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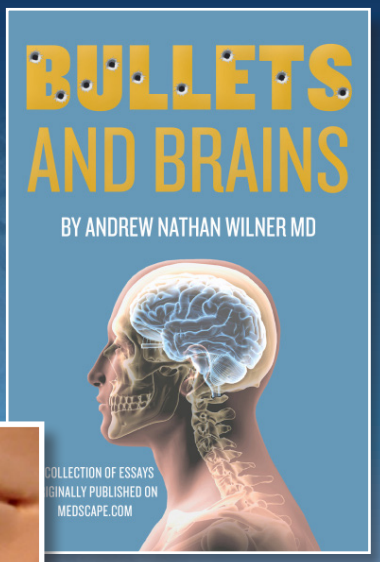

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SPECIAL SECTION

PEDIATRIC EMERGENCY MEDICINE

SUSAN DUFFY, MD, MPH, GUEST EDITOR

JANUARY 2014 VOLUME 97• NUMBER 1 ISSN 2327-2228

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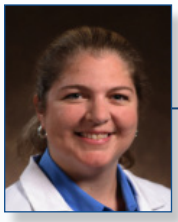

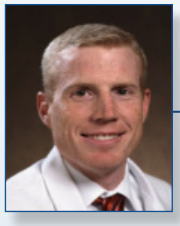

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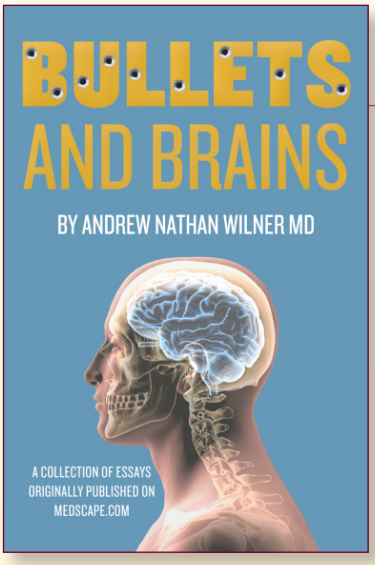

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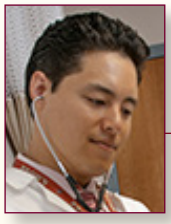
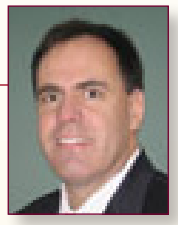
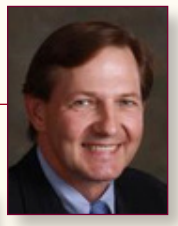
IN THE NEWS







PEOPLE

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RIMJ Mission Statement

The Rhode Island Medical Journal (RIMJ), published by the Rhode Island Medical Society, is an independent, monthly, electronic publication which aims to reflect the views and purposes of the entire medical community of Rhode Island.

We see the Journal as a vehicle aimed at the practicing physicians of Rhode Island – whether they are in private practice, on the staff of the state's hospitals or as part of the many colleges and universities of the state. It offers a venue for them to express their clinical or investigative findings, and for the academic faculty to publish their clinical or research results. It also serves as a platform for local medical students, resident physicians and fellows to contribute to the medical literature while honing the rudiments of medical writing.

In addition, it offers the opportunity for medical professionals to make the community aware of testing or clinical expertise that may not be widely known, even within our small state. And finally, RIMJ is a forum where allied health professions such as local schools of public health, pharmacy and nursing may share their concerns and aspirations as the business of health care takes on new and unanticipated challenges.

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Memory Feats

JOSEPH H. FRIEDMAN, MD
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I attended a conference last October with Dr. Stanley Aronson, a neuropathologist and former chair of pathology at Downstate Medical Center, editor emeritus of this journal, and 91 years old. Stan gave a talk about his personal history in the field of medicine, focusing largely on his experiences at Downstate, where the talk was held. He mentioned several colleagues he had worked with. At the end of his talk, an audience member noted that a faculty member who had featured prominently in his talk had a daughter who became a neurologist and was in attendance. Stan immediately noted that in his talk he had not had time to describe the contributions her mother had made. The mother, he noted, was an extraordinarily devoted nurse, who had run a particular children's unit. He recalled the college she had graduated from and the nature of her work. He then added that in his discussion of the neurologist's father, he had not had time to remark on his skills as a fencer, and his role as physician to the U.S. Olympic fencing team in 1964. Stan had not had contact with these people in 40 years.

It was a remarkable feat. Several months prior, I brought our new chair of neurology at Brown to visit Stan. He described her husband's research project, required for graduation from the Brown Medical School at that time, 25 years prior. He remembered the topic and the collaborators.

My other notable observation of a memory feat involved Raymond Adams, MD, former chair of neurology at Harvard, and, like Stan, a noted neuropathologist. I had encountered an 80-year-old woman with an atypical parkinsonian condition, whose family history included her father having had a diagnosis of Parkinson's disease (PD). I noted that when the father had been ill, the various subcategories of parkinsonism had not been created, and what passed for PD in the 1950s might be diagnosed very differently today. I learned that the diagnosis had been made by Ray Adams, who was famous for his clinical pathological studies, and assumed, correctly, that an autopsy had been obtained. With family approval, I contacted the hospital where the autopsy had been done, which unfortunately was at a Boston Hospital, which, back in the day, had had several university services ensconced. The records had never been computerized. All entries were hand-written, by date only, without cross referencing. I was able to get someone to read through a year's worth of autopsies for one pathology service, and then another, without success. I called the chief of neuropathology, who was a professional friend. He suggested contacting Dr. Adams, who was about 90 at the time, and retired. "He remembers a lot."

I briefly wrote up the case and solicited his help. About two weeks later, in 2005 or so, I received a typed note, not a computer word processed letter, from Dr. Adams, telling me that the case I was interested in was case 1 in a series of four patients he wrote up for a Swiss journal, published in French, in 1961. He apologized for not having a reprint to include. And, sure enough, that case was my patient's father.

Not all of us are bound to forget. Not all of us will continue to forget faces and names.

When I got back from Brooklyn, having experienced Stan's recollection of his nurse's college days, I went through my emails to discover that I was late on delivering a promised article for our Rhode Island PD support group. I didn't know when I'd have time. I had submitted Part 1 a few months before and couldn't recall what I had planned for Part 2. I scanned my files to find Part 1 so I could write Part 2, and discovered that I had already written Part 2. I didn't recall what I had written, but, as usual, when I review things I've written, it was with a great deal of relief, that I agreed with what I had written a few months prior. Unfortunately, it is not too uncommon for me to not recall that I've

written these things, which prompted this article.

All readers of this column over the age of 60, and many who are younger, have dealt with increasing concerns about their memory. "I forgot to get the milk when I went to the store for milk. I got everything else. Is it Alzheimer's?" Certainly all of us who practice clinical medicine with elderly patients run into this every day. We reassure them that their friends have the same problem. I have the same problem. Not to worry. But, unfortunately, some of us really do have this problem, and this is how it starts, and not until something dramatic happens, like getting lost driving, that we begin to really worry.

Encountering feats of memory like those above, especially in the elderly, are wondrous but reassuring. Not all of us are bound to forget. Not all of us will continue to forget faces and names. Age does not mean that, absent a disease, we will all slowly have our memories whittled away by time. Unfortunately, I don't think I'm going to be one of those people. I fully expect that in one year, if I review my columns, I'll marvel that I wrote this one and can't recall it. I worry now that I may have written this column before, although not using the very recent Brooklyn event. That really did happen recently. I take comfort only in knowing that you, the reader, if you read this once before, probably don't remember it either. ❖

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, and chief of Butler Hospital's Movement Disorders Program.

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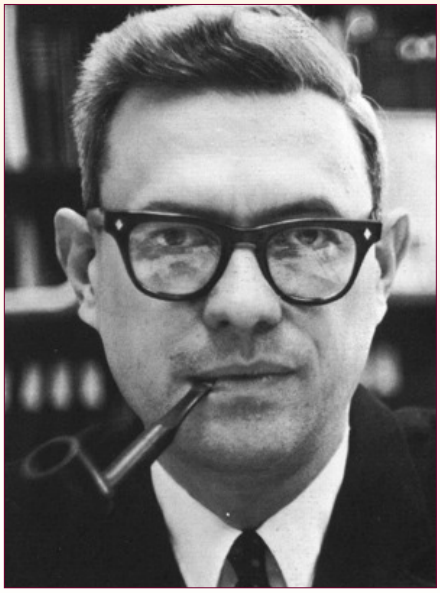
BROWN

Dr. Aronson in 2007 receiving Doctor of Medical Science (DMS) at Brown in 2007.



DOWNSTATE

Stan Aronson, MD, in the early years in the 1950s at Downstate Medical Center in NYC.

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An Exaltation of Offshore Islands

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The eminent English jurist, Edward Coke (1552–1634), declared – in magisterial Latin – that a man's home is his castle, his ultimate refuge. Humans need homes for protection from weather and predation, to provide some measure of privacy; and, not least, for a privileged place to fulfill all of the many of their domestic and hygienic needs. And of all the geographic sites to place a privileged and secure home, none seems more suitable that an island.

There is something magical about an island (especially if it bears the name, Rhode): One feels a sense of splendid insularity, of separateness from the mundane world on the mainland; certainly the many ills of a contentious humanity seem to cluster more on the mainland than on the set-apart islands; and no matter which shore you choose on your special island, the vista is always aquatic.

However small, an island becomes more than a site for a home; it becomes an independent kingdom unto itself with defined boundaries, its own idiosyncratic moral code and a protective ocean to distinguish it from the continental territories. If situated on an isle, even a rude hut is magically transformed into a castle.

Think of the many historical islands, either real or fabled, populated or deserted, serene or even bedecked with streams of molten lava. They are each special in there own way.

Some islands have become sanctuaries of human imagination: Monte Cristo, Elba, St. Helena, Ceylon and Capri. The isolated island of Kos in the eastern Mediterranean, home of Hippocrates, was identified with the origins of medicine as a distinct profession. Others, such as Alcatraz and Ile d'If, were notorious as prisons. Still others, such as Pitcairn Island, in the southeast Pacific, were made unique by their geographic remoteness. This remote volcanic island – one of four – had been inhabited by Polynesians until the 15th Century when unknown circumstances, probably famine, caused the Pitcairn inhabitants to abandon the island and seek residence elsewhere. The island remained uninhibited until the early months of 1790 when nine mutinous sailors of the HMS Bounty, along with 18 Tahitians, sailed the Bounty east seeking any remote isle to escape the

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Public Health Service physicians on Ellis Island in New York Harbor check the eyes of immigrants for signs of trachoma.

vengeful jurisdiction of Great Britain.

Ellis Island, in upper New York harbor, stands apart from other islands as a place of judgment, determining whether its foreign visitors may enter this nation. The island was established as this nation's primary immigration processing center in 1892, and in its six decades of operations, about 12 million immigrants entered this nation. It is estimated that one-third of American citizenry can claim Ellis Island as the portal of admission of one or more ancestors.

And then there are islands made immortal by some curious happenstance, some event of historic importance. The story of a tiny Micronesian atoll, part of the Marshall Islands, begins in 1946. This was the dawn of the nuclear age, when the United States used the atoll as a testing site for its atomic bombs. When Russia developed its own functional atomic bomb in 1949, President Harry Truman initiated Operation Castle Bravo to devise still more powerful nuclear weapons, these to be tested on the same remote, uninhabited isle.

Polynesians had called this atoll Pikinny, meaning the place to grow coconut trees, although European mapmakers designated it as Bikini. A French bathing suit designer, Louis Reard, knowing that a competitor of his had manufactured a bathing suit called Atome, named his new two-piece swimsuit bikini. The sobering historic remembrances of the atolls of Bikini and Eniwetok have now been tempered by the memories of an engaging swimsuit.

Islands have earned their glamour by providing a sense of detachment from madding crowds, an isolated place that offers fresh breezes, lonely beaches, a novel perspective and little bureaucratic supervision. Ask committed islanders for the virtues of island-life: "Distance from the mainland," they will declare; but then, after a pause, they will add: "But that distance should not be too great. Our connection to the mainland should not be compromised." It is much like the first-year college students demanding a physical separation from their parents – but not too much of a distance. ❖

Author

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

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The author has no financial interests to disclose.

Rhode Island Medical Journal Submissions

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CONTRIBUTIONS

Contributions report on an issue of interest to clinicians in Rhode Island. Topics include original research, treatment options, literature reviews, collaborative studies and case reports.

Maximum length: 2000 words and 20 references.

PDFs or Jpegs (300 dpis) of photographs, charts and figures may accompany the case, and must be submitted in a separate document from the text. Color images preferred.

CREATIVE CLINICIAN

Clinicians are invited to describe cases that defy textbook analysis. Maximum length: 1200 words. Maximum number of references: 6.

PDFs or JPEGs (300 ppi) of photographs, charts and figures may accompany the case, and must be submitted in a separate document from the text.

POINT OF VIEW

The writer shares a perspective on any issue facing clinicians (eg, ethics, health care policy, patient issues, or personal perspectives). Maximum length: 600 words.

ADVANCES IN PHARMACOLOGY

Authors discuss new treatments. Maximum length: 1000 words.

ADVANCES IN LABORATORY MEDICINE

Authors discuss a new laboratory technique. Maximum length: 1000 words.

IMAGES IN MEDICINE

Authors submit an interesting image or series of images (up to 4), with an explanation of no more than 400 words.

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Morning Report in Kigali – November 20, 2013

ONYEMA OGBUAGU, MD

The following column was written by a colleague with whom I recently worked in Kigali, Rwanda. We attended morning report together and shared several patients. His observations are accurate to my western eyes, but his greater experience, having attended morning report the previous year, brings a sense of optimism to the Rwandan endeavor that is based on observation, a stronger foundation than mere hope. I hope it may encourage some readers to consider a teaching experience in some resource-poor country.

— Joseph H. Friedman, MD

YALE MEDICAL GROUP

It starts as a trickle. Some postgraduate residents come into the conference room, including the more senior PGY2 and PGY3 residents, half of whom have blood shot eyes and are visibly tired from an overnight moonlighting shift, which is necessary to supplement their meager internal medicine residency stipend. The *muzungu* doctors, mostly from US Ivy League schools, and here to support residency training, arrive like a flood. Being on time is a concern to them, maybe only them. The local consultant physicians keep arriving, some show up just before the last sentence of the session is spoken.

"I am presenting the case of Mr. XYZ…," the presenter begins. While the statement is being uttered, a willing volunteer leaps off a chair to document the important details of the presentation on the small hanging white board in the room. He may not appreciate it but he has accepted the herculean task of transcribing a mixture of medical and true street slang spoken in a mix of different languages – French, Kinyarwanda and English – in a manner that can be comprehended by onlookers. Words in the latter language are transcribed phonetically by the volunteer scribe. The output is disastrous. English was only recently adopted as the nation's primary language 5 years ago. I recall the poor advice given by my elementary school English teacher who always encouraged me to spell words as they sounded, but failed to appreciate that the strategy leaves the speller at the mercy of how well and appropriately a word is pronounced by the speaker. It is written on the white board – the patient has fever, weight loss, cough, and shortness of "*breathe*."

"The patient *consulted* the hospital for…," the speaker goes on, really meaning to say that the patient *presented* to the hospital on account of... He speaks at a rate of 15 words per minute and the speller is writing at half the pace. It is obvious that speaking is easier than writing in a new and foreign language. Important points are not all transcribed. A good memory for the listener is key. He has reported the patient's presenting complaints. I am waiting for the history of presenting illness (HPI), but it never comes. The presenter doesn't know the difference.

He goes on to discuss the other pertinent parts of the patient's history. It is important to highlight that the patient is a heavy drinker of the local beer "urwagwa," which is their equivalent of moonshine, as he cannot afford the locally manufactured, legally produced beer brands or more expensive imported beers. The patient is in his forties and unmarried, he must be a playboy who is having a hard time "settling down" as they say. Definitely needs an HIV test! He can afford to but did not sign up for the means-tested national health insurance scheme or "Mutuelles de Sante," bummer! Okay, I admit these were my thoughts but I am pretty sure they weren't mine alone.

