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**401-272-1050**
18 Collaboration and Collegiality: The Fuel For Growth in Sports Medicine
RAZIB KHAUND, MD
GUEST EDITOR

19 Preparticipation Physical Exams: The Rhode Island Perspective, A Call for Standardization
PETER K. KRIZ, MD, FAAP, FACSM
AILIS CLYNE, MD, MPH, FAAP
SARA R. FORD, MD, FAAP

23 Current Concepts in Sports-related Concussion
JEFFREY P. FEDEN, MD

27 Diagnosis and Management of Meniscal Injury
JACOB BABU, MD, MHA
ROBERT M. SHALVOY, MD
STEVE B. BEHRENS, MD

31 Understanding Athletic Pubalgia: A Review
BRIAN COHEN, MD
DOMINIC KLEINHENZ, MD
JONATHAN SCHILLER, MD
RAMIN TABADDOR, MD
8 COMMENTARY
The Not-So-Near Death of Autopsies in the U.S.
JOSEPH H. FRIEDMAN, MD

Medical Decision-Making for Unrepresented Patients
HERBERT RAKATANSKY, MD

The Rio 2016 Polyclinic – An Athlete-Centered Experience in the Olympic Village
CLIVE W. BRIDGHAM, MA, DC

9 LETTER TO THE EDITOR
Changes in the Maintenance of Certification (MOC) process have not gone far enough
LISA FRAPPIER, DO

16 RIMJ AROUND THE WORLD
Accra, Ghana
Mountain View, California
Stykkishólmur, Iceland

62 RIMS NEWS
Are you reading RIMS Notes?
Vote Yes on Question 7
Working for You
New officers inaugurated
Special Event: Demystifying the Legislature
Why You Should Join RIMS

87 HERITAGE
Daughters of Asclepius: Early women physicians in Rhode Island
MARY KORR
DEPT. OF HEALTH, AG OFFICE 71
give conditional approval to LMW Healthcare (Westerly Hospital)/ Yale-New Haven affiliation

DANA-FARBER, LIFESPAN 71
sign MOU

BROWN LAUNCHED 72
MD/MPA program

EPIVAX AWARDED 72
$600,000 NIH grant to improve H7N9 avian influenza vaccine

DRS. VIREN D’SA, BARRY LESTER 74
awarded $11.1M NIH grant to study environmental influences on child health

HASBRO 76
receives $1.8M from NIH to study environmental influences on child health

76 STUDY ON SMARTPHONE APP
to teach sexual health to adolescent girls

77 RESEARCH EVALUATES
risk factors for postpartum depression in mothers of preterm infants

77 WOMEN & INFANTS
participating in National Pelvic Floor Disorders Network

79 ENROLLMENT 100%
in Prescription Drug Monitoring Program

79 HEALTH CENTER FOR WEIGHT LOSS
at Charlton earns national accreditation

79 DR. LINDA J. RESNIK
at Providence VA awarded $2.5M for multi-center amputation care study

F. DENNIS MCCOOL, MD 81
patient travels from Thailand to Memorial for a good night’s sleep

ALAN MORRISON, MD 83
research project at VA funded to study heart valve disease

PATRICK SWEENEY, MD 83
receives ACCME’s 2016 Rutledge W. Howard, MD, award

STEPHANIE CURRY, MD 84
joins CharterCARE Medical Associates

EDWARD HURLEY, MD 84
named President-elect of Pediatric Research Society, Junior Section
CONTRIBUTIONS

35 The Decline of the Autopsy in Rhode Island and Nationwide: Past Trends and Future Directions
ALEX BAUMGARTNER, MD
DOUGLAS ANTHONY MD, PhD

37 Fluid Choice Matters in Critically-ill Patients with Acute Pancreatitis: Lactated Ringer’s vs. Isotonic Saline
MOHAMED M. ABOELSOUD, MD
OSAMA SIDDIQUE, MD
ALEXANDER MORALES, MD
YOUNG SEOI, ScB
MAZEN O. AL-QADI, MD

42 A Five-Year Evolution of a Student-led Elective on Health Disparities at The Alpert Medical School
LUCINDA B. LEUNG, MD, MPH
JAMES E. SIMMONS, MD
JULIUS HO, BS
EMMA ANSELIN, BA
RIAN YALAMANCHILI, BA
JOSEPH S. RABATIN, MD

47 Medical School Ranking and Student Research Opportunities
ANNIKA G. HAVNAER
PAUL B. GREENBERG, MD

CASE REPORT

53 Systemic Amyloidosis Masquerading as Intractable Cardiomyopathy
LINDSEY CILIA, MD
LESLIE PARikh, MD
MADHU M. OUSEPH, MD, PhD
EDWARD STOPA, MD
MICHAEL K. ATALAY, MD, PhD

PUBLIC HEALTH

56 HEALTH BY NUMBERS
Community Health Teams: A Healthcare Provider’s System Transformation Opportunity
JAMES C. RAIOTTE, MS
DEBORAH GARNEAU, MA
NANCY SUTTON, MS, RD, LDN
AILIS CLYNE, MD, MPH

60 Vital Statistics
ROSEANN GIORGIANNI, DEPUTY STATE REGISTRAR
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The Not-So-Near Death of Autopsies in the U.S.

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Neurological disorders are the most difficult to diagnose. While imaging and genetic testing has advanced tremendously over the past three decades, and our ability to diagnose has advanced with it, the truth of the matter is that we’re not so good at identifying most neurodegenerative disorders in life that do not fit a clear pattern. Complicating the matter is the fact that it is not uncommon for different disorders to have identical clinical presentations. Probably the most common example is the problem of diagnosing dementia with Lewy bodies. This is quite simple if the patient with dementia also has clear-cut features of Parkinson’s disease. But, if the dementia precedes the motor dysfunction the diagnosis is made correctly in only about half the cases if seen by a dementia specialist, and mostly diagnosed as Alzheimer’s by other doctors, including neurologists.

Much rarer is the newly re-named disorder, “corticobasal syndrome,” which had been called, “corticobasal ganglia degeneration,” after initially being labeled as “cortico-striatal-pallidal degeneration with neuronal achromasia.” The first change was made for brevity’s sake. The recent change was made when autopsies made clear that one third of the cases were actually unusual cases of Alzheimer’s disease, and not what they were expected to be. Occasional cases of Alzheimer’s masquerade as other, rare disorders. In a few years we will see that much of what we believe about Parkinson’s disease will be reframed based on pathological and genetic findings. Thirty percent of people diagnosed with Alzheimer’s disease by dementia experts are proven wrong at autopsy. We Parkinson’s disease experts even misdiagnose Parkinson’s disease about 10–20% of the time, especially during the early years. The point of these references to esoterica is to establish that neurologists are unable to make diagnoses in a fair number of cases, that we know a lot about what we don’t know, but, like everyone else, don’t know what we don’t know, which is why autopsies are crucial if we are to make advances.

I am not very good at getting autopsies. I do get some, particularly when I think we may learn something of relevance to the family. I am less assiduous when the motivation is largely for me to be the primary recipient of the knowledge. I am more interested in knowing the true diagnosis than the family. It is meaningful to me to learn which of the several atypical parkinsonisms was the pathology, whereas the family finds the diagnosis of atypical parkinsonism, which, despite being only a general term for a syndrome, adequate enough to understand the disease process, possibly do a Google search, etc. My local colleagues learn as well, but only an occasional brain autopsy will merit a case report.

Getting autopsies is not very easy, despite the extremely generous and hospitable nature of the neuropathology group at Rhode Island Hospital, which is where all brain autopsies are performed. It turns out that they do more than I thought, although less than they should. Autopsies, in general, are dwindling. In the U.S., in-hospital deaths were autopsied over half the time 50 years ago, but now only about 5%. Obviously, out-patient death autopsies are much less common, partly because the family rarely knows how to proceed, and if they contact the attending physician, that person usually does not know how to proceed. And, even if the doctor is me, the logistics are challenging and the family has to pay the funeral home to transport the body. Many funeral homes discourage the practice. I am not sure why in-patient autopsies are so uncommon, but I have a lot of thoughts on why outpatient post-mortems are rare. In UK, a recent medical article spoke of autopsies as being near extinct.

I think that one reason in-hospital autopsies are uncommon is that there is a fear of unwittingly revealing a deficit in medical care. Yet, it turns out that medical-legal data have shown that
autopsies generally aid the physicians in cases of alleged malpractice, even when the autopsy demonstrated an unrecognized, yet treatable condition. Decisions were based on standard of care for what were thought to be the problems at the time of treatment. In a recent article looking at this by the American Association of Anesthesiology, over 50% of the autopsies were thought to help the plaintiff while only 28% supported the malpractice allegations. I believe that another reason is that requesting an autopsy requires asking something from the bereaved relatives, which is always a difficult thing to do unless the illness was a great mystery that the family wants to understand better to achieve closure. Perhaps most important is the common belief that little is to be gained from the autopsy, that with the current battery of highly sophisticated tests we know all we need to know, so why go to the bother and expense of a formal autopsy? This is remarkably incorrect, in general. For neurological cases, this is even more likely to be incorrect.

Complicating any attempts to increase autopsy rates is the absence of reimbursement for the pathology department for autopsies, a rather expensive undertaking, especially for brain disorders which often require extensive testing and large amounts of time as special stains get ordered to perform increasingly sophisticated testing.

The autopsy “completes” the physical exam. Neither has yet become outdated, despite what some of our colleagues might think.

Author
Joseph H. Friedman, MD, is 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, chief of Butler Hospital’s Movement Disorders Program and first recipient of the Stanley Aronson Chair in Neurodegenerative Disorders.

Disclosures on website

Changes in the Maintenance of Certification (MOC) process have not gone far enough

To the Editor and my RI colleagues:

I am writing to seek your interest and support in asking the Rhode Island Medical Society to follow in the steps of the Massachusetts Medical Society1 and many others in creating a formal resolution against the Maintenance of Certification [MOC] process being promulgated by the American Board of Medical Specialties. Grassroots efforts across the country have pressured the specialty boards into making concessions, but these changes have not gone far enough.

In the last two years, we have seen a group of well-respected physicians2 create an alternative to the American Board of Medical Specialties, The National Board of Physicians and Surgeons, which has so far been accepted into 40 hospitals in the US.3 Oklahoma has enacted the first ever “Right to Care” legislation4 which states that MOC cannot be linked to licensure, reimbursement, hospital privileges or employment. Michigan and Missouri are now considering their own similar legislation. The AMA has called for an immediate end to any mandatory, secure recertifying examinations5 which is a major step, although it has also previously endorsed the idea of more intense Maintenance of Licensure to be enforced by the states6, a process which looked exactly like MOC with its self-assessment, assessment of knowledge and skills, and performance in practice.7

Though making a resolution against MOC is a small step, it is one brick in a much larger foundation, which has made the current progress we have seen possible. Most doctors who are required to complete MOC feel this is an important issue, and I have yet to talk to one who has not complained about this burdensome process. I believe this would be an issue where our medical society could be a strong advocate and voice for its doctors.

With a formal resolution like Massachusetts, we could then seek “Right to Care” legislation to prevent what has become mandatory participation in MOC for many doctors in RI. It is complicated with the many hospitals and insurers and will not happen overnight, but if we join together with physicians and medical societies nationwide, our voices do have power. Help ensure that MOC will never be linked to licensure, reimbursement, hospital privileges or employment. The time to act is now.

Please take a look at our petition and add your name if you haven’t previously: https://www.change.org/p/rhode-island-medical-society-create-a-resolution-against-the-abms-moc

Sincerely,
Lisa Frappier, DO
lisa.frappier.ripqc@gmail.com
RI Physicians for Quality Care

References
2. https://nbpas.org/board/
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A sixty-ish-year-old homeless man is admitted to the hospital with pneumonia and found to have COPD and cancer of the lung. Radiation and surgery are under consideration. He is forgetful and is unaware of any family. He has no friends and this is his first encounter with the medical system. He is confused and lacks capacity to make decisions about his treatment. A diligent search fails to discover any friends or relatives and did not reveal any cultural, religious or other values that might influence medical decisions.

Such cases are not common but pose difficult dilemmas when they occur. Without family, friends or a prior knowledge of their views on medical treatment, such persons are “unrepresented patients.” They have no advocates. The literature suggests that 5% of the 500,000 patients who die annually in ICU’s and 3–4% of patients in nursing homes are unrepresented.

Forty-three states have laws designating who can make medical decisions for patients who lack capacity and have not designated a proxy. Rhode Island (RI) is not one of these. RI has a statute designating a hierarchy of persons who can consent for an autopsy, but we do not have such a legal hierarchy for decision-making for live patients when there is no designated proxy. Generally we designate close family or friends who may know the patient’s values and will be able to use the criterion of “substituted judgment” to make medical decisions. But there are no such persons for our patient.

A proxy who could apply the “reasonable person” standard is the default option. But who is that person? In emergency situations it is clear that treatment should be given. But in our case, where the treatment is urgent but not emergent, the only legal option is to seek a court-appointed guardian. This is not a realistic solution as that process is very time consuming (up to several months) and expensive (est. $5000–$8000). And often a willing guardian who can make timely informed decisions cannot be found.

The attending physician generally should not be the default proxy of record. In some states, including RI, the attending physician is prohibited by law from being an appointed proxy. However, 12 states allow the attending doctor to be the legal proxy although 7 of those impose significant limitations on them. A multi-disciplinary committee such as an ethics committee could serve in this role. Only 5 states, however, have laws that specifically empower such committees to make decisions about treatment. RI does not have such a law. Three states (New York, Texas, Iowa) have laws establishing extra-institutional committees that may serve as proxies. In Florida, the “ultimate surrogate” is a clinical social worker and in Texas “a member of the clergy.”

Currently our largest RI health care system instructs attending physicians faced with caring for an unrepresented patient to call “risk management.” We need an approach in RI that will better serve these unfortunate folk.

A new law (effective August 2016) in Colorado (CO) offers guidance. The law works as follows: Lack of capacity must be confirmed by an independent examiner. A doctor (other than a doctor involved in the care of the patient) may be appointed proxy with the consensus of the ethics committee.

For routine treatment (formal informed consent not required) the proxy may act independently.

For treatments requiring formal informed consent both the proxy and the ethics committee must sign the informed consent.

For end-of-life treatment involving withholding or withdrawing treatment, a second independent medical opinion from a physician (not the proxy) and the consensus of the ethics committee must be obtained.

This law applies to all medical institutions in CO, including nursing homes,
assisted living facilities and community-based health services. If the designated doctor proxy is willing, he/she may continue as a proxy in all of the other care facilities and systems. If the consensus of the ethics committee is required and there is no such committee in the other facilities, the hospital committee may continue in its role to support the patient.

Since there is no law in RI that addresses these issues, we have several options. We could try to get a law passed as the initial effort. Such legislation would likely address the issue of the hierarchy of medical proxies when family and friends are available as well as the process to assist unrepresented patients. Such an effort is likely to be lengthy, expensive and afflicted with unintended legislative consequences.

However, we could more easily incorporate processes to protect the unrepresented patients into the policies of our institutions. A protocol based on the CO law, incorporated into the policy structure of hospitals, would be inexpensive and effective in dealing with this significant issue. Acting in concordance with hospital policy, the doctors caring for an unrepresented patient could enhance timely medical decision-making. And by acting in accordance with official hospital policy doctors may receive significant legal protection. This would be a benefit for patients, and would result in significant financial savings. Patients would get prompt, medically appropriate treatment and the administrative costs of dealing with the legal issues of unrepresented patients would be reduced.

Our small size and relatively few hospitals offer a unique opportunity for the competing medical systems in RI to cooperate on a non-controversial issue and establish a uniform policy for all RI medical institutions. Doctors working in multiple institutions would always know the rules as would the institutions, and the designated proxy (if willing to do so) and the ethics committee could continue to serve in their roles in other institutions or settings, further benefiting both patients and institutions.

Finally, if a single agreed-upon policy to protect unrepresented patients were adopted by the various medical institutions and endorsed by the RI Hospital Association and the RI Medical Society, the legislature then might be convinced to create legislation incorporating these already effective policies and thus ensure the legal protection of these most vulnerable members of our society.

And that, after all, is our real goal. ❖

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At first, being a member of the sports medicine team at the Rio 2016 Olympic Games was like being a mouse in a huge maze of corridors, offices, entries and exits – not to mention protocols. It quickly became an athlete-centered, check your ego at the door experience.

Arriving on my first assignment day was a transportation maze. I was living with friends in Logoa, where the rowing and kayak events took place. I opted to take a taxi, as I had no idea of the public transportation logistics of walking to buses which took you to subways which took you to more buses and more walking. My taxi arrived 15 minutes late and the driver didn’t know where the Olympic Village (OLV) was. After 50 minutes and driving in circles, we found an entrance, but the security guards wouldn’t let the taxi into the restricted area. We were stopped with a huge bus honking behind us. I got out of the taxi and fortunately one of the guards spoke enough English and let me get on the bus, which was authorized to go into the outer perimeter of the village. I walked toward some volunteers and asked for directions to the Polyclinic. Passing through security with credential check, metal detector, and x-ray examination of my official volunteer carry bag, they pointed me in the right direction.

After a fast walk/jog, which seemed like an eternity, I arrived at the Polyclinic, where we had our introductions and meetings of the physical therapies team of physios, chiros, and osteos. We then toured the clinic, which included many specialties: dentistry, ophthalmology, emergency room, orthopedic sports medicine, podiatry, osteopathy, massage therapy, and of course chiropractic.

The complex also included two state-of-the-art MRIs, one digital x-ray, a cryo pool room, a rehab room with an anti-gravity treadmill, conference, storage and IT rooms, as well as lounges and reception areas.

There was a room for orthotics and support braces for ankles to shoulders, a chiropractic table room, an osteopathic table room, and our main area for physical medicine: the physio room with 12 treatment tables and state-of-the-art physio machines for ultrasound, ems, laser, cryo/compression, and hot moist packs. There was also a Swiss machine for intense pulsed ultrasound. The one exception was that no acupuncture was allowed in the clinic. The physios were allowed to perform mobilization but...
only the chiros and osteopaths were allowed to perform manipulation.

During the first few days, the early morning hours were relatively quiet with only an easy flow of returning athletes, so it was watch and learn and figure out what specialty we each were as we were all dressed the same and our credentials made no differentiation as to our degrees. It was an adaptive process on all sides, learning the subspecialties of each provider. Watching the team develop understanding and work together was a great experience. The chiropractic team provided treatment to all athletes requesting their services, from any country’s team in any sport.

We saw a wide variety of treatment needs, with many athletes being referred to us for neck, low back and extremity conditions. It was great being able to make a difference in these athletes’ lives. We helped them achieve their goals by getting them back into play after an injury, or helping them perform at their optimum level by making sure that their body was functioning at 100%.

Our teams were divided into two shifts. On my first day there were only about 2,500 people housed in the OLV, by midway through my rotation the OLV swelled to at least 11,000 occupants. Athletes accompanied by their team doctor or team physio were allowed direct access and could either work with us or independently.

I found many team physios and some team MDSs were very interested in referring and watching chiropractic services. Pleased athletes spread the word about the clinic and soon the volume increased exponentially. Once the athlete was in the physio treatment area interdisciplinary referrals were allowed and encouraged, providing the athletes with a world-class experience. My first day shift ended at 3 p.m. with a debriefing and a team Rio cheer.

There are so many people to thank for their years of work in making the Rio 2016 Polyclinic the success that it was. Of special note are Dr. Marcelo Botelho, the lead chiropractic physician and Felipe Tadiello, coordinator of physical therapy services. Many people were exposed to chiropractic services for the first time. Many new friendships were formed and old acquaintances renewed.

It is amazing what happens when you have a dedicated team of professionals who are athlete-centered treating the finest athletes in the world. This has been a dream for my entire chiropractic career, and was 30 years in the making. It is the highest level of sport, and a total honor to be a part of the sports medicine staff. It was truly a world-class experience, well worth the time to learn how to navigate the mazes I encountered.

Author
Dr. Clive W. Bridgham, a chiropractic sports medicine specialist and director of the Barrington Chiropractic and Sports Medicine Clinic, was one of the 17 chiropractors from eight countries chosen by the Rio 2016 Organizing Committee to serve in the host medical services during the Olympics and Paralympics. For three weeks, from July 29 to August 11, Dr. Bridgham and colleagues worked in a multidisciplinary polyclinic open to all athletes, coaches and officials.
We are read everywhere

ACCRA, GHANA
Joseph H. Friedman, MD, visiting professor in the Department of Medicine for the house staff training program at 37 Military Hospital in Accra, Ghana, pauses to consult the September issue of the journal. It was Dr. Friedman’s first return to Ghana after teaching there in 1969-1971 as a Peace Corps Volunteer prior to attending medical school. Dr. Friedman is editor-in-chief of RIMJ, Professor and Chief of the Division of Movement Disorders, Department of Neurology at the Alpert Medical School of Brown University, chief of Butler Hospital’s Movement Disorders Program and Stanley Aronson Chair in Neurodegenerative Disorders.

MOUNTAIN VIEW, CALIFORNIA
Kelly Grimes, RN, high-risk obstetrics coordinator at Lucille Packard Children’s Hospital at Stanford and Kevin Grimes, MD, (Brown ’79, MD ’82) Director, Spark Translational Research Program, and Associate Professor of Chemical and Systems Biology, both at Stanford University School of Medicine, peruse the September issue at their home in Mountain View.

Wherever your travels take you, be sure to check the latest edition of RIMJ on your mobile device and send us a photo: mkorr@rimed.org.
Spirited, small, and hardy, Icelandic horses are descendants of ponies taken to Iceland by the Norse as early as the 9th century. They are capable of two additional, distinctive gaits called the tölt and skeið, compared to the typical three gaits (walk, trot, gallop) of other breeds.

It is believed that 60% of the world’s Atlantic puffins form their breeding colonies in Iceland in spring and summer. The plentiful lundi, the Icelandic name for their national bird, are also found on Icelandic menus. Smoked, or boiled in milk, puffin is now considered a delicacy, but had been a dietary staple in centuries past.

Wherever your travels take you, be sure to check the latest edition of RIMJ on your mobile device and send us a photo: mkorr@rimed.org.
This month’s *Rhode Island Medical Journal* has dedicated the issue to sports medicine. It is my honor to be the guest editor, as over the past 25 years, from my days as a medical resident at Brown to my return from fellowship to start practice in Rhode Island, I have seen tremendous growth in the field locally and nationally. The acceptance of sports medicine amongst physicians and the public is parallel to its acceptance by the American Board of Medical Specialties. Fellowship training and board certification have helped to set modern standards of practice.

Truth be told, sports medicine can be traced back to Herodicus 5th century BCE with regards to fundamental theories on the use of therapeutic exercise for the maintenance of health and treatment of disease. The dawn of the modern sports medicine era is ascribed by some to Harvard Medical School in 1890. It was there that significant injuries were recognized and thus a program was instituted to educate players of the need for personal fitness, use of proper gear, need for treatment of all injuries and the importance of rehabilitation. Most people consider the true genesis of modern sports medicine to have begun in the 1950s. Don O’Donoghue, MD, from the University of Oklahoma, wrote the textbook “Treatment of Injuries to Athletes” which became the bible for sports medicine physicians. At the same time in Columbus, Georgia, Jack Hughston, MD, was starting sideline coverage of football/athletic events. His foresight to merge clinical practice, research, and education is legendary.

Sports as a part of life, be it recreational, therapeutic, competitive, or professional, continues to take on more significance as time moves on. Be it the billion-dollar industry of professional sports or the patient recovering from heart surgery who is participating in cardiac rehabilitation, people from all walks of life can benefit from sports medicine. Physicians are commonly prescribing exercise to help with overall health, and with this rise in the number of athletes comes a concomitant rise in problems and injuries specific to a sport.

The field of sports medicine can best be defined as medicine meant to include all of the subspecialties of medicine as well as nutrition, physiology, and preventative health care. It involves the education, treatment, and care not just of injuries, but of athletes. It involves the understanding of sports, climate of competition, the athlete, and medicine; and how they all relate to one another.

