terminal (*teleo-*) blood vessels (*angeion*). Further medical usage of the *teleo-* prefix includes teleelectrocardiography (EKGs recorded at a distance), telemetry, telencephalon, telephase (the terminal phase of mitosis), and teleology, a word employed by both physicians and the clergy.

Teleology may be defined as that doctrine which insists that final, ultimate causes and purposes exist; and further, that they may be studied in a formal philosophic enterprise called teleology. Medicine tends to be silent on ascribing ultimate causes of cosmic design to biologic or pathobiologic happenings, relying rather on a more Darwinian appreciation to such happenings.

The Latin word, *terminus*, describes a boundary, a limit and sometimes, the end of a path. In late Latin, the word came to mean an expression, even a definition (as in words such as term paper or terminology). And so, a variety of English words evolved: terminate, determine, exterminate, and even interminable (literally, something without an ending). Physicians have reserved the word, terminal, however, to describe illnesses which may not linger but will shortly result in death.

There are, of course, a handful of other words, mostly of Latin derivation, to convey the sense of completeness, finality, the ending.



FEATURED ONLINE CME PROGRAMS



QUICK LINKS

[RIMS Online CME](#)

[Calendar](#)

[RIMS Website](#)

SUBJECT AREAS

[Billing](#)

[Cancer](#)

[Ethics](#)

[Leadership](#)

[Legal](#)

[Patient Safety](#)

[Physician Health](#)

[Primary Care](#)

[Risk Management](#)

[Substance Abuse](#)

[2013 CPT Coding Changes for Cardiology Services](#)

1.5 AAPC

[2013 ENT Services CPT Coding and Documentation Update](#)

1.5 AAPC

[Prescribing Exercise for Cancer Survivors](#)

0.5 AMA PRA Category 1™ (Enduring) | 0.5 Ethics

[ICD-10 Starts with Physicians](#)

1 AMA PRA Category 1™ (Enduring)

[Preventive Services: Confusion Eliminated](#)

1 CEU

[E/M for Psychiatrists](#)

1 CEU

[From Meaningful Use to Rational Use: The EHR in Primary Care](#)

[I'm the New Privacy and Security Officer...Now What?](#)



**RHODE ISLAND
MEDICAL SOCIETY**

50 Years Ago: Mission to Algeria

MARY KORR
RIMJ MANAGING EDITOR



Thomas Perry, Jr., MD

In the May 1963 edition of the *Rhode Island Medical Journal*, **THOMAS PERRY, JR., MD**, president-elect of the Rhode Island Medical Society (RIMS) and a general surgeon at Rhode Island Hospital, shared an account of a month-long medical mission to Algeria at the end of its eight-year struggle for independence.

The physician team included: **DRS. ARMAND VERSACI**, a plastic surgeon; **FREDERICK H. STEPHENS**, an ophthalmologist; **THOMAS FORSYTHE**, a roentgenologist; **PATRICIA FARNES**, an internist; Charles Cox, an anesthesiologist; pediatricians **GEORGE K. BOYD** and **BANICE FEINBERG**; and general surgeons Perry and **ANTHONY V. MIGLIACCIO**.

Dr. Perry noted that by the end of the conflict in the summer of 1962, there were only about 200 doctors left in the country. "Virtually every French doctor had left the country because the FLN (the Algerian Nationalist Front) rightly or wrongly believed that the medical profession as a whole was secretly aiding the OAS (French Resistance). Mass extermination of the doctors was therefore announced." The majority fled the country.

According to the account, the new Algerian government issued a call for medical aid and, through the organization Care-Medico, the Rhode Island team volunteered for the month of October, 1962. They worked in a hospital on the outskirts of Algiers staffing the operating rooms and out-patient clinics. Part of the facility also housed a tuberculosis sanatorium caring for a 1,000 patients.

Dr. Perry reported the group took several excursions "except for two days during the Cuban blockade crisis when the American Embassy advised us to stay on the hospital grounds."

On the weekends, the intrepid among them ventured overnight in a Land Rover to "Bou Saada. This was a rather thrilling trip over a rugged mountain road to an oasis town," Dr. Perry wrote.

In addition, the medical team was also sent south over the mountains to the edge of the Sahara, to assist at a 700-bed hospital with only a single physician left. Chronic orthopedic cases accounted for the bulk of the surgical patients. Dr. Perry lauded the "aseptic techniques" of the Algerian technicians but, "we regarded the toilet facilities as a major adventure." v