Consultants: The *muzungus*

Some consultants listen intently, clinging on more to the spoken than the written word while others are more interested in their smartphones. We have trained ourselves not to interrupt resident presentations, things have changed since the *muzungus* arrived. This is hard. The medical history needs to be expanded, wrongly used terms need to be corrected, some spelling errors on the board are inducing an acute and progressive retinopathy, we are almost blinded. Sometimes we cannot hold off; one consultant blurted out, "How long had the patient's cough lasted prior to presentation? It makes a difference if this is known." "The cough had been present for 1 month," the presenter replied and "I forgot to mention previously that he had mild hemoptysis with some episodes." The questioner no longer regrets interrupting the presentation, the response had more useful information than she had bargained for.

We are now at the review of systems portion of the medical history. The presenter reports that it is non-contributory. I am thinking… "yeah right!" The system needs to be reviewed! There is a reason why the quality of resident medical education leaves much to be desired. If more funds, faculty and better facilities were available for your training, this case presentation should be

better. I have to remind myself, for now, that we are talking about a patient, not the system. I miss hearing about the patient's vital signs during my musing, but luckily they are written on the board. The oxygen saturation always seems to be reported as 96% on room air. I keep my suspicions to myself. It is not like we measure and document respiratory rates accurately in the US all the time.

"The patient is asthenic" seemed to be the starting description for all the patients. I thought I had a good grasp of the English language but I don't know what the word means. Just like the early student in medicine, rarely used terms and syndromes seem to be learned and recalled first. "He has logorrhea," the presenter continues. Now I am concerned, I must be illiterate. How can they know and use more sophisticated English words than I do? Surely the word does not exist. I google logorrhea using my smartphone, quite dubious of its existence in any dictionary. Yes, there is internet service. I almost fall back in my chair in surprise. Logorrhea is actually an English word and is defined as a tendency to extreme loquacity. "Who in the world explains a difficult word using another difficult one?" I wonder. However, somehow I get it. The patient talks a lot! I have a lot of friends with this disorder.

The physical examination report goes quite well. I must admit that it was even better than I expected. Among other things, the presenter mentions diminished breath sounds, and crackles in the right lung base; and also notes the presence of egophony. I am really impressed as someone had examined the patient rather thoroughly. I don't even recall when last I included assessing for egophony on lung auscultation – maybe when I was a medical student? I keep my embarrassment to myself and chide myself for becoming sloppy over the years with my physical examination skills.

Differential diagnosis

Next is the generation of a differential diagnosis. Common things are mentioned – pulmonary tuberculosis (TB), Mycobacterium avium intracellulare (MAC), bronchiectasis, fungal disease like histoplasmosis. No "zebras" are mentioned. But it is internal medicine rounds and this is residency training; we need to expand the list to a hundred differential diagnoses in exact order of likelihood – okay, maybe ten. Consultants chip in – lung cancer, chronic bronchitis, vasculitis, paragonimiasis, recurrent pulmonary thromboembolism …the list grows.

We discuss the patient's admission laboratory tests. We are pleased when results of a full blood count, electrolyte panel and INR are reported. A chest radiograph is available and shows a left upper lung cavity and a right lower lung infiltrate. Appropriate investigations are usually ordered in the emergency room; the problem is that they are not always done for varying reasons. This time everything had worked perfectly. While we celebrate the available labs, we now consider additional tests to narrow down the list of differentials. Two expectorated sputum smears have returned negative for visualized acid fast bacilli (AFB); we would like the newer and more sensitive GeneXpert test. It cannot be performed as there are no more cartridges available to run samples. The mycobacteriology lab is not performing AFB cultures. The patient cannot afford a CT scan of his chest as the copay is too high. Bronchoscopy is possible but only a bronchoalveolar lavage can be performed, and no biopsies can be taken. I shudder when I recall that it is performed without sedation. A urine Histoplasma antigen test is not available. Our enthusiasm fades, our diagnostic capabilities are limited.

An argument erupts among consultants on the appropriate medical treatment of the patient. Half of them want to start an anti-tuberculosis drug cocktail now as TB is the leading diagnostic possibility; the other half want more data to justify use of the same. The patient remains febrile with ongoing hemoptysis despite a 5-day course of ceftriaxone and erythromycin initiated in the emergency department obviously oblivious to the chronicity of his complaints. There is pressure to "do something." Residents watch with glee; the arguments are equally weighty. They aspire to join the vigorous debate someday. Somehow, the final decision is made, the managing team would decide on the best course of treatment based on the evolution of the patient's clinical condition and with consideration of limitations in performing appropriate diagnostic testing. Class dismissed.

Seven months later

I return 7 months later. It is morning report again. It is at the same time, same place, and there are new seats in the conference room. More residents are in training, most arrive on time. Local consultants are still late. As the saying goes, old habits die hard. Another case is presented. There is an HPI after the presenting complaint. The case presentation is rather excellent and the scribe has improved. Diagnostic testing is still limited but the presenter advocates for samples for testing to be sent to national reference laboratory where they can be performed. Things are getting better. It is the second year of the *muzungu* presence. Dare I say, "mission accomplished!" Okay, maybe that is too exuberant, so I will say rather, "something accomplished!" ❖

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Onyema Ogbuagu, MD, is Assistant Professor of Medicine, Yale AIDS Program of the Yale School of Medicine. He has clinical and research interests in HIV/AIDS care, Tuberculosis and Hepatitis C. Dr. Ogbuagu completed his bachelor of medicine at University of Calabar in Nigeria, his residency at Mount Sinai School of Medicine in New York and his fellowship in infectious diseases at Yale School of Medicine.

Secure Email Communication between Patient and Physician Associated with Better Glycemic Control

Dear Editor,

Communication by email between patient and physician can be used as a strategy to improve personalized care in diabetes which can lead to better glycemic control. Moreover, involving patients in the decision-making process may increase their motivation and confidence to carry out their regimens.[1] There has not been enough research in this area and therefore not much is understood about the impact that secure email communication between patient and physician has on the glycemic control.

In an effort to study the association of HbA1C with secure email communication between patient and physician, a pilot study was conducted in a private group practice in Worcester, MA between January 1, 2006 and January 1, 2009. Patients with type 2 diabetes mellitus who were web-enabled were included. These patients were divided into two groups: group 1 (n=43) communicated and group 2 (n=125) did not communicate with their doctor via email regarding their finger-stick blood glucose levels (FSBGL). Crossover only occurred from group 2 to group 1. The primary outcome was a change in HbA1C in 3-6 months after the web-enabled patients started communicating.

Forty-three (25.6%) patients used secure email to communicate with their doctor during the study period (n=168). Of the 43 people who were using the web, 16 were on insulin and 27 were not. Of the 125 patients who were not using the web, 73 were on insulin, and 52 were not. Communication by secure email system regarding their FSBGL was associated with a reduction of HbA1C increased from 7.7 to 6.5. Interestingly, HbA1C increased from 6.5 to 7.5 in patients who were not communicating by secure email with their doctor regarding their FSBGL. The result was significant with a P-value of less than 0.0001.

Though there are several limitations of this study, the findings of this study can profoundly influence and improve the way to manage diabetes and thereby its complications. Secure messaging may serve as an important part of care for patients with diabetes and an opportunity to support them in self-management outside of routine visits.[2] By incorporating secure email communication between physicians and the diabetic patients regarding their blood glucose level, we can enhance the care given to them as seen in our simple and inexpensive study.

Neha Alang, MD
Nitin Trivedi, MD

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Letters in reference to a Journal article must not exceed 175 words (excluding references), and must be received within four weeks after publication of the article. Letters not related to a Journal article must not exceed 400 words (excluding references).

A letter can have no more than five references and one figure or table. A letter can be signed by no more than three authors. The principal author will be asked to include a full address, telephone number, fax number, and e-mail address. Financial associations or other possible conflicts of interest must be disclosed.

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Pediatric Emergency Medicine: From small beginnings, a subspecialty emerges and evolves in RI, nationwide

SUSAN DUFFY, MD, MPH
GUEST EDITOR


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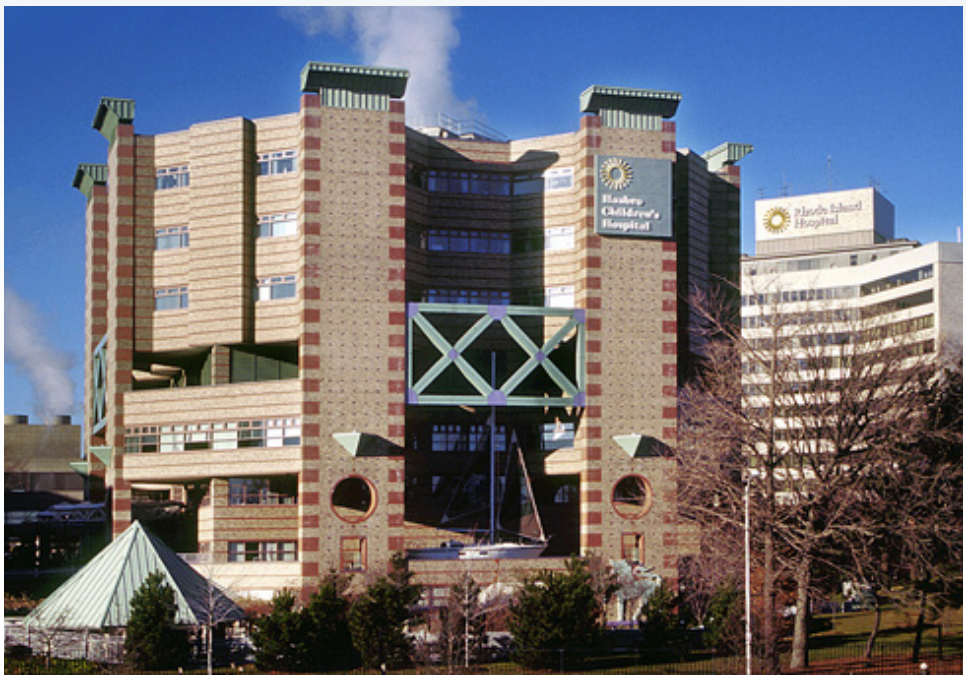
Pediatric Emergency Medicine (PEM) was introduced in Rhode Island in 1985, the year after the establishment of the federal EMS-C program designed to assist states in improving emergency medical care for children. Based at Rhode Island Hospital, PEM began as a fledgling subspecialty when **DR. WILLIAM LEWANDER** was recruited as Rhode Island's first PEM subspecialist by the divisions of Emergency Medicine and Pediatrics. Dual-trained in PEM and toxicology and a member of the first class of PEM fellows at Boston Children's Hospital, Dr. Lewander was charged with building a system of regional emergency care dedicated to the medical needs of children and their families. Early in his career, he worked tirelessly caring for patients and educating physicians, nurses and EMS providers about the evolving body of medical evidence which recognized that children were not "little adults" and were best served when receiving specialized emergency care befitting their unique physiologies and responses to injury and illness. Within a few years of arrival, additional PEM medical and nursing colleagues joined Dr. Lewander. Together, they collaborated with emergency medicine physicians and pediatric surgeons to develop a multifaceted emergency medical system focused on the unique medical, developmental and social needs of children and adolescents.

From a few rooms at RIH to Hasbro Children's Hospital

The first "pediatric emergency department" at RIH was only a few rooms embedded in the adult emergency department and in 1985 cared for approximately 9000 pediatric emergency patients. Critical pediatric patients were managed in resuscitations bays poorly equipped for the care of young children and staffed primarily by adult-trained caregivers. Over the course of a few years, however, practices evolved as the division grew and expanded its educational, research and injury prevention focus and established a fellowship in PEM. These efforts paralleled an increased demand, both locally and nationally, for pediatric emergency and urgent care that was bolstered by the 1993 Institute of Medicine Report, "Emergency Medical Service For Children," a document providing the first "comprehensive view of the need for and effectiveness of pediatric emergency care services in the U.S." As the region's pediatric emergency and trauma patient population increased, so did the need for dedicated space and staff to accommodate children's specialized needs, as well as serve as a resource and referral center for community emergency providers.

When Hasbro Children's Hospital opened in 1994, its Emergency Department had an annual census of approximately 34,000 patients, 13 treatment rooms, 2 resuscitation bays, 12 PEM faculty and fellows and a core of pediatric emergency nurses. Over the next 10 years, the census, faculty, staff and number of patient rooms nearly doubled and



PEM expanded its clinical, educational, research and injury prevention missions within the academic Department of Emergency Medicine of The Alpert Medical School of Brown University and the clinical departments of Emergency Medicine and Pediatrics at Hasbro.

This issue of the *Rhode Island Medical Journal* is dedicated to aspects of pediatric emergency medicine that distinguish the subspecialty and highlight care that is provided in pediatric emergency departments. The topics were selected with the insight that the majority of children in the United States, including those in Rhode Island, receive emergency and urgent care, not in dedicated pediatric medical centers, but in general emergency departments and urgent care facilities. With that in mind, the authors focused their articles on enhancing awareness of pediatric conditions and managements pertinent to all clinicians who provide acute care to children.

Section overview

"Pediatric Resuscitation: Lessons Learned and Future Directions" by **LINDA L. BROWN, MD, MSCE**, and **LAURA CHAPMAN, MD**, reviews the goals of pediatric resuscitation and the importance of preparedness and training to improve outcomes for relatively infrequent and high-stress pediatric events. In addition, it includes a review of the emerging practice of early recognition and goal-directed therapy for pediatric sepsis.

"Going With The Flow" by **THERESE L. CANARES, MD**; **CRAIG TUCKER, RRT-NPS** and **ARIS GARRO, MD, MPH**, focuses on the management of pediatric respiratory illnesses, conditions that are particularly burdensome to the very young and which commonly bring children to emergency departments for treatment and which are the most common reasons for pediatric admissions.

"Not Just Not Little Adults, A Pediatric Trauma Primer" by **FRANK L. OVERLY, MD**; **HALE WILLS, MD, MS**, and **JONATHAN H. VALENTE, MD**, highlights the importance of dedicated pediatric trauma care, the unique pediatric physiology and response to trauma as well as the benefits of a skilled approach to assessment and management.

"Fear and Loathing in the ED: Managing Procedural Pain and Anxiety in the PED" by **CHRIS MERRITT, MD, MPH**, examines the importance of a developmentally appropriate and multidisciplinary approach to the management of pediatric pain and anxiety.

"Multicenter Pediatric Emergency Medicine Research and Rhode Island" by **THOMAS H. CHUN, MD, MPH**, focuses on the frontiers of PEM research and the important role of multicenter collaboration in enhancing knowledge of pediatric emergency conditions and care. In 25 years, the subspecialty of PEM has made great strides in enhancing care, setting national standards and improving systems of emergency care for children, particularly in well-populated regions. The subspecialty continues to strive on a local and national level to set standards and improve the emergency care for children and adolescents in every medical setting.

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Pediatric Resuscitation: Lessons Learned and Future Directions

LINDA L. BROWN, MD, MSCE; LAURA CHAPMAN, MD

ABSTRACT

The science of resuscitation has had significant and meaningful advances over the past fifty years, with resultant improvements in outcomes for both adult and pediatric populations. This article aims to describe some of the recent advances in pediatric resuscitation, including aspects of care affecting the management of cardiac arrest and sepsis, and to give a glimpse into technologies and methodologies that may be utilized to improve outcomes for children in the near future.