Sports medicine as a specialty is relatively young; however, its roots are very deep. It represents the best in medicine; a collaboration of various specialties to provide education and care to the patient. It is also susceptible to outside demands. An important tenet to remember: when treating an athlete, they are a patient first and athlete second. Education of the athlete, parents, coaches, administrators, general public, and colleagues is the best tool we have to temper expectations.

This issue of the *Rhode Island Medical Journal* includes articles addressing current “hot” topics in the field. Peter Kriz, MD, and colleagues write about the need for standardization of pre-participation physical exams. Pre-participation exams are part of the foundation of sports medicine. The ability to screen and counsel athletes is an important opportunity not to be wasted. Jeffrey Feden, MD, provides insight and perspective regarding concussions in sports. Over the past few years, there has been significant media coverage of concussions. Improving the awareness of the public has been a benefit. Unfortunately, some media coverage has perpetuated misperception. Robert Shalvoy, MD, and Steve Behrens, MD, address meniscal injuries in the knee. The article helps to review a common diagnosis seen in athletes as well as the general public. It also highlights arthroscopy and its role in revolutionizing orthopedic sports medicine. Finally, Ramin Tabaddor, MD, and colleagues take on a difficult topic in Athletic Pubalgia. In the past, athletic groin pain was considered a black-box diagnosis. In the past few years, however, there have been advances in the understanding of athletic groin pain. Dr. Tabaddor’s article highlights these developments and outlines treatment options.

Sports medicine is a relatively young vibrant field that is in the midst of a growth spurt. As I head into the second half of my career, I am anxious to see the future unfold.

**Author**

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Preparticipation Physical Exams: The Rhode Island Perspective, A Call for Standardization

PETER K. KRIZ, MD, FAAP, FACSM; AILIS CLYNE, MD, MPH, FAAP; SARA R. FORD, MD, FAAP

ABSTRACT
As of 2015, 98% of U.S. states require preparticipation exams (PPE) before participating in scholastic sports. Despite widespread availability of a PPE monograph endorsed by six medical societies, a lack of uniformity exists regarding implementation of the PPE among Rhode Island health care providers (HCPs). Consequently, significant variability exists regarding how comprehensive a history and physical exam screening is conducted for adolescent athletes looking for sports participation clearance. The purpose of this document is to: 1) establish a uniform screening process in Rhode Island for the PPE utilizing a peer-reviewed history and physical exam; 2) familiarize HCPs with the 2010 PPE monograph, with emphasis on the cardiovascular and musculoskeletal (MSK) systems; 3) encourage HCPs to treat the PPE as a separate entity from the annual wellness visit; 4) engage HCPs and sports medicine providers in Rhode Island to improve the quality and process of evaluating adolescent athletes for sports participation.

KEYWORDS: preparticipation exam, adolescent, athlete, screening

BACKGROUND
In 2010, the fourth edition of the Preparticipation Physical Evaluation monograph was published by 6 medical societies, including the American Academy of Family Physicians, American Academy of Pediatrics (AAP), American College of Sports Medicine, American Medical Society for Sports Medicine, American Orthopedic Society for Sports Medicine, and American Osteopathic Academy of Sports Medicine. This comprehensive, peer-reviewed document was the culmination of an extensive review of the literature including position, policy, and consensus statements pertaining to provision of health care in the adolescent population. The objective of the authoring societies was to promote the PPE as an effective tool in identifying medical and orthopedic conditions that may affect an athlete’s ability to participate safely in sports, particularly when performed thoroughly and consistently by qualified, licensed supervising physicians. Critics of the PPE have questioned its utility, as 1) ≤2% of high school athletes are ultimately disqualified from sports participation; 2) the PPE lacks capacity to effectively screen athletes for risk factors associated with sudden cardiac death (SCD); 3) the PPE has little effect on the overall morbidity and mortality of athletes. Proponents of the PPE cite that 1) ≥75% of medical and orthopedic conditions which may require sports participation restriction are detected by history alone; 2) it allows for establishment of a medical home, updating of immunizations, identification and management of chronic health conditions related to sports and other lifestyle risk factors.

In Rhode Island, wide variability exists regarding the implementation of the PPE. In many health care settings, the PPE is combined with the annual wellness visit, due to a variety of factors. Insurance companies restrict reimbursement for adolescent physical examinations to annual wellness visits only. As a result, HCPs cannot bill insurance for dedicated sports physical/PPE. Nationally, the PPE substitutes for the annual comprehensive health evaluation in 30-88% of adolescents. Time restrictions (e.g., timely need for physical forms for sports, camps, school enrollment) and appointment availability often impact the feasibility of scheduling separate annual wellness visits and PPE visits in most clinical practices. As a result, most HCPs utilize a state-issued School Physical Form (http://www.health.ri.gov/forms/school/Physical.pdf) which can be used for multiple purposes, including school-sponsored physical activity/sports participation and non-scholastic sports participation.

With the development of the 2010 PPE monograph comes new momentum to develop a standardized, uniform approach to the PPE. Currently, each state determines the content, comprehensiveness, and length of its respective PPE form, as well as the type of HCP licensed to perform the PPE. A 2015 study found that only 19 U.S. states (37%) required or recommended use of the 2010 PPE monograph. By adopting the 2010 PPE monograph, Rhode Island could assist in the establishment of a national, standardized approach to the PPE that would allow for meaningful data collection, with future editions transitioning from predominantly expert opinion-based content to evidence and outcome-driven content. Aside from the authoring societies of the 2010 PPE monograph, other organizations have recently joined in efforts to standardize the approach to PPE performance, including the Campaign and Coalition for Youth Sports Health and Safety. Ninety-five percent (95%) of Americans believe that PPE screenings must be conducted in a consistent manner across the country.
MAKING THE TRANSITION

Physician-reported obstacles to the delivery of the PPE include time and scheduling limitations, lack of familiarity with the medical history and physical examination portions of the PPE, uncertainty regarding relative importance of each PPE component, length of the PPE form, time spent covering non-PPE topics, and lack of a standard approach. When evaluating a patient for sports participation clearance, HCPs are responsible for conducting a detailed history and physical examination that screens an athlete for cardiovascular and MSK conditions that may ultimately predispose to a life-threatening event, disabling injury or illness during training or competition. A critical element for determining athletic participation is a targeted, albeit detailed PPE history and physical examination. PPEs were never intended to take the place of an annual wellness visit; conversely, the standard history and physical examination of an annual physical can effectively be integrated into the annual physical by utilizing the PPE monograph.

The authoring societies of the 2010 PPE monograph acknowledge that the athlete’s personal physician’s office is the ideal setting for the PPE given the established physician-patient relationship, accessibility to the complete medical record, and comfortable environment to discuss confidential issues. This endorsement assumes clinical comfort and competency in performing the PPE. Alternative arrangements for PPE administration, such as group-based assessments by a coordinated medical team, should be available to student-athletes if a comprehensive PPE cannot be accomplished in the medical home.

One of the overall purposes of the 2010 PPE monograph was to provide a resource for primary care physicians to improve the quality of the PPE performed in the medical home and to close the knowledge gap regarding the various components of the PPE. Clinicians interested in familiarizing themselves with the various components of the screening examination (e.g., general MSK screening examination) should consider purchasing the 180-page 2010 PPE monograph in its entirety. For those clinicians who have access to the current or previous editions of the PPE monograph, detailed figures provide valuable information pertaining to screening examination assessments.

The authoring societies of the 2010 PPE monograph provide the history, physical exam, and clearance forms free of charge (available at AAP Council on Sports Medicine and Fitness website). Clinicians can download these forms for use in their practice settings (Figures 1A–B).

THE CARDIOVASCULAR AND MUSCULOSKELETAL EVALUATIONS: WHAT YOU SHOULD KNOW

While a comprehensive review of the history and physical exam sections of the PPE is beyond the scope of this article, specific attention to key elements of the cardiovascular and MSK evaluations is warranted.
Preparticipation cardiovascular screening in athletes entails a detailed personal and family history and physical exam. Cardiovascular disorders are the leading cause of sudden death in young athletes, accounting for ~ 75% of all sudden death in athletes.12 In the United States, hypertrophic cardiomyopathy (HCM) and congenital coronary artery anomalies are the most common etiologies of sudden cardiac death (SCD), with HCM accounting for one-third of anomalies that represent one-third of SCD deaths in US athletes younger than 30 years.13 The prevalence of HCM is 1:500 in the general population, and ~ 1:1000-1500 in competitive athletes.14 Because HCM is the most common genetic cardiovascular disease,15 a targeted family history may trigger a referral to cardiology for additional screening and increase the yield of detection of this high-risk condition. Most athletes with HCM are asymptomatic, with SCD often the sentinel event of their disease. Only 25% of patients with HCM have a murmur,16 which characteristically is a harsh systolic ejection murmur, best heard at the left sternal border that increases in intensity with maneuvers decreasing venous return (e.g., Valsalva, moving from squat to stand) and diminishes with maneuvers increasing venous return (e.g., supine position, transitioning from stand to squat).1 Coronary artery anomalies are the second-leading cause of SCD, accounting for ~ 17% of cases in athletes.18 Abnormal origin of the left coronary artery is the most common anomaly. <50% of SCD cases from coronary anomalies have prodromal symptoms identifiable by preparticipation history. The American Heart Association (AHA)13 recommends the PPE include:

1. **Auscultation for heart murmurs**: should be performed in both supine and standing positions (or with Valsalva) to identify dynamic LV outflow tract obstruction murmurs. Standing is preferred to sitting because the diagnostic HCM murmur becomes louder when the patient stands due to decreased venous return.

2. **Palpation of the femoral pulses**: delayed femoral artery pulses compared to radial artery pulses (radiofemoral delay) may indicate the presence of coarctation of the aorta and warrant further diagnostic assessment.

3. **Examination for physical stigmata of Marfan syndrome**: kyphoscoliosis, high-arched palate, pectus carinatum or excavatum, arachnodactyly (long, slender fingers), arm span greater than height (ratio > 1.05), mitral valve prolapse, aortic insufficiency murmur, myopia, and generalized hyperlaxity are clinical findings.

4. **Brachial artery blood pressure**: should be obtained on a bare upper arm supported at heart level, measured with an appropriate cuff size, with the patient in the sitting position with back supported.

Currently, noninvasive cardiovascular screening tests such as ECG or echocardiography are not recommended in the preparticipation screening of athletes. A discussion regarding this controversial topic is beyond the scope of this article, but numerous articles17-19 illustrate the ongoing debate in sports medicine and cardiology communities.

Regarding the musculoskeletal evaluation, a focused history is the most important first step in the PPE3:

- Athletes with unresolved musculoskeletal pain require additional evaluation prior to sports clearance.
- Stress fractures may be associated with inadequate caloric, calcium, and vitamin D intake.
- Fractures or dislocated joints represent more serious orthopedic injuries, and often accompany each other. Neurologic deficits can be associated with such injuries. Referral to sports medicine specialists may be indicated prior to clearance.

While the overall yield of the MSK examination in detecting significant injuries in asymptomatic athletes with no history of injury is typically low (in contrast, history alone is 92% sensitive in detecting significant MSK injuries20), a general MSK screening examination is recommended:

- **Inspection**: athlete faces examiner. Assess symmetry of trunk, upper and lower extremities, upper-to-lower segment ratio, arm span-to-height (should be < 1.05), general body habitus
- **Assess cervical ROM (flexion, extension, lateral rotation, lateral flexion)**
- **Assess shoulder function** (resisted shoulder shrug for trapezius strength, resisted abduction to 90° for deltoid strength, internal and external rotation for glenohumeral joint ROM)
- **Assess upper extremity function** (flexion/extension of elbows for ROM, pronation/supination of forearms for ROM, clench fist and spread fingers for ROM).
- **Assess back/spine**: athlete faces away from examiner. Assess forward flexion, extension, perform Adams forward bend testing to evaluate for scoliosis.
- **Perform “duck walk”** for 4 steps (hip, knee, and ankle ROM; strength and balance testing).
- **Perform toe and heel walk** (calf symmetry and strength, balance).

Clinicians should augment the general screening examination with a thorough joint-specific examination as indicated by historical or general screening findings (e.g., glenohumeral joint instability), and referral to an orthopedic specialist should be considered if diagnosis, clearance, or further treatment decisions are uncertain. Sport-specific examinations may be considered in addition to the general screening examination to assess strength, endurance, and flexibility testing in joints or segments under particular stress in a given sport (e.g., shoulders in swimmers and baseball pitchers).1
SUMMARY AND RECOMMENDATIONS

Despite controversy regarding the effectiveness of the PPE as a screening tool for potentially life-threatening or disabling medical/MSK conditions, PPEs continue to be widely performed and a necessary requirement for scholastic sport participation. Currently in Rhode Island, there is no uniform or standardized process for conducting a PPE. Additionally, annual wellness visits and PPEs are commonly combined by HCPs out of convenience and necessity. Potential to miss the opportunity to identify conditions that may be life-threatening or disabling may occur if pertinent historical information is not gathered and a systems-based physical examination is not performed.

The 2010 PPE monograph is a comprehensive tool that is gaining traction nationally as a standard for all 50 states to utilize for preparticipation physical evaluation of adolescent athletes. The current Rhode Island School Physical Form includes a section to indicate any physical activity restrictions, but the form does not specifically require documentation that life-threatening or disabling medical and musculoskeletal conditions in athletes were screened for. Rhode Island physicians and affiliated health care providers can ensure a more comprehensive and consistent approach to the PPE by adopting the screening recommendations in the 2010 PPE monograph for the performance of PPEs in their respective clinical settings. It is not the charge of the clinician to find the one “needle in a haystack” diagnosis that will prevent a sports-related adverse event, but rather to provide a more uniform, systematic screening process. Adopting and implementing the 2010 PPE monograph history, physical examination, and clearance forms could assist in development of a national, standardized approach to the PPE. By utilizing the 2010 PPE monograph, clinicians can improve the quality of their PPE data collection, physical examination skills, and ultimately contribute to an evidence-based approach and expanding scientific basis for the preparticipation physical evaluation.

References


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Disclosures

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Current Concepts in Sports-related Concussion
JEFFREY P. FEDEN, MD

ABSTRACT
Increasing concern over the acute and long-term consequences of sports-related concussion has generated widespread interest and attention. This article provides an overview of concussion in athletes, including diagnostic and management considerations, and highlights the clinical challenges associated with repeated minor head trauma in sports.

KEYWORDS: sports-related concussion, mild traumatic brain injury, athletes

INTRODUCTION
Sports-related concussion has become a growing concern in recent years and has generated considerable discussion within the scientific and athletic communities. Perhaps no other issue in sports medicine has received as much attention in the media as the potential long-term consequences of concussion in athletes. An estimated 1.6 million to 3.8 million concussions occur annually in the United States [1], but many more may go unrecognized or unreported. Although significant advances have been made over the last decade, the assessment and management of concussion remains a challenging endeavor.

PATHOPHYSIOLOGY
Concussion is defined as a complex pathophysiologic process resulting in transient neurologic dysfunction following a biomechanical insult to the brain, with or without loss of consciousness [2]. It falls on the mild end of the traumatic brain injury [TBI] spectrum. There is considerable evidence to implicate linear and rotational acceleration forces at the moment of impact, causing deformation of neuronal membranes and axonal stretching. The resulting neurometabolic cascade involves ionic imbalances and local metabolic dysfunction [3]. These physiologic disturbances are transient but render the brain more vulnerable to repeat injury, possibly with longer lasting effects.

EVALUATION AND RETURNING TO PLAY
The acute clinical effects of concussion result from neuronal dysfunction. They include balance and cognitive impairment, and any of more than 20 symptoms ranging from headache and “fogginess” to irritability [Table 1]. Diagnosis is made when an athlete presents with the typical constellation of findings following either direct or indirect trauma. The focus of initial care is on the evaluation for cervical spine injury or neurosurgical emergency. The next step in evaluating and managing concussion involves recognition of the injury and removal from play. A systematic neurologic exam and assessment of symptoms, cognition, and balance will often lead to the correct diagnosis. However, sports-related concussion is not always easy to identify. While novel technologies are being developed to measure biomechanical forces, the magnitude of head impact does not necessarily predict clinical injury. Furthermore, the various symptoms of concussion are nonspecific, sometimes resulting in a diagnostic dilemma. This is complicated by the fact that athletes may not recognize the significance of their symptoms or will conceal symptoms in an effort to continue playing. Symptom checklists, such as the Sideline Concussion Assessment Tool [version 3, aka SCAT3] [2], are useful in the sideline evaluation after injury and have been adapted to assist in the office-based evaluation of concussion. Unless there is concern for structural brain injury, CT or MRI is often unnecessary. Traditional neuroimaging is expected to be normal in concussion, reflecting the more functional nature of the injury.

Same-day return to play should not be allowed at any level of sport for an athlete with diagnosed or suspected concussion. Following the Zackery Lystedt Law in Washington State in 2009, all fifty states have now enacted some form of concussion legislation in an effort to increase awareness and improve athlete safety. Rhode Island’s School and Youth Programs Concussion Act (Chapter 16–91) mandates education for all coaches and volunteers involved with interscholastic

Table 1. Symptoms of Concussion

<table>
<thead>
<tr>
<th>Physical</th>
<th>Cognitive</th>
<th>Behavioral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Memory problems</td>
<td>Increased emotions</td>
</tr>
<tr>
<td>Nausea/Vomiting</td>
<td>Difficulty concentrating</td>
<td>Sadness</td>
</tr>
<tr>
<td>Visual disturbance</td>
<td>Fogginess</td>
<td>Depression</td>
</tr>
<tr>
<td>Dizziness/Vertigo</td>
<td>Feeling slowed down</td>
<td>Anxiety</td>
</tr>
<tr>
<td>Impaired balance</td>
<td>Confusion</td>
<td>Irritability</td>
</tr>
<tr>
<td>Sensitivity to light/noise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep disturbance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
athletics, it requires immediate removal from play for suspected concussion, and written clearance for return to sports must be provided by a licensed physician (4).

After eliminating life-threatening injury and diagnosing concussion, safely returning an athlete to sports is a critical piece of the management paradigm. Grading systems were popular in the diagnosis and management of sports-related concussion in the early 1990s [5]. However, these systems were flawed and have been abandoned as the focus shifted from categorizing injury severity to making individual recommendations based on several factors. Although most concussions will resolve within 7–10 days [6], recovery can be unpredictable and some may take significantly longer to improve. The return-to-play decision is complex and requires a very individualized plan. It is well understood that returning an athlete to sports assumes complete resolution of symptoms at rest and with physical activity, in addition to full recovery of cognitive function. Physical rest eliminates the risk of another head injury and allows recovery, though the degree and duration of rest are debatable. The widely used protocol published by the Concussion in Sport group is a consensus approach that outlines a progression of activity from light aerobic exercise to full contact activity [2]. Introduction of exercise occurs once the athlete is asymptomatic, and each step identifies a 24-hour period with suggested activity [Table 2]. Successful completion of each step requires that symptoms are not exacerbated during or after exertion.

### Table 2. Graded Return to Play Protocol

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activity</th>
<th>Functional Exercise</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No activity</td>
<td>Complete physical and cognitive rest</td>
<td>Recovery</td>
</tr>
<tr>
<td>2</td>
<td>Light activity</td>
<td>Low-intensity aerobic exercise Walk, swim, stationary bike</td>
<td>Increase heart rate</td>
</tr>
<tr>
<td>3</td>
<td>Sport-specific</td>
<td>Simple sport-related exercise Skating, running</td>
<td>Add movement</td>
</tr>
<tr>
<td>4</td>
<td>Training</td>
<td>Noncontact sport-related training drills Resistance training</td>
<td>Coordination and cognitive load</td>
</tr>
<tr>
<td>5</td>
<td>Full contact practice</td>
<td>Resume normal activity/practice</td>
<td>Restore confidence &amp; Assess function</td>
</tr>
<tr>
<td>6</td>
<td>Return to play</td>
<td>Resume competitive game play</td>
<td></td>
</tr>
</tbody>
</table>

Adapted from Consensus Statement on Concussion in Sport (2).

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In addition to physical rest, cognitive rest is recommended as a cornerstone of concussion management and is also consensus-based [2]. Cognitive rest entails limiting activities of attention and concentration, including schoolwork and video games, which may exacerbate symptoms and delay recovery. It often involves varying levels of academic accommodations [and sometimes removal from school] in an effort to allow recovery and preserve school performance. Although guidelines for “returning to learn” lack a strong evidence base, there is increasing attention to the need for a student-athlete’s gradual and structured return to the classroom. The American Academy of Pediatrics emphasizes the importance of this and provides strategies for a productive transition back into the academic setting following concussion [7].

### Neuropsychological Testing

Neuropsychological assessment first entered the scene in the late 1980s when it was discovered that sports-related concussion results in an acute decline in neurocognitive function. Traditional paper and pencil testing was cumbersome and gave way to computerized neurocognitive testing in the 1990s as a tool to more objectively evaluate concussion. Neuropsychological testing adds diagnostic value over symptom reporting alone [8], and computerized neurocognitive testing is now an important piece in the evaluation and management of concussion. Formal testing examines memory, attention, reaction time and other executive functions commonly affected by mild TBI. It allows for detection of subtle cognitive deficits, which can persist beyond symptom resolution. It is most useful to have a baseline evaluation for comparison following injury, but testing can be beneficial in the athlete without pre-injury data as well. Computerized neurocognitive testing is inexpensive, widely available, and has demonstrated reliability and validity [9]. Nevertheless, it must be understood that such testing is only a single tool in the comprehensive evaluation of concussion and should not stand alone or be considered mandatory.

### Feared Consequences

Although the neurometabolic disturbances and symptoms of concussion are often short-lived, there are acute and long-term consequences related to unrecognized or recurrent injury. A very conservative approach to managing concussion has evolved based on our knowledge of three major [and often controversial] clinical concerns: second impact syndrome, post-concussion syndrome, and chronic traumatic encephalopathy.

#### Second Impact Syndrome

The phenomenon of second impact syndrome, first popularized in the mid-1980s, remains a frequently cited concern when returning athletes to play. It refers to a second impact that occurs prior to recovery from an initial concussive injury, leading to loss of cerebral auto-regulation, diffuse cerebral edema, and permanent neurologic disability or death. However, there is little evidence to support its existence and it is, at most, an exceedingly rare entity [10]. Participation in contact and collision sports will always present a risk for catastrophic head trauma, but the reference to second impact syndrome as a reason for caution is debatable.
Post-concussion Syndrome

Post-concussion syndrome (PCS) is another major concern and represents the most practical clinical challenge following sports-related concussion. The definition of PCS in the medical literature is inconsistent, but it is generally understood to be the persistence of cognitive, physical, or emotional symptoms well beyond the expected time frame for recovery [11]. Post-concussion syndrome is considered when concussion symptoms last more than six to twelve weeks following injury, and some experts argue that PCS is the manifestation or unmasking of psychiatric illness rather than the neurological injury itself. Severity of injury does not always correlate with symptoms, but a large symptom burden might predict a prolonged course. Pre-existing migraine headaches and learning difficulties may also herald a lengthy recovery. There is evidence to suggest a period of vulnerability following concussion, and repeated injury during this period can exacerbate symptoms and complicate recovery [3]. A protracted course following a second concussion before complete recovery is perhaps more concerning than the unlikely second impact syndrome.

Regardless of the underlying pathophysiology, a multidisciplinary and symptom-targeted approach is best for managing PCS. Education of the athlete, family, coaching staff and others in the recovery process is universally important as well. While there are various medical treatments available, evidence is limited, and many therapies remain anecdotal or opinion-based. Pharmacologic therapy is directed toward alleviating symptoms but should not be expected to speed recovery and may cause cognitive or behavioral side effects. Examples include melatonin for sleep disturbance, amitriptyline for headache, selective serotonin reuptake inhibitors for depression, and amantadine for cognitive impairment [12]. Unfortunately, because there is little supportive evidence for the use of medications for PCS in athletes, these strategies should be considered only by experienced providers after failure of more conservative measures.