KEYWORDS: pediatric, resuscitation, sepsis, shock

INTRODUCTION

The history and epidemiology of pediatric resuscitation

In the early 1960s, the American Heart Association (AHA) initiated the first program in cardiopulmonary resuscitation. Over fifty years later, the science of resuscitation has grown significantly in scope and breadth and has led to improvements in outcomes across all age ranges. It is well documented that pediatric cardiac arrests differ from those in adults in incidence, etiology, management and the eventual outcomes from these infrequent but potentially devastating events. Unlike the primary cardiac causes that lead to the majority of arrests in adult populations, cardiac arrests in children are likely to be secondary to progressive respiratory failure or shock. The initial cardiac rhythm upon presentation to medical care is often asystole (78%) or pulseless electrical activity (12.8%), with the ventricular dysrhythmias found commonly in adults, documented in only 5-15% of pediatric cases.[1,2] Pediatric specific advanced life support (PALS) guidelines were initially developed in 1988 to address the unique characteristics of this population and have continued to undergo regular updates based on evolving evidence and expert consensus, with the most recent release in 2010.[1]

Survival estimates from pediatric cardiac arrests differ based upon the location where the arrest takes place. Children with an out-of-hospital arrest have generally poor outcomes with estimates of approximately 3-9% survival to hospital discharge, with the majority of survivors left with significant neurologic sequelae. These numbers have remained essentially unchanged over time while interventions continue to be aimed at improving bystander cardiopulmonary resuscitation (CPR) and the pre-hospital care these children receive. The outcomes from in-hospital pediatric cardiac arrests, however, have had more meaningful improvements. Survival rates in the 1980s for children after an in-hospital cardiac arrest were reported as 9%, while recent reports reveal survival rates of up to 27-35%.[3-6] The basis for these improvements is likely multifactorial, including earlier recognition and management of shock and impending respiratory failure that can lead to cardiac arrest, the institution of rapid

Figure 1. Simulation is currently being used in the Hasbro Children's Hospital ED to train multidisciplinary teams caring for simulated pediatric patients within the resuscitation room.

response teams, updates in PALS algorithms, improvements in the quality of cardiac compressions, and advances in the training of the healthcare providers responsible for the resuscitation of these critically ill pediatric patients.

Pediatric septic shock: New pathways in recognition and management

As previously stated, pediatric arrests are often secondary to respiratory failure or shock. Overwhelming infection, leading to septic shock, is one of the largest causes of morbidity and mortality in pediatrics. The overall mortality rate of septic shock in children is 13.5%.[7-9] Previously healthy children with sepsis have a mortality rate of 9-10%, while chronically-ill children have a 12-15% mortality.[7-9] Pediatric sepsis is a complex disease state; the core process that leads to end organ dysfunction is complicated, multifaceted, and not clearly understood.

The recognition of early sepsis has also proven to be difficult for myriad reasons. Children may be scared or upset during their examination, making the evaluation of mental status and accurate vital signs challenging. Normal vital signs also vary by age group, so memory aids or advanced electronic medical records (EMR) may be necessary to alert providers to subtle abnormalities. Hypotension is a late finding in pediatrics, and, unlike in adults, is not required for the diagnosis of sepsis or septic shock. In fact, children have impressive cardiovascular reserve and can compensate for severe illness, sometimes with normal heart rates and normal blood pressures, until they "fall off the cliff" and rapidly decompensate. There is also a lack of pediatric literature to support the routine use of biomarkers, such as lactate, to aid in the diagnosis and management of sepsis. Despite these difficulties in recognition, studies have clearly shown that rapid identification and timely treatment consisting of early goal-directed therapy, which includes fluid administration and antibiotics, leads to improved outcomes.[10-12]

The Surviving Sepsis Campaign was launched in 2002 with the goal of decreasing mortality by using evidence-based guidelines to implement recognition and management bundles. In adults, participation in the Surviving Sepsis database has led to a 5.4% absolute survival benefit.[13] The American College of Critical Care Medicine in combination with the AHA PALS program has created formal resuscitation guidelines for septic shock.[10] In brief, these guidelines recommend administration of 60 ml/kg of intravenous fluids and antibiotics within 60 minutes of sepsis recognition and initiation of vasoactive drugs, if indicated, at 60 minutes.

It has been shown that for every hour delay in return to normal vital signs and capillary refill in the community hospital emergency department has been associated with a twofold increase in odds of death.[14] Even in large children's hospitals there are impediments to initiating treatment and in delivering timely interventions. Some of these barriers include delayed recognition of sepsis, difficulty with IV access, slow administration of intravenous fluids, difficulties in obtaining medications from pharmacy, and delays in transportation from the community setting to a tertiary care pediatric hospital.[15-17]

This past year, Hasbro Children's Hospital joined a pediatric sepsis collaborative that included children's hospitals across the country. Over the next 5 years, with the support of the American Academy of Pediatrics, this collaboration will implement standard triage criteria and screening tools for sepsis in the pediatric emergency department as well as create intervention bundles for timely intravenous fluid administration and antibiotics. The collaborative goal is to decrease mortality by 20 percent across all participating sites. Additionally, aggressive treatment goals have been set to administer initial intravenous fluids within 15 minutes of recognition of sepsis and antibiotics within 1 hour. Smaller studies at individual institutions have shown this standardized approach to the treatment of pediatric sepsis improves time to fluid and antibiotic administration and has decreased the hospital length of stay, but few studies have been powered to show significant reduction in mortality.[16-17]

The future in pediatric sepsis likely will take two paths. Quality improvement projects will be implemented to distill the current knowledge we have and use it more efficiently and thus effectively. Early diagnosis and risk stratification may also be achieved in the future with the use of biomarkers of disease or with non-culture identification of pathogens using PCR, microarrays or mass spectroscopy. At this time, the studies for biomarkers in pediatrics have been small and the data conflicting, though larger scale projects are on the horizon.

Recent innovations in pediatric resuscitation

One of the factors that may be responsible for the improvements in survival and overall outcomes from in-hospital cardiac arrests may be the increasing utilization of rapid response teams (RRT). These teams have been instituted across many children's hospitals and are comprised of a group of healthcare providers, including nurses, respiratory therapists, and physicians, with significant experience in the assessment and management of critically ill pediatric patients. In several published studies, the early evaluation and management of the deteriorating pediatric patient by such teams has led to significant improvements in the incidence of cardiac and respiratory arrests, with decreases in these events by as much as 72% and decreased mortality by as much as 35%.[18-19] At Hasbro Children's Hospital in Providence, RI, the pediatric FAST team (Focused Assessment and Stabilization Team) was instituted in 2007, with ongoing updates, including the utilization of a PEWS score (pediatric early warning score) in 2009.[20] As of October 2013, data regarding intubations and cardiopulmonary arrests that have occurred outside of the emergency department or pediatric intensive care unit reveal no events in over two years, reinforcing the value of these teams.

Although the importance of early recognition and

management of the pediatric patient with impending respiratory failure or shock cannot be understated, for optimal patient outcomes improvements must also be made in the care of the patient once cardiac arrest occurs. The most recent update to the PALS guidelines in 2010 highlighted the importance of quality chest compressions (pushing hard, pushing fast, allowing for full recoil and minimizing interruptions). Immediate and effective bystander CPR has been shown to have a significant impact on the return of spontaneous circulation with preserved neurologic outcomes. Unfortunately, it has been estimated that only one third to one half of infants and children receive bystander CPR.[3] The C-A-B sequence for basic life support was introduced in 2010 and was aimed at increasing bystander CPR across all ages, with a theoretical delay of only 18 seconds if compressions start the sequence instead of ventilations. This delay is even shorter if two providers are available for the resuscitation. [4] Evolving technological advances are also assisting providers in performing quality compressions, with several real-time CPR feedback devices currently undergoing rigorous evaluation.[21]

Publications on the training of healthcare providers in BLS and PALS have been increasing, with the focus on the best methods to educate and promote retention of these crucial, yet infrequently utilized, skills and behaviors. Medical simulation has developed over the past twenty years as a means to educate healthcare practitioners and to allow practice of critical procedures and resuscitations by multidisciplinary teams. It is uniquely suited to train individuals and teams in the assessment and management of low frequency/high acuity events in a safe setting.[22,23] With the use of high-fidelity simulators, the clinical staff experiences real-time feedback of their decisions and interventions in the form of changes in the mannikin's "responsiveness," vital signs, prognosis and outcome. Published studies have shown that the use of simulation to teach and update PALS results in improved cognitive performance.[24] Furthermore, research regarding the use of "boosters," where providers receive a brief refresher and practice at the bedside, has been shown to improve the quality of BLS skills in simulated arrest scenarios.[25]

In situ simulation, in which portable mannikins are transported into actual clinical environments, has also been recently been used to directly evaluate clinical settings and systems, to optimize patient care and minimize potential adverse events.[23] Simulation is currently being used in the Hasbro Children's Hospital ED, through an ongoing relationship with the Lifespan Medical Simulation Center, to train multidisciplinary teams caring for simulated pediatric patients within the resuscitation room (**Figure 1**). The focus of these sessions includes the practice of infrequently used skills and behaviors as well as the ongoing assessment of the clinical systems that are involved in caring for these patients in a safe, timely and effective manner.

Pediatric Resuscitation: Where are we headed?

One of the interventions that has been shown to improve outcomes in adults after cardiac arrest is therapeutic hypothermia. During cardiac arrest there are significant derangements in perfusion resulting in ischemic, metabolic and inflammatory changes that continue even after return of spontaneous circulation. Although there have been randomized controlled trials of therapeutic hypothermia showing improved survival with good neurologic outcomes in adults and neonates, due to differences in pediatric physiology and the varying etiologies of cardiac arrests across the spectrum of ages, the findings from these studies cannot be directly translated to pediatric cardiac arrests. There are currently several major multi-center trials underway, involving two large federally funded pediatric clinical research networks (Pediatric Emergency Care Applied Research Network and the NICHD Collaborative Pediatric Critical Care Research Network), to evaluate the effect of therapeutic hypothermia in children after in-hospital and out-of-hospital cardiac arrests. After significant planning, the trial initiated in 2009, with a goal to enroll 900 patients over 6 years at approximately 37 clinical centers throughout the US and Canada.[26]

CONCLUSIONS

Important advances continue to be made in pediatric resuscitation, including the utilization of rapid response teams, changes in algorithms for the management of sepsis and cardiac arrest, ongoing research into new training methodologies for healthcare providers and new frontiers in post-resuscitation care. These developments have led to improved outcomes for children, and given the pediatric community a glimpse into the significant advances that are possible in the future.

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Disclosures

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Going with the Flow: Respiratory Care in the Pediatric Emergency Department

THERESE L. CANARES, MD; CRAIG TUCKER, RRT-NPS; ARIS GARRO, MD, MPH

ABSTRACT

Providers in pediatric emergency departments (ED) frequently encounter a variety of life-threatening respiratory illnesses. This article reviews current updates on the management and unique adjuncts for 3 common respiratory illnesses. Discussed first is bronchiolitis and the impact of high flow nasal cannula on reducing the need for intubation. Next, the current therapy for croup and the adjunctive use of Heliox and finally, the ED approach to asthma and treatment with breath actuated nebulizers.

KEYWORDS: pediatrics, respiratory care, bronchiolitis, asthma, croup

BRONCHIOLITIS

Bronchiolitis is a lower respiratory tract illness that produces acute inflammation, edema, and necrosis of epithelial cells lining small airways, leading to increased mucous production and bronchospasm.[1] In winter, bronchiolitis is the number one reason infants are admitted to hospitals and a significant portion of infants is cared for in Hasbro Children's Hospital Emergency Department (HCH ED).

The HCH ED follows the American Academy of Pediatrics (AAP) bronchiolitis management recommendations, which emphasize the importance of clinical assessment and supportive care.[1] Noninvasive interventions are the first line approach to bronchiolitis. Infants are suctioned (by bulb or suction catheter) and repositioned to improve airway patency. The impact of bronchiolitis on infant feeding and hydration can be significant. Infants unable to tolerate milk products or with mild dehydration may attempt oral hydration with Pedialyte. Patients admitted may receive nasogastric tube feeding if there is moderate dehydration or mild respiratory distress during feeds. This provides enteral nutrition and hydration while minimizing trauma. Intravenous hydration is reserved for infants with moderate to severe respiratory distress or dehydration.

As per AAP guidelines, bronchodilators may be given as a trial with observation for positive clinical response but are not routinely repeated unless there is clinical benefit. Similarly, corticosteroids are not routinely used in the management of bronchiolitis given the insufficient evidence to improve length of stay or clinical score.[1] A novel therapy for bronchiolitis is nebulized 3% hypertonic saline. The saline concentrate causes osmotic movement of water from the pulmonary interstitium into the airways, thereby decreasing interstitial edema and viscosity of intraluminal mucous. The preliminary evidence shows mixed results with some reports of decreased length of stay and others showing no clinical effect. There are no studies that demonstrate impact of emergency department visits. All studies on hypertonic saline report no harm or adverse effects.[2-4]

Despite interventions, some infants with bronchiolitis have persistent respiratory distress that requires additional support such as high flow nasal cannula (HFNC). HFNC provides heated, humidified airflow via a wide-diameter cannula. The shorter, wider nasal prongs provide increased flow at lower resistance than traditional nasal cannulas, and humidification prevents desiccation of the nasal mucosa that can occur with high flow rates. It serves as an alternative form of respiratory support than nasal continuous positive airway pressure in infants.[5]

HFNC has revolutionized the management of infants with moderate to severe bronchiolitis, often removing the need for intubation. HFNC has been studied in infants with bronchiolitis in the emergency department (ED), pediatric intensive care unit (PICU), and pediatric ward settings.[6-8] The primary indication to initiate HFNC is moderate to severe respiratory distress in infants, based on tachypnea, hypoxia, and accessory muscle use. HFNC significantly increases median SpO_2 by 1-2%, decreases end tidal CO_2 by 6-8 mmHg, and decreases respiratory rate by 13-20 breaths per minute, as compared to standard nasal cannula.[8] This adjunct therapy improves heart rate and respiratory rate within 60-90 minutes, and therefore HFNC in bronchiolitis may decrease the need for intubation.[5] After institutional guidelines for HFNC use were implemented for infants in one ED there was 83% reduction in the number of intubations.[7]

There are preliminary data that children with bronchiolitis benefit from use of Heliox. Heliox is a gaseous mixture of helium and oxygen and is frequently combined in 80%/20% or 70%/30% ratios. Helium's property of lower density leads to laminar flow of inspired gas across a narrowed airway, and therefore improves oxygen delivery particularly in upper airway obstructive processes.[9] Carbon dioxide diffuses through helium 4-5 times faster than through air, thus Heliox improves gas exchange at the alveolar level.[9] In infants with bronchiolitis, Heliox decreases work of breathing[9] and

improves respiratory scores particularly in the first hour of use.[10-12] Despite these improvements, Heliox use has not been shown to affect the rate of intubation or PICU length of stay.[11]

At the HCH ED, respiratory therapists supply HFNC with an oxygen blender using an institutional protocol of flow based on age (**Figure 1**). At this institution, HFNC is initiated for children ages < 6 months at 2-8 L/min, ages 6-18 months at 4-12 L/min, and ages > 18 months at 8-15 L/min. Rate of flow and fraction of inspired oxygen (FiO_2) is titrated to effect of improved work of breathing and maintaining SpO_2 > 92%. The majority of patients requiring HFNC are admitted to the PICU, except in high-patient volume months during the winter. Anecdotal data from the HCH PICU show a 50% decline in rates of intubation on patients started on HFNC since it became routinely used in 2009, as compared to 2012 (55 versus 27 patients, respectively).

CROUP

Croup, also known as laryngotracheobronchitis, is characterized by inflammation and edema of the subglottic area causing hoarseness, barking cough, and in some cases inspiratory stridor. Croup is often preceded by symptoms of an upper respiratory tract infection, frequently caused by viral pathogens, parainflueza or influenza.[13,14] Patients with croup frequent EDs due to the acuity of onset of stridor and respiratory distress, particularly during the night.

The first line of treatment for croup is glucocorticoids. Glucocorticoids have demonstrated improvement in croup scores at 6 and 12 hours, decreased return visits or readmissions, and decreased ED and hospital length of stay.[14] Glucocorticoids reduce the subglottic swelling and inflammation, thereby improving respiratory effort. Children with inspiratory stridor and respiratory distress due to croup are treated with nebulized racemic epinephrine which causes upper airway vasoconstriction and therefore decreasing edema. It improves croup scores by 30 minutes post-treatment, although no significant improvement is seen at 2 or 6 hours post treatment.[15] The HCH ED utilizes dexamethasone routinely in patients with croup, and nebulized racemic epinephrine in those with distress, followed by a 2-4 hour observation period for recurrent stridor or respiratory distress.

Children with refractory croup may benefit from Heliox. Heliox improves respiratory scores in children with croup, and has similar efficacy to racemic epinephrine, without the adrenergic side effects.[9,13,16,17] The major impediment to Heliox use is hypoxia because of the limited FiO2 that can be achieved due to a high concentration of helium versus oxygen. In addition, the tanks and blenders are cumbersome, and require knowledge of the equipment, thus limiting use to respiratory therapists. Heliox is therefore best used as an adjunct in croup for children with medical conditions that may be exacerbated by racemic epinephrine use, or those with persistent stridor despite multiple doses of racemic epinephrine.

Heliox is supplied by the respiratory therapy department at Hasbro Children's Hospital, and is typically used with HFNC prongs in infants or non-rebreather facemask in children (**Figure 2**). The helium:oxygen ratio is titrated to maintain normoxia and flow rate of nasal cannula is adjusted to improve respiratory distress.

Figure 1. The equipment setup for heated, humidified, high flow nasal cannula. Below: A comparison of the wider diameter of HFNC prongs to the standard infant/small child nasal cannula prongs.

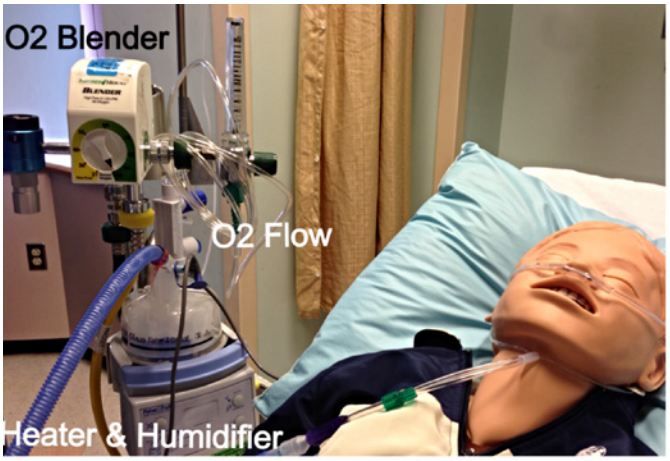
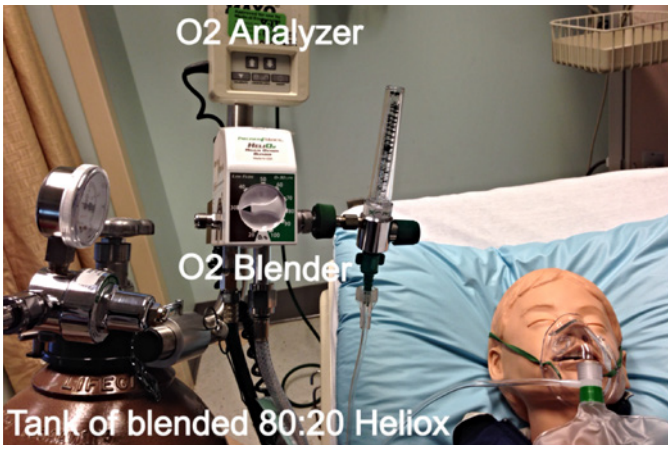


Figure 2. Depicted is the setup and equipment for Heliox, applied with a non-rebreather mask.



ASTHMA

Asthma is a chronic condition of airway inflammation and hyperreactivity, and is a frequent reason for ED visits. Beyond treating acute asthma exacerbations, the HCH ED serves as an alternative setting to initiate education and improve primary care linkage for children with poorly controlled asthma.

HCH ED providers treat asthma as recommended by the National Heart, Lung, Blood Institute (NHLBI) guidelines. Nebulized albuterol and ipratropium (Duoneb) are used for initial management of moderate-to-severe asthma exacerbations, and are administered with breath-actuated nebulizers (BANs).

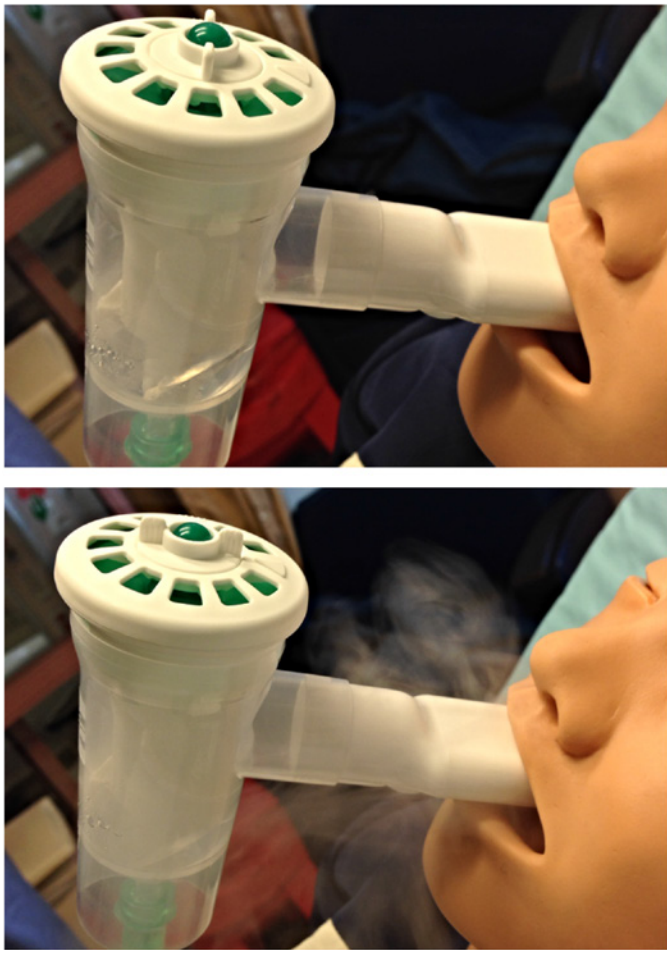
BANs have been introduced in the last 10-15 years for efficient nebulized medication delivery for patients with asthma. When used in the appropriate clinical scenarios BANs are cost effective. BAN devices deliver aerosol particles at the onset of inhalation, thus limiting the loss of aerosol during exhalation.[18,19] Only 4% of medicine is lost to the environment versus > 30% with the conventional nebulizer.[20] Randomized pediatric trials of conventional nebulizer versus BAN during asthma exacerbations demonstrated superior results of BAN on asthma scores, respiratory rates, spirometry, oxygen saturation, length of stay, and admission rates.[18,21] BANs can be used with a mouthpiece for older children, or tight-fitting facemask for the younger child and are routinely utilized for children of all ages with asthma in the HCH ED (**Figure 3**). Due to more effective medication delivery children are reassessed after each nebulized treatment to determine need for further treatments.

For infants who are unable to generate enough force to deliver the aerosol, the nebulizer may be converted to continuous administration with a twist of the top of the device (Figure 3). Use of the BAN for continuous delivery, however, is not as cost effective as more traditional nebulizer delivery systems that provide continuous delivery. In older children with mild symptoms, multi-dose inhaler (MDI) with a spacer is administered. Observation of MDI use by ED staff provides an opportunity for education about administration techniques.

Management of acute asthma includes systemic corticosteroids to reduce airway inflammation in patients who do not completely respond to a single albuterol treatment. Oral prednisone or dexamethasone is utilized in patients who can tolerate oral medication, and IV methylprednisolone is reserved for severely ill or vomiting patients. Due to its 36-72 hour half-life, dexamethasone is often administered in 2 doses: day 1, and day 2 or 3. Children who do not respond to first-line therapies are typically given continuous albuterol and adjunctive treatments such as IV fluids, IV magnesium sulfate and those with significant distress may benefit from additional respiratory interventions such as Bipap or Heliox.

Heliox may improve medication delivery to obstructed airways in children with asthma by improving laminar flow, but the limited data available has not demonstrated consistent benefits.[9,23,24] One study showed improvement in asthma scores in the ED,[22] but other studies showed no difference in asthma scores or length of stay.

Figure 3. Depiction of Breath Actuated Nebulizer. Note that during exhalation the green ball in the center is raised (above), and during inhalation it becomes depressed, releasing nebulized medication (below). The white tabs on the top can be turned to change the mode from breath actuated to continuous nebulization.



Prior to discharge from the ED, steps are taken to maximize outpatient asthma management. HCH ED providers regularly communicate with the primary care provider, educate families on an asthma action plan, and if indicated, initiate inhaled corticosteroids or refer to the "Draw A Breath" program which is an innovative asthma education program that provides families with the knowledge and skills to manage asthma and serves over 800 families in Rhode Island.

CONCLUSION

Respiratory illnesses are common pediatric conditions that often require emergency treatment. Unique modalities are available in a tertiary pediatric emergency department for the care of children with 3 common respiratory illnesses:

bronchiolitis, croup and asthma. In addition to traditional guideline-based therapies, the HCH ED has incorporated several treatment adjuncts including HFNC, Heliox, and BANs. HFNC or Heliox use are currently limited to the hospital environment, however, BANs are a simple and cost-effective device that can be integrated into the primary care, urgent care, or community ED setting.

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'Not Just Little Adults' – A Pediatric Trauma Primer

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ABSTRACT

This article describes pediatric trauma care and specifically how a pediatric trauma center, like Hasbro Children's Hospital, provides specialized care to this patient population. The authors review unique aspects of pediatric trauma patients broken down into anatomy and physiology, including Airway and Respiratory, Cardiovascular Response to Hemorrhage, Spine Injuries, Traumatic Brain Injuries, Thoracic Injuries and Blunt Abdominal Trauma. They review certain current recommendations for evaluation and management of these pediatric patients. The authors also briefly review the topic of Child Abuse/Non-accidental Trauma in pediatric patients. Although Pediatric Trauma is a very broad topic, the goal of this article is to act as a primer and describe certain characteristics and management recommendations unique to the pediatric trauma patient.

KEYWORDS: pediatric trauma care, pediatric trauma center, non-accidental pediatric trauma

INTRODUCTION

Trauma is the leading cause of death and disability in children and adolescents, accounting for 1/3 of all Emergency Department (ED) visits in patients less than 15 years of age.[1] There are significant differences between adult and pediatric trauma patients including anatomic variations in size, body proportions and ossification of the skeleton, physiologic responses to injury, patterns of injury, and psychological, emotional and social needs. This paper reviews some of the unique characteristics of pediatric trauma patients and how specialized care at Pediatric Trauma Centers (PTC) benefits this population.

Pediatric trauma patients who receive care at PTCs have been shown to have improved outcomes.[2] PTCs have specialized infrastructure, medical staff, ancillary support personnel and medical equipment to specifically assess and treat injured children. The Pediatric Trauma Team at Hasbro Children's Hospital (HCH) is jointly led by board-certified pediatric emergency medicine physicians and pediatric surgeons. In 2012, injured patients represented almost 13,000 of the 50,000 patients treated in the HCH ED.

Injured pediatric patients arriving at the HCH ED are immediately triaged by skilled RNs who evaluate mechanism of injury, physiologic parameters, perform gross assessment of injuries and activate the trauma system. There is a tiered response based on the mechanism of injury and physiologic condition of the injured patient. All patients are evaluated by a pediatric emergency physician who works in concert with the pediatric surgical team. When pediatric trauma patients are hemodynamically unstable or have sustained injuries that put them at immediate risk of mortality without rapid treatment, the highest trauma response is activated. This tier of the pediatric trauma system includes the following resources: the presence of the pediatric trauma attending surgeon, pediatric anesthesia, and respiratory therapy, notification of the operating room, blood bank, laboratory, Pediatric ICU, chaplain and social work services.

All pediatric trauma patients are systematically assessed according to the Advanced Trauma and Life Support (ATLS) protocols[3] beginning with a primary assessment focusing on the "ABCs" – Airway, Breathing, and Circulation. Each component is assessed and secured by the physicians before moving to the next with the goal of immediately addressing and correcting physiologic derangements, such as hypoxia or hypotension that could result in secondary insult or death if not recognized and treated quickly. Once stabilized, a secondary assessment is performed with a complete head-to-toe physical exam and may include laboratory and radiologic evaluations. Examinations are repeated throughout the initial resuscitation period to assess response to treatment or evidence of physiologic deterioration. When the correct disposition is determined, the patient is then transferred from the ED to the operating room, inpatient bed, or discharged home.[3] For those patients admitted to the hospital, tertiary assessments are carried out to identify any other injuries that were not apparent during the initial evaluation.

UNIQUE ASPECTS OF PEDIATRIC TRAUMA PATIENTS

Airway and Respiratory Reserves

Hypoxia and inadequate ventilation are the most common causes of pediatric cardiopulmonary arrest following trauma, therefore, efficient and effective airway management is a critical aspect for pediatric trauma.[4] The unique features of infant and pediatric airway anatomy and respiratory physiology make airway management one of the most challenging

components of pediatric trauma care. Infants and small children have relatively large heads that may result in flexion of the neck and airway causing airway obstruction in the unconscious patient. Children also have small oral cavities, relatively large tongues, and a more anteriorly and superiorly positioned larynxes compared to adults, limiting visualization of the airway during interventions. Clinicians at PTCs are specially trained in pediatric airway management using appropriately sized equipment based on the patient's age and size. Advanced techniques such as video-assisted laryngoscopy are sometimes utilized to establish a secure airway while minimizing manipulation of the patient's head and neck. Once intubated, due to relatively short tracheas, pediatric patients are at increased risk of endotracheal tube displacement, either into the right mainstem bronchus or accidental extubation if the tube is under tension. Appropriately securing the tube, adequate, safe sedation and close monitoring when transferring pediatric patients can help prevent complications.[5]

Cardiovascular Response to Hemorrhage

Children are better able to maintain relatively normal blood pressure despite significant blood loss, compared to adults. Studies have shown that pediatric patients can maintain a perfusing pressure with up to 35-40% blood loss prior to becoming hypotensive.[3] Furthermore, infants and small children must increase their heart rates to increase stroke volume and improve cardiac output. Therefore, any interventions or medications that decrease heart rate may cause a rapid and detrimental loss of perfusion.

SPECIFIC INJURIES

Spine Injuries

Spine injuries are relatively uncommon in the pediatric trauma patient, with approximately 1000 spinal cord injuries occurring each year in the United States.[6] About one-half of patients with vertebral fractures have no neurologic findings. Conversely, some patients have spinal cord injuries without radiographic abnormality (SCIWORA), where the normal laxity of the soft tissues of the child's spinal column leads to damage of the spinal cord without fracture or ligamentous injury. Spinal immobilization is therefore recommended when there is concern for cervical spine injuries based on mechanism of injury or if the patient cannot be adequately assessed due to agitation or altered mental status. Immobilization can be done with a pediatric C-collar and a rigid backboard.

Physical exam and plain radiography are the standards of care in pediatric spine evaluation. Plain radiographs have a higher relative sensitivity for diagnosing cervical spine fractures in pediatric patients compared with adults because children do not have the degenerative orthopedic changes seen in adults.[7] A concerted effort should be made to reduce radiation exposure with pediatric patients, especially to sensitive tissues like the developing thyroid gland. If there is a concerning finding on plain films or high clinical suspicion for fracture, a selective CT is more sensitive than plain films and is recommended. In contrast to adults who are more likely to suffer lower c-spine injuries, most spinal injuries in young children involve the upper c-spine due to their relatively larger heads that create a fulcrum-like effect on the upper c-spine region.[8] If there is concern for ligamentous injury or SCIWORA, patients should be placed in an extended wear rigid collar and best evaluated in concert with a pediatric spine specialist and may require MRI.