Rehabilitation techniques play an increasing role in the management of prolonged concussion recovery. Cognitive behavioral therapy may be helpful in managing emotional and sleep disturbances, as well as other physical symptoms such as posttraumatic headache. Neurocognitive rehabilitation may enhance memory, attention and general cognitive performance. Vestibular rehabilitation may help relieve dizziness and improve gait and balance. It has been postulated that prolonged rest may actually be detrimental to recovery. Some experts advocate a supervised and controlled aerobic exercise rehabilitation program for athletes with symptoms lasting beyond three weeks. Gradual progression of exercise at a subsymptom threshold can aid in recovery [13].

Chronic Traumatic Encephalopathy

The third major concern surrounding sports-related concussion involves the cumulative effects of repeated head trauma. The investigation into long-term neuropathologic, cognitive, and behavioral changes is not well established. Some research supports a decline in neurocognitive function with multiple concussions, but other studies have failed to demonstrate cumulative adverse effects [14]. Chronic traumatic encephalopathy (CTE) was first described in boxers as dementia pugilistica in the 1930s, referring to boxer’s dementia. CTE is a neurodegenerative disease found in individuals with a history of repetitive mild traumatic brain injury. It shares clinical similarities with Alzheimer’s dementia and parkinsonism, but diagnosis is made only by distinct changes on post-mortem neuropathologic examination.

Although the risks of developing neurodegenerative disease from boxing have been recognized for decades, researchers and the media have more recently brought attention to this risk in football following several high-profile cases and tragic deaths. CTE generally occurs later in life, long after retirement from sports, and is characterized by an insidious-onset of cognitive decline and behavioral changes. Deterioration of mental health has also been highlighted as a concern. Clinical diagnosis is complicated by the lack of standard criteria, the requirement for autopsy confirmation, and confounders such as substance abuse. Additionally, the exact relationship between sports-related concussion and CTE remains unclear [15]. Risk factors within sport are largely unknown, including the significance of repetitive subconcussive head trauma or even a single lifetime concussion. Nonetheless, concerns about the cumulative effects of both concussive and subconcussive impacts are growing, and certain thresholds may predict later-life depression and cognitive impairment [16].

Based on the subacute and chronic consequences of concussion mentioned above, the question of retiring athletes from contact or collision sports is frequently encountered in clinical practice. There are no specific data or criteria on which to base retirement decisions, and each decision is highly individualized. Despite a lack of strict guidelines, it is generally understood that several variables will prompt this discussion: decreasing time intervals between concussions, relatively minor impacts causing or exacerbating symptoms, and increasing symptom burden or duration with each successive injury.

FUTURE DIRECTIONS

Concussion will always be an inherent risk of contact and collision sports. Present and future efforts toward mitigating this risk are focused on prevention, diagnosis, and improved understanding of long-term sequelae. Primary prevention includes enforcement of existing rules and careful consideration of further rule changes. Equipment use and modification is important for injury prevention, but despite manufacturers’ claims, there is no conclusive scientific evidence that protective equipment prevents or reduces risk of concussion. Continued efforts toward educating the athletic community about injury recognition and significance, and
the importance of safe return to competition, is essential in limiting adverse outcomes.

Presently, sports-related concussion is a clinical diagnosis. Advances in areas like biomarker research and functional magnetic resonance imaging may someday offer a more objective view of this injury. Development of other technologies, such as force-measuring accelerometers in football helmets, may also change our understanding of head trauma, as may further research into the roles of age, gender, and genetic predisposition as risk factors for injury or long-term complications.

**CONCLUSIONS**

Our knowledge of sports-related concussion has grown exponentially in the past decade, but it is clear that we have only scratched the surface. Dissemination of information by media outlets has outpaced our true scientific understanding of concussion. This has been productive in educating the public about its significance, and education is integral in mitigating risk. However, it has arguably created unsubstantiated concern in the absence of sound evidence for poor long-term outcomes. The management of sports-related concussion has evolved from grading systems to consensus-based recommendations with a limited base of evidence. Currently, the standard for management incorporates a conservative, individualized approach guided by the principles of physical and cognitive rest, though the role of strict or prolonged rest is being challenged. Complex cases often require a multidisciplinary team consisting of primary care providers, sports medicine specialists, neurologists, mental health professionals, neuropsychologists, and physical therapists.

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**Disclosures**

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Diagnosis and Management of Meniscal Injury

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ABSTRACT

Meniscal injury is a common cause for presentation to the emergency department or primary care physician’s office. Meniscal injuries can be the result of a forceful, twisting event in a young athlete’s knee or it can insidiously present in the older patient. Many patients with meniscal pathology appropriately undergo conservative management with a primary care physician while some may need referral to an orthopedist for operative intervention. Arthroscopic surgery to address the menisci is the most frequently performed procedure on the knee and one of the most regularly performed surgeries in orthopedic surgery.1 The purpose of this paper is to help elucidate the diagnosis and management of meniscal pathology resulting in knee pain.

KEYWORDS: meniscal injury, knee pain, osteoarthritis, arthroscopy, orthopedic referral

INTRODUCTION

The frequency in which meniscal tears occur makes it an important injury to identify by the medical practitioner. Acute, traumatic tears in the young patient and atraumatic, degenerative tears in the older patient represent a continuum of pathology, often presenting with their own difficulties in diagnosis and management. The prevalence of meniscal tears in the general population has been challenging to identify due to the high frequency of asymptomatic or undiagnosed lesions. In some Northern European countries, the estimated incidence of meniscal tears is 2 per 1000 person-years.2 A study by Englund et al., focusing on degenerative tears, found that 35% of enrolled patients older than 50 years old had imaging evidence of a meniscal tear, with ⅔ of these being asymptomatic.3 Risk factors associated with the development of a symptomatic meniscal tear have been identified to be a BMI > 25 kg/m², male sex, and occupations requiring kneeling, squatting or stair-climbing.4,5 A military study looking at more acute, traumatic meniscal tears estimated the incidence in active duty personnel to be 8.27 per 1000 person-years.6 In this study, age was found to be a variable associated with elevated rates of injury, with tears occurring 4 times as often in those over 40 compared to those less than 20 years of age.5 Arthroscopic meniscectomy is estimated to occur 400,000-700,000 times annually.1,6

PRESENTATION

Knee pain can be the result of numerous possible intra- and extra-articular diagnoses, all of which must be kept in the differential when evaluating a patient. Meniscal tears can be identified by asking a few focused questions during the patient evaluation. The mechanism of injury is important as are the presence of specific symptoms after injury.

Acute meniscal tears are most often associated with a twisting mechanism to the knee while the foot is planted, providing an axial load. The joint swelling with a meniscus tear is more likely to present in a delayed fashion (> 24 hours).

Atraumatic, degenerative meniscal pathology more frequently presents with an insidious onset of pain. This diagnosis can be difficult to distinguish from osteoarthritis in the older patient. Mechanical symptoms are relatively common, with patients often describing the sensation of ‘locking,’ ‘clicking,’ ‘popping,’ and sometimes even a feeling of ‘giving way’ of the knee. Symptoms tend to wax and wane with activity levels.

On physical examination, joint line tenderness is often described as the most sensitive finding for diagnosing a meniscal tear; however, it is not very specific.7 Blocks to active and passive range of motion, especially to deep flexion, are associated with more complex meniscal tears. A few provocative examination maneuvers for meniscal pain include the Apley Compression, McMurray, Steinman and Thessaly tests, demonstrated in Figures 1 and 2.7,8 The basic premise of these tests involves applying an axial force through the knee joint to simulate weight-bearing while providing a rotational moment about the leg to try to elicit clicking, popping or pain. Kocabey et al. evaluated the effectiveness of various physical examination maneuvers in diagnosing meniscal pathology and found the combination of joint line tenderness, positive McMurray, Steinmann and Apley tests to have an 80% sensitivity for medial meniscal pathology and a 92% sensitivity for lateral meniscal pathology.8

ANATOMY

The menisci are fibrocartilaginous structures which importantly serve as load-sharing components of the knee joint. By increasing the surface area of contact between the femur and tibia, they can significantly decrease contact stresses experienced by articular cartilage. Menisci also function as secondary restraints to anterior/posterior translation of
the tibia with the primary restraint being provided by the cruciate ligaments. The menisci are triangular in cross-section, and predominantly comprised of water, proteoglycans and Type 1 collagen.6 The medial meniscus is c-shaped with multiple capsular attachments including the medial collateral ligament, making it much less mobile than the lateral meniscus which is more circular and devoid of ligamentous constraint. This disparity in motion contributes to the frequency in which each meniscus is injured. The medial meniscus is injured much more often than the lateral meniscus, with the posterior horn being the most afflicted component. The lateral meniscus is more commonly injured in association with ACL tears. In ACL-deficient knees, the menisci become increasingly important restraints to anterior translation of the tibia, predisposing it to injury. The medial and lateral inferior genicular arteries provide blood supply to the peripheral ¼ to ⅓ of the menisci, with the remaining central portion of the meniscus receiving its nutrition via diffusion from the synovial fluid.6 The poor vascularity of the central meniscus accounts for its very limited inherent capacity to heal. The menisci have been found to have nociceptor/mechanoreceptor innervation at the peripheral ⅔ and at the anterior and posterior horns from histologic study.9

**IMAGING**

Plain radiographs of the knee provide little information about meniscal pathology. However, they are still valuable initial tests and provide information about bony anatomy and alignment. MRI is the most sensitive diagnostic imaging test available, albeit with a high false positive rate. MRI is often not necessary when osteoarthritis is recognized on plain films or there is a high clinical suspicion for meniscal pathology. On MRI, a linear hyperintensity that extends to the superior or inferior joint surface is diagnostic of a meniscal tear, most sensitively identified on T1 sagittal and coronal slices.10 Parameniscal cysts visualized on MRI are most often seen in the presence of meniscal tears, so images must be carefully scrutinized when cysts are present. A study performed by Zanetti et al. utilized MRI to evaluate 100 patients that had unilateral symptoms consistent with a meniscal tear.11 MRIs were performed on the symptomatic and asymptomatic contralateral knee. Meniscal tears were found in 57 of the symptomatic knees and 36 of the asymptomatic knees.11 Symptoms correlated most with radial, vertical and complex, displaced types of meniscal tears.11 Another study showed that MRI had a sensitivity of 91.4 percent and specificity of 81.1 percent for identifying medial meniscus tears and a sensitivity and specificity of 76 and 93.3 percent, respectively, for identifying lateral-sided tears.12 The management of meniscal tears is centered on the presence of symptoms; this study recognizes that a large percentage of meniscal tears are asymptomatic.

**TEAR CONFIGURATION**

Vertical or longitudinal tears in the sagittal plane, as seen in Figure 3, are the most common type of meniscal tear and can be repaired when present in the peripheral third of the meniscus.6 Radial tears are tears that initiate in the
central portion of the meniscus and propagate to the periphery; they are usually not repairable due to the poor vascularity of this area of the meniscus. When these tears are symptomatic, a partial meniscectomy is indicated. Bucket-handle tears are vertical tears with displacement that can cause mechanical blocks to flexion/extension. Flap and parrot-beak tears are tears that initiate centrally and continue in a circumferential manner.6

MANAGEMENT
Meniscal tears require treatment when pain is unmanageable or function is impaired. Some meniscal tears are managed successfully without operative intervention. This is typically consistent with small radial tears and stable, nondisplaced longitudinal tears. ACL-deficient knees with no plan for ACL reconstruction and degenerative tears in patients with osteoarthritis are usually not candidates for arthroscopic treatment.6 Several studies have shown good results from managing certain meniscal tears conservatively with a protocol of ice, NSAIDs, and physical therapy.13-16 Physical therapy for these injuries focuses on strengthening the muscles of the injured extremity, especially surrounding the knee, as well as maintaining range of motion of the knee and hip.17,18 Supervised therapy sessions emphasizing exercises such as quadriceps sets, hamstring curls, straight-leg raises, and heel raises have been shown to produce statistically significant improvements in knee pain and functional outcome scores.17,18 Patients should be encouraged to avoid deep-knee flexion activities that exacerbate their pain such as squatting and kneeling.17,18 Intra-articular steroid injections can be useful adjuncts to minimize inflammation and suppress symptoms in patients with osteoarthritis. Several studies have shown statistically significant, short-term improvement in pain following an intra-articular steroid injection lasting 2–4 weeks or longer.13

Katz et al. performed a randomized controlled trial comparing arthroscopic meniscectomy to a standardized physical therapy regimen in 351 patients 45 years and older with MRI-confirmed meniscal tear and osteoarthritis.14 This study showed no significant differences in magnitude of improvement in functional status evaluated by Western Ontario and McMaster Arthritis Index (WOMAC) as well as pain at 6 and 12 months after intervention.14 Moseley et al. compared outcomes after randomization of 180 patients with osteoarthritis and meniscal tears to an arthroscopic debridement, arthroscopic lavage, or placebo surgery group and reported no significant differences in the Knee-Specific Pain Scale at one- and two-year follow-up.15 Sihvonen et al. evaluated outcomes after random assignment to either arthroscopic partial-meniscectomy or a sham-controlled surgery for patients with symptoms consistent with a degenerative medial meniscus tear without osteoarthritis.16 There were no significant differences in change from baseline to 12 months in any of the primary outcome scores, regardless of intervention.16 The effect of various biases, crossover from treatment groups, and the external validity of these trials have recently brought some of these data into question.19 These studies demonstrate the difficulty practitioners have deciphering whether knee pain is the result of osteoarthritis or a symptomatic meniscal injury, and subsequently determining the appropriate management. However, they do reinforce the importance of attempting conservative management, especially for the older patient with a degenerative tear. Some clues that can help identify the source of pain are the mechanism of injury, radiographic findings consistent with osteoarthritis, and patient demographics.
Patients with large or complex tears, a traumatic mechanism, or a large joint effusion are likely candidates for operative intervention. Severe pain with provocative maneuvers such as the McMurray, Apley, and Steinman tests or any patient with a locked knee are also likely surgical candidates. Patients with persistent symptoms after a period of conservative management should receive orthopedic consultation for either arthroscopy or arthroplasty as appropriate. Operating options include partial meniscectomy, total meniscectomy, meniscal repair, and meniscal transplantation. A partial meniscectomy is by far the most common procedure preferred for centrally located radial tears, complex tears away from the periphery, and degenerative tears.

Peripheral tears that have good vascularity and subsequently a greater likelihood of healing are often better targeted by meniscal repair procedures. This includes longitudinal tears located peripherally, especially in young patients, and tears associated with ACL injury when repaired concomitantly.

Total meniscectomies are rarely performed considering the implication of increased stresses experienced by articular cartilage as well as early degenerative changes. Meniscal transplantation is usually considered after partial or total meniscectomy with persistent symptoms in younger patients that have reached skeletal maturity without arthritic changes of the knee.

CONCLUSION
Meniscal injury is one of the more common musculoskeletal conditions and a frequent cause of knee pain. It is important for physicians to recognize meniscal pathology as a source of knee pain and not solely an MRI finding. Painful tears can be managed conservatively in certain circumstances as well as surgically with success.

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Understanding Athletic Pubalgia: A Review
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ABSTRACT
Athletic Pubalgia, more commonly known as sports hernia, is defined as chronic lower abdominal and groin pain without the presence of a true hernia. It is increasingly recognized in athletes as a source of groin pain and is often associated with other pathology. A comprehensive approach to the physical exam and a strong understanding of hip and pelvic anatomy are critical in making the appropriate diagnosis. Various management options are available. We review the basic anatomy, pathophysiolog y, diagnostic approach and treatment of athletic pubalgia as well as discuss associated conditions such as femoroacetabular impingement.

KEYWORDS: athletic pubalgia, groin pain, sports hernia, impingement

INTRODUCTION
Hip and groin pain has long been a diagnostic dilemma in athletes given the complexity of the anatomy and the multiple sources of pathology. Athletic pubalgia is increasingly identified as a source of pain in athletes as it is becoming more recognized and better understood. Originally termed “Gilmore’s groin” over 40 years ago, it has also been known as sportsmen’s hernia, groin disruption injury, sports hernia and, most recently, core muscle injury (CMI).1,2,3,4 The evolution from “hernia” to CMI/athletic pubalgia stems from our developed understanding that there is no true hernia or deficiency from the posterior wall of the inguinal canal but rather an injury to the various structures that comprise the pubic aponeurosis.4,5,6 Athletic pubalgia can occur in isolation but often occurs in the setting of other hip and pelvic pathology which can make its diagnosis challenging. Although this is much more common in athletes, it can be seen in non-athletes and is referred to simply as pubalgia in this population.

ANATOMY AND PATHOPHYSIOLOGY
The pubic symphysis is believed to act as a fulcrum for the anterior pelvis and, according to Meyers, a majority of pathology stems from this fulcrum point.7 It is a common attachment site for the rectus abdominus and adductor longus which are confluent and form a sheath anterior to the pubis. The confluence of the rectus abdominus, the conjoint tendon (formed by the internal oblique and transversus abdominus) and external oblique form the pubic aponeurosis, which is also confluent with the adductor and gracils. The rectus abdominus flexes the trunk, compresses the abdominal viscera, and stabilizes the pelvis for motion at the hip while the adductors stabilize the anterior pelvis. During athletics, a large amount of force occurs at the anterior pelvis in which the pubic symphysis is its center. The opposing forces of the adductor longus directly against the rectus abdominus at the pubic symphysis fulcrum point are thought to be implicated as the origin mechanism of athletic pubalgia. Therefore, when the rectus is weakened, the adductor longus pulls in an unopposed fashion. Typically this is from chronic or acute intense muscle contractions by the athlete while hyperextending and/or twisting the trunk. The inequality of forces acting on the anterior pelvis leads to tearing at the insertion point of the rectus abdominus. (Figure 1) Athletic pubalgia is more common in males due to a narrower pelvis that cause greater shifts in force and less stability than the wider female pelvis.7

Figure 1. Pathoanatomy of Athletic Pubalgia
The rectus abdominus and adductor longus muscles pull in the opposite direction. With injury to the rectus an imbalance in muscle forces occurs causing groin pain.

PATIENT HISTORY
Chronic lower abdominal and groin pain is increasingly more recognized in high-level athletes. Forces across the pelvis increase as muscle strength increases, which may explain why athletes are commonly affected. Activities that can lead to athletic pubalgia involve running, kicking, cutting
and twisting movements, and explosive turns and changes in direction. In the United States, soccer, ice hockey, and American football players are most commonly affected. 1,8,9

Athletes usually present with the complaint of exercise-related unilateral lower abdomen and anterior groin pain that may radiate to the perineum, inner thigh, and scrotum. Pain is mostly relieved with rest. However, even with resolution of symptoms after a period of rest, the pain often returns with return to play. Pain can occur gradually, but 71% of athletes will relate the recurrence to a specific event.1,9 This event can include trunk hyperextension and/or hip hyperabduction leading to increased tension in the pubic region. Kachingwe and Grech explained 5 signs and symptoms that they felt encompassed athletic pubalgia: “(1) a subjective complaint of deep groin/lower abdominal pain, (2) pain that is exacerbated with sport-specific activities such as sprinting, kicking, cutting, and/or sit-ups and is relieved with rest, (3) palpable tenderness over the pubic ramus at the insertion of the rectus abdominus and/or conjoined tendon, (4) pain with resisted hip adduction at 0, 45 and/or 90 degrees of hip flexion, and (5) pain with resisted abdominal curl-up.” 9

**PHYSICAL EXAM**

One should start palpation laterally at the inguinal ligament and work centrally to the pubic tubercle. It is important to include the pubic symphysis as osteitis pubis can often be present with athletic pubalgia. Exam findings include tenderness at or just above the pubic tubercle near the rectus insertion or hip adductor origin on the affected side. Pain can also be elicited with resisted sit-up and hip flexion. There is no a bulge at the external inguinal ring, or palpable true hernia. Valsalva maneuvers can occasionally reproduce symptoms. One should evaluate the adductor longus as a source of isolated pain by resisted leg adduction in both flexion and extension. This can also exacerbate the rectus abdominus symptoms. Adductor tenderness can be found in as many as 36% of athletes with athletic pubalgia.1 A sensory exam should be performed as sensory disturbances and dysesthesias in the lower abdomen, inguinal region, anteromedial thigh, and genitalia can be present with occasional entrapment of the iliohypogastric, ilioinguinal, and genitofemoral nerves.19 Both hips must be examined for range of motion and provocative maneuvers to rule out isolated findings of intra and extra-articular pathology that can coexist with athletic pubalgia. (Table 1)

<table>
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<tr>
<th>Table 1. Examination for Groin and Hip</th>
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<td><strong>Athletic Pubalgia Test</strong></td>
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<td>Resisted Sit up</td>
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<td>Single or Bilateral Resisted Leg Adduction</td>
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<td><strong>Hip Test</strong></td>
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<td>FADIR (Flexion, Abduction, Internal Rotation)</td>
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<td>FABER (Flexion, Abduction, external rotation) also know as Patrick test</td>
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**FEMOROACETABULAR IMPINGEMENT (FAI) AND OTHER ASSOCIATED CONDITIONS**

Many disorders around the hip and pelvis can coexist with athletic pubalgia making diagnosis difficult. These include acetabular labral tears, adductor injuries, snapping hip syndromes, iliopsoas tendinitis, osteitis pubis, and femoroacetabular impingement. (Figure 2) One must rule out a true
groin hernia, genitourinary and gynecological disorders, and intra-abdominal sources of pain that can mimic athletic pubalgia symptoms.

Recent literature has suggested a strong relationship between athletic pubalgia and FAI. Addressing one or the other independently may not resolve symptoms completely. Femoroacetabular impingement is defined as an abnormal contact between the femoral neck and the acetabular rim during terminal motion of the hip due to excessive bone on the acetabular rim, the femoral neck or both. Limited range of motion associated with FAI can lead to compensatory patterns of movement around the pelvis and trunk. In a cadaveric study, Birmingham showed that cam morphology restricts hip motion and results in increased stress and motion on the pubic symphysis. This causes excessive strain at these joints and on the muscles that attach to them predisposing patients to athletic pubalgia. Therefore, treatment of FAI may normalize hip motion which can restore core and pelvic mechanics.

Multiple studies have shown that the treatment of athletic pubalgia alone may lead to poorer results and inability to return to play. Larson showed that pubalgia surgery alone allowed only 25% of patients to return to the previous level of sport, whereas arthroscopic treatment of FAI alone resulted in a 50% return to the previous level. However, when both conditions were surgically treated, 89% returned to sports. Hammound reported similar findings with no patients returning to sport after athletic pubalgia surgery alone. Proximal adductor tendonopathy is often associated with athletic pubalgia and FAI. One study showed that 94% of athletes with adductor-related pain had radiographic signs of FAI. Patients may also develop osteitis pubis, a stress injury to the perisymphseal pubic bones secondary to increased strain on the anterior pelvis, and internal snapping hip syndrome, an iliopsoas tendinitis resulting from irritation of a tight iliopsoas tendon snapping over the iliopectineal eminence as the hip moves from flexion to extension. Intra-articular hip pathology that may produce similar symptoms to athletic pubalgia include synovitis, loose bodies, osteoarthritis, avascular necrosis and torn acetabular labrum.

Diagnostic Imaging and Diagnostic Injections

Radiographic evaluation includes a standing anteroposterior (AP) pelvis and lateral hip radiographs. One should look for intra-articular disorders including FAI, arthritis, loose bodies and acetabular dysplasia. Extra-articular pathology that may be visible on radiographs includes osteitis pubis, acute or chronic pelvic avulsion fractures/apophyseal injuries and fractures. Magnetic resonance imaging (MRI) of the pelvis is important to obtain for suspicion of athletic pubalgia and other already discussed pathology, although a dedicated hip MR arthrogram should be performed if there is specific concern for hip pathology such as FAI and labral tears. Concern for athletic pubalgia should be specified in the history. Tears of the rectus abdominis on MRI are uncommon. When a tear is seen, it is essentially pathognomonic for athletic pubalgia. Zoga found MRI to be 68% sensitive and 100% specific for rectus abdominis pathology when compared with findings at surgery. Rectus disruptions are seen as a cleft sign with increased signal on T2-weighted images at the rectus abdominis/adductor aponeurosis. Also, MRI is 86% sensitive and 89% specific for adductor pathology and 100% sensitive for osteitis pubis.