Traumatic Brain Injury

Traumatic brain injury is the leading cause of death in pediatric trauma patients. While the best management is prevention, once the injury has occurred, it is critical to prevent secondary insult to the brain from hypoxemia and hypotension.[9]

Early establishment of a secure airway and close monitoring and management of the hemodynamic status of patients are paramount. Rapid sequence intubation (RSI) should be employed using medications selected for their adjunctive neurologic properties. Lidocaine premedication can minimize increased ICP. Etomidate also has neuroprotective properties through its effects on intracranial pressure, cerebral blood flow, and cerebral metabolic rate of oxygen consumption.[10] In addition, etomidate maintains blood pressure. Either polarizing or non-polarizing paralytics are acceptable; however, agents that are rapidly cleared are ideal as they have minimal impact on ongoing assessment of the neurologic exam. Hyperventilation is no longer recommended as a PaCO2 <35 mmHg may result in cerebral ischemia. The use of continuous end tidal CO2 monitoring is recommended, with a target between 35-38 mmHg. Head of bed elevation 30 degrees may also decrease ICP; however this has not been well studied in children. When there is evidence of elevated ICP, Mannitol and 3% hypertonic saline boluses may transiently decrease ICP.[11,12] Goals should be limited to initial stabilization and expedited transfer to a PTC. Delays in transfer for imaging beyond a chest x-ray should be avoided. If neuroimaging has been obtained, it is important to share the findings with the PTC prior to transfer and to ensure a copy of the images accompanies the patient.[3]

Luckily, up to 98% of head trauma is not severe. A recent large, multicenter study established guidelines with an online calculator, "The Pediatric Head Injury/Trauma Algorithm" to identify those patients who had a low risk of a clinically important traumatic brain injury.[13,14,15] These guidelines can help clinicians safely avoid unnecessary head CTs and radiation exposure in many pediatric patients.

Thoracic Injuries

Thoracic injuries are the second leading traumatic cause of death in children.[16] The ribs and sternum are not fully ossified until late in adolescence so the chest wall provides less

protection to underlying vital structures, thus a significant amount of energy is transferred to the lungs, heart and great vessels. The most common life threatening thoracic injuries are tension pneumothorax, cardiac tamponade, airway obstruction, open pneumothorax and massive hemothorax and all can be rapidly addressed in the ED.

Blunt Abdominal Trauma

Blunt abdominal trauma is the third most common cause of pediatric trauma deaths, but is the most common unrecognized fatal injury. Many serious abdominal injuries have non-specific or subtle external signs, so a systematic approach is important to avoid a missed diagnosis.[17,18] Splenic and hepatic injuries are the most common followed by renal, small bowel and pancreatic injuries. Children have very compliant chest and abdominal walls, and a relatively larger volume of viscera with less fat within a smaller AP diameter. As a result, the liver and spleen are less protected by the rib cage, placing them at increased risk of injury during blunt trauma. Common mechanisms include high-speed motor vehicle collisions, falls from greater than 20 feet, and direct blows to the abdomen (i.e., bicycle handlebar injury). Concerning exam findings include abdominal wall abrasions or bruising, seat-belt marks, tenderness or rigidity, distension, referred shoulder pain from diaphragmatic irritation, and emesis.[19] Abdominal wall bruising is a significant finding as one study of restrained children in MVCs found that those with a "seatbelt sign" were 232 times more likely to have intra-abdominal injuries than those without.[20]

The evaluation and management of pediatric blunt trauma has changed significantly in recent years. In addition to considering screening x-rays of the c-spine, chest and pelvis, screening laboratory studies may include CBC, type and cross, and urinalysis. LFTs, amylase and lipase are used selectively for patients who cannot give a reliable abdominal examination or if there is a concern for child abuse. Indications for CT scanning include >50 RBCs/HPF on urinalysis, LFTs >3 times normal, elevated pancreatic enzymes in the absence of facial trauma.[21,22,23] CT scanning should only be done in a hemodynamically stable patient.

Non-operative management (NOM) has been shown to be successful in >90% of solid organ injuries (liver, kidney, and spleen). It is preferable to preserve the spleen to allow for maturation of the immune system and to avoid the potential morbidity and mortality related to infection and sepsis. NOM for severe hepatic injuries may be complicated by bile leak or hemobilia, which can usually be managed with interventional radiology or endoscopic techniques. NOM should only be attempted under the direction of a surgeon in a facility with intensive care monitoring and the ability to take patients emergently to the operating room if they become unstable. Indications for operative management of solid organ injuries include: hemodynamic instability, persistent requirement for blood transfusions or evidence of bowel injury. Patients who remain hemodynamically unstable or are only transiently stable after resuscitation with crystalloid and blood should undergo exploratory laparotomy.

The FAST ultrasound exam (Focused Assessment with Sonography for Trauma) has been popularized for adult trauma patients. However, FAST has a low sensitivity (66%) in the hemodynamically stable pediatric trauma patient. A negative FAST does not exclude intra-abdominal injury, especially to retroperitoneal or hollow organs. A positive scan may suggest the need for CT, but it should not be used as the sole indication for laparotomy in children.[4]

Child Abuse/Non-accidental trauma

Victims of non-accidental trauma (NAT) present for medical care with a spectrum of trauma and non-trauma complaints. Over the past year, Hasbro Children's Hospital has cared for 236 children who are confirmed or suspected victims of child abuse injury and 4 deaths as a result of NAT. When evaluating and caring for pediatric patients, it is important to consider that young children are at increased risk of significant morbidity and mortality from child abuse, especially non-ambulatory infants and children. Risk factors for abuse include delayed medical care, injuries not consistent with the history or the patient's developmental stage, and unexplained bruising or oral trauma, especially in non-ambulatory patients. The HCH has a team of pediatric child abuse specialists at the Lawrence A. Aubin Sr. Child Protection Center. If NAT is suspected, medical documentation, radiographs and laboratory tests are critical components of forensic evaluations. Other children in a family may also be at risk, so involving law enforcement and child protective agencies (such as RI DCYF) to investigate the safety of the home is another important component in the management of these patients.

CONCLUSION

Pediatric injuries and trauma are common. As reviewed in this article, there are many differences between adult and pediatric trauma patients including anatomical, physiological, psychological, emotional and social. Understanding these differences and having a systematic approach to these patients is critical to providing excellent care, preventing secondary insult and avoiding oversight of potentially significant injuries. It is also important to understand how the specialized care at Pediatric Trauma Centers (PTC) can benefit this population of injured patients and when expedited stabilization and transfer to a PTC is the most appropriate disposition.

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Fear and Loathing in the ER: Managing Procedural Pain and Anxiety in the Pediatric Emergency Department

CHRIS MERRITT, MD, MPH

ABSTRACT

The pediatric emergency department can be frightening for children. Visits are unplanned, and frequently accompanied by significant emotional and physical distress. While treatment of pain and anxiety in children have been historically inadequate, the barriers to their treatment have largely been overcome through increased awareness, child- and family-focused care, standardized assessment, institutional safety protocols, and newer pharmacologic agents. The pediatric emergency physician is now a primary advocate for treatment of children's pain and anxiety and for the safe and appropriate use of procedural sedation. This article focuses on the treatment spectrum available for providing safe and effective procedural sedation, analgesia and anxiolytic therapy.

KEYWORDS: Procedural sedation, analgesia

INTRODUCTION

The pediatric emergency department (PED) can be frightening for children. Unplanned visits, family anxiety, illness and injury lead to significant emotional and physical distress. Historically, treatment of pain and anxiety in children has been poorly delivered.[1] Infants and children were once thought to experience pain differently from adults, or not at all. Physicians may be hesitant to prescribe stigmatized medications, such as narcotics, to children. A long-discredited belief that analgesia may mask important diagnostic findings is still widely held. During different stages of development, anxiety and pain can be difficult to assess in infants and children and are often underestimated.[2]

Thankfully, myths and stigma surrounding the treatment of pain and fear have been largely minimized. Using standardized assessment tools, newer pharmacologic agents, improved monitoring, institutional safety protocols, the pediatric emergency physician (PEP) now advocates for and provides analgesia, anxiolysis and procedural sedation for PED patients.[3] This article focuses on the treatment spectrum available for providing procedural sedation, anxiolysis and analgesia (PSA).

Assessment through the developmental lens

Pain is subjective, making self-report the preferred method of assessment. However, when combined with anxiety of an unfamiliar situation, pain is difficult to assess accurately in infants and children. Self-reported numeric pain scales, commonly used in adults, can be applied to older children and adolescents. Self-report pain scales such as the FACES or color analog pain scales may be used in pre-school and school-aged children.[4] For infants and toddlers, in whom self-report is not appropriate, a behavioral scale such as the Face, Legs, Activity, Cry, Consolability (FLACC) scale can be substituted.[5]

Developmentally disabled children, particularly those who are non-verbal, may display increased anxiety and maladaptive reactions to pain or anxiety. Observational pain scales are available to assess pain in these children, but frequently it is the caregivers who recognize subtle changes in state or behavior that indicate discomfort in their child. PEPs should actively enlist the partnership of the parents of non-communicative patients in the assessment and re-evaluation process in the PED.

Non-pharmacologic anxiolysis

Anxiety and pain are intricately interrelated. The approach to pain must include an appreciation of anxiety, and vice versa. Beginning with a non-threatening, child-friendly environment, gearing the PED toward child and family comfort is a first step toward minimizing children's anxiety. Environmental approaches, including pictures on the walls and ceiling and the availability of books, toys, and age-appropriate videos in PSA areas, provide comfort and therapeutic distraction to anxious patients and their families.

Table 1. Commonly-used pain assessment scales in the PED

Scale	Ages
Neonatal Infant Pain Scale (NIPS)	Newborns
Face, Legs, Activity, Cry, Consolability (FLACC)	Newborns to Age 7
Faces Pain Scale*	3 years and up
Non-Communicating Children's Pain Checklist	5 years and up, non-verbal or with developmental disability
Numeric Rating Scales (0-10, e.g.)*	7 years and up
Visual Analog or Color Analog Scales*	7 years and up

*Self-reported pain scales

Children fear the unknown, including the possibility of a painful procedure. While preschool and young school-age children are not likely to respond to reasoning or detailed explanation, emotional support at an age-appropriate level reduces pain and anxiety. Older children can be comforted by a reassuring explanation of anticipated procedures.

Child life specialists are a crucial part of the PED team, providing therapeutic methods of distraction, anticipation, coping and education.[6] These specialists use books, pictures, toys, music, video, guided imagery and other tools during preparation, procedure and recovery. In the absence of a dedicated specialist, ubiquitous smart phones and tablet computers allow PEPs to enlist parents or PED staff in providing child-centered distraction such as videos or music as an adjunct to PSA. Allowing family members to remain present during procedures reduces distress, especially if the family can be enlisted to guide the patient through the procedure.

Pharmacologic anxiolytics

Even painless procedures can lead to significant anxiety in children, sometimes precluding successful completion. Procedures for which analgesia will be necessary may also require treatment of anxiety. For instance, a child with a facial laceration will require local anesthesia, but may also benefit from anxiolytics during the delicate repair. In concert with non-pharmacologic techniques, medications specifically aimed at reducing anxiety can limit a child's distress and ensure successful procedure completion.

Benzodiazepines are the most commonly used anxiolytics in the PED. Midazolam has the advantages of rapid onset and relatively brief duration, and may be given by oral, intravenous (IV) or intranasal (IN) routes. The IN route, using an atomizer and syringe, provides rapid transmucosal absorption, which bypasses hepatic first-pass metabolism, making the medication immediately bioavailable.[7,8]

Table 2. Commonly-Used Anxiolytics in the Pediatric ED

	Dose	Route
Midazolam	0.5 mg/kg	PO
	0.1 mg/kg	IV
	0.2-0.4 mg/kg	IN
Nitrous Oxide	40-70%	Inhaled

Analgesia in the PED

In addition to assessment for pain in all PED patients, protocols that call for the timely administration of pain medications, even for less severe pain, allow for earlier management.[9] Triage and nursing protocols can identify patients with pain early in their ED stays, and oral medications such as ibuprofen, acetaminophen, and even oral or IN narcotics can be administered.

In addition to systemic analgesics, topical analgesia can be applied in anticipation of IV cannulation, laceration repair, lumbar puncture or other procedures. Early placement of topical anesthetics can shorten procedure time and improve results. Needle-free lidocaine powder or liquid and ethyl chloride vapocoolants can further reduce IV-associated pain, and a variety of products using vibration or cooling are reported to mitigate pain from IV insertion. Concentrated sucrose solution and non-nutritive sucking have been shown to decrease the pain response in neonates and young infants.

Topical anesthetics can also be applied in anticipation of wound closure. Lidocaine, epinephrine and tetracaine (LET) can be compounded in a liquid or gel and applied to lacerations, and offers effective anesthesia for many small wounds. Alternative repair techniques are considered for appropriate wounds; cyanoacrylate wound adhesive or adhesive "butterfly" bandages may be painless substitutes for sutures.

Local anesthesia is achieved using 1-2% lidocaine or 0.25-0.5% bupivicaine. Administration causes a brief but intense stinging sensation, which can be mitigated by buffering with

Table 3. Commonly-Used Analgesics in the Pediatric ED

	Dose	Route	Comments
Topical preparations			
LET (liquid or gel)	0.175 ml/kg max 3 ml	Topical	
EMLA or LMX_4	"Small Amount"	Topical	
Local anesthetics			
1% lidocaine with epinephrine	Minimal necessary	Injected within a wound	Injection causes stinging pain. Use epinephrine with caution in areas of terminal circulation. Max: 5 mg/kg of lidocaine
Non-narcotics			
Acetaminophen	15 mg/kg	PO, PR	Max 3g/day or 75 mg/kg/day
Ibuprofen	10 mg/kg	PO	Caution in anticoagulated patients, asthmatics
Ketorolac	0.5-1 mg/kg	IV, IM	Similar to ibuprofen. Max 15-30 mg
Nitrous oxide	40-70%	Inhaled	Avoid in intracranial injury, pneumothorax, bowel obstruction
Narcotics			
Morphine	0.1-0.2 mg/kg	IV, IM, SQ	Frequent histamine release, observe for respiratory depression
Hydromorphone	0.015 mg/kg	IV, IM	
Hydrocodone	0.2 mg/kg	PO	Typically available in combination with acetaminophen
Fentanyl	1-2 mcg/kg	IV, IM, IN	Rigid chest is a rare but severe side effect. IV formulation (50 mcg/ml) can be given intranasally

SQ = subcutaneous, IM = intramuscular, IV = intravenous, IN = intranasal

sodium bicarbonate, warming to room temperature, and administering the smallest necessary dose as slowly as possible. For small lacerations, a 1 ml insulin syringe allows a slowly titrated injection through a tiny 29-gauge needle, causing less distress than a larger syringe and avoiding using more anesthetic than necessary. When possible, regional blocks may provide a broader area of anesthesia with fewer injections.[10]

Opiates, morphine being the archetypal example, are the workhorses of ED analgesia, with rapid and generally predictable absorption and onset. Monitoring for respiratory depression is recommended, though typical doses are generally safe. Morphine may cause histamine release, with flushing and pruritus, nausea and hypotension, which are less common with synthetics such as fentanyl. Fentanyl has been associated with sudden onset of chest wall rigidity, which requires aggressive treatment, including respiratory support and muscle relaxation. Naloxone may be used for reversal, given at a dose of 0.1 mg/kg IV and repeated every 2-5 minutes.

An alternative to IV opiates is IN fentanyl. Like midazolam, fentanyl becomes rapidly bioavailable when administered to the nasal mucosa using an atomizer and syringe. It has relatively rapid onset, and is less irritating to the mucosa than is midazolam. IN fentanyl can be used for brief painful procedures (e.g., I&D) or as a bridge to definitive analgesia prior to IV access.[11,12] Fentanyl may also be effective when nebulized, though there is less data using this administration.

Sedation in the PED

There are situations when analgesia alone is inadequate to safely care for PED patients, and prudence calls for the use of sedation. Sedation can be achieved using a pure sedative without analgesic properties (e.g., for a radiographic procedure), a sedative with some analgesic properties (e.g., for suturing a laceration) or one with strong analgesic properties (e.g., for fracture reduction). As with any medication, the PEP must weigh risks and benefits in the context of a patient's history and needs.

PEPs have the training and skills, including emergency management of pediatric airways and resuscitation, necessary to safely manage the sedated child and any potential untoward effects of sedatives.[13-16] Although serious complications are rare, it is critical that sedation providers in the PED establish and adhere to institutional guidelines for training, credentialing and provision of PSA, and refresh this training to maintain familiarity with the medications and their appropriate applications.[14,16]

Ketamine is a dissociative anesthetic with sympathomimetic effects, providing analgesia and sedation but preserving airway reflexes and cardiovascular function. This makes ketamine an attractive sedative for painful procedures.[17] While ketamine may cause some increase in oral secretions, this side effect is rarely clinically significant, though some PEPs co-administer antisialagogues.[18] Ketamine's most serious adverse effect is laryngospasm, though this too is rare. Its most common side effect, however, is nausea, for which some practitioners provide empiric antiemetics. Occasionally ketamine is associated with a non-dose-dependent dysphoric emergence reaction, and is contraindicated in those with known psychosis.

Propofol is gaining traction in PEDs as a short-acting sedative-hypnotic whose rapid onset, short duration and antiemetic effect make it ideal for many procedures.[19] While it provides no analgesia in and of itself, it can be combined with ketamine or other analgesia to achieve excellent sedation for painful procedures. In fact, when mixed and co-administered with ketamine, the total doses of either medication can be reduced.[20] When provided as a constant infusion, propofol can provide prolonged post-intubation sedation for critically ill patients who can tolerate its modest lowering of blood pressure.

Like propofol, the barbiturates, including pentobarbital, provide sedation but little or no analgesia. Adverse reactions are rare, and primarily include symptoms related to hypoventilation.

Inhaled nitrous oxide is an effective sedative used alone or in combination with analgesics. It has a rapid onset, and

Table 4. Commonly-Used Sedative Agents in the Pediatric ED

	Dose	Route	Comments
Dissociative			
Ketamine	1-2 mg/kg	IV	IM dosing less predictable, may be associated with increased incidence of laryngospasm. Nausea is common. Emergence reactions may occur.
Sedative/Hypnotics			
Propofol	1-2 mg/kg, repeat doses of 0.5 mg/kg	IV	Little/no analgesia, hypotension common but not often clinically important
Pentobarbital	2-5 mg/kg	IV	No analgesia. Respiratory depression and hypotension possible
Inhaled agent			
Nitrous oxide	40-70% admixed with oxygen	Inhaled	Some analgesia. Nausea is common
Combined Medications			
"Ketofol" 1:1 mixture of ketamine/propofol	Starting dose of 0.5-1 mg/kg of each agent	IV	Unproven benefit over ketamine alone

once removed, its effects are reversed within seconds to minutes. It provides some analgesia, making it useful for brief painful procedures. Nausea and vomiting are common but tend to be brief. The drug requires a gas scavenging system, which may limit its use to specific locations within an ED.

There is evolving pediatric experience with newer sedatives such as dexmedetomidine, which appears promising, though it may require longer induction time than similarly effective agents such as propofol.[21]

CONCLUSION

Pediatric emergency physicians are uniquely positioned to advocate for and manage pain, anxiety and distress in sick and injured children throughout the ED experience. Untreated pain and anxiety are not excusable given our understanding of pediatric pain and its lasting effects. PEPs possess a unique understanding of the modalities for pain management – including but not limited to pharmacologic choices. The PEP should understand the relative safety and efficacy of each of these modalities and should be prepared with a systematic approach to pediatric pain.

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Disclosures

None

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Multicenter Pediatric Emergency Medicine Research and Rhode Island

THOMAS H. CHUN, MD, MPH

ABSTRACT

Multicenter clinical research studies are often needed to address issues of generalizability, conditions with low incidence, adequate statistical power, and potential study bias. While pediatric research networks began work in the 1950s, and Rhode Island physicians have contributed to many of these studies, pediatric emergency medicine (PEM) collaboratives are relative newcomers. Since the mid-1990s, Rhode Island pediatricians have contributed to multicenter studies of diabetic ketoacidosis, bronchiolitis, asthma, quality of PEM care, meningitis, brief interventions for substance use disorders, point-of-care ultrasound, and pre-hospital triage protocols.

In 2011, Rhode Island Hospital joined the Pediatric Emergency Care Applied Research Network, the first federally funded pediatric emergency medicine network of its kind. Its mission is to perform high quality, high impact PEM research. Since joining the network, Rhode Island Hospital has quickly become a productive and valued member of the network, portending a bright future for multicenter PEM research in the Ocean State.

KEYWORDS: pediatric, multicenter, research, PECARN

THE NEED FOR MULTICENTER PEDIATRIC RESEARCH

High quality medical research must successfully address many challenges. Single-center studies frequently encounter problems with generalizability as patient, geographic, and socioeconomic factors frequently bias results. Such studies may also suffer from lack of statistical power, to either definitively answer a clinical question or provide estimates with reasonable statistical confidence. Pediatric research often faces the additional conundrums of conditions or outcomes with low incidence, a wide range of severity of illness or injury, and the ethical, legal and logistic considerations of obtaining assent and consent of minors and their parents. All of these factors complicate and pose barriers to rigorous pediatric studies.

Multicenter studies offer a potential solution. The benefits of multicenter trials include the ability to recruit a larger number of and more diverse participants from a variety of geographic locations, and the possibility of evaluating the effect of practice variation between sites. It is likely that genetic, ethnic, environmental, psychosocial, and cultural factors all make significant contributions to observed medical phenomena. Multicenter trials may be the only method for properly investigating these effects, and providing robust, generalizable clinical data.

The first national pediatric multicenter networks were formed by oncologists in the 1950s, rheumatologists in the 1970s, and neonatologists in the 1980s. To address research in primary care settings, regional pediatric research collaboratives formed in Rochester, NY, and Chicago, IL, in the 1970s and 1980s respectively, ultimately resulting in the formation of the PROS (Pediatric Research in Office Settings) by the American Academy of Pediatrics (AAP) in 1985.[1] Since their inception, Rhode Island pediatricians and investigators have contributed to numerous studies in the neonatology, hematology-oncology and PROS networks, and have recently begun to collaborate with critical care networks as well.[2,3]

Multicenter Pediatric Emergency Medicine Research

Beginning in the mid-1990s, members of the AAP's Section of Emergency Medicine formed the Pediatric Emergency Medicine Collaborative Research Committee (PEM-CRC), which has subsequently produced numerous multicenter studies, on broad ranging topics, from career satisfaction, diabetic ketoacidosis, infectious diseases, and cardiac arrhythmias, to appendicitis clinical prediction rules.[4-10] To further address the need for and challenges of high quality pediatric emergency medicine research, in 2001 the Emergency Medical Services for Children (EMSC) branch of the Maternal and Child Health Bureau of the Health Resources and Services Administration (HRSA) funded proposals to "demonstrate the value of an infrastructure or network…to conduct investigations on the efficacy of treatments,…including those preceding the arrival of children to the hospital." As a result of this request, the Pediatric Emergency Care Applied Research Network (PECARN) was born.[11,12]

Table 1.

PECARN Nodes and Sites	
GLEMSCRN **Great Lakes EMSC Research Network** • University of Michigan, Ann Arbor, MI • Children's Hospital of Michigan, Detroit, MI • Nationwide Children's Hospital, Columbus, OH	HOMERUN **Hospitals of the Midwest Emergency Research Node** • Cincinnati Children's Hospital, Cincinnati, OH • Washington University, St. Louis, MO • Children's Hospital of Wisconsin, Milwaukee, WI
PEM-NEWS **Pediatric Emergency Medicine-Northeast, West & South** • Children's Hospital of New York, New York, NY • Children's Hospital of Colorado, Denver, CO • Texas Children's Hospital, Houston, TX	PRIME **Pediatric Research in injuries and Medical Emergencies** • University of California, Davis, CA • Children's Hospital of Philadelphia, Philadelphia, PA • Primary Children's Medical Center, Salt Lake City, UT
PRIDENET **Pittsburgh, Rhode Island, Delaware Network** • Children's Hospital of Pittsburgh, Pittsburgh, PA • Hasbro Children's Hospital, Providence, RI • A.I. duPont Hospital for Children, Wilmington, DE	WBCARN **Washington, Boston, Chicago Applied Research Node** • Children's National Medical Center, Washington, DC • Children's Hospital of Boston, Boston, MA • Lurie Children's Hospital, Chicago, IL
CHaMP E-RNC **Charlotte, Houston, Milwaukee Prehospital EMS Research Node** • Milwaukee County EMS, Milwaukee, WI • Mecklenburg EMS Agency, Charlotte, NC • Houston Fire Department EMS, Houston, TX	

PECARN emergency departments (ED's) currently care for over 900,000 children and adolescents annually, with over-representation of minorities and underserved populations. Since its inception, PECARN has produced more than 150 publications, abstracts and presentations at national meetings.

PECARN's infrastructure funding has been renewed three times by HRSA. In the most recent funding cycle of 2011, PECARN reorganized to 18 major academic pediatric centers across the country, centered around 6 research "nodes," each consisting of 3 affiliated hospitals. An entirely new node was added, PRIDENET – the **P**ittsburgh, **R**hode **I**sland, and **De**laware **Net**work, marking Hasbro Children's Hospital and Brown University's entry into PECARN. Since joining PECARN, Hasbro Children's Hospital has quickly become a high performing site, consistently enrolling high percentages of eligible participants and contributing high quality data on these participants. The most recent addition to PECARN was a demonstration EMSC node in 2013.

The formation of the AAP's PEM-CRC and PECARN subsequently spawned similar organizations across the world, including PERC (Pediatric Emergency Research Canada),[13] PREDICT (Pediatric Research in Emergency Departments International Collaborative Australia and New Zealand),[14] and REPEM (Research in European Paediatric Emergency Medicine).[15] In 2009, these networks joined together to form the consortium of PERN, Pediatric Emergency Research Networks.[16,17] Together, PERN ED's care for over 2 million pediatric patients per year, in over 100 hospitals, in 4 of the 6 World Health Organization regions. They also recently published their first global pediatric emergency research study.[18]

While PECARN and other research networks offer the potential of an increased participant pool, multicenter networks face important challenges, including the possibility of variations in data collection, inter-rater reliability, protocol compliance, and the significant expense of maintaining such networks. Multicenter studies are complex and time-consuming undertakings, requiring painstaking preparation, detailed, comprehensive, and unambiguous study protocols, clearly delineated roles and responsibilities of study personnel, and coordinated IRB approval across multiple institutions. The success of networks hinge on all sites having adequately trained and committed research personnel, who collect and transmit study data in a timely and efficient manner.[1,19]

RHODE ISLAND'S CONTRIBUTION TO MULTICENTER PEDIATRIC EMERGENCY MEDICINE RESEARCH

Since joining PECARN, we have participated in 4 exciting studies, each of which has the potential to revolutionize care of children and adolescents.

RNA "Biosignatures" for Febrile Infants

Neonates with fever are at increased risk of serious bacterial infections (SBI), and routinely undergo invasive testing

of blood, urine, and cerebrospinal fluid. Because current laboratory testing strategies cannot rapidly or consistently distinguish which patients have bacterial or viral illnesses, many infants are admitted for 24-48 hours of observation. Assessing host response to infections may be an accurate, ground-breaking and novel method for determining the etiology of a febrile infant's fever.[20] Microarray analysis of very small amounts of blood, in which "biosignatures" of transcriptional leukocyte RNA may reliably differentiate between bacterial and viral pathogens.

Figure 2 is an example of such biosignatures.

Figure 2.

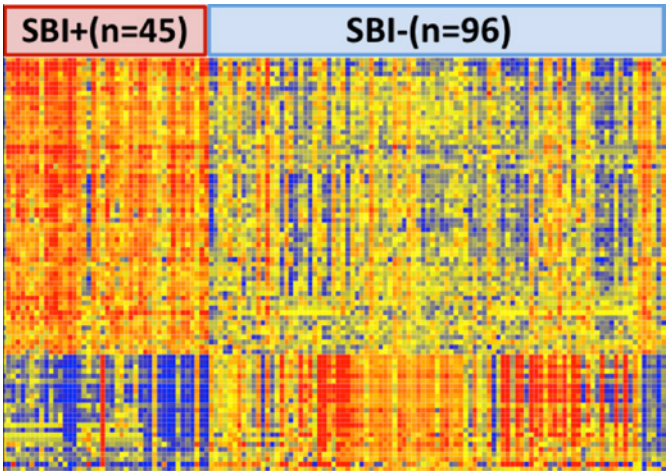

Image courtesy of Prashant Mahajan, MD, MPH, MBA

Each column represents an individual patient, each row represents a different leukocyte indicator gene. The red color signifies over-expression of a gene, while blue color indicates under-expression of that gene. As is easily seen in the picture, SBI-positive and SBI-negative patients appear to have very different biosignatures. Preliminary analyses (personal communication from study investigators) suggest that bacterial infections over-express inflammatory genes and under-express interleukin genes, while viral infections have the opposite pattern. If validated, this technology may dramatically alter how febrile neonates are evaluated and managed.

Diabetic Ketoacidosis and Cerebral Edema

Cerebral edema (CE) is a well known and the most feared complication of diabetic ketoacidosis (DKA).

Old studies suggested that intravenous (IV) fluids were the underlying cause of cerebral injury in DKA. However, DKA research from the last decade has shown that IV fluid administration is not associated with CE. Cerebral hypoperfusion and reperfusion injuries play a key role in DKA-related brain injury. A wide spectrum of CE is often present both before and during treatment for DKA. Neurologic symptoms can be present in the absence of radiologically detectable CE, and even mild DKA may result in long-term neurocognitive deficits.[21]

Based on these data and to address this vexing question, PECARN is currently investigating whether the type and rate of IV fluid administration affect both short- and long-term neurocognitive outcomes of DKA (National Institute of Child Health and Human Development, U01 HD062417). Utilizing a 2x2 factorial design, the study varies the amount of IV fluids given (10 vs 20 cc/kg initial bolus), the rate at which they are given (rapid deficit replacement over 36 hours vs slower replacement over 48 hours), and the type of IV fluid (0.45% vs 0.9% saline). The primary outcome of the study is the occurrence of Glasgow Coma Scale < 14 (15 being normal); the secondary outcomes are incidence of overt CE, and neurocognitive assessments while hospitalized and at 3 month follow-up. The study has a planned enrollment of 1,500 participants. When completed, this study will likely contribute significant, robust data towards answering the question of whether any of these IV fluid regimens either exacerbate or protect against DKA-related cerebral injury.

Figure 3. Diffusion weighted MRI, cytotoxic cerebral edema.

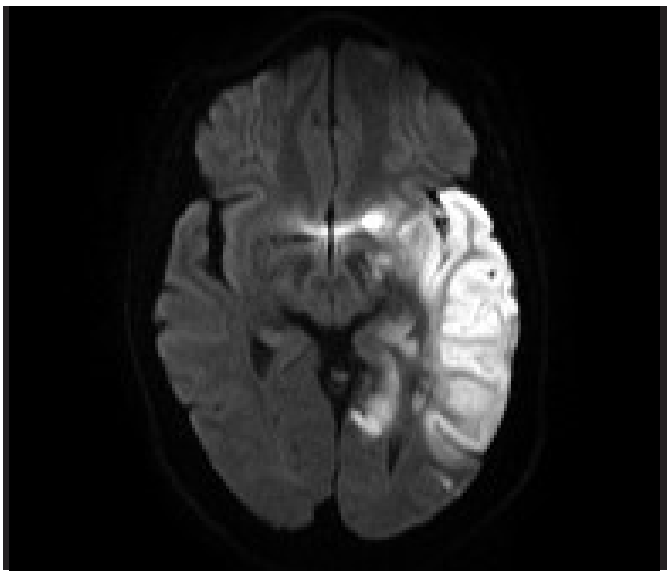

Image courtesy of Jerrold Boxerman, MD and Jeffrey Rogg, MD

PECARN Core Data Project

While many federal agencies collect epidemiologic data on emergency department visits, pediatric specific data has been lacking. To address this deficit, from 2002 to the present, PECARN has compiled data on all patient visits to participating ED's into a single database, the PECARN Core Data Project (PCDP). Using PCDP data, PECARN has been able to drill down into its specific epidemiologic database and perform more granular epidemiologic analyses as compared to other large database studies of pediatric ED visits, identifying patterns related to patient age (e.g., ED visits, hospital admission, and mortality) and the most common conditions for which patients sought care (i.e., infectious diseases, asthma, and mental health conditions).[22,23] Such data is important in helping inform institutions with needs assessments

and resource planning, providing a rigorous basis for epidemiologic reporting and research, as well as developing clinically and epidemiologically sensible diagnostic grouping systems for ED visits by children and adolescents.[24]

PECARN investigators currently seek to advance the use of clinical and epidemiologic data, by extracting more detailed information from electronic health records (Agency for Healthcare Research and Quality, R01 HS020270). The aims of this study are to identify variation in clinical performance and outcomes, with the ultimate goal of improving both patient and quality of care by identifying clinically relevant, evidence-based benchmarks and vastly improving the evaluation of healthcare delivery. If successful, the project would also represent a quantum leap forward in the abstraction of clinical data from electronic health records.