Diagnostic intra- and extra-articular injections of local anesthetic and/or corticosteroid can be helpful to make a diagnosis. This can be done either fluoroscopically or ultrasound guided. Injection of the hip joint followed by provocative maneuvers can be used to distinguish hip from pelvic pain. Continued pain in the lower abdominal/
adductor regions, despite an intra-articular injection, can help diagnose athletic pubalgia. Pubic symphysis injections can be performed when osteitis pubis is suspected. Pubic cleft and psoas bursal injections can also be performed for adductor and psoas-related pain, respectively.

CONSERVATIVE TREATMENT
Rehabilitation with physical therapy is first-line treatment for most patients with athletic pubalgia. However, treatment should be individualized based on the level of the athlete, the length of time before the athlete is expected to return to play, and timing of sport season. (Figure 5) Physical therapy should include core strengthening and stabilization, restoration of pelvic tilt and postural training. Increasing range-of-motion of the hip should be done with caution in patients with underlying hip pathology/FAI as changes in the pelvic motion may increase the patient’s symptoms. Generally, conservative treatment should be attempted for 3 months before considering surgery. In-season athletes can trial a 4-week period of rest. Pharmacological treatments include nonsteroidal anti-inflammatories and oral steroid taper. Injections include selective corticosteroid or platelet-rich plasma injections into the rectus abdominus and/or adductor longus origin. After this rest period, return to sport can be trialed. If pain continues, it is up to the athlete whether or not to return to play. Return to play is not believed to worsen the tear or the surgical results of repair. Paajanen compared nonsurgical treatment consisting of physical therapy and corticosteroid injections with surgical treatment for athletes with chronic groin pain. Twenty-three percent of patients in the nonsurgical group crossed over into the surgical arm due to continued pain. Only 50% of the nonsurgical patients returned to sport at 1-year. At 1-year follow-up, 97% of patients in the surgical group were pain-free and returned to full sport.

SURGICAL TREATMENT
If the athlete has continued pain despite a trial of nonsurgical management, surgery may be warranted. Athletes should be referred for evaluation to an orthopedic or general surgeon who is familiar with the recognition, treatment and management of athletic pubalgia. Multiple operations and

Figure 4. MRI of Pelvis
Magnetic resonance imaging of the hip and pelvis in 22-year-old Division 1 football player with left sided lower abdominal and proximal adductor related pain reveals a disruption of the distal rectus abdominus/adductor aponeurosis on the left (solid arrow).

Figure 5. Algorithm for Treatment of Athletic Pubalgia
techniques including laparoscopic and open procedures exist which make it difficult to compare outcomes. Most techniques have satisfactory results reported in the literature. Principles of operative management include reinforcement of the posterior wall and fixation of the rectus abdominus or conjoint tendon. Most also recommend adductor tenotomy when adductor pain and dysfunction is present. Femoroacetabular surgery should also be considered accordingly if recognized as a contributing issue, as previously discussed. A full return to sport is expected at about 6–8 weeks if an isolated athletic pubalgia repair is performed and 4 months if FAI surgery is concomitantly done.17

SUMMARY

Though referred to as many names in the literature, chronic lower abdominal and groin pain without a true hernia is known as athletic pubalgia. It is most commonly seen in male athletes. The pathophysiology is based on weakening or tearing of the lower abdominal or adductor muscles and their opposing forces on the pubic bone. Symptoms include exercise-related unilateral lower abdominal and anterior groin pain that is relieved with rest. Examination shows tenderness at or just above the pubic tubercle near the rectus insertion and pain with a resisted sit-up. Intra-articular hip, genitourinary, and intra-abdominal pathology, as well as gynecological sources of pain in women, must be ruled out. FAI has been shown to be associated with athletic pubalgia and addressing both pathologies may be necessary for complete relief. Plain radiographs, pelvic MRI, and diagnostic injection should used to help make a diagnosis. Conservative treatment is the mainstay and physical therapy should be tried prior to any surgery. However, the timing and length of therapy should be individualized to the athlete. With failure of conservative treatment, referral to a specialist should be made for repair. Results of surgical treatment allow most athletes to return to play at 6 weeks.

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The Decline of the Autopsy in Rhode Island and Nationwide:
Past Trends and Future Directions

ALEX BAUMGARTNER, MD; DOUGLAS ANTHONY MD, PhD

ABSTRACT
The autopsy has long been a fundamental aspect of medical practice and research. However, in the last 50 years, the proportion of deaths for which an autopsy is performed has decreased dramatically. Here we examine some of the reasons for the decline of the autopsy, as well as several interventions that have been proposed to revive it. We also present autopsy utilization data from the Lifespan system, which mirrors nationwide trends.

KEYWORDS: autopsy, pathology, medical education

INTRODUCTION
The importance of the autopsy, or post-mortem examination, to the practice of medicine is difficult to overstate. In the clinical setting, autopsy provides information to providers, researchers, and students that cannot be gleaned from living patients. In the forensic setting, it continues to play a critical role in medico-legal cases. However, in the past several decades, the autopsy rate in US hospitals has declined precipitously. Many have voiced their opinion about ‘the death of the autopsy’, and the detriment thereof to clinicians, particularly to the pathologists who perform them. Still others have offered suggestions for the revival of the autopsy as well as its transformation to a more modern, less invasive, and timelier procedure. Here we provide commentary on the past, present, and future of the autopsy, as well as data from the Lifespan system about recent autopsy trends. We argue that the autopsy remains a critical aspect of modern medicine, and should remain a part of the training of the next generation of physicians.

WHAT IS AN AUTOPSY?
Autopsy has its roots as far back as 5000 years ago in ancient Greece, Babylonia, and Egypt. In fact, the word autopsy comes from the Greek roots autos (meaning self) and optos (meaning sight). Thus an autopsy, literally translated, is an opportunity to see for oneself.1 The modern autopsy originated when Renaissance physicians such as Vesalius and Morgani began to more reliably correlate autopsy findings with clinical disease processes, and it is Virchow who is credited with integrating the use of the microscope into common autopsy practice.2 Today, the full autopsy includes a detailed external examination, as well as full dissection and investigation of the cranial, thoracic, abdominal, and pelvic cavities. Medical, or hospital, autopsies are usually performed at the request of a physician or family member of the deceased in order to answer a specific clinical question or as part of a research effort to investigate new diagnostic or therapeutic interventions. In addition, medical autopsies often have the added benefit of providing a sense of closure to family members, and also identifying any hereditary factors that could have consequences for relatives of the patient.3 These autopsies require the informed consent of legal next of kin.4 On the other hand, forensic autopsies are performed in cases of death suspected to be due to injury, poisoning/intoxication, or unexpected natural death. They are often more focused in nature, and include detailed documentation of injuries, quantification of substances within the body, determination of the ultimate cause of death, or other investigations as required by the criminal justice system. These autopsies are requested by the coroner or medical examiner, and do not require the consent of legal next of kin.1

THE DECLINE OF THE AUTOPSY
In the years following World War II, nearly 50% of US hospital deaths underwent an autopsy.2,4 Since then, the autopsy rate in the US and other western nations has steadily declined. In 1971, the Joint Commission on Accreditation of Hospitals eliminated the performance of a minimum number of autopsies as a requirement for accreditation, which fueled a further decline in the autopsy rate.1 Today, the autopsy rate in academic hospitals hovers around 10%, while many non-teaching hospitals no longer perform any autopsies.1,5 Furthermore, the leading indications for autopsy and the ages of those autopsied have changed significantly. The proportion of autopsies performed for deaths from disease decreased from 16.9% in 1972 to 4.3% in 2007, while the proportion of autopsies performed for deaths from external causes increased from 43.6% to 55.4% during the same time period.6 Of the ten most common causes of death autopsied in 2007, all but one (pregnancy, childbirth, and puerperium) were related to external causes.6 Elderly patients are now much less likely to undergo autopsy: in 1972, 37% of those autopsied were aged 64 or greater, that figure decreased to 17% in 2007.6

Data from the Lifespan system mirror nationwide statistics. Approximately 90% of autopsies performed within the Lifespan system take place at Rhode Island Hospital, with the remainder occurring at The Miriam Hospital. Only rarely are autopsies performed at Newport Hospital (usually one or two cases per year). For the years 2012 through 2014,
approximately 10% of deaths at RIH and 5% of deaths at TMH underwent autopsy, resulting in an overall autopsy rate around 8%. Autopsy rates from these years are shown in Figure 1.

DISCUSSION
Over the years, several reasons have been offered for the decline in autopsy rate. Often first among them is the belief that advances in ante-mortem diagnosis have made autopsy unnecessary. However, several studies have shown this to be an invalid assumption. The most robust of these was a 2003 review of 53 autopsy series from 1966 to 2002, which examined both major missed diagnoses (those relating to the cause of death) and class I errors (defined as major errors that, had they been detected during life, would or could have affected patient prognosis or outcome). They concluded that the rate of major missed diagnoses decreased at a rate of 19.4% per decade, while the rate of class I errors decreased at a rate of 33.4% per decade. However, they estimated that a contemporary institution with an autopsy rate as low as 5% could experience rates of major missed diagnoses and class I errors as high as 24.4% and 6.7%, respectively. Another, a 2007 retrospective review of cancer patients dying in the ICU at a tertiary cancer center where the autopsy rate was 13%, revealed a 26% rate of major missed diagnoses and a 14% rate of class I errors.

Another frequently cited cause for the decline of the autopsy is the belief that autopsy reports will initiate and fuel malpractice lawsuits. Again, pathologists have supplied studies to counter these claims. A 2002 review of court reviews of malpractice cases showed that defendant physicians were acquitted in 61% of cases when the autopsy report favored the plaintiff, and in 100% of cases when the autopsy favored the defendant. Furthermore, in 17% of cases the autopsy findings were deemed to be important or critical to acquitting the physician.

There remains the belief that family members are increasingly opposed to autopsy. It is important to note that patients cannot legally give consent for an autopsy before their death. It is not uncommon for a patient to express a desire to undergo autopsy, only to have the next of kin refuse consent once the patient is deceased. The reasons for this are numerous. Common motives for family members’ refusal of autopsy include concerns about mutilation, concerns about delaying the funeral, objections expressed by the patient before death, and religious or cultural beliefs. Unfortunately, these concerns are often not properly dispelled by clinicians. Shortcomings in the obtaining of consent for autopsy include: consents being performed by inadequately trained staff, use of outdated forms, failure to provide sufficient information, and consent being obtained from the incorrect family member. One study found that among family members of recently deceased patients, only 42% demonstrated satisfactory knowledge of what the autopsy entails. Logistical issues often present another barrier to autopsy. For instance, clinicians or other personnel are sometimes not available at the proper time to sign consent forms, which can delay or prevent the autopsy.

The financial burden of the autopsy must also be considered. Although performing an autopsy comes at a mean cost of $1,275, this cost is rarely covered by managed care organizations or third-party insurers. Thus, the cost is frequently passed on to the patient’s next of kin, at times making it prohibitive to perform the autopsy. Poor reimbursement rates are also to blame for pathologists’ decreased enthusiasm to perform autopsies. Payments for some components of the autopsy are made to hospitals through Medicare Part A; however, there is no specific reimbursement figure for autopsies under the Medicare resource-based relative value scale fee schedule. Deaths occurring outside the hospital present another level of complexity, in that transportation must be arranged and other additional costs are incurred by the next of kin. Although data are sparsely available, the autopsy rate for out-of-hospital deaths is far lower than that for in-hospital deaths.

Despite the decreasing rate at which it is utilized, the autopsy remains a vital part of medical science. Perhaps more than any other organ systems, knowledge of diseases of the heart and brain relies heavily on autopsy. There are multiple reasons for this: first, diseases of the brain and heart are responsible for the majority of deaths in developed nations, and second, these organs are among the least amenable to tissue investigation during life. Autopsy is of critical importance to research efforts in which death is an outcome measure, particularly when it is necessary to determine whether an intervention may have contributed to, or helped prevent, a patient’s death.

Concurrent with the decline of the autopsy rate has been a similar decline in the use of autopsy as an instrument of medical education, such that many medical students no longer observe any autopsies during their training. However, medical students who do have the opportunity to view an...
autopsy consistently describe it as a valuable aspect of their education. Although viewing an autopsy can at times be difficult and may produce a wide variety of psychological responses in a trainee, it remains the duty of the pathologist to minimize these reactions and impart a basic understanding of how and why autopsies are obtained.

In an attempt to increase the dwindling autopsy rate, numerous efforts have been made to improve and modernize the autopsy. These include performing limited autopsies, primarily by endoscopy, laparoscopy, needle, or some combination of these three. Both computed tomography and magnetic resonance imaging have been studied as methods of noninvasive, or virtual, autopsy. However, it has been a struggle to demonstrate that these modalities can be as accurate as the conventional autopsy. A prospective study of 182 cases comparing CT and MRI to autopsy found the discrepancy rate between cause of death identified by radiology and autopsy to be 32% for CT, 43% for MRI, and 30% for combined CT-MRI. The most common missed diagnoses were ischemic heart disease, pulmonary embolism, pneumonia, and intra-abdominal lesions. It is also important to note that imaging is useless for almost all neurodegenerative disorders. Currently, it appears that imaging is best used as a complement to, rather than a replacement for, the conventional autopsy.

Of course, no endeavor to revive the autopsy will be successful without considering the multitude of medical, legal, and societal factors that are responsible for its decline. Some have called for the Joint Commission to reinstate its minimum autopsy rate as a requirement for hospital accreditation. Others have emphasized the need to standardize autopsy reporting and optimize workflow in order to deliver results to clinicians in a timelier manner. It will be necessary to improve training, both for medical students and pathology residents, in order to increase their familiarity with, and inclination to utilize, the autopsy. Finally, a greater effort will need to be made to educate the public regarding the autopsy and the crucial role it plays in public health, research, and myriad other areas.

CONCLUSION
The autopsy is a vital aspect of modern healthcare. However, rates of autopsy utilization have been in decline for more than half a century. The Lifespan system is no exception to this trend. Although many different reasons have been offered to explain the decline, nearly all agree that it is a detriment to practice of medicine. A multidisciplinary effort will be necessary to prevent the death of the autopsy.

References

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Disclaimer
The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Lifespan Corporation, the Alpert Medical School of Brown University, or Beth Israel Deaconess Medical Center.

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Fluid Choice Matters in Critically-ill Patients with Acute Pancreatitis: Lactated Ringer’s vs. Isotonic Saline

MOHAMMED M. ABOELSOUD, MD; OSAMA SIDDIQUE, MD; ALEXANDER MORALES, MD; YOUNG SEOL, ScB; MAZEN O. AL-QADI, MD

ABSTRACT

OBJECTIVES: To investigate the effect of different crystalloid solutions on clinical outcomes in critically-ill patients with acute pancreatitis (AP).

METHODS: We conducted a retrospective study of patients with AP admitted to the ICU using the Multi-parameter Intelligent Monitoring in Intensive Care III (MIMIC-III) database. We investigated the effect of fluid type; lactated ringer’s (LR) vs. isotonic saline (IS) on hospital mortality rates, and ICU length of stay (LOS).

RESULTS: Hospital mortality of the 198 included patients was 12%. For fluid type, 32.9% were resuscitated with LR vs. 67.1% with IS. Hospital mortality was lower in the LR group (5.8%) vs. 14.9% for IS group, odds ratio of 3.10 [P=0.041]. This effect was still observed after adjusting for confounders. However, ICU LOS was longer in LR compared to IS group, 6.2±6.9 vs. 4.2±4.49 days respectively [P= 0.020].

CONCLUSION: The type of fluid used for resuscitation in AP may affect the outcome. LR may have survival benefit over IS in critically-ill patients with AP.

KEYWORDS: acute pancreatitis; Lactated Ringer’s; Isotonic Saline; resuscitation; critically-ill

INTRODUCTION

Acute Pancreatitis (AP) remains one of the most common gastrointestinal disease processes. Clinical practice guidelines put forth by the American College of Gastroenterology (ACG) regarding AP management emphasized large-volume fluid resuscitation for improved patient survival.

AP precipitates a systemic inflammatory process, which cascades into reduced end-organ perfusion, further inflammation, and subsequently, massive third-spacing of fluids. Many indices of AP severity have been presented in order to guide the monitoring of hemodynamic status in those patients undergoing large-volume fluid resuscitation, especially within the first 48 hours of presentation. ACG recommends Lactated Ringer’s (LR) as the preferred isotonic fluid for resuscitation in acute pancreatitis over isotonic saline, (IS) based on expert opinion and supported by one randomized control study. Wu et al demonstrated reduction in markers of systemic inflammation after comparable volumes of infusion with LR vs. IS, at 24 hours after presentation.

While the debate over LR vs. IS in improving outcomes remains indecisive, increased attention has been paid in recent years to the acid-base benefits of LR. Although both LR (pH 6.5) and IS (pH 5.5) have a lower pH than that of plasma, LR remains more physiologically complementary. IS infused in large volumes has shown marked non-anion gap metabolic acidosis and hyperchloremia in trauma patients. Saline-induced hyperchloremia was also associated with decreased renal blood flow, and worse clinical outcomes. Additionally, the lactate component of LR is metabolized by the liver to reduce acidosis induced by acute fluid or renal losses. LR was found to be superior to IS in animal models of hemorrhagic shock. Use of IS for large-volume resuscitation in hemorrhagic shock increased the risk for metabolic acidosis, hyperkalemia, and vasodilation. We explored LR vs IS in critically-ill patients with acute pancreatitis and its effects on acid-base profile and outcomes.

METHODS

Study design
A retrospective study comparing the outcomes of critically-ill patients with acute pancreatitis based on the type of crystalloid fluid used for resuscitation in first 72 hours of their ICU stay.

Study Population
We used the Multi-parameter Intelligent Monitoring in Intensive Care (MIMIC-III) research data-base, developed by researchers from the Laboratory for Computational Physiology at Massachusetts Institute of Technology (MIT), Cambridge, MA, USA, and the Department of Medicine at the Beth Israel Deaconess Medical Center (BIDMC) Boston, MA, USA. The data-base has detailed information about intensive care unit patient stays, including high-resolution vital sign trends and waveforms, laboratory data, therapeutic interventions, discharge summaries, radiology reports and International Classification of Diseases, 9th Revision (ICD-9) codes for all patients admitted to BIDMC ICU between 2001 and 2012. Patients were de-identified in a Health Insurance Portability and Accountability Act-compliant manner. The institutional review boards of BIDMC and MIT approved the use of the MIMIC-III database.
We included adult patients (>18 years) admitted directly to the intensive care unit from the emergency department with acute pancreatitis. The diagnosis of acute pancreatitis was made based on the ICD-9 code, and confirmed by elevated serum amylase and/or lipase (> three times the upper limit of normal), and/or finding on CT abdomen consistent with AP. Patients who received colloids were excluded. Patients with missing data (demographics, clinical or fluid intake/output), or with alternative diagnoses other than AP on admission to the ICU were excluded.

**Study variables**

We included demographic information such as age, sex and race. Predictors of severity included Simplified Acute Physiology Score II (SAPS-II), and Bedside Index of Severity in AP (BISAP) scores on admission, using worst values in the 1st 24 hours. Chart notes were reviewed for etiology of pancreatitis when applicable. Amount and type of resuscitation fluid were extracted from the database. The amount of fluid was expressed as total amount in first 24, 48 and 72 hours of ICU stay. Based on type of fluid, patients were categorized into two groups; LR vs. IS. If a given patient received both LR and IS, they were assigned to the group of predominant fluid amount administered in 72 hours. Serial biochemical profile and vital signs were extracted for the first 72 hours. We specifically used serum bicarbonate and chloride as surrogates for non-gap metabolic acidosis. We reviewed serum levels of bicarbonate and chloride on admission and at 24 hours. The difference between the two points was calculated for both, and presented as percentage of change from the initial level (ΔHCO3% and ΔCl%).

**Study outcomes**

The primary study outcome was in-hospital mortality. The secondary outcomes were ICU length of stay, the trend of serum bicarbonate and chloride after 24hrs of resuscitation.

**Statistical analysis**

Age, SAPS score, vital signs, biochemical profile, amount of fluid and LOS were defined as continuous variables; race, gender, etiology of pancreatitis, BISAP score [as ≥3 or <3], type of fluid and hospital death were defined as categorical variables. Continuous variables are reported as mean with standard deviation or median with interquartile range when appropriate; categorical variables are reported as percentages. Comparisons between groups for categorical variables were evaluated using Pearson’s chi-square test for contingency and for continuous variables a two-sided t test was used. To adjust for confounders, a multivariate analysis for in-hospital death was done using a logistic regression model. Variables were introduced into the model based on clinical and/or statistical significance (p value <0.1 on univariate analysis). In the event of co-linearity between variables, only one variable was included. The final model included the following variables: type of fluid, age, total amount of fluid in first 24 hours and BISAP score. As a supplemental analysis, we investigated the effect of LR vs. IS on changes in serum chloride and bicarbonate as surrogates for acidosis. All statistical tests and/or confidence intervals (CI), as appropriate, were performed at α = 0.05. All reported P values were two sided rounded to three decimal places. Statistical analysis was performed using JMP Pro by SAS Institute.

**RESULTS**

Out of 1093 patients with ICD-9 of AP, only 198 satisfied inclusion and exclusion criteria; amongst excluded patients, 585 were transferred from another facility, 259 were initially admitted to the general medical wards or did not have AP on presentation, and 51 had missing data [Figure 1]. The baseline characteristics are summarized in Table 1. LR group was older, received more fluid and had more patients with BISAP ≥3. Both groups had comparable SAPS-II scores. The overall mortality was 12.6%. Higher SAPS-II and BISAP scores on admission correlated with higher in-hospital mortality [P<0.0001]. The key results were summarized in Table 2. There was higher mortality in the IS group (16.1%) compared to the LR group (5.8%) in both univariate and multivariate logistic regression model, [P=0.029 and 0.045]

![Table 1. Baseline Characteristics](chart1.png)

<table>
<thead>
<tr>
<th></th>
<th>Lactated Ringer’s (n=68)</th>
<th>Isotonic Saline (n=130)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, median (IQR), years</td>
<td>63 (52–74)*</td>
<td>56 (44–72)*</td>
</tr>
<tr>
<td>Men, %</td>
<td>51</td>
<td>50</td>
</tr>
<tr>
<td>Ethnicity, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>78</td>
<td>76</td>
</tr>
<tr>
<td>African American</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Etiology, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stones</td>
<td>36</td>
<td>21</td>
</tr>
<tr>
<td>Alcohol</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>Unknown</td>
<td>50</td>
<td>58</td>
</tr>
<tr>
<td>Amount of fluid, median (IQR), liters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 hours</td>
<td>7.2 (4.3–11.0)*</td>
<td>5.6 (3.5–7.9)*</td>
</tr>
<tr>
<td>48 hours</td>
<td>9.0 (5.3–15.8)*</td>
<td>7.5 (4.5–11.3)*</td>
</tr>
<tr>
<td>72 hours</td>
<td>10.3 (6.4–17.3)*</td>
<td>8.6 (4.7–14.0)*</td>
</tr>
<tr>
<td>BISAP ≥3, %</td>
<td>22*</td>
<td>35*</td>
</tr>
<tr>
<td>SAPS-II, median (IQR)</td>
<td>33 (24–41)</td>
<td>35 (25–47)</td>
</tr>
</tbody>
</table>

* P value < 0.05. Abbreviations: IQR, interquartile range; BISAP, Bedside Index of Severity in Acute Pancreatitis; SAPS-II, Simplified Acute Physiology Score-II.

![Table 2. Results summary](chart2.png)

<table>
<thead>
<tr>
<th></th>
<th>Lactated Ringer’s (n=68)</th>
<th>Isotonic Saline (n=130)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-hospital mortality, %</td>
<td>5.8</td>
<td>16.1</td>
<td>0.029</td>
</tr>
<tr>
<td>ICU LOS, mean (SD), days</td>
<td>6.2 (6.9)</td>
<td>4.2 (4.49)</td>
<td>0.020</td>
</tr>
</tbody>
</table>

Abbreviations: LOS, length of stay; SD, standard deviation.
CONTRIBUTION

respectively with odds ratio of 3.10, 95% (CI 1.11-10.92). The multivariate model included age, amount of fluid in 72 hours and BISAP score to adjust for differences between the two groups. Interestingly, ICU LOS was longer in the LR compared to IS group; 6.2±6.9 vs. 4.2±4.49 days respectively, [P= 0.020]. Mean serum bicarbonate on admission was comparable between the two groups 22.16 vs. 20.84 mEq/L for LR and IS respectively, [P= 0.18]. More patients (44%) in IS group had a drop in serum bicarbonate after 24 hours of resuscitation compared to the LR group (36%); however, this didn’t reach statistical significance [P= 0.323]. Among those whom HCO₃ dropped, ΔHCO₃% was more prominent in IS group -18% vs. -13% for LR, [P=0.033] [Figure 2]. For chloride, although mean serum level on admission was higher in LR group 103.80 vs.100.17 mEq/L in IS group, [P=0.012], both groups had comparable percentage of patients who had increase in Cl levels after 24 hours 78% vs. 77% for LR and IS respectively [P= 0.867]. Among those whom Cl increased, IS group showed higher ΔCl% of 10% vs. 7% for LR group [P= 0.002] [Figure 3].

DISCUSSION

In our study, we found that fluid choice in resuscitation of critically ill patients with AP may impact outcomes. Specifically, LR was associated with decreased mortality when used for resuscitation compared to IS. This association persisted after adjusting for differences between the two groups such as age, amount of fluid and severity on presentation. Moreover, we found that LR is associated with a less dramatic drop in serum bicarbonate and less increase in serum chloride; thus, reduced incidence of acidosis. Our study adds to the growing body of evidence suggesting that LR is more physiologically compatible with human serum than normal saline, and is associated with better outcomes in different settings, including AP.

The findings from our study, and previous studies are all consistent with the identified advantages of LR over IS in terms of reduction in SIRS, lower CRP level at 24 hours, improved pH-homeostasis, and electrolyte balance. We hypothesized that all of these advantages may culminate into a survival benefit. Moreover, a well-known phenomenon related to large volume saline infusion is the development of hyperchloremic metabolic acidosis, which further builds a case for the superiority of LR over IS in AP, and thus to the observed lower mortality with LR. This also supports our finding of a more prominent %ΔHCO₃ drop (p=0.033) and %Δ Cl increase (p=0.002) in the IS group than LR after 24 hours of resuscitation. The above findings coincide with the fact that metabolic acidosis itself, is a part of the pathophysiology of AP. Despite the advantages observed with the use of LR, it was interestingly associated with a longer duration of hospital stay. Differences in the age between the two groups could be contributing to the longer hospital stay observed in the LR group. Noteworthy however, is the fact that the LR group showed lower mortality in our study despite an overall more advanced age, making the dominance of LR over IS in AP even more consequential.

The observational nature of our study is susceptible to bias and confounding. We adopted a very rigorous inclusion and exclusion criteria which makes the study susceptible to selection bias and impacting sample size as we excluded patients who were transferred from other facilities or who...
were initially admitted to the floor, which was necessary since the first 24 hours in AP is the most crucial in treatment. Other confounding variables included the amounts of fluid administered during first 24, 48 and 72 hours was higher in LR group. However, both groups received amounts of fluid (7.2L for LR vs. 5.6L for NS) that were almost within the recommended range by the ACG guidelines [6-12L] in the first 24 hours, which is considered the most crucial period for adequate treatment\(^4\). IS has been shown to cause vasodilation, thus requiring increased volumes for resuscitation\(^12\). Decreased amount of IS was used in our study, leading to a question of under-resuscitation, yet a larger amount would have led to higher acidemia and mortality. Although our patients showed varied proportions of \(\geq 3\) BISAP score in both groups (22% in LR group and 35% in IS group) they displayed comparable median SAPS II scores (33 for LR vs. 35 for IS). Nonetheless, we included BISAP in the multivariate model to adjust for any possible confounding. Also a major limitation of our study was that most of our patients received both IS and LR which is hard to control for in retrospective studies. We assigned patients to the group based on the predominant amount which still can introduce some bias. Another limitation of our study was that it included only AP in critically-ill patients from a single center, which should caution us from generalizing the results to a larger population.

In conclusion, we showed that LR may have a survival benefit over IS in critically-ill patients with AP. We encourage similar studies to be conducted, in the hopes that the seemingly endless debate regarding the optimal choice of isotonic fluid resuscitation can reach a conclusion.

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Disclosures

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A Five-Year Evolution of a Student-led Elective on Health Disparities at The Alpert Medical School

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ABSTRACT

BACKGROUND AND OBJECTIVE: Medical students are often unprepared for social challenges in caring for safety net patients. We aim to evaluate and chronicle the evolution of a pre-clinical elective alongside medical disparities curriculum.

DESIGN AND METHODS: Medical students designed the course to supplement clinical training on care of vulnerable patients. From 2011–2015, there have been 80 first-year medical student participants, five cohorts of second-year course leaders, and two supporting faculty advisors for this 10–12 session evening elective.

RESULTS: Students (n=67) rated the course extremely highly (ranging from 4.4-4.6 on a five-point Likert scale). Medical students reported having significantly more knowledge of underserved populations after taking the course (difference=0.72, SE=0.16, P <0.001). Career interests and attitudes toward health disparities remained strong after taking the course.

CONCLUSIONS: This student-created elective equipped participants with improved knowledge in caring for underserved patients and contributed to the incorporation of health disparities in medical curriculum.

KEYWORDS: medical education, health disparities, underserved patients

INTRODUCTION

Medical students increasingly have the opportunity to care for underserved patients. Student-run health clinics are present in most medical schools, accounting for more than 36,000 annual patient-physician visits nationally.1 In these clinics, medical students learn how to treat acute illness and manage chronic conditions in predominantly low-income, minority patients. These clinical experiences are often a student’s first exposure to social and economic determinants of health inequality, extensively documented in Institute of Medicine’s Unequal Treatment report on racial-ethnic disparities in United States healthcare.2 While many authorities urge academic institutions to take responsibility for educating medical students on these health disparities,3,4 medical students have risen to the challenge of educating themselves on this important subject.

Student-run clinic participants are quick to recognize that patients they care for have complex needs and are calling for more health disparities training. University of California San Diego medical student survey respondents perceived that student-run free clinics were a valuable educational experience and improved attitudes toward working with underserved patients.5 Jefferson Medical College student-run clinic participants reported on a survey that they were not prepared to confront social problems and barriers to care encountered at free clinics but that they welcomed orientation to these issues prior to working in these clinics.6 Despite both institutional and student-led demands to incorporate health disparities into medical education, there are few case reports of health disparities training in didactic settings. Literature describes examples of peer mentoring and clinical teaching in student-run clinics9,10 and also examples of student-initiated didactic curricula separate from clinical experience.8 One case report from the University of California San Francisco highlighted students who developed a preclinical service-learning curriculum about hepatitis B viral infection.11 To our knowledge, this report is the first to chronicle student-led efforts to care for underserved patients alongside the evolution of medical curriculum to include health disparities education.

At The Warren Alpert Medical School of Brown University, student-run clinic participants observed a gap in their ability to successfully care for the needs of uninsured Rhode Island patients. In order to enhance and deepen their patient care at these clinics, medical students developed a preclinical elective called “Healthcare for the Underserved.” Based on a peer-learning model, the elective examines the unique health and healthcare challenges faced by underserved patients in Rhode Island. This paper aims to share the opportunities, mechanics, and challenges characterizing the experiences of student leaders in pre-clinical course development. We argue for the feasibility and sustainability of this student-led elective’s structure as a supplement to student-run clinic efforts, formal medical school curriculum, and as a model for shaping pre-clinical medical education.

INTERVENTION

In 2010, several medical students founded Alpert Medical School’s inaugural student-run health clinics, Brown
Student Community Clinic within the Rhode Island Free Clinic, and later, a second one within the existing Clínica Esperanza (Figure 1). Quickly thereafter, student clinic leaders recognized the need for more formal education in the care of underserved patients. In addition to an experiential component in free clinics, the classroom allowed a forum for discussion on topics relevant to underserved populations with a focus on health disparities. Two medical students designed the pre-clinical elective, Healthcare for the Underserved, as a venue to engage others in peer-learning about health disparities. In 2011, the Medical Curriculum Committee approved the elective and opened the course to enrollees.

A senior medical student and a faculty advisor helped with the elective during its first two years and recruited the initial cohort of 19 junior medical students from a student activity fair. Students determined class content, invited class speakers (i.e., physicians, community leaders), facilitated class discussion for realistic solutions to problems discussed. This effort culminated in 10–12 evening seminars on student-selected topics such as homelessness/teenage runaways, immigrants and non-English speakers, and safety-net workplace culture. At the end of the elective’s second year, three class participants volunteered to be course leaders for the following year and continued to engage previous students in preparing for the next series of seminars.

In 2013, based on course feedback showing evolving student interests, course leaders restructured the elective. Evaluations from the previous year called for more formal structure and content in each student-led session. Students wanted a more cohesive framework for exploring health disparities, while preserving student-determined course content.

In response, student leaders reorganized the course into five modules on designated topics: (1) Refugee/Immigrant health and medical-legal issues, (2) child obesity and the built environment, (3) hypertension rates and race/ethnicity, (4) teen pregnancy and sex education, and (5) mental health and homelessness. Students were also divided into five groups based on these modules, and each group was asked to collaborate on a presentation or workshop. This framework allowed the flexibility of peer-learning within a set of core topics in healthcare for the underserved.

Student evaluations also pointed to the importance of linking class topics to clinical practice. Because students were no longer required to volunteer at local free clinics (although many did), student leaders incorporated clinical cases into didactic sessions. They invited physicians to present examples of patients they cared for in underserved communities. These examples included asthmatic children living in mold-infested housing and overweight children with poor access to balanced and healthy nutrition.

In addition, didactic sessions were typically followed by workshops that aimed to teach students patient-centered skills essential to the care of underserved patients. These skills included optimizing interpretation in patient encounters, techniques in culturally-sensitive motivational interviewing, and composition of legal advocacy letters. Following the 2013 course, this new structure has persisted and even incorporated new topics based on student feedback each year (Table 1). All the while, the same faculty advisor, since the elective’s inception, continues to support all curricular activities and attend class sessions.

Following the Healthcare for the Underserved elective, new electives and required courses increased opportunities for health disparities training for Brown medical students. Emerging preclinical electives furthered several issues touched on by Healthcare for the Underserved (e.g., “Poverty, Health and Law,” “Gender and Sexuality in Healthcare,” “Refugee Health and Advocacy”).

RESULTS

Following each class and at the end of every Healthcare for the Underserved course, students provided quantitative
Class seminar topics by academic year

2011–2012
- Healthcare for homeless
- Geriatric issues
- Med student cynicism, professionalism, and the underserved
- Addiction and substance abuse

2012–2013
- Underserved communities in Rhode Island
- Adolescent mental health
- Domestic violence
- Emergency room diversion
- At-risk youth
- Race and biomedicine in historical perspective
- Patient-physician communication

2013–2014
- Refugee and immigrant health
- Immigration and medical-legal partnerships
- Disparities in childhood obesity
- Nutrition counseling and WIC/SNAP*
- Disparities in hypertension
- Race and biomedicine
- Teen pregnancy in Rhode Island
- Interventions in teen pregnancy
- Veteran homelessness
- Mental health

2014–2015
- Refugees and medical-legal partnerships
- Working with interpreters
- Prisoner health
- Lesbian, gay, bisexual, transgender, and queer health
- Veterans health and the VA
- Teen pregnancy and sex education
- Homelessness
- Race and biomedicine

2015–2016
- Introduction to social determinants of health
- Power, privilege and oppression
- Racial and ethnic disparities in health and healthcare
- Race and medicine
- Gender, sexuality and intersectionality
- Unconscious bias in medicine
- Neighborhood and the built environment
- Health, social policy & the role of the physician advocate

*WIC/SNAP= Supplemental Nutrition Assistance Program for Women, Infants, and Children

feedback, including the benefit of discussing topics relevant to the local community, learning from different perspectives among peers, and engaging with local experts. Students felt class sessions “inspired fruitful discussion between the medical community at Brown and local advocacy groups.”

Students particularly valued the course as a space to discuss and implement solutions to health inequities. They asked for more emphasis on “on student projects and finding problems that can be fixed by student involvement.” They found discussion “thought-provoking” and “definitely something that I want to look more into and think more about.” Ultimately, they connected policy discussions back to the patients they served: “I think this is a great way for us to start thinking about health policy and how we as clinicians can establish or develop programs that will help the livelihoods of our patients.”

Student feedback was instrumental in shaping curriculum changes from year to year. A specific recommendation in 2012 asked to integrate the sessions into a more cohesive framework and for “a bit more continuity between sessions.” Students reflected on the importance of structure and asked for leaders to “be more systematic and focused,” citing, “Because we are handling so much information every day, it is difficult to follow when things get too informal at 6 pm [for the elective].” These comments led to the development of the five modules in 2013.

Following the implementation of modules, a one-time pre- and post-course survey with 4-point Likert scales was added to track changes in student knowledge (i.e., definition of “underserved”) and attitudes (i.e., interest in a medical career providing care for underserved and interest in non-clinical health disparities work). Univariate analysis with paired t-tests was performed on STATA 13.0. From 2013-2014, the overall survey response rate was 90% (n=18).

Following course completion, students reported having more knowledge about underserved populations and their career interests and attitudes toward health disparities remained above average [2.5 out of 5 on Likert scale]. There was a large increase in self-reported understanding of what “underserved” means [difference = 0.72, SE = 0.16, p<.001] (Table 2). However, all other statements concerning career choices and interests (i.e., devotion to caring for underserved, work in primary care, interest in health disparities research) were not statistically significant. There was still an overall increase in knowledge and interest in caring for the underserved [difference = 0.15, SE = 0.06, p=.02], which likely resulted from the substantial self-reported improvement in knowledge of the underserved. Results should be interpreted knowing that there was no comparison group.

Evaluation from 2014 of the elective continues to inform course leaders. Students called for patients to speak about their own experiences of health disparities (e.g., “Definitely bring a patient next time! Would really love to hear a patient perspective.”). At the same time, students called for more time for group discussion. They further reinforced the value
of a student-driven course design, consistently giving positive feedback on student-led presentations (e.g., “My classmates really did a great job; I was very impressed.”).

**DISCUSSION**

As the only medical students in the state of Rhode Island, Brown students successfully advocated for the creation of student-run clinics and more didactics to provide better care for its most vulnerable patients. The innovation in Healthcare for the Underserved is not in curricular content, but rather in its dissemination method, in which students became the catalyst for encouraging medical curriculum change.

As student leaders and faculty of Healthcare for the Underserved, the authors learned several lessons. First, the elective is an example of how student demand was harnessed into medical education reform. Second, it demonstrated that a student-designed elective with both clinical and didactic components can increase self-reported knowledge about health disparities and caring for the underserved. Despite its original intentions, it is unclear if the elective inspired any attitude or career changes, though the lack of demonstrated change may be due to significant interest of students who self-selected into this class. Despite limitations to extrapolating from case reports, Healthcare for the Underserved appears to be a sustainable student-run effort that generates strong support from class participants.

Since the elective’s inception, the Alpert Medical School has undergone vast curricular change. An issue of the **Rhode Island Medical Journal** dedicated a 25-page special section to health disparities education at Brown, highlighting curricular innovations and future directions around health disparities.\(^1\) In addition to elective courses, the following now exist: (1) a required multimodality health disparities curriculum, (2) an annual health disparities symposium, (3) required inter-professional workshops focusing on clinical issues pertaining to health disparities, and (4) an Objective Structured Clinical Examination that requires students to navigate cases addressing health disparities (e.g., counseling non-English speaking patient against leaving against medical advice).\(^1\) There is also recognition of the shortage of physicians to care for underserved populations in Rhode Island, with an explicit goal to train Brown medical students to provide outstanding primary care for them.\(^1\)

Healthcare for the Underserved is a successful, sustainable elective at the Alpert Medical School and a contribution to health disparities education. The increasing overlap between its content and that of required medical curriculum is evidence of the impact student efforts can have on the medical curriculum. Healthcare for the Underserved will continue to evolve to meet the needs of current students and make medical education relevant to the most vulnerable patients served by tomorrow’s physicians.

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Medical School Ranking and Student Research Opportunities
ANNIKA G. HAVNAER; PAUL B. GREENBERG, MD

ABSTRACT
OBJECTIVE: This study aimed to characterize the current state of student research opportunities in a sample of US medical schools ranked in three different tiers.

METHODS: The authors examined the websites for five US medical schools in each of the first, second, and third tiers per National Institutes of Health funding and U.S. News & World Report rankings. Available research opportunities were identified and categorized.

RESULTS: There were 26 schools in the first (n=6), second (n=10), and third (n=10) tiers. From the first, second, and third tiers, 4/6 (67%), 1/10 (10%) and none, respectively, required a research experience (p=0.003); 6/6 (100%), 4/10 (40%) and 1/10 (10%), respectively, offered internally funded one-year research (p=0.002); and 5/6 (83%), 4/10 (40%) and 2/10 (20%), respectively, offered student research days (p=0.045).

CONCLUSIONS: Higher ranked schools provided more opportunities for student research by providing internally funded one-year research, requiring research, and offering student research days.

KEYWORDS: medical student research; research program; research experience; medical school research opportunity

INTRODUCTION
Over the past five years medical student involvement in scholarly research at United States (US) medical schools has grown.1 The Association of American Medical Colleges (AAMC) 2014 Medical School Graduation Questionnaire cited a 7.9% increase in the proportion of students who conducted a research project with a faculty mentor between 2010 and 2014 (Table 1). The proportion of students with sole or joint authorship of a research paper submitted for publication increased by 7.4% over the same time period (Table 1).

Medical schools can promote medical student research through a number of programs. Some schools require a research experience as part of the core curriculum; others offer optional scholarly tracks, annual student research days where students can showcase their research projects, summer research experiences, or an entire year dedicated solely to research. Several recent studies have evaluated student research opportunities at US medical schools. A 2015 systematic review by Chang et al characterized the outcomes associated with medical student research programs and found that the majority of students perceive their research experiences to be positive and author at least one article.2 In their 2010 literature review, Bierer et al focused on a specific type of research program – scholarly concentrations – and found that the diversity of articles and variable results prevent definitive conclusions about the value of these programs.3 Numerous studies have also evaluated student research programs at single institutions.4-9 However, no studies to-date have comprehensively examined the available student research opportunities across a wide selection of medical schools or sought to compare research opportunities among medical schools in different tiers.

Given the recent trend toward increased student participation in research, it is important to identify the types of research programs presently available to medical students. This study aimed to characterize the current state of medical student research opportunities in a sample of US medical schools ranked in three different tiers.

METHODS
To determine the nature of research opportunities available to medical students, the authors examined the websites

| Table 1. Student Participation in Research During Medical School |
|--------------------------|-------|-------|-------|-------|-------|-------|
| Independent study project for credit | 41.4  | 42.2  | 42.4  | 42.4  | 43.8  | 5.8             |
| Research project with faculty mentor     | 64.2  | 66.3  | 68.1  | 68.2  | 69.3  | 7.9             |
| Authorship (sole or joint) of a research paper submitted for publication | 39.1  | 40.6  | 41.8  | 41.7  | 42.0  | 7.4             |
| Authorship (sole or joint) of a peer-reviewed oral or poster presentation | 10.0  | 10.1  | 10.1  | 10.5  | 10.5  | 5.0             |
| Thesis project                      |       |       |       |       | 43.6  | N/A            |

for five US medical schools ranked in each of the first, second (38-42) and third (76-80) tiers per National Institutes of Health (NIH) funding and U.S. News & World Report (USNWR) research rankings.

As USNWR only ranked schools to 84 in 2015, the authors capped both ranking lists at 80. When medical schools were tied in rank, schools closest in rank to the predetermined ranges were included. For each predetermined range, only the first five schools from each ranking list were included. Available research opportunities were grouped into the following categories: internal funded year-off research opportunities (e.g., year-long research awards from medical school funds), internal funded summer research opportunities, an annual student research day, external funded research opportunities for one year or longer, and external funded summer research opportunities. Research opportunities that fell outside these categories were noted but not ranked. Only funds provided to medical students directly, whether for stipends or research costs, were included. Combined MD-PhD programs were not included as participation involves students pre-selected for a research career.

Descriptive statistics, such as frequencies and percentages, were used to describe the availability of research opportunities within each tier. Chi-square analysis was performed to compare the availability of each type of research opportunity among the three tiers; the significance level was 5%.

RESULTS

There were 26 medical schools in the first (n=6), second (n=10), and third (n=10) tiers. The research opportunities at the schools from each tier are outlined in Tables 2-4 and the chi-square analysis in Table 5. From the first (Table 2), second (Table 3), and third (Table 4) tiers, four (67%), one (10%) and none, respectively, required a research experience \( p=0.003 \); six (100%), four (40%) and one (10%), respectively, offered internally funded one-year research \( p=0.002 \); and five (83%), four (40%) and two (20%), respectively, offered a student research day \( p=0.045 \).

Research opportunities that fell outside these categories included for-credit research offered by three schools in the first tier and one school in the second tier (Tables 2, 3). In addition, one school in the first tier offered weekly group scholarship sessions (Table 2) and one school in the first tier and another in the third tier each offered an M.D. with Research Honors (Tables 2, 4).

DISCUSSION

We sought to characterize current research opportunities at US medical schools by examining the websites of schools in the first, second, and third tiers from two separate ranking systems. We found that higher ranked medical schools were more likely to require a research experience, provide internally funded one-year research, and offer a student research day.

The role of required versus elective research experience on student satisfaction and scholarly productivity remains uncertain. In their systematic review, Chang et al found that students in elective research programs were both more satisfied with their research experiences and had similar rates of publications and presentations as students in mandatory research programs.2 The authors attributed differences in satisfaction to the inherent self-selection bias of voluntary research programs or to the additional funding or distinctions offered by some elective programs.3 However, the studies included in Chang’s report were limited in number and

<table>
<thead>
<tr>
<th>Medical School</th>
<th>NIH Ranking</th>
<th>US News &amp; World Report Ranking</th>
<th>Required Research</th>
<th>Optional Scholarly Track</th>
<th>Internal Funded Year-Off</th>
<th>Internal Funded Summer Opportunities</th>
<th>Research Day</th>
<th>External Funded Year-Off</th>
<th>External Funded Summer Opportunities</th>
<th>Additional Research Opportunities &amp; Services Supporting Student Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of California San Francisco</td>
<td>1</td>
<td>4</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Up to 4 months of for-credit research permitted Optional weekly group scholarship discussion sessions</td>
</tr>
<tr>
<td>Johns Hopkins University</td>
<td>2</td>
<td>3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>For-credit research permitted</td>
</tr>
<tr>
<td>University of Pennsylvania</td>
<td>3</td>
<td>4</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>For-credit research permitted</td>
</tr>
<tr>
<td>Washington University</td>
<td>4</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>For-credit research permitted</td>
</tr>
<tr>
<td>Stanford University</td>
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<td>2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>For-credit research permitted</td>
</tr>
<tr>
<td>Harvard University</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>MD with Honors offered</td>
</tr>
</tbody>
</table>

### Table 3. Mid-Ranked\(^a\) Medical Schools by NIH Funding 2014 & U.S. News & World Report – Best Medical Schools 2015 (Research)

<table>
<thead>
<tr>
<th>Medical School</th>
<th>NIH Ranking</th>
<th>US News &amp; World Report Ranking</th>
<th>Required Research</th>
<th>Optional Scholarly Track</th>
<th>Internal Funded Year-Off</th>
<th>Internal Funded Summer Opportunities</th>
<th>Research Day</th>
<th>External Funded Year-Off</th>
<th>External Funded Summer Opportunities</th>
<th>Additional Research Opportunities &amp; Services Supporting Student Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purdue University at Indianapolis</td>
<td>38</td>
<td>-</td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>University of Virginia</td>
<td>39</td>
<td>-</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>For-credit research permitted</td>
</tr>
<tr>
<td>University of Utah</td>
<td>40</td>
<td>-</td>
<td></td>
<td>X</td>
<td></td>
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<td>X</td>
<td>X</td>
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<td></td>
</tr>
<tr>
<td>University of Iowa</td>
<td>41</td>
<td>-</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>University of Miami</td>
<td>42</td>
<td>-</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dartmouth College</td>
<td>-</td>
<td>34</td>
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<tr>
<td>Ohio State University</td>
<td>-</td>
<td>34</td>
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<td>X</td>
<td></td>
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<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>University of Maryland</td>
<td>-</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>University of Minnesota</td>
<td>-</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>University of Rochester</td>
<td>-</td>
<td>34</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) 38th through 42nd ranked U.S. medical schools. Note that because many USNWR rankings are tied, only the first five from each predetermined range are included.