NIAAA Two-Question Screen

Alcohol use is a significant contributor to adolescent morbidity and mortality. It may result in long-term anatomic and neuropsychologic changes and is a strong predictor of adult alcohol use disorders. Given this public health burden, in 2011 the National Institute of Alcohol Abuse and Alcoholism (NIAAA) developed and published a practitioner's guide to assist pediatricians in screening for and intervening in adolescent alcohol use.[25] NIAAA recommends asking adolescents two simple, brief questions about their alcohol use and their friends' experiences with alcohol. NIAAA also believes that these two questions may also reliably predict risk of other substance use and problem behaviors.

The 2 questions as well as the NIAAA practitioner guide can both be downloaded for free from NIAAA at: http://www.niaaa.nih.gov/Publications/EducationTrainingMaterials/Pages/YouthGuide.aspx

To further validate the NIAAA two-question screen and to investigate whether it has predictive ability for other adolescent risky behaviors, shortly after publishing their practitioner's guide, NIAAA released a funding opportunity (RFA-AA-12-008) to study these questions. Utilizing the PECARN network, James Linakis PhD, MD, and Anthony Spirito, PhD, researchers at Rhode Island Hospital and Brown University respectively, received one of these awards (NIAAA, R01 AA021900). The NIAAA two-question screen is currently being tested in 16 PECARN EDs, with a planned study enrollment of 5,000 adolescents, 1,600 of whom will be followed for 2 years. This study will capture a broad cross-section of U.S. adolescents and will generate very robust and generalizable data in terms of age, gender, race and ethnicity, level of alcohol use, and geographic diversity. If valid screening tools are identified, this study has the potential to offer pediatric practitioners a rapid and efficient method for identifying high-risk adolescents.

CONCLUSION

In just a few short years, pediatric emergency medicine research in Rhode Island has significantly grown. Diverse studies, with the potential to dramatically change and improve clinical practices, are now being performed in our state. Joining the PECARN network is an exciting opportunity to continue this growth in research productivity, as well as for new collaborative studies.

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Disclosures
None

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Driving Policy after Seizures and Unexplained Syncope: A Practice Guide for RI Physicians

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ABSTRACT

Physicians in Rhode Island sometimes find it difficult to advise patients about returning to driving after they present with a seizure or syncopal episode due to lack of statutory or professional guidance on the issue. We provide an overview of the medical literature on public policies and recommendations regarding driving after seizures or syncope. We also present the laws in Rhode Island regarding physician notification of the medical advisory board of the Department of Motor Vehicles, legal obligations, and immunity from prosecution for those who report. Finally, we present the results of a survey of current practice by Rhode Island neurologists when they advise patients who have had a recent seizure or unexplained syncopal event. Based upon this information, we hope local practitioners are empowered in their decision making on driving restrictions and we hope this data informs future public policy efforts.

KEYWORDS: driving recommendations, seizures, unexplained syncope

INTRODUCTION

Many physicians find it difficult to prescribe driving recommendations to patients who present with seizure or unexplained syncope. Some of the questions that arise include: How long should drivers stay off the road? After prescribing restrictions, are physicians obliged to report this to state authorities? And if a physician chooses to notify the authorities, is the physician immune from prosecution for breaking confidentiality? The last review article on driving policies and physicians relevant to Rhode Island was published over a decade ago.[1] The current article provides an update to this review and reports the first survey of neurologists on their current driving-related practices in our state.

METHODS

Academic neurologists and members of the Rhode Island Neurological Society (RINS) and Rhode Island Neurology Association (RINA) were invited to participate in an online survey about driving recommendations post syncope or seizure. Different scenarios were created and physicians chose from six possible driving restriction durations: No restriction, 3 months, 6 months, 12 months, 18 months, other (with explanation). The questions asked are presented in **Table 1**.

RESULTS

According to RINS/RINA/AAN records there are approximately 60 practicing neurologists in RI, and most of them were contacted to complete the survey. Thirty neurologists, representing approximately 50% of practicing neurologists in Rhode Island, responded to the survey. As demonstrated in **Table 2**, in the setting of a first seizure with loss of consciousness, more than half of the respondents recommended a 6-month driving restriction irrespective of an identified seizure focus (70.0 %) or normal EEG and MRI (63.3%). Surprisingly, half (50.0%) of the surveyed neurologists were in favor of 6 months driving restrictions even with seizure presentations without loss of body control.

Respondents showed consensus when questioned about patients with nocturnal seizures. Eighteen neurologists representing 60% of respondents were in favor of a 6-month driving restriction; 16.7% (5) respondents chose "Other" and some of the explanations given included: "It depends how well established the nocturnal seizure pattern is;" "Do not drive at night;" and "If not first ever event and well documented only at night, would not restrict."

Table 1. Online survey questions posed to neurologists in Rhode Island. EEG: Electroencephalography, MRI: Magnetic resonance imaging

How would you advise a patient who:
Presents with a first seizure (complex partial or with loss of consciousness) but has a normal EEG and MRI?
Presents with first seizure (complex partial or with loss of consciousness) and has an identified seizure focus?
Presents with first partial seizure that does not affect awareness or bodily control?
Presents with only nocturnal seizures?
Is suspected of having psychogenic or non-epileptic seizures with loss of consciousness or bodily control?
Presents with unexplained syncopal episode with normal EEG and cardiac monitor?

For non-epileptic ("psychogenic") seizures the recommendations were equivocal (**Table 2**). Close to half of respondents advise a 6-month driving restriction (n=13, 43.3%) while one-fifth (20%) recommended a 3-month seizure-free period. Neurologists who selected "Other" explained: "It depends on the confidence in non-epileptic diagnosis;" "It depends on the suspicion for real seizures."

Table 2: Recommended duration of driving restrictions after syncope or seizure by neurologists in the state of Rhode Island.
LOC: loss of consciousness, EEG: Electroencephalography, MRI: Magnetic resonance imaging

Seizure/Syncope (% respondents)	Driving restrictions (Months)					
	0	3	6	12	18	Other
Seizure LOC/Normal EEG-MRI (n) %	(2) 6.7	5 (16.7)	(19) 63.3	(1) 3.3	(0) 0.0	(3) 10.0
Seizure LOC/ Identified Focus (n) %	(0) 0.0	(2) 6.7	(21) 70.0	(4) 13.3	(2) 6.7	(1) 3.3
Seizure/ Body Control (n) %	(5) 16.7	(4) 13.3	(15) 50	(2) 6.7	(0) 0.0	(4) 13.3
Nocturnal Seizures (n) %	(2) 6.7	(2) 6.7	(18) 60.0	(3) 10.0	0 (0.0)	(5) 16.7
Psychogenic/ Non-Epileptic (n) %	(3) 10.0	(6) 20.0	(13) 43.3	(2) 6.7	(1) 3.3	(5) 16.7
Unexplained Syncope (n) %	(8) 26.7	(5) 16.7	(8) 26.7	(0) 0.0	(0) 0.0	(9) 30

The recommendations for "unexplained syncope" were very varied. As shown in **Table 2**, 26.7% did not think a driving restriction was warranted while another 26.7% advocated for a 6-month seizure-free period. The variability in opinion was reflected by the observation that 30% of respondents chose "Other" and provided varying detailed explanations, including: "Patient needs cardiology evaluation;" "Medical advice is to avoid driving if episodes recur but no legal restriction on driving if living in RI;" "I will ask them to consult with their PCP, otherwise 6 months;" and, "Syncope is not common while sitting so would watch for a while."

Epilepsy and Driving Restrictions

Epilepsy refers to recurrent seizures which causes altered neurological function. States have varying driving restrictions in terms of seizure-free periods, varying between 3 and 12 months.[2] The optimal seizure-free period is still unknown. In a study by Krauss et al, longer seizure-free intervals, i.e. ≥6-12months, significantly reduced seizure-related motor vehicle accidents compared to shorter seizure-free periods.[3] A three-month seizure-free period compared to shorter ones demonstrated greater odds in reducing seizure-related MVAs; however, no statistical significance was seen. By comparison, in Arizona a 12-month seizure-free period failed to significantly reduce seizure-related car crashes and deaths compared to a 3-month criterion.[4]

The privilege to drive is regulated by the state division of motor vehicles (DMV). In neighboring Massachusetts, the recommendation is for a 6-month seizure-free period. In Rhode Island there are no regulations or state-published advisories regarding seizure-free periods. The Epilepsy Foundation of America's website references 18 months[5] for Rhode Island, which seems to have been an unpublished recommendation for Rhode Island in the past. At some point more than 20 years ago, Rhode Island switched from this uniform 18-month recommendation to a more flexible recommendation from the Medical Advisory Board (MAB) that determines driving restrictions on a case-by-case basis.[2] In light of this lack of clearly defined public policy in Rhode Island, the findings of our survey are highly relevant to informing decision making on driving restrictions. The majority of the neurologists in Rhode Island would restrict patients from driving for a 6-month period for any kind of seizure that involves loss of consciousness and/or loss of motor control adequate for driving.

National guidelines

How do these practices square with published guidelines from national medical associations? Two decades ago the American Academy of Neurology (AAN), American Epilepsy Society (AES) and the Epilepsy Foundation of America (EFA) in a consensus statement advocated for a more liberal 3-month seizure-free period.[6] However, in their landmark consensus paper they noted that factors such as: structural brain disease, uncorrectable brain functional or metabolic disorder, frequent seizure recurrence after seizure-free intervals and prior crashes caused by seizures could lengthen the duration. Favorable modifiers included seizures that do not interfere with consciousness or motor function, seizures with consistent and prolonged auras, established pattern of pure nocturnal seizures, and seizures related to metabolic states or illness that are unlikely to recur.

Overall it appears that the scientific evidence supports driving restrictions of 3-12 months duration, but not 18 months. However, it is very important that physicians use their clinical judgment in prescribing driving restrictions. The 30-year-old woman with a first idiopathic unprovoked seizure could be restricted from driving for 3 months, and this would be consistent with the recommendations of the Canadian Medical Association.[7] The middle-aged man with structural brain disease on anti-epileptic medication presenting with recurrent tonic-clonic seizures while driving would most likely require greater restriction such as 6 months or longer.

It must be noted that commercial drivers who use interstate roads present a different situation for advisement. These categories of drivers are governed by the Federal

Department of Transportation (DOT), whose regulations bar people with history of seizure or epilepsy from driving in interstate commerce at all, unless they have been off seizure medication and seizure free for 10 years. Interstate drivers with a single unprovoked seizure may be qualified in half that time (5 years) if they remain seizure free and off anti-epileptic drug (AED) therapy.[8] Intrastate commercial drivers are subjected to similar rules, as governed by individual states.

Most states do not predicate their driving and seizure policy upon use or non-use of AEDs. Instead, time from last seizure is the usual determinative factor, independent of AED use. This makes particular sense when considering the new-onset seizure patient. Only about 50% of such patients will become seizure-free after their first trial of an AED[9]; the proof of seizure-control must derive from observation over time. This lack of reliance upon AED status notwithstanding, it is understandably concerning when AEDs are being discontinued. It is therefore reasonable to encourage patients to stop or limit their driving for a period of time when AEDs are being tapered or stopped.[6,10] Since a breakthrough seizure temporarily negates a patient's ability to drive, ensuring the continuity of driving privileges is one compelling reason for many patients to elect to remain on AED treatment.

Syncope and Driving Restrictions

Syncope is defined as transient loss of consciousness due to hypotension. Neurally mediated (vasovagal) syncope is the most common type of syncope associated with driving.[11]

The American Heart Association (AHA) and the North American Society of Pacing and Electrophysiology (NASPE, now Heart Rhythm Society) have provided recommendations on driving restrictions after syncope.[12] In the setting of mild vasovagal syncope (syncope with prodrome or precipitating symptoms), no restrictions are required for private drivers while their professional counterparts should be restricted for at least a month. After severe syncope (reference to syncope with no clear precipitating factors or warnings), it is recommended that private drivers do not drive for at least 3 months (6 months for professional drivers) until treatment is established.

The European Society of Cardiology (ESC) taskforce on the management of syncope in 2009 also addressed the question of driving restriction. In private drivers who present with a mild or neurally mediated syncope, the ESC suggested that there is no need for driving restriction.[13] This is in line with the findings of Sorraja et al that the actuarial recurrence of syncope while driving is very low (0.7% at 6 months and 1.1% at 12 months).[11] In the setting of recurrent or severe syncope (which includes syncope during high-risk activities like flying or machinery operation), restrictions should be applied until effective treatment is established.[13]

Recommendations for driving restrictions related to various cardiac conditions are beyond the scope of this article, and readers are encouraged to read further in various reviews and editorials on the subject.[12,14] For unexplained syncope, many (including 26.7% of our surveyed neurologists) would suggest no restriction, unless there is absence of a prodromal occurrence or the presence of severe structural heart disease.

There is controversy regarding driving restrictions in patients with diabetes or recurrent hypoglycemia. At the moment Rhode Island has adopted no specific guidelines for restricting drivers with diabetes. In early 2013, the American Diabetes Association published a position statement on diabetes and driving.[15] They note that the relative risk of a motor vehicle accident in diabetics compared with non-diabetics is between 1.13 and 1.19. A recent history of severe hypoglycemia is the biggest predictor of motor vehicle accidents. Physicians should assess individual risks of patients and counsel them accordingly.

The Medical Advisory Board and Clinician Reporting

In Rhode Island, physicians are not mandated to report patients considered unfit to drive to the DMV. This is consistent with the American Academy of Neurology position statement on physician reporting of medical conditions.[6] The fear is that if made mandatory it will inhibit patients from discussing their seizure episodes with their physicians thus resulting in under treatment and higher public risks. In RI, physicians can voluntarily report drivers who they believe are impaired to safely operate a motor vehicle to the office of operator control of the DMV. This office forwards these recommendations to the MAB which is an advisory panel established pursuant to Section 31-10-44 of the Rhode Island General Laws. This board consists of a general practitioner, a neurologist, a psychiatrist, an optometrist, an orthopedic surgeon, a physician from the RI Department of Health, and two members of the public representing the elderly and the disabled. The board meets on the second Wednesday of every month to discuss referred cases. The Office of Operator Control of the DMV can be contacted at 600 New London Avenue, Cranston RI 02920, Telephone : 401-462-0802, Fax: 401-462-0830.

Rhode Island law provides for immunity from prosecution for physicians who report medically unsafe drivers. Per Rhode Island General Law 31-10-44(e), "Any physician or optometrist reporting in good faith and exercising due care shall have immunity from any liability, civil or criminal, that otherwise might result by reason of his or her actions pursuant to this section. No cause of action may be brought against any physician or optometrist for not making a report pursuant to this section."