### Table 4. Low -Ranked\(^a\) Medical Schools by NIH Funding 2014 & U.S. News & World Report – Best Medical Schools 2015 (Research)

<table>
<thead>
<tr>
<th>Medical School</th>
<th>NIH Ranking</th>
<th>US News &amp; World Report Ranking</th>
<th>Required Research</th>
<th>Optional Scholarly Track</th>
<th>Internal Funded Year-Off</th>
<th>Internal Funded Summer Opportunities</th>
<th>Research Day</th>
<th>External Funded Year-Off</th>
<th>External Funded Summer Opportunities</th>
<th>Additional Research Opportunities &amp; Services Supporting Student Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tulane University</td>
<td>76</td>
<td>-</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUNY Stony Brook</td>
<td>77</td>
<td>-</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown University</td>
<td>78</td>
<td>-</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tufts University</td>
<td>79</td>
<td>-</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>MD with Research Honors offered</td>
</tr>
<tr>
<td>University of Tennessee</td>
<td>80</td>
<td>-</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Georgia Regents University</td>
<td>-</td>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Louis University</td>
<td>-</td>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Missouri</td>
<td>-</td>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Hawaii – Manoa</td>
<td>-</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Louisville</td>
<td>-</td>
<td>78</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) 76th through 80th ranked U.S. medical schools. Note that because many USNWR rankings are tied, only the first five from each predetermined range are included.
used disparate metrics to evaluate student satisfaction and publication and presentation rates. In addition, the authors did not include the role of required research in students’ choice of a medical school; students who are highly interested in research may be drawn to schools with more established research programs and devote more extracurricular time to scholarly pursuits.

An important characteristic to consider across all research opportunities is level of funding available to both students and faculty mentors. We found that top-ranked medical schools were more likely to require a research experience and offer internally funded year-off research. This suggests that higher funding levels are available at these institutions, given the greater resource requirements inherent in both longer and required programs. Although it is difficult to determine exact available funding levels based on school websites alone, many of the top-ranked schools that required research also listed associated internal funding for these programs. A study by Jacobs et al at a single medical school reported that student research productivity and satisfaction with research was facilitated by financial incentives, with 79% of students satisfied with their research experience and 75% coauthoring at least one published article. In addition, 28% of faculty cited lack of funding as a reason why they chose not to work with students on a research project. Similarly, Hunskaar et al examined students in a two-year elective research program implemented across four schools and reported an association between level of funding availability and student satisfaction rates, with higher rates of dissatisfaction found among students in lower-funded programs. Funding of students’ research was also crucial to faculty mentors’ interest in recruiting students to the research program. Although the studies from Jacobs and Hunskaar lacked control groups and relied on questionnaires for data, their findings suggest that adequate funding for student research projects – e.g., educational, faculty, or departmental grants – is an essential characteristic for promoting greater medical student satisfaction and involvement in research.

An additional program characteristic that may promote medical student research is program length and allotted research time. Among top-ranked schools that required a research experience, there was a high degree of flexibility in terms of allowable research time, ranging from a minimum of three months to a maximum of several years. Top-ranked schools were also more likely to provide internal funding for year-off research, though the number of schools offering internal funding for summer research did not differ across tiers. Dyrbye et al examined allotted research time in a mandatory research program and found that more students in a required 21-week research experience were first authors than those in a 17/18-week experience. However, other measures of research productivity did not change with decreased allotted research time. The authors concluded that a required medical research experience facilitated greater research productivity, with shorter experiences yielding similar outcomes as longer experiences. Jacobs et al also examined allotted research time and found that allowing medical students up to six years to complete course requirements facilitated student research and high student publication rates. Allowing students more time to engage in an in-depth research project may be necessary for project completion, especially given the many unforeseen setbacks inherent in conducting research and the limited available time for activities outside the core medical school curriculum. However, it is also important to make sure that students have detailed timelines and goals to make sure they maximize the use of the allotted research time.

Providing students with excellent support and opportunities for presenting their research projects likely plays an important role in encouraging student research. We found that top-ranked schools were more likely to offer a student research day during which students could present their research and view the research projects of their peers. Zier found that infrastructure created to support student research activity, including a student research day, increased student interest and participation in research. In addition, the percentage of graduating students publishing peer-reviewed manuscripts increased from 11% to 25% between two and eight years following implementation of these structured research opportunities. This trend is likely due to

<table>
<thead>
<tr>
<th>Table 5. Available research opportunities among three medical school tiers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Tier Medical Schools</strong> (N = 6)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Required Research</td>
</tr>
<tr>
<td>Optional Scholarly Track</td>
</tr>
<tr>
<td>Internal Funded Year-Off</td>
</tr>
<tr>
<td>Internal Funded Summer Opportunities</td>
</tr>
<tr>
<td>Research Day</td>
</tr>
<tr>
<td>External Funded Year-Off</td>
</tr>
<tr>
<td>External Funded Summer Opportunities</td>
</tr>
</tbody>
</table>

<sup>a</sup> Calculated using χ² tests.
maturation and improvement of research programs, as more students participate over time, specific program characteristics can be tailored to better meet student needs and foster increased productivity. Langhammer et al also examined research program maturation and student participation rates at a single medical school: the evolution of a Distinction in Research (DIR) track coincided with a greater proportion of students taking six months to a year off for research, which the authors attributed to the increased visibility of funding opportunities for year-out programs and maturation of the DIR program to provide an intensive research training experience. Given the retrospective study design, it is difficult to conclude that greater student participation rates stem from program maturation. However, for medical schools implementing student research programs, more mature programs may serve as better models.

Our finding that higher ranked medical schools offered more student research opportunities is consistent given our use of NIH and USNWR research rankings, which rank schools according to total NIH awards and a weighted average that includes research indicators, respectively. Research programs and opportunities offered by schools in the first tier may serve as a template for schools in the second and third tiers. However, while schools in the first tier may offer more student research opportunities, additional evidence is needed to determine the efficacy of particular program features in promoting student research productivity.

This study has several limitations. We used school websites as the sole determinant of research opportunities available to medical students. Some schools may require a school login to view certain research opportunities, or may inform students of research opportunities through other means such as e-mail or information sessions. In addition, despite its popular appeal, the USNWR methodology has been criticized on a number of grounds; hence, we used a ranking system based on listings from both USNWR and the NIH. Due to high variability in school website design, it is also possible that we may have missed certain research opportunities on school websites that had poor organization and navigational features. To help promote student scholarly activity, we recommend schools keep their web pages on student research opportunities up-to-date with thorough descriptions of opportunities, including length, funding source, requirements, deadlines, and a clearly delineated research contact person.

References

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Systemic Amyloidosis Masquerading as Intractable Cardiomyopathy

LINDSEY CILIA, MD; LESLIE PARIKH, MD; MADHU M. OUSEPH, MD, PhD; EDWARD STOPA, MD; MICHAEL K. ATALAY, MD, PhD

KEYWORDS: cardiac amyloidosis, MRI, multiple myeloma

INTRODUCTION
Cardiac amyloidosis is an infiltrative cardiomyopathy in which amyloid protein is deposited throughout the myocardium. It is increasingly recognized as a cause of heart failure with preserved ejection fraction in the elderly. Presenting symptoms include exercise intolerance, fatigue, angina, breathlessness and syncope or pre-syncope. Atrial fibrillation is the most common early arrhythmia, with ventricular fibrillation occurring later in the course of the disease. This case presents a 79-year-old man with multiple myeloma and non-ischemic cardiomyopathy whose diagnostic tests failed to illustrate the typical findings seen in cardiac amyloidosis, although extensive cardiac amyloid deposition was seen at autopsy. This case highlights the need to pursue myocardial biopsy as the gold standard test if clinical suspicion is high.

CASE PRESENTATION
A 79-year-old man presented to the hospital after one day of fever, nausea and vomiting. History included non-ischemic cardiomyopathy with an ejection fraction (EF) of 35%, smoldering multiple myeloma diagnosed by bone marrow biopsy in 2014 with evidence of focal amyloid deposition, and cholangiocarcinoma status-post roux-en-y and hepato-jejunostomy with stenting in 2013. He had diabetes, hyperlipidemia, and anxiety. After the diagnosis of smoldering myeloma, he was lost to follow-up, so no treatment was initiated. Medications included aspirin, atorvastatin, metformin, metoprolol, lisinopril, mirtazapine and venlafaxine. He had a 20 pack-year smoking history and drank alcohol occasionally. His family history was significant for multiple myeloma in his sister.

Nine months earlier he was hospitalized for new onset heart failure. EKG was normal and echocardiogram demonstrated an EF of 35%. Cardiac catheterization showed minimal coronary artery disease. Clinical concern for cardiac amyloidosis, given his history of smoldering myeloma and bone marrow amyloid, prompted cardiac MRI. MRI demonstrated features concerning for myocarditis without evidence of cardiac amyloid (Figures 1&2). Hospitalization was complicated by multiple episodes of monomorphic ventricular tachycardia. He was started on lisinopril and metoprolol and discharged with the diagnosis of heart failure secondary to myocarditis of unknown etiology.

At his current presentation, his temperature was 101.2F, with a blood pressure of 122/74 mmHg, a regular heart rate of 100 bpm, and a respiratory rate of 20 breaths per minute with an oxygen saturation of 97% on room air. His exam was notable for diffuse abdominal tenderness. EKG showed normal sinus rhythm, normal voltage, and QTc prolongation of 514. Computed tomography of the abdomen showed new hypodense lesions within the right hepatic lobe.

Figure 1. Cardiac MRI of the patient. Horizontal long axis (a) and mid-ventricle short axis (b) end-diastolic views were taken from “bright-blood” cine loops. The left atrium (LA) is mildly dilated. There is no left ventricular (LV) thickening. Images (c) and (d) are corresponding post-contrast views. Normal myocardium appears black and abnormal myocardium, bright (enhancement). The proximal interventricular septum has a small linear focus of enhancement (arrow). Questionable enhancement is seen in the LA posterior and subendocardial LV free walls (arrowheads). These imaging findings are not typical of cardiac amyloidosis. RV: right ventricle.
with intrahepatic biliary ductal dilatation, concerning for micro-abscesses. He had a white blood cell count 12.1 x 10^9 cells/L, elevated alkaline phosphatase (223 IU/L, upper limit of normal is 104 IU/L), and elevated troponin (0.21 ng/mL, upper limit of normal is 0.06 ng/mL). He was admitted for ascending cholangitis complicated by liver micro-abscesses and started on piperacillin-tazobactam and vancomycin. Blood cultures returned positive for Enterococcus faecalis, prompting a switch to linezolid and gentamicin. His course was complicated by multiple episodes of polymorphic ventricular tachycardia (PMVT), in the absence of profound electrolyte abnormalities, ischemia or acidosis, requiring direct current cardioversion and amiodarone. The refractory PMVT episodes raised concern for recurrent myocarditis or progressive cardiomyopathy. His family decided to focus on comfort measures and hours later, the patient expired from a ventricular arrhythmia. Autopsy revealed plasma cell myeloma and systemic AL (light chain) amyloidosis with extensive deposition in the cardiovascular, gastrointestinal, respiratory, and genitourinary systems, and involvement of skin and bone marrow.

**DISCUSSION**

Three types of amyloid are responsible for the majority of cardiac involvement. They include (1) light chain (AL) amyloidosis (2) senile systemic amyloidosis (SSA) and (3) the hereditary forms. While AL amyloidosis occurs in isolation, 10% of patients with multiple myeloma develop systemic AL amyloid. Clinical evidence of cardiac involvement occurs in up to 50% of patients with AL amyloidosis. The classic electrocardiogram finding is low voltage. Low QRS voltages (all limb leads <5 mm in height) with poor r-wave progression in the chest leads occur in up to 50% of patients with cardiac AL amyloidosis. Characteristic echocardiographic features include a thickened interventricular wall, diastolic dysfunction and preserved EF. EKG and echocardiogram have poor sensitivity to detect cardiac amyloidosis, so cardiac MRI is emerging as the preferred diagnostic modality. Cardiac MRI has excellent spatial resolution for tissue characterization with an 80% sensitivity for detecting infiltrative cardiomyopathy. MRI in cardiac AL amyloidosis usually demonstrates global and subendocardial late gadolinium enhancement of the myocardium due to increased interstitial cardiac volume as amyloid replaces normal myocardium.

Despite extensive amyloid deposition throughout the myocardium and cardiac conduction system, our patient did not demonstrate characteristic electrocardiographic, echocardiographic, or cardiac MRI findings. (Figures 1 & 2), highlighting the importance of endomyocardial biopsy. Biopsy remains the gold standard for diagnosis, and shows amyloid deposits. AL amyloidosis management involves both slowing protein production and deposition, and preventing complications including cardiac arrhythmias and decompensated heart failure. AL amyloidosis results from extracellular deposition of monoclonal immunoglobulin light chains secreted by a plasma cell clone. Most patients have an isolated monoclonal gammopathy or smoldering myeloma. Treatment goal is to suppress the plasma cell dyscrasia, thus reducing the production of immunoglobulin light chains and minimizing end-organ damage. Combination therapy with bortezomib, melphalan and dexamethasone provokes a rapid response in most patients with AL amyloidosis and is preferred for cardiac amyloidosis patients needing prompt reduction of pathogenic light chain. Further regimen selection is dependent upon extent of organ involvement and potential toxicities.

Cardiac involvement, manifested as diastolic heart failure, left ventricular hypertrophy and ventricular arrhythmias, is the main determinant of prognosis in AL amyloidosis. Electrophysiology studies suggest the His-Purkinje system is the most affected part of the conduction system in patients,
causing QTc prolongations and ventricular arrhythmias.\(^3\)

Cardioverter-defibrillator (ICD) implantation in cardiac AL amyloidosis can prolong survival with a good quality of life, and may be appropriate in some settings.\(^8\) Although data on the efficacy of antiarrhythmic medications in AL amyloidosis is lacking, amiodarone is widely used and has shown benefit.\(^6\)

In patients with AL amyloidosis with limited extra-cardiac involvement and systemic disease control, cardiac transplantation is an evolving therapeutic option that may decrease mortality and reduce complications including heart failure and arrhythmia.\(^9\) The prognosis of systemic AL amyloidosis with dominant cardiac involvement is generally very poor. However, timely and tailored chemotherapy along with ICD implantation, antiarrhythmic therapy or cardiac transplantation can improve survival and decrease morbidity.\(^8\)

Acknowledgments
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References

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Disclosures
None of the authors report a conflict of interest

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Community Health Teams: A Healthcare Provider’s System Transformation Opportunity

JAMES C. RAJOTTE, MS; DEBORAH GARNEAU, MA; NANCY SUTTON, MS, RD, LDn; AILIS CLYNE, MD, MPH

ABSTRACT
“The goal of community health teams is to develop and implement care models that integrate clinical and community health promotion and preventive services for patients.”
—Association of State and Territorial Health Officials (ASTHO)¹

Eleven community health teams (CHTs) operate in various geographies within Rhode Island. Physicians and payers refer their highest-risk patients to CHTs that serve as community extenders. Community health workers and others work to link referred individuals to primary care and work to address the other determinants affecting their health, such as safe housing. Since much of health is driven by factors outside of the healthcare setting, CHTs compliment the work of physicians within the office environment. Transforming practices and addressing both the physical and behavioral needs of patients simultaneously is key to CHT success. This article attempts to quantify the expanding need for CHTs within Rhode Island and describes ways in which CHTs as a practice transformation resource may be leveraged by providers.

BACKGROUND
ASTHO’s aim for developing CHTs resonates in Rhode Island. Rhode Island’s CHTs serve as extensions of primary care, reaching into the community setting to help patients reestablish relationships with primary care while also addressing the social, behavioral, and environmental needs that affect health. Primary care may include those specialists who in some instances assume the role of primary care provider and care coordinator for their patients [e.g., geriatrician, oncologist, and obstetrician/gynecologist]. In Rhode Island, there are currently 11 teams operating in various geographies. Rhode Island CHTs serve three critical functions:

- Improving population health by addressing social, behavioral, and environmental needs;
- Supporting providers in transitioning to value-based systems of care; and
- Transforming primary care in a way that increases quality of care, improves coordination of care, and reduces/controls related costs.

Rhode Island’s CHTs are comprised of two major staff components: Community-Based, Licensed Health Professionals (CBLHPs) and Community Health Workers (CHWs). CBLHPs are typically licensed nurse care managers or behavioral health providers. Other CBLHPs include licensed health professionals who serve as clinical educators (e.g., nutritionists, pharmacists). All Rhode Island CHTs employ CHWs who are non-licensed staff trained as patient navigators, care coordinators, or resource specialists. Specialty CHWs are certified CHWs who also have successfully completed separate workforce development training [e.g., Diabetes Prevention Program, medical home model]. Certified Peer Recovery Specialists who focus on behavioral health (including substance abuse recovery) given one’s own lived experience may comprise a third component of a CHT, based on population and setting needs.

Several models for CHTs exist in Rhode Island, each operating in different locations and with slightly different foci. In general, Rhode Island CHTs fall into one of four models—an extension of a patient-centered medical home (PCMH) within a specified geography; an extension of general primary care practice; a statewide extension of a payer; or an extension of an accountable care organization. According to the Rhode Island State Innovation Model (SIM) Operation Plan, PCMH and primary care-based CHTs are estimated to have a catchment population of 75,000 and at least 14,000 Medicaid beneficiaries are within catchment areas of payer-based CHTs. Only one CHT organization provides services to children who have special healthcare needs in Rhode Island.

All CHTs within Rhode Island seek high-risk individuals for CHT referrals, services, and targeted interventions. To improve population health, address social and environmental determinants of health, and make progress in eliminating health disparities, CHTs are an essential health system transformation resource. As such, CHT services should be made available to all Rhode Islanders who need continued multi-disciplinary, community-based services to address the factors that impact one’s health. This article attempts to quantify the current need for CHTs within Rhode Island and describes ways in which CHTs as a practice transformation resource may be leveraged by providers. As part of the SIM Test Grant, “highest-risk”¹ patients who are eligible for CHT services are not just those living in poverty but rather those who:
- Have three or more known chronic conditions;
• Have two or more special healthcare needs (i.e., disabilities);
• Have a significant behavioral health co-morbidity (including substance abuse);
• Are not regularly accessing primary care;
• Are unable to access essential healthcare due to cost; and
• Have three or more in-patient or emergency department visits within six months.

**METHODS**

Data to quantify the patient population considered to be “highest-risk,” and therefore a priority for CHTs, were compiled using the Behavioral Risk Factor Surveillance System (BRFSS) and HealthFacts RI. The BRFSS is a national telephone survey that monitors behavioral health risks, access to health care, and health conditions of randomly selected adults ages 18 and older. From January through December, the Rhode Island BRFSS conducted random-digit dialed telephone interviews with 6,531 [2013] and 6,450 [2014] Rhode Island, non-institutionalized adults.

HealthFacts RI, which first began collecting all-payer claims in 2014, aims to ensure transparency of information about the quality, cost, efficiency, and access of Rhode Island’s healthcare delivery system. Use of this data system provides insight into healthcare system use, the effectiveness of policy interventions, and the health of the population. HealthFacts RI collects, organizes, and analyzes healthcare data from nearly all major insurers who cover at least 3,000 Rhode Islanders. The system is based on claims paid and allows users to track the healthcare system’s utilization through measures of hospital readmissions, total cost of care, and participation in preventive/disease management services.

While data reflecting the exact “highest-risk” criteria is not readily available, proxy indicators were created using a combination of variables from existing survey questions and claims codes. Estimates that best represent the delineated “highest-risk” criteria were calculated. Table 1 depicts the questions that were combined into indicators for each of the criteria and resulting estimates. Respondents were included in the indicator count if they answered “yes” to any BRFSS measure. Respondents who answered “no,” “not sure,” or “refused” were excluded from the indicator. Respondents missing one or more data elements for the disability indicator were excluded (5.3%). Respondents who reported that “they did not need a prescription” were excluded from the cost indicator. Confidence intervals (CI) were generated to reflect the stability of prevalence estimates. To account for the complex sampling design, BRFSS data were analyzed using SAS® 9.3. Claims from HealthFacts RI were included in the indicator count if they had three or more emergency department visits within 2013 or 2014. Note, these indicators do not represent unique respondents across indicators, only unique counts within the specified indicator.

**RESULTS**

The Rhode Island prevalence for each indicator is listed in Table 1. The estimated adult population size for each indicator was estimated using the respective year’s U.S. Census estimate for Rhode Island adults (ages 18 and older), while the estimate for children and adults used the overall estimate for all Rhode Islanders. The largest percentage of the population meeting any of the CHT eligibility criteria was for those adults with an identified behavioral health or substance abuse condition (35.6%). The smallest percentage of the population meeting any of the CHT eligibility criteria was for those children and adults who have had three or more emergency department visits in a calendar year (1.9%).

**DISCUSSION**

The estimated prevalence, by indicator, for those of “highest-risk” (i.e., eligible for CHT services), demonstrate that Rhode Island’s population would benefit from increased access to CHTs. While CHTS are currently attributed to at least an estimated 89,000 patients, it is unlikely that any one of the criteria are covered fully by these estimates. This is increasingly likely given that limited geographic-specific coverage extends only to Washington County, Blackstone Valley, and West Warwick. Access to quality care through CHTs that demonstrate the ability to adequately serve clients to address social and environmental determinants of health is critical. Further return-on-investment studies are planned to confirm the effectiveness of CHTs and models in Rhode Island.

There are a few study limitations. The indicators are not exact matches or exhaustive lists that fully represent the proposed criteria. Because questions such as hypertension are asked on odd-years only, use of a single survey was unavailable; therefore a percentage of respondents meeting at least one highest-risk criteria was not generated. Behavioral health morbidity was not analyzed across other conditions to indicate co-morbidity. For the HealthFacts RI data, all counts and percentages could only be estimated since Medicare data were from 2013, while Medicaid and commercial data were from 2014. Only insurers with more than 3,000 patients were included in HealthFacts RI.

**MOVING FORWARD**

The Rhode Island SIM Test Grant is committed to investing in ways to support providers in health system transformation and empower patients to embrace and navigate a changing delivery system focused on patient outcomes. As such, SIM encourages providers to engage in practice transformation efforts including, but not limited to: creating or participating in existing agreements that provide access to CHTs for their patients; employing certified CHWs to assist practices in assuring health equity for patients; and integrating physical and behavioral healthcare through Screening, Brief
Intervention, and Referral to Treatment (SBIRT) for patients. SIM is poised to prioritize a segment of Rhode Island for such services by investing funding to implement SBIRT in 10-12 sites and create at least two new CHTs to meet unmet social, behavioral, and environmental needs of Rhode Islanders. SIM’s investment also includes data collection and evaluation that explores the return-on-investment of these strategies to inform sustainability planning. Providers can engage in new opportunities by attending a SIM Steering Committee Meeting and checking the State of Rhode Island for Requests for Proposals.

Table 1. Indicators Estimating Rhode Island Needs for CHTs Using Highest-Risk Eligibility Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Measure(s)</th>
<th>Data Source</th>
<th>Estimated Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients who have three or more known chronic conditions</td>
<td>• Has a doctor, nurse, or other health professional EVER told you that you had any of the following? For each, tell me “Yes,” “No,” or “Not sure”</td>
<td>BRFSS (2013)</td>
<td>11.0% 95% CI: 10.1-11.9 (Est. 91,444 adults)</td>
</tr>
<tr>
<td>Patients who have two or more special healthcare needs (i.e., disabilities)</td>
<td>• Are you blind or do you have serious difficulty seeing, even when wearing glasses?</td>
<td>BRFSS (2014)</td>
<td>9.2% 95% CI: 8.2-10.2 (Est. 76,480 adults)</td>
</tr>
<tr>
<td>Patients who have a significant behavioral health co-morbidity (including substance abuse)</td>
<td>• Do you now smoke cigarettes every day, some days, or not at all?</td>
<td>BRFSS (2014)</td>
<td>35.6% 95% CI: 33.8-37.4 (Est. 295,945)</td>
</tr>
<tr>
<td>Patients who are not regularly accessing primary care</td>
<td>• About how long has it been since you last visited a doctor for a routine check-up? A routine check-up is a general physical exam, not an exam for a specific injury, illness, or condition</td>
<td>BRFSS (2014)</td>
<td>19.8% 95% CI: 18.2 – 21.3 (Est. 164,599 adults)</td>
</tr>
<tr>
<td>Patients who are unable to access essential healthcare due to cost</td>
<td>• Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?</td>
<td>BRFSS (2014)</td>
<td>17.1% 95% CI: 15.6-18.6 (Est. 142,153 adults)</td>
</tr>
<tr>
<td>Patients who have three or more in-patient or emergency department visits within six months</td>
<td>• Number of Medicare-insured individuals with three or more claims for Emergency Room visits per calendar year</td>
<td>HealthFacts RI (2013; 2014)</td>
<td>Est. 1.9% Est. 16,097 adults and children</td>
</tr>
</tbody>
</table>
References


Acknowledgments

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Rhode Island Monthly Vital Statistics Report
Provisional Occurrence Data from the Division of Vital Records

<table>
<thead>
<tr>
<th>VITAL EVENTS</th>
<th>REPORTING PERIOD</th>
<th>APRIL 2016</th>
<th>12 MONTHS ENDING WITH APRIL 2016</th>
<th>Rates</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live Births</td>
<td>900</td>
<td>11,588</td>
<td></td>
<td>11.0*</td>
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<tr>
<td>Deaths</td>
<td>846</td>
<td>10,153</td>
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<td>9.6*</td>
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<td>Infant Deaths</td>
<td>4</td>
<td>65</td>
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<td>5.6#</td>
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<td>Neonatal Deaths</td>
<td>4</td>
<td>52</td>
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<td>Marriages</td>
<td>451</td>
<td>6,824</td>
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<td>6.5*</td>
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<td>Divorces</td>
<td>206</td>
<td>3,083</td>
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<td>2.9*</td>
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<td>Induced Terminations</td>
<td>181</td>
<td>2,440</td>
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<td>210.6#</td>
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<tr>
<td>Spontaneous Fetal Deaths</td>
<td>48</td>
<td>587</td>
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<td>50.7#</td>
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<tr>
<td>Under 20 weeks gestation</td>
<td>37</td>
<td>523</td>
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<td>51.5#</td>
</tr>
<tr>
<td>20+ weeks gestation</td>
<td>11</td>
<td>64</td>
<td></td>
<td>5.5#</td>
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</tbody>
</table>

* Rates per 1,000 estimated population
# Rates per 1,000 live births

<table>
<thead>
<tr>
<th>Underlying Cause of Death Category</th>
<th>REPORTING PERIOD</th>
<th>OCTOBER 2015</th>
<th>12 MONTHS ENDING WITH OCTOBER 2015</th>
<th>Rates</th>
<th>YPLL</th>
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<tbody>
<tr>
<td></td>
<td>Number (a)</td>
<td>Number (a)</td>
<td>Rates (b)</td>
<td></td>
<td></td>
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<tr>
<td>Diseases of the Heart</td>
<td>204</td>
<td>2,421</td>
<td>230.1</td>
<td>3,758.5</td>
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<tr>
<td>Malignant Neoplasms</td>
<td>221</td>
<td>2,319</td>
<td>219.5</td>
<td>5,137.5</td>
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<tr>
<td>Cerebrovascular Disease</td>
<td>40</td>
<td>444</td>
<td>42.0</td>
<td>480.0</td>
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<tr>
<td>Injuries (Accident/Suicide/Homicide)</td>
<td>83</td>
<td>857</td>
<td>81.1</td>
<td>12,858.0</td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>39</td>
<td>539</td>
<td>51.0</td>
<td>537.5</td>
<td></td>
</tr>
</tbody>
</table>

(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 1,056,298 (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.
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- Invest in the construction of 800 homes and apartments that Rhode Island workers, families, seniors, and veterans can afford.

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On November 8th, Vote Yes on Question 7 to approve a $50 million Housing Opportunity bond for the construction of more homes and apartments across Rhode Island, and help our cities and towns revitalize blighted and foreclosed properties.
Working for You: RIMS advocacy activities

September 6, Tuesday
RIMS Physician Health Committee: Herbert Rakatansky, MD, Chair

September 8, Thursday
Meeting with Neighborhood Health Plan regarding legislation
AMA conference call regarding opioid toolbox
SIM Meeting, Peter Hollmann, MD, and staff

September 12, Monday
Conference call with RI Urological Association regarding Modifier 25
Board of Directors Meeting

September 13, Tuesday
Primary Election Day

September 14, Wednesday
Board of Licensure and Discipline meeting
Governor’s Opioid Taskforce

September 15, Thursday
SIM Measurement sub-committee
“Yes on 7” Coalition Kick Off
Senate Health and Human Services Committee Hearing on Mental Health

September 16, Friday
Diabetes Prevention Program Stakeholder Group

September 17, Saturday
New England Delegation to the AMA meeting and Council of State Medical Societies of New England meeting, Massachusetts Medical Society Headquarters, Waltham; Peter Hollmann, MD, Yul Ejnes, MD, and staff

September 19, Monday
US Attorney Peter Neronha event at Brown University, National Opioid Awareness Week

September 20, Tuesday
Office of the Health Insurance Commissioner’s Health Insurance Advisory Committee meeting

September 22, Thursday
Meeting with Blue Cross Blue Shield of RI regarding legislation
AMA conference call regarding opioid toolbox

Employment 101: A Guide to Important Considerations for Your Future

September 23 Friday
RIMS Annual Convivium, Squantum Association, East Providence

September 27, Tuesday
Meeting with Rhode Island Public Health Institute regarding legislation
EOHHS Advisory Council, Secretary Roberts, at RIMS Offices

September 29, Thursday
Tobacco Free RI Executive Committee Meeting

September 30, Friday
Senior Physicians: Addressing Age, Ability, and Acumen; a regional conference initiated by RIMS Physician Health Program and made possible by a grant from the Coverys Community Healthcare Foundation.

RIMS inaugurated a new slate of officers at the annual Convivium on September 23 at the Squantum Association.
[LR] Treasurer Jose R. Polanco, MD; Secretary Christine Brousseau, MD; President-Elect Bradley J. Collins, MD; President Sarah J. Fessler, MD; Vice President Peter A. Hollmann, MD; and seated in front, Immediate Past-President Russell A. Settipane, MD
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Monday, October 24, 5:30–8:30pm
Mile and a Quarter, 334 South Water Street, Providence

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Care New England was founded in 1996 and is the parent organization of Butler, Kent, Memorial and Women & Infants hospitals, the VNA of Care New England, The Providence Center, CNE Wellness Center and Integra, a certified Accountable Care Organization. Care New England includes 970 licensed beds and 216 infant bassinets. Through Butler, Memorial and Women & Infants, Care New England has a teaching and research affiliation with The Warren Alpert Medical School of Brown University. Kent is a teaching affiliate of the University of New England College of Osteopathic Medicine.

www.carenewengland.org

Doctor’s Choice provides no cost Medicare consultations. Doctor’s Choice was founded by Dr. John Luo, a graduate of the Alpert Medical School at Brown University to provide patient education and guidance when it comes to choosing a Medicare Supplemental, Advantage, or Part D prescription plan. Doctor’s Choice works with individuals in RI, MA, as well as CT and helps compare across a wide variety of Medicare plans including Blue Cross, United Health, Humana, and Harvard Pilgrim.

john@insurehealthgroup.com

Neighborhood Health Plan of Rhode Island is a non-profit HMO founded in 1993 in partnership with Rhode Island’s Community Health Centers. Serving over 185,000 members, Neighborhood has doubled in membership, revenue and staff since November 2013. In January 2014, Neighborhood extended its service, benefits and value through the HealthSource RI health insurance exchange, serving 49% the RI exchange market. Neighborhood has been rated by National Committee for Quality Assurance (NCQA) as one of the Top 10 Medicaid health plans in America, every year since ratings began twelve years ago.

www.nhprri.org

RIPCPC is an independent practice association (IPA) of primary care physicians located throughout the state of Rhode Island. The IPA, originally formed in 1994, represent 150 physicians from Family Practice, Internal Medicine and Pediatrics. RIPCPC also has an affiliation with over 200 specialty-care member physicians. Our PCP’s act as primary care providers for over 340,000 patients throughout the state of Rhode Island. The IPA was formed to provide a venue for the smaller independent practices to work together with the ultimate goal of improving quality of care for our patients.

www.ripcpc.com

The Rhode Island Medical Society continues to drive forward into the future with the implementation of various new programs. As such, RIMS is expanded its Affinity Program to allow for more of our colleagues in healthcare and related business to work with our membership. RIMS thanks these participants for their support of our membership.

Contact Megan Turcotte for more information: 401-331-3207 or mturcotte@rimed.org
RIMS gratefully acknowledges the practices who participate in our discounted Group Membership Program
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Publications include Rhode Island Medical Journal, Rhode Island Medical News, annual Directory of Members; RIMS members have library privileges at Brown University

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Dept. of Health, AG Give Conditional Approval to LMW Healthcare (Westerly Hospital) and Yale-New Haven Affiliation

PROVIDENCE – The Rhode Island Department of Health [RIDOH] approved, with conditions, the proposed affiliation between Westerly Hospital [LMW Healthcare] and Yale-New Haven Health Services Corporation.

“We looked very closely at the application and issued a decision with a series of patient- and community-focused conditions,” said Director of Health NICOLE ALEXANDER-SCOTT, MD, MPH.

RIDOH accepted an affiliation application from the organizations on June 11, 2016. A public meeting about the affiliation was held in Westerly on August 2, 2016.

Some of the conditions of the decision include that the new hospital must:
• Submit a plan for the delivery of primary care within an integrated healthcare delivery system for physical (including oral health) and behavioral health (including mental health and substance use) in the new hospital’s service area;
• Submit a plan to address the social and environmental factors within the new hospital’s service area that affect people’s health (for example, through coordination with RIDOH’s Health Equity Zone initiative);
• Ensure access to services for all patients without discrimination, including payment source or ability to pay;
• Participate in interventions to improve the safety of opioid prescribing and expand medication-assisted treatment and services to address the overdose epidemic;
• Submit a plan to RIDOH for the development of relationships with local tribal nations; and
• Make the CurrentCare data available at all clinical sites.

In addition to this Hospital Conversion Act approval signed by Dr. Alexander-Scott, she also accepted the unanimous recommendation of the Health Services Council to approve the Change in Effective Control application submitted by the two organizations.

The Health Services Council is a group that advises RIDOH on healthcare facility licensing reviews. For the affiliation to move forward, both the Hospital Conversion Act and Change in Effective Control applications needed approval (along with approval from the Rhode Island Attorney General).

On September 6, Attorney General Peter F. Kilmartin also announced that the Office of Attorney General [RIAG] has approved, with conditions, the proposed affiliation.

Under the Hospital Conversions Act, the Attorney General has 90 days to review and issue a decision on an expedited application.

Dana-Farber Cancer Institute, Lifespan sign MOU

PROVIDENCE – Dana-Farber Cancer Institute and Lifespan leadership have signed a memorandum of understanding to form a partnership that will advance cancer treatment and expand research. The details will be finalized early next year.

The partnership will focus on five areas: genomics and precision medicine; clinical trials; value-based care and cancer care delivery innovation; shared care models; and cancer workforce development. As the planning moves forward, the two organizations are already collaborating on a multi-site grant application to the National Human Genome Research Institute [NHGRI] to study the clinical utility of genomics information.

“This is an exciting opportunity to create a meaningful and impactful partnership,” said DAVID E. WAZER, MD, director of the Lifespan Comprehensive Cancer Center.

“More can be accomplished when strong organizations work together on joint research projects, the development of innovative new treatments, and ensuring access to the best care for our entire community.”

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Brown launches the country’s first four-year, integrated MD/MPA program

PROVIDENCE – A new dual-degree program at Brown University aims to train students in both medicine and health care policy and create the next generation of leaders in those intersecting fields. Students who complete the four-year program will earn both a doctorate of medicine (MD) and a master of public affairs (MPA).

“This degree program was developed knowing what knowledge and skills students will need if they want to effect change in health care moving forward,” said DR. PAUL GEORGE, assistant dean of medical education at Brown’s Warren Alpert Medical School. “It is important for us that students have an idea of what shapes health policy and gain practical experience in this arena, so that they will be facile in promoting health policy changes during their careers.”

This is the first integrated program of its kind in the U.S., in which students are able to complete their degrees in four years and take courses taught by both medical school and public policy faculty. Other institutions offer five- or six-year joint programs and sometimes require students to apply to a master of public affairs program only after their course of medical study is underway. At Brown, the degrees are integrated from the start.

Students must be admitted to the Warren Alpert Medical School before opting for the dual-degree track, in which they study with faculty from Brown’s Watson Institute for International and Public Affairs. The integrated MD/MPA program has a June start date, and the first cohort of dual-degree students will be enrolled in the summer of 2017.

James Morone, director of the A. Alfred Taubman Center for American Politics and Policy, said, “This is an exciting program that reflects one of Brown’s great strengths – active collaboration across the campus. Everyone can see the need for policy-savvy health care leadership. There’s nothing else like this program. This is a terrific collaboration that will benefit and educate the students in both medicine and policy.”

In the first year, students take courses in health systems science and public organizations management. They also begin a four-year Policy in Action consultancy, spending a half-day per week in a leading health care system, foundation or non-governmental organization, shaping and implementing a project with a real-world client.

In subsequent years, students engage in a longitudinal clerkship with a mentor physician. They work with an assigned panel of about 30 patients, whom they follow to health care settings ranging from the operating room to primary care doctors’ and specialists’ offices.

By the third year, MD/MPA students gain global policy experience by spending 10 days in an international setting where they meet with elected officials, entrepreneurs and lawmakers to examine how policy is constructed. Past sites for these immersion programs have included Sweden, Brazil, India and Cambodia.

This international emphasis is unique to the Watson Institute’s MPA program, the only program in the country to integrate an international policy experience into the core curriculum.

Students who complete the four-year program will earn both a doctorate of medicine (MD) and a master of public affairs (MPA).

EpiVax awarded $600,000 NIH grant to improve a vaccine for the H7N9 avian influenza virus

KINGSTON – University of Rhode Island Research Professor ANNIE DE GROOT, MD, and her team at EpiVax have been awarded a $600,000 grant from the National Institutes of Health to improve a vaccine for the H7N9 avian influenza virus.

De Groot is the co-founder, chief executive officer and chief scientific officer of EpiVax, a Providence-based biotechnology company. She is also the director of the URI Institute for Immunology and Informatics, where she and her colleagues apply bioinformatics tools to develop vaccines for emerging infectious diseases.

The grant was from the Small Business Innovation Research program at the National Institutes of Health. De Groot and URI associate professor Lenny Moise, the director of vaccine research at EpiVax, will oversee the research in collaboration with Ted Ross, director of the Center for Vaccines and Immunology at the University of Georgia.

The novelty of the program stems from the concept that vaccines can be “immune engineered” to be more effective, De Groot says. Re-engineering the viral proteins to produce more of an immune response without modifying their ability to generate protective antibodies to the original “wild-type” version is the major focus of the work under the new program, she says.

The H7N9 influenza has been called a “stealth virus” because of its ability to evade the human immune response, both in natural infections and in vaccine formulations. H7N9 vaccines developed using conventional methods have significantly underperformed in clinical trials. De Groot says that the EpiVax program aims to re-engineer H7N9 viral proteins to be more easily detected by the immune system, resulting in a more potent vaccine product.

The first version of the vaccine from EpiVax will soon enter a trial in Australia in collaboration with Vaxine in Australia and Protein Sciences Corp. in Connecticut.
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Drs. Viren D’Sa, Barry Lester awarded $11.1M NIH grant to study environmental influences on child health

The National Institutes of Health (NIH) recently announced $157 million in awards in fiscal year 2016 to launch a seven-year initiative called Environmental Influences on Child Health Outcomes (EChO) – a program that will investigate how exposure to a range of environmental factors in early development influences the health of children and adolescents.

Two Care New England hospitals – Memorial Hospital and Women & Infants Hospital of Rhode Island – were among the 35 pediatric cohorts who will together enroll more than 50,000 children to study the early environmental origins of health outcomes. The initial award to Memorial is a two-year grant of $6.2 million, and $4.9 million over two years to Women & Infants. Pending successful completion of this “feasibility phase,” an additional five years of funding is expected to be available.

Memorial
The principal investigator at Memorial is VIREN D’SÀ, MD, the hospital’s pediatrician-in-chief, director of the New England Pediatric Institute of Neurodevelopment (NEPIN) and associate professor of pediatrics at The Warren Alpert Medical School of Brown University, which has followed children from as young as three months of age since 2010 under a previous NIH grant, and a second based in Colorado, which has enrolled pregnant mothers. Combined, these studies sought to examine pre and postnatal influences that shape pediatric development.

“We are looking to better understand how the various environmental, genetic and nutritional influences interact to shape early brain development from the prenatal stage through childhood and to puberty,” Dr. Deoni said. “We will investigate how factors such as the in utero environment, starting as early as 22 weeks gestation, breastfeeding and early nutrition, lead exposure, parent interaction, sleep and daytime activity, pollution, and specific genes influence brain structure and function.”

The research will track the children’s performance in many functional domains including academic progress as well, according to Dr. D’Sa.

“By understanding how and when this diverse array of influences impact brain growth and ultimately affect childhood outcomes such as their performance in school or their chance of developing a medical, developmental or behavioral disorder, we hope to identify predictors of such outcomes and learn how interventions can be optimized for a particular child to maximize their individual potential,” he said.

Women & Infants
Principal investigators at Women & Infants are BARRY M. LESTER, PhD, director of the hospital’s Brown Center for the Study of Children at Risk and professor of psychiatry and pediatrics at the Alpert Medical School, and CARMEN MARSIT, PhD, formerly of Women & Infants/Brown and now a professor at Emory University in Atlanta. The project is entitled “Environmental Influences of Neurodevelopmental Outcome in Infants Born Very Preterm.”

This grant will enable Dr. Lester and his colleagues to enhance the work they are doing through an existing study – the Neonatal Neurobehavior and Outcomes in Very Preterm Infants (NOVI) Study. Sponsored by the National Institute of Child Health and Human Development, the primary goal of the NOVI study is to learn about how early detection of neurobehavior can identify which individual infants are most likely to suffer later developmental impairment and advance interventions to combat those developmental deficits.

“ECHO will enable us to study the development of these infants in the broader environmental cohort in which they develop, including a range of exposures from air pollution and chemicals in our neighborhoods to societal factors such as stress and parenting,” Dr. Lester said. “At the same time, NOVI will contribute a unique population of very low birthweight infants to the pooled EChO sample and study how the effects of the kind and timing of early exposures can be detected amongst these diverse populations. This is a win-win study, with children and their families as the ultimate winners.”  

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Hasbro receives $1.8M from NIH to study environmental influences on child health

PROVIDENCE – Hasbro Children’s Hospital, the pediatric division of Rhode Island Hospital, has been awarded a $1.8 million grant from the National Institutes of Health (NIH) as part of a national research project to study the effects of environmental exposures on the health and development of children. The grant is tied to a NIH $157-million, seven-year initiative called Environmental influences on Child Health Outcomes (EChO).

The ECHO program will investigate how exposure to a range of environmental factors in early development – from conception through early childhood – influences the health of children and adolescents.

The Hasbro Children’s Hospital research will be led by PHYLLIS DENNERY, MD, pediatrician-in-chief at Hasbro Children’s Hospital. Dennery will be joined on the initiative by THOMAS CHUN, MD, a pediatric emergency medicine physician at Hasbro Children’s Hospital, and ABBOT LAPTOK, MD, medical director of the Neonatal Intensive Care Unit at Women & Infants Hospital.

ECHO studies will focus on four key pediatric outcomes: upper and lower airway; obesity; pre-, peri- and postnatal outcomes; and neurodevelopment.

“We know that pediatric health issues can impact a child for the rest of his or her life,” said Dennery. “But, we also know that early intervention can drastically improve the course of a child’s long-term health and even avoid negative outcomes altogether. So, better understanding of how maternal and environmental influences impact diseases such as autism, obesity and asthma amongst others, will be very important to the health of Rhode Island children and children across the country.”

Researchers will look at a broad range of potentially harmful exposures, from air pollution and chemicals in neighborhoods, to societal factors such as stress, to individual behaviors like sleep and diet. Some exposures may act through any number of biological processes, for example, changes in the expression of genes or development of the immune system.

A critical component of ECHO will be to use the NIH-funded Institutional Development Awards (IDEA) program to build state-of-the art pediatric clinical research networks in rural and medically underserved areas, so that children from these communities can participate in clinical trials. Hasbro Children’s Hospital is one of 17 of these sites, with a goal of enrolling more than 50,000 children nationally.

Research Team Studies Use of Smartphone App to Teach Sexual Health to Adolescent Girls

New research published in The Journal of Pediatric and Adolescent Gynecology

PROVIDENCE – A research team led by LYNAE M. Brayboy, MD, reproductive endocrinologist in the Division of Reproductive Endocrinology and Infertility at Women & Infants Hospital of Rhode Island and at The Warren Alpert Medical School of Brown University, found that a smartphone application vs. traditional methods can potentially connect teenage girls to more information about sexual health. The research, entitled “Girl Talk: A Smartphone Application to Teach Sexual Health Education to Adolescent Girls,” was recently published in The Journal of Pediatric and Adolescent Gynecology. The article was co-authored by CAROL WHEELER, MD, also of Women & Infants/Brown University.

“We found that a smartphone application is a feasible sexual health educational tool that is appealing to teenage girls,” said Dr. Brayboy. “In fact, our participants recommended the application as a valuable resource to learn about comprehensive sexual health.”

For their research, Dr. Brayboy and her team recruited 39 girls ages 12 to 17 from Rhode Island to participate in a two-phase prospective study. In phase one, 22 girls assessed a sexual health questionnaire in focus groups. In phase two, 17 girls with iPhones used the Girl Talk application for two weeks and answered the revised sexual health questionnaire and interview questions before and after the application use. The participants’ responses to the sexual health questionnaire, interviews and time viewing the application were used to determine feasibility and desirability of Girl Talk.

Dr. Brayboy explained that Girl Talk was used on average for 48 minutes during participants’ free time on weekends, generally in 10 to 15 minute intervals. The reported usefulness of Girl Talk as a sexual health application increased significantly from baseline (35.3%) to follow-up (94.1%). “More than three-quarters of the participants were exposed to sexual health education before using Girl Talk, but 94.1% of participants stated that the application provided new and/or more detailed information than health classes.”

Dr. Brayboy and her team will be seeking opportunities to perform additional trials to determine if Girl Talk improves sexual health knowledge, increases contraception usage and decreases sexually transmitted infections and unplanned pregnancy.
Research Evaluates Risk Factors for Postpartum Depression in Mothers of Preterm Infants

Research team from Women & Infants Hospital publishes in The Journal of Pediatrics

PROVIDENCE – Postpartum depression is the most common complication of pregnancy and childbirth, affecting up to 15 percent of all women within the first three months following delivery. Research has shown that mothers of infants born prematurely have almost double the rates of postpartum depression, particularly during their time in the neonatal intensive care unit (NICU).

Research led by BETTY R. VOHR, MD, director of Women & Infants’ Neonatal Follow-Up Program and professor of pediatrics at The Warren Alpert Medical School of Brown University, found that there are certain social and emotional factors that further increase the risk of postpartum depression in mothers of preterm infants. The research, entitled “Social Emotional Factors Increase Risk of Postpartum Depression in Mothers of Preterm Infants,” has been published in The Journal of Pediatrics. Lead author is KATHELEEN HAWES, PhD, RN, of the Center for Children and Families at Women & Infants Hospital of Rhode Island and assistant professor (adjunct) in the Department of Pediatrics at the Alpert Medical School.

“We found mothers with a previous mental health disorder and experiencing negative perceptions of herself and her infant at NICU discharge were at increased risk for depression one month post discharge, regardless of the infant’s gestational age at birth,” explained Hawes.

The study included 724 mothers of preterm infants who were cared for more than five days in the NICU and participated in a Transition Home Program. Families in the program received enhanced support and education about their infants from former NICU parents trained as family resource specialists. Participants completed an evaluation prior to discharge to determine their perceptions of NICU staff support, infant well-being, maternal well-being (emotional readiness/competency), and maternal comfort (worry about her infant). Mental health history and social risk factors were also obtained by the researchers. At one month post discharge, the Edinburgh Postnatal Depression Scale was administered.

Hawes said, “Mothers of early, moderate and late preterm infants reported similar rates of possible depression – 20%, 22% and 18% respectively – one month after NICU discharge. A history of mental health disorder, decreased perception of maternal well-being, decreased maternal comfort regarding her infant, and decreased perception of family cohesion were also associated with possible depression at one month post discharge.”

Hawes and her colleagues concluded that comprehensive mental health assessment prior to discharge is essential to identify women at risk and provide appropriate referrals. She said, “Comprehensive transition home assessment and interventions to reduce anxiety and bolster maternal mental health, confidence and readiness, along with post discharge assessment, are needed to identify, treat and support mothers of preterm infants.”

The research team also included Women & Infants/Brown University colleagues ELISABETH MCCOWAN, MD; MELISSA O’DONNELL, MSW; and RICHARD TUCKER, BA. ✤

Women & Infants Participating in National Pelvic Floor Disorders Network

PROVIDENCE – Women & Infants Hospital has been selected by the National Institutes of Health’s (NIH) to participate in the Pelvic Floor Disorders Network (PFDN) for a second consecutive five-year cycle. Women & Infants is one of just seven medical centers from across the US, and the only one in the Northeast, to work collaboratively to develop and perform research studies related to women with pelvic floor disorders.

Principal investigator at Women & Infants is VIVIAN SUNG, MD, MPH, FACOG of Women & Infants’ Division of Urogynecology and Reconstructive Pelvic Surgery and associate professor at The Warren Alpert Medical School of Brown University.

“Pelvic floor disorders are an issue of growing importance, from both an individual and public health point of view,” said Dr. Sung. “Participating in such high-level, national research will offer us the opportunity to test and refine the most appropriate treatment protocols for women for generations to come. From a patient perspective, being part of this network also brings new and cutting edge treatment options to women in our region.”

The five-year grant from the NIH’s Eunice Kennedy Shriver National Institute of Child Health and Human Development will enable members of the Network to design and conduct large-scale, high quality studies to significantly advance the care of women with pelvic floor disorders. Studies include treatments and prevention of urinary incontinence, fecal incontinence, pelvic organ prolapse, and other sensory and emptying abnormalities of the lower urinary and gastrointestinal tracts.

Studies currently enrolling include a randomized trial studying the most effective procedures for prolapse of the vagina, a randomized trial studying different treatment options for controlling bowel leakage, and a randomized trial evaluating the best treatments for mixed urinary incontinence. ✤
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Enrollment 100% in Prescription Drug Monitoring Program

PROVIDENCE – One hundred percent of healthcare providers who are authorized to prescribe opioids and other potent medications are now enrolled in the state’s Prescription Drug Monitoring Program (PDMP), the Rhode Island Department of Health [RIDOH] announced last week.

In addition to prescribers, the PDMP is used by pharmacists when filling prescriptions. Legislation from 2014 requires all prescribers of controlled substances to register for the PDMP; however, before RIDOH initiated a PDMP Education, Notification, and Enforcement Plan in January 2016, only approximately 40% of prescribers had done so. Through increased training and staff visits to practices, RIDOH helped boost enrollment to 100%.

“The Prescription Drug Monitoring Program is an indispensable tool in the fight against the epidemic of overdose in Rhode Island,” said Director of Health and Overdose Task Force Co-Chair NICOLE ALEXANDER-SCOTT, MD, MPH.

In addition to ensuring all eligible users are enrolled in the PDMP, RIDOH is working to enhance the tool to make it easier for users to integrate it into their current practice and support better patient care.

Rhode Island’s PDMP is now connected to similar databases in Massachusetts, Connecticut, and seven other states, and prescribers will soon automatically be notified about potentially risky prescribing behaviors by any prescriber treating their patients. RIDOH is also working with practices to help connect the PDMP to patients’ electronic health records.

Southcoast Health’s Center for Weight Loss at Charlton earns national accreditation

FALL RIVER, MASSACHUSETTS — Southcoast Health announced last week that the Center for Weight Loss at Charlton Memorial Hospital in Fall River has been accredited as a Comprehensive Bariatric Center under the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP), a joint program of the American College of Surgeons (ACS) and the American Society for Metabolic and Bariatric Surgery (ASMBS).

Southcoast Health’s Center for Weight Loss at Tobey Hospital in Wareham is also accredited by the MBSAQIP.

The MBSAQIP standards ensure that bariatric surgical patients receive a multidisciplinary program, not just a surgical procedure, which improves patient outcomes and long-term success. The accredited center offers preoperative and postoperative care designed specifically for their severely obese patients.

“We are pleased to add Charlton Memorial Hospital to our already well-established bariatric program at Tobey Hospital. Patients in the Fall River and Rhode Island region now have easy access to a comprehensive weight loss surgery program that has been recognized nationally for excellence. Local surgical care provides patients with convenient access and improves outcomes with better long-term follow up support,” said RAYFORD KRUGER, MD, FACS, Chief of the Southcoast Center for Weight Loss.

To earn the MBSAQIP designation, the Center for Weight Loss at Charlton Memorial met essential criteria for staffing, training and facility infrastructure and protocols for care, ensuring its ability to support patients with severe obesity. The center also participates in a national data registry that yields semiannual reports on the quality of its processes and outcomes, identifying opportunities for continuous quality improvement. The standards are specified in the MBSAQIP Resources for Optimal Care of the Metabolic and Bariatric Surgery Patient 2014, published by the ACS and ASMBS.

Dr. Linda J. Resnik at Providence VA awarded $2.5M for Multi-Center Amputation Care Study

PROVIDENCE – DR. LINDA J. RESNIK, a researcher at the Providence VA Medical Center, was awarded a three-year contract by the Department of Defense on Sept. 23rd to study the care of veterans and service members with upper-limb amputations.

“This study will be the largest, most comprehensive, study of Veterans and service members with upper-limb amputation,” said Dr. Resnik, the principal investigator for the study, who is also a professor of research at the Department of Health Services, Policy and Practice at Brown University. “Findings will be used to improve quality of care, and inform evidence based policies for device prescription and provision of rehabilitation services.”

The nearly $2.5 million contract, awarded by DOD’s Orthotics and Prosthetics Outcomes Research Program to the Ocean State Research Institute Inc., the non-profit arm of the Providence VAMC, will provide data to assess the quality of amputation care in VA and the DOD, and the impact of their new evidence based clinical practice guidelines for the rehabilitation of people with upper limb amputation over a one-year follow-up period.

A cross-agency collaboration, the study will include participation by the University of Massachusetts Medical School; University of South Florida; Henry M. Jackson Foundation for the Advancement of Military Medicine Inc. at the Center for the Intrepid at Brooke Army Medical Center; Tampa VA Research and Education Foundation at the James A. Haley VA Medical Center; North Florida Foundation for Research and Education at Malcom Randall VA Medical Center; McGuire Research Institute at Hunter Holmes McGuire VA Medical Center, and the Seattle Institute for Biomedical and Clinical Research at VA Puget Sound Health Care System.
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A Long Journey from Thailand to Memorial Lab for a Good Night’s Sleep

PAWTUCKET – Eden Weinmann hadn’t had a good night’s sleep in 30 years. Scoliosis arcs his spine into a 103-degree curve, making it difficult to breathe when he would lie down. When he did drift off, the curvature triggered gastroesophageal reflux disorder (GERD), high blood pressure and a pressing need to urinate several times a night.

Over the years, Weinmann, a Washington, DC, native who lives in Thailand and has worked as a lawyer, writer, economist, urban planner and management consultant – sought medical help for much-needed sleep. He says he found that “every doctor tends to know what’s in their specialty, whether it’s urology or pulmonology.”

“I went to five major medical centers – four in America, one in Asia – and nine doctors in the last year and a half and none could pull it all together. Many wanted to operate on my back,” Weinmann said.

Called “teenage onset idiopathic scoliosis,” the disease left him unable to sleep more than an hour straight, which made him think he might have chronic fatigue syndrome. Then he noticed that his blood pressure would be elevated when he woke up. He researched the connection and found sleep apnea.

“It was like being waterboarded incessantly all night long, but I saw that and it was like ‘boom!’ Then I found a chapter about diseases of the chest wall in Murray and Nadel’s Textbook of Respiratory Medicine,” Weinmann says of the piece written by F. Dennis McCool, MD, interim chief of pulmonary, sleep and critical care medicine at Memorial and medical director of the sleep labs at both Memorial and Kent hospitals.

“In the chapter, Dr. McCool connects chest wall disease with sleep apnea,” Weinmann said.

Dr. McCool wrote that he had seen significant improvement when patients with chest wall diseases use a bipap machine that uses pressure to get the air into the lungs. Weinmann bought his own machine, but didn’t know what pressure setting to use. As a result, his lungs weren’t fully inflating and there was little difference in his sleep. Needing to get an expert’s help, he made an appointment in January and took the long transcontinental trip to see Dr. McCool.

The doctor scheduled a sleep study. Based on the numbers from Weinmann’s machine, Dr. McCool says he was able to start the machine on a high pressure and inch backwards until he reached the right setting.

After trying five categories of urine remedies, cognitive behavior therapy, GERD medications, and limiting caffeine during the day, Weinmann says his night in the Memorial Hospital Sleep Lab was “great.” Once he was able to get more sleep, he found his daytime work schedule improved as he was able to concentrate more on work and did not need naps.

“It was a huge weight being lifted off my shoulders, like a major black cloud of the quality of my life going away and the sunshine coming back out!” says the Columbia and Massachusetts Institute of Technology graduate.

Dr. McCool, who is also a Professor of Medicine at the Warren Alpert Medical School of Brown University, says he believes in blending clinical acumen with knowledge of respiratory physiology. This allows one to make better connections between a specific disease or condition with other possible symptoms.

“People don’t have the time to think about the physiological side of things, but they need to because there are so many answers in the overlap,” he says.

Weinmann, who remains temporarily in Rhode Island to continue seeing Dr. McCool, says he is so pleased with the comprehensive approach taken in caring for him at Memorial that he would like to “find a way to extend ‘Pawtucket care’ over the rest of my medical treatment, including outside Pawtucket, both now and into the future, in this country and also in Asia.”

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Recognition

Dr. Alan Morrison’s Research Project at VA Funded to Study Heart Valve Disease

PROVIDENCE – DR. ALAN MORRISON, a cardiologist at the Providence VA Medical Center, was awarded a 12-month pilot project August 29 through Ocean State Research Institute to study the thickening and hardening of aortic heart valves.

Dr. Morrison, who is also an assistant professor of medicine at the Warren Alpert Medical School of Brown University, said his team’s long-term goal is to develop new treatments to improve the survival rate and quality of life for veterans with calcific aortic valve disease.

Coronary heart disease is the leading cause of death for U.S. veterans.

Morrison said previous research identified some key inflammatory signals associated with the calcification of plaque in the hearts of veterans. “It turns out that, as we inhibited the calcification of plaques, we also slowed aortic valve thickening and hardening,” said Dr. Morrison. “We hope to apply what we’ve learned to develop effective treatments for aortic stenosis.”

More than 500 swimmers participated in the seventh annual Swim Across America at Roger Wheeler State Beach in Narragansett recently, raising more than $158,000 for cancer research at Women & Infants Hospital. At the event were, from left, Mark R. Marcantano, president and chief operating officer at W&I; Dr. Maureen Phipps, chief of obstetrics and gynecology at W&I, and Dr. Paul DiSilvestro, W&I’s interim director of the Program in Women’s Oncology.

Patrick Sweeney, MD, receives ACCME’s 2016 Rutledge W. Howard, MD, Award

CHICAGO – The Accreditation Council for Continuing Medical Education (ACCME®) announced that PATRICK SWEENEY, MD, MPH, PHD, is the recipient of the 2016 Rutledge W. Howard, MD, Award for Individual Service to the Intrastate Accreditation System.

Given in two categories, this award recognizes state medical societies, their staff, and volunteers for their contributions and commitment to advancing community-based continuing medical education (CME) programs and the intrastate accreditation system.

The recipients will be given their awards during a ceremony at the ACCME State/Territory Medical Society Conference, to be held December 7–8, 2016, in Chicago.

Dr. Sweeney was nominated for the award by the Rhode Island Medical Society (RIMS). For the past 23 years, Dr. Sweeney has led the RIMS Committee on CME as Chair. Under his leadership, RIMS has continued to be designated as an ACCME Recognized Accréditor of intrastate CME.

Dr. Sweeney has served in many roles at Women and Infants Hospital, including as Director of Medical Education, Director of CME, Chair of the CME Committee, and Chair of the Graduate Medical Education Committee. He also spent 17 years as Associate Dean of Medicine for CME at Brown Medical School.

Dr. Sweeney has been involved with CME on a national level since 1992 as an ACCME surveyor, surveying more than 75 nationally accredited CME programs. He has served as a member of the ACCME Committee for Review and Recognition, and as a member, Vice Chair, and Chair of the ACCME Accreditation Review Committee.

“As I look back over the list of previous recipients of this award, I am impressed by how many of them have become valued personal friends and colleagues. I am indeed honored to have my name added to such a prestigious list of CME professionals, and I am grateful to the Rhode Island Medical Society for having submitted my name in nomination. During my 25 years in CME I consider myself extremely fortunate to have worked with some of the most talented and committed individuals in our field, and I gratefully share this recognition with them,” he said.

“It is very difficult to do justice to the breadth, depth, and distinction of Dr. Patrick Sweeney’s long service to CME in Rhode Island and nationally. He has been recognized and honored by his peers on numerous occasions, and has earned the respect of our legislators and regulators for his steadfast single-handed defense of the integrity of CME from the many unripe ideas that too often spring up in the halls of state government. Due to Patrick’s commitment to the community and education, he was honored by his colleagues with the Medical Society’s special award for medical professionalism. On behalf of all his colleagues and friends in Rhode Island, we thank the ACCME for formally recognizing this fine gentleman and physician,” said RUSSELL A. SETTIPANE, MD, President, Rhode Island Medical Society.
Appointments

Dr. Stephanie Curry joins CharterCARE Medical Associates

PROVIDENCE—DR. STEPHANIE A. CURRY, a physician specializing in endocrinology, diabetes and metabolism with an added interest in obesity medicine, has joined Charter CARE Medical Associates (CCMA).

Dr. Curry is a graduate of the Medical University of the Americas, completed her Internal Medicine residency at Roger Williams Medical Center and recently completed a Fellowship in Endocrinology, Diabetes and Metabolism at Lahey Hospital and Medical Center in Burlington, Mass. Dr. Curry has co-authored 14 academic publications and presentations. She has also participated in numerous research projects at Lahey Hospital and Medical Center, Miriam Hospital and Roger Williams Medical Center.

At CCMA, Dr. Curry’s practice will concentrate on general endocrinology with a special focus on treating diabetes and on medical weight loss, in collaboration with the Roger Williams Weight Loss Surgery Program.

Edward Hurley, MD, named President-elect of Pediatric Research Society, Junior Section

EDWARD HURLEY, MD, a second-year neonatal-perinatal medicine fellow at Women & Infants Hospital, has been chosen as president-elect of the Junior Section of the Society for Pediatric Research (SPR). His term begins immediately and will run through June 2017, at which point he will begin his one-year term as president of the society.

A graduate of the University of Massachusetts, Amherst, and of Harvard University, Dr. Hurley earned his medical degree at New York Medical College. He completed an internship and residency in pediatrics at Brown University/Hasbro Children’s Hospital. He has published research in Pediatrics, The American Journal of Medical Genetics, The Rhode Island Medical Journal, and The Archives of Disease in Childhood, Fetal and Neonatal Edition.

The mission of the American Pediatric Society’s Society for Pediatric Research is to foster the research and career development of investigators engaged in creating new knowledge that advances the health and well-being of children and youth. Since 2012, the Society for Pediatric Research Junior Section has helped to introduce and integrate trainees into the Society by promoting scholarly work and serving as a resource for those making the transition to junior faculty.
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Daughters of Asclepius: Early women physicians in Rhode Island

MARY KORR
RIMJ MANAGING EDITOR

In a 1971 issue of the Rhode Island Medical Journal, Dr. Seebert J. Goldowsky described Martha H. Mowry, MD, (1818–1899), as the first woman medical practitioner in the state, although he could find no record of her as a Fellow of the Rhode Island Medical Society.

According to his account, she began to study medicine in 1844 with Drs. Briggs, Fabyan, Fowler and Mauran. They advised her to continue her studies in Boston, particularly in laboratory dissections. In 1850, Mowry was asked to take charge of a medical college in Boston (probably the New England Female Medical College) where she worked closely with “Drs. Cornell, Page, Gregory and to others,” according to American Women: Fifteen Hundred Biographies, published in 1893.

At the same time, The Providence Physiological Society, founded in 1850, sponsored monthly lectures and meetings, attended mostly by women, for 12 years. According to Rhode Island Historical Society records, “Many lectures were given by the Society’s members, including Dr. Martha H. Mowry, one of the first female physicians practicing in Rhode Island and president of the Society for several years. Topics of lectures ranged from anatomy lessons to discussions of women’s rights.”

In 1853, the Female Medical College of Pennsylvania, conferred on Mowry an MD and offered her a teaching position, which she held for a year. Here she began a lifelong association with abolitionist and leader of the women’s suffrage movement, Lucretia Mott.

However, a year later Dr. Mowry returned to Providence at the wish of her father, a longtime widower. She then began a regular practice on South Main Street. “Her father presented her with a horse and chaise, and since then, for nearly 40 years, she has constantly kept one or two horse in use in her rounds of practice. In 1880 she partially retired from practice, but the demands upon her seemed so pressing that she consented in 1882 to resume work under limitations absolving her from going out nights, except in extreme cases,” wrote Richard M. Bayles, in the History of Providence County, Rhode Island in 1891.

Dr. Anita Elizabeth Tyng was the first woman to be admitted as a Fellow of the medical society, on Dec. 18, 1872. She was an 1864 graduate of the Woman’s (previously Female) Medical College of Pennsylvania in Philadelphia. At the society’s annual meeting in 1882, Dr. Charles W. Parsons described Tyng as the medical society’s first “Soror-Socius” at the annual meeting. “If we are to have women doctors at all, do let us have well-educated ones, and if this Society does anything to keep up the standard, let them and their patients have the good of it.” He noted “the contrast between the action of this Society and our brothers in Massachusetts, who have not yet opened their doors to women.”

According to an appreciation of her life written by Dr. George H. Hersey in 1913, Tyng began her medical work early in life at the New England Hospital for Women and Children in Boston. When she began her practice in Providence she won the esteem of “many prominent people by her good sense and ability.”

Hersey noted her most famous case was “one of removal of the ovaries by abdominal section to check the growth of a uterine fibroid.” The operation was performed in 1880 in Providence, with only women in the operating theater, “all of whom had carefully bathed with carbolized water and wore fresh, clean, calico dresses.”

In 1883, Tyng accepted a position as surgeon at the Woman’s Hospital in Philadelphia. “By consecrated industry and a constant striving after that happy buoyancy of mind which Dr. Osler tells us underlies all successful effort, our first woman fellow raised herself to eminence in her profession,” Hersey wrote.

In an 1883 issue of Transactions, Dr. Dan King is quoted: “If women

“Of all the crimes against life the worst is our infant mortality rate.”
— Helen C. Putnam, MD

Helen C. Putnam, MD
choose to dip their delicate fingers in dead men’s gore and become skillful anatomists and otherwise qualify themselves for the practice of medicine, we do not refuse to admit them.”

Providence native MARY P. ROOT, MD, an 1883 graduate of the Woman’s Medical College of Pennsylvania, joined the medical society in 1884, but a year later sailed to India with the American Board of Foreign Missions. She was appointed administrator of the Women’s Hospital in Madura.

In a letter to her Alumnae Association, she wrote: “Uterine diseases are very common here, due partly to the barbarous methods of the native midwives, and partly no doubt to the early marriages and confinements…Miscarriages are quite frequent.

“The people are fearfully anemic and go into collapse easily. I am told that it is very common for the body to become suddenly cold – the patient shudders, faints and dies.”

Root remained in Madura until 1891. Later in her career she worked as resident physician at Smith College in Massachusetts, from 1906–1909.

In Providence, HELEN C. PUTNAM, MD, who joined the state medical society in 1892, could be called the queen of hygiene. Also a graduate of the Woman’s Medical College of Pennsylvania, she was born in Minnesota and once described her family as “frontiersmen, surrounded by Indians.” She kept the pioneer spirit throughout her 93 years.

The National Institutes of Health features Putnam in its traveling and online exhibit of women physicians, “Changing the Faces of Medicine,” as a pioneer in introducing pre-natal and neo-natal care for low-income families. “Of all the crimes against life the worst is our infant mortality rate,” she often proclaimed.

Putnam practiced infant and child health and gynecology in Providence for 43 years. As president of the American Academy of Medicine, she helped organize a conference on infant mortality in 1909, which led to the founding of the American Association for the Study and Prevention of Infant Mortality.

She worked relentlessly to clean up elementary school classrooms, fighting for medical inspections and legislative initiatives. In 1913, she published the book, School Janitors, Mothers and Health. “Our topic is clean school-houses, and it is fair to call the common cup a part of the schoolhouse since it is chained to the wall. The sooner mothers insist on its banishment, the safer their children will be from other children’s sore lips, sore mouths, poison of decaying teeth and sore throats.”

Putnam also co-founded the American Child Health Association with Dr. Abraham Jacobi of New York City, considered the father of American pediatrics. The following anecdote from Vassar College’s Women in Science archives (she was an 1878 alumna) shows her moxie: “At a meeting of the American Medical Association, a learned doctor who was to speak on social diseases declined to do so because ‘there were ladies present.’ Putnam rose to her feet, declared that she was not so squeamish, and proceeded to deliver an address on the subject. She was met with tumultuous applause.”

In 1939 Putnam donated most of her sizable inheritance from a family member to Butler Hospital and the Rhode Island School of Design. She died in Providence on February 3, 1951.