CONCLUSION

Physicians should use their clinical judgment to determine driving restrictions in patients who present with a seizure. Based on the available (albeit limited) data, the restriction should range from 3-12 months depending on the clinical presentation and risk of recurrence. In light of our RI

neurologists' survey responses, the published literature, and the recommendations of national neurological organizations, a 6-month event-free restriction seems very reasonable for most patients who have had a seizure that impairs consciousness or that impairs bodily control (including similar psychogenic non-epileptic events). Physicians should be comfortable contacting the Office of Operator Control in the DMV when a patient potentially presents a risk of harm to self or to the public if the individual continues to drive despite the provider's recommendation to abstain from driving.

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Age and Consumer Product-Related Eye Injuries in the United States

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ABSTRACT

PURPOSE: The purpose of this study was to describe the epidemiology of consumer product (CP) related eye injuries presenting to US emergency departments (EDs) stratified by age.

METHODS: The Consumer Product Safety Commission's National Electronic Injury Surveillance System (CPSC-NEISS) database was used to derive national, weighted estimates of nonfatal Emergency Department visits for eye injuries by patients' age, gender, diagnosis, injured body part, locale of incidence, and related CP.

RESULTS: The CPs causing the highest proportion of injury visits varied among the different age groups: chemicals in the very young (0-4 yr), household items in 5-9 year olds, sports products in 10-24 year olds, cutting and construction tools in 25-64 year olds, and chemicals in the elderly (65+). Patients aged 0-4 also represented the age interval with the highest rate of injury visits (92 visits per 10,000).

CONCLUSION: This study identified the CPs responsible for the most eye injury visits by age groups. Further research is needed on how to effectively change the behavior of individuals and their environment so that we can minimize preventable eye injuries from consumer products.

KEYWORDS: consumer products, eye injury, emergency department (ED)

INTRODUCTION

Each year, more than 2.5 million eye injuries occur in the United States (US).[1] Consumer products (CPs) – defined as any articles produced or distributed for use by the public in or around a home, school or recreational area – are an important cause of eye injuries and contribute to more than 210,000 eye injury visits annually in the US.[2] However, the current characteristics of CP-related eye injuries are not well described in the US population. Specific age ranges,[3-5] a focus on a specific type of consumer product[6-9] or older data[10,11] have limited previous studies of CP-related eye injuries. More detailed information on CP-related eye injuries by age will assist in targeting high-risk products and implementing effective prevention strategies specific to appropriate age groups.

The purpose of this study was to describe the epidemiology of CP-related eye injuries presenting to US emergency departments (EDs), with a focus on identifying the highest injury-causing CP categories for different age ranges. Unlike previous studies that have used this database to examine eye injuries over all age ranges,[10,11] we used both the narrative and administrative data from each case record to describe and classify the CP-related eye injuries.

MATERIAL AND METHODS

Data source and population

The Providence VA Institutional Review Board exempted the protocol for this retrospective cohort study. The data source for this study was derived from the Consumer Product Safety Commissions' National Electronic Injury Surveillance System (CPSC-NEISS), a database created by the U.S. CPSC with the objectives of establishing product safety standards and identifying unsafe consumer products. The data are derived from a probability sample of 100 hospitals nationwide, which is representative of the estimated 5300 hospitals that include a minimum of six beds and a 24-hour emergency department in the United States and its territories. CPSC-NEISS data, through use of inverse probability weights, can be used to project national, weighted estimates of nonfatal injuries treated in US EDs. We reviewed data for all nonfatal eye injuries occurring in patients of all ages from 2002–2010.

CPSC data include information on patients' age, gender, diagnosis, injured body part, locale of incident, case disposition, and the CP causing the injury; each CP has a NEISS-specific code. Each case also includes a narrative component, which describes the injury. Data not provided in the NEISS include patient visual acuity, follow-up information, or comorbidities. For our study, all cases in which the injured body part was coded as "eyeball" met the criteria for analysis.

Data analysis

We reviewed data for all non-fatal eye injuries in patients of all ages from 2002-2010. Proportions of eye-injury visits were calculated by age, gender, diagnosis, disposition, and locale of incidents. To calculate proportion of CP injuries by age group, we took a stratified random sample of 500 cases from each age group (see Table 3 for age-group breakdown),

and two authors (AC and JC), used the narrative data associated with each case to classify the cause of injury. Any discrepancies in coding were revisited for correction, and uncertain products were placed in an "Other" category. Groups were then constructed to categorize the CPs causing eye injuries (Table 1), and the proportion of injuries from each CP category was calculated for all the age groups.

RESULTS

There were an estimated 119,800,205 CP-related injury visits to US EDs in patients ages 0 to 110 from 2002-2010; 1,903,269 involved the eye. Males comprised 69% of all eye-injury visits. Patients aged 0-4 were the five year age group with the highest percentage of ED-treated eye injuries (9.5%) (Table 1).

In Table 2, CPs are classified into 11 categories. Table 3 lists the frequency and proportion of eye injury visits in each CP category by age group; the CPs causing the highest incidence of injury in each age group are bolded. The majority of eye injury visits in patients aged 0-4 were caused by chemicals (37%). The CP categories responsible for the most eye injury visits in those aged 5-9 were household items (25%); for those aged 10-14, sports products (41%); for those aged 15-24, sports products (25%); for those 25-64, cutting tools and construction products (32%); and for those 65 and older, chemicals (23%).

Table 1. Estimated emergency department visits by age

Age	% of ED[a] Visits	National Estimates[b] n (95% CI)	Sample Size[c]
0-4	9.5%	181,367 (152,509-210,225)	7,178
5-9	8.1%	154,281 (130,106-178,456)	5,779
10-14	8.2%	155,744 (135,597-175,890)	5,574
15-24	17.1%	325,895 (281,984-369,806)	8,383
25-34	17.0%	322,722 (277,323-368,122)	7,367
35-44	16.4%	313,059 (265,835-360,282)	7,061
45-54	12.2%	231,329 (197,658-265,000)	5,211
55-64	6.7%	127,081 (107,023-147,140)	2,806
Over 65	4.8%	91,791 (74,546-109,036)	1,973
Total	100%	1,903,269 (1,648,723-2,157,815)	51,332

[a] Emergency Department

[b] Weighted frequencies projected by CPSC-NEISS

[c] Actual number of injuries reported by CPSC-NEISS

Table 4 contains the diagnosis of eye injuries. Contusions and abrasions were the leading diagnoses of eye injuries (44%), followed by foreign body injuries (19%) and conjunctivitis (10%). Of the injuries recorded with a specific locale of injury, the most common locale was at home (79%), followed by at a place of recreation or sports (8.8%) and at school (5.9%). The recorded disposition of 97% of ED eye injury visits was "treated and released."

DISCUSSION

This study describes CP-related eye injuries seen in US EDs from 2002 through 2010. The CPs causing the highest estimated number of eye injuries varied by age group and were in the categories of chemicals, cutting tools/construction, sports-related products, and household items.

In those aged 0-4 and 65+ years, chemicals were the leading cause of injury. The chemicals included cleaners, detergents, disinfectants, and various types of glue, soaps, and sprays. Chemical injuries in those aged 0-4 often involved cleaning products used and sprayed by siblings, others at home, or the patients themselves. Chemical injuries in those aged 65+ were often indirectly linked to the use of eye medication in the elderly, as patients often mistook a bottle of nail glue for their eye drop medication (See Figure 1). To minimize chemical injuries to infants and toddlers, the AAO recommends that chemical cleaners and sprays be securely placed out of reach of small children and be used minimally around them.[12] In the case of the elderly, to prevent confusion between eye drops/artificial tears and chemicals, bottle fonts could be enlarged so that the elderly can easily read labels despite pre-existing visual deterioration. Furthermore, since glue accounted for 8% of all chemical injuries in the elderly, an engineering strategy could involve glue bottle manufacturers changing the shape and/or feel of their glue bottles, as many elderly may not be able to read bottle labels prior to putting in eye drops due to preexisting visual deterioration.

Among those aged 5-9, household item products were the leading cause of eye injury. Some of these products include bags, boxes, paper, clothing, hair combs, clothes hangers, spoons, teapots, toys, and umbrellas. Since the injuries caused by these products were highly prevalent in children, injury rates could be lowered through better adult supervision and education on the proper use of these items. The AAO suggests avoiding toys such as darts, bows and arrows, and missile-firing toys, and being aware of common household items such as paper clips, bungee cords, wire coat hangers, rubber bands, and fishhooks, which can cause serious eye injuries. In addition, they suggest that parents provide adequate supervision when children handle potentially dangerous items, such as pencils, forks, and knives.[12]

Among those aged 10-24, sports-related products were the

Table 2. Consumer product categories

Category	Included Consumer Products
Chemical	acetic acid solution, algaecide concentrate, air freshener, battery acid, bleach, cedar stain, chlorine, cleaner, degreaser, deodorant, detergent, disinfectant, Febreeze, furniture polish, gasoline, glue, hair coloring dye, kerosene, nail polish, Oxyclean, paint, paint thinner, pepper spray, perfume, shampoo, shower cleaner, smoke, soap, stain remover, sunscreen, wasp spray
Furniture	bathtub, bed, bedrail, blinds, chair, clothes rack, couch, door, doorknob, drawer, dresser, floor, lamp, light fixture, mattress, nightstand, refrigerator, rugs, shelf, sofa, stairs, table, tub faucet, TV, TV stand, wall, window shade, wood chest
Cutting Tools & Construction	attic insulation, chain swing, cutter, driller, pipe, plaster, plastic decking, power grinder, sandblasting, saw, table saw, tent poles, tractor, trailer, welding tools, wood cutter
Gardening	gardening-tool related injury, hose, leaf blower, mower, mulch, plant stick, pressure washer, rake, sprinkler, trimmer, weed-wacker, wheelbarrow, wood saw (for branches)
Household Items[1]	basket, bed sheet, beer bottle, belt, book, broom, bucket, bungee cord, can, cardboard, carpet, CD, chopsticks, Christmas tree lights, cigarette, clothes, clothes line, clothesline, cork, crayon, cup, divider, drinking glass, eraser, flashlight, folder, fork, glass bottle, glass bowl, glass vase, hanger, jacket, key, knife, laundry basket, magazine, mailbox, metal rod, pan, paper, paper clip, pen, pencil, pillow, ribbon, rug, ruler, scissors, shower cap, spoon, staple, stapler, straw, tape, teapot, toothpick, towel, zipper
Toys	airsoft gun, balloon, eye patch, jigsaw puzzle, rubber dart, rubber snake, suction cup gun, toy arrow, toy unspecified
Appliances	air conditioner, antenna, ceiling fan blade, cellphone, computer, cord, curling iron, electric cord, electric toothbrush, fan, grill fan, hair curler, hair dryer, hot water heater, iron, key board, light bulb, radiator, radio antenna, sewing machine needle, slot machine, computer, telephone receiver, TV, vacuum
Household tools[2]	cord, hammer, ladder, nail, nail kit, nail gun, plier, rod, rope, screw, screwdriver, steel wool, stereo wire, tool box, tweezers, wrench, zipper
Sports-related products	air pistol, arrow, baseball, basketball, bike, exercise band, fishing pole, football, golf ball, golf club, gun, hockey, paintball, racquet, rifle, sinker, soccer ball, soccer net, soft gun, swimming, tennis ball, trampoline, treadmill, water polo
Glasses	Glasses, sunglasses, glass bottle, window
Other	4 wheel AV, 4-wheeler, amusement ride, artificial Christmas tree, ashes, bottle rocket, charcoal, clothes tag, compound bow, dog food, dust, exercise weights, fence, fence wire, filter, fire extinguisher, firecrackers, firework, fishing rod, foot, glitter, go-cart, graduation cap, laser beam, monkey bar, no narrative information, sandbox, scooter, slide, snowball, sparkle from Christmas decoration, sparkler, tennis court, toenail, trashcan lid, unknown, walker, window lock, yard sign

leading cause of eye injury. These products included baseballs, basketballs, air pistols, bikes, fishing poles, footballs, golf balls, clubs, paintballs, soft guns, tennis balls, among others. Those aged 10-14 had an especially high incidence of sports product-related injury; 41% of their eye injuries were due to sports products. Previous literature has shown that eye injury rates (# eye injuries/# participants) from sports were highest among participants of airsoft and paintball, basketball, football, and baseball.[13] Consistent with these findings, our study also revealed that sports injuries were mostly a result of being struck by a ball or high velocity projectiles from guns. According to the Eye Injury Snapshot conducted by the AAO and American Society of Ocular Trauma, more than 78% of people were not wearing eyewear at the time of sports injury, and of those reported to be wearing eyewear, only 5.3% were wearing safety or sports glasses.[14] Encouraging people (especially children beginning their sports careers) to habitually wear protective eyewear may help eliminate many of these sports product-related injuries. Such directives may most effectively come from parental enforcement: parents of children who are involved with paintball or BB gun battles should require their children to wear face masks prior to commencing gun battles and should prevent children from accessing these guns when they are not involved in an organized game (e.g., in the home setting). An enforcement strategy could be for paintball battle hosts mandating all participants to wear full-face masks prior to entering the battlefield.

Among those aged 25-64, the cutting tools/construction products were the leading cause of eye injury These products include drills, cutters, power grinders, saws, insulation, plaster, welding tools, among other construction products. Ocular injuries from these products were often due to high-velocity projectiles of metal, dust, concrete, and wood. The Vision Council recommends the use of protective eyewear while working in situations with higher risk of injury, such as auto repair, construction, electric work, and welding.[15] Some interventions that may encourage the use of eye protection may include use of media: for instance, the media can encourage 25-64 year olds to use eyewear when working with construction and cutting tools by promoting protective eyewear while marketing certain machine tools (e.g., We know that people in this age range often shop online or scavenge online reviews, so online product sites or

Table 3. Consumer product-related eye injuries by age group (in %)*

	0-4 yrs	5-9 yrs	10-14 yrs	15-24	25-44 yrs	45-64 yrs	>65 yrs
Chemical	**37.1 (30.8, 43.3)**	15.1 (10.3, 19.9)	15.5 (11.0, 20.0)	16.4 (12.4, 20.4)	16.6 (13.9, 19.4)	20.4 (17.4, 23.3)	**23.6 (19.2, 28.0)**
Furniture	11.3 (7.5, 15.1)	10.2 (6.2, 14.3)	4.1 (1.7, 6.6)	4.3 (2.1, 6.4)	3.7 (2.4, 5.1)	2.8 (1.8, 3.9)	11.0 (7.9, 14.1)
Cutting tools/ construction	1.8 (0.0, 3.6)	1.3 (-0.2, 2.9)	1.9 (0.3, 3.6)	25.0 (20.1, 29.9)	**34.7 (31.2, 38.3)**	**31.1 (27.7, 34.5)**	23.4 (18.9, 27.9)
Gardening	1.6 (0.0, 3.3)	2.2 (0.3, 4.1)	1.5 (-0.1, 3.2)	2.3 (0.6, 4.0)	5.4 (3.7, 7.1)	10.6 (8.3, 12.9)	12.9 (9.5, 16.3)
Household items	22.8 (17.8, 27.9)	**25.3 (19.8, 30.7)**	16.4 (12.1, 20.7)	13.0 (9.3, 16.7)	13.7 (11.2, 16.2)	15.0 (12.4, 17.6)	9.2 (6.3, 12.1)
Toys	11.3 (7.2, 15.4)	11.4 (7.2, 15.5)	7.4 (4.2, 10.6)	1.4 (0.2, 2.6)	1.0 (0.3, 1.6)	0.3 (0.0, 0.6)	0.1 (-0.1, 0.3)
Appliances	2.2 (0.5, 3.9)	0.9 (-0.3, 2.2)	0.7 (-0.2, 2.6)	2.2 (0.8, 3.5)	3.1 (1.8, 4.4)	3.8 (2.4, 5.2)	6.1 (3.5, 8.6)
Household tools	1.6 (0.0, 3.1)	2.6 (0.5, 4.6)	4.0 (1.5, 6.6)	3.9 (1.9, 6.0)	4.6 (3.0, 6.1)	2.8 (1.6, 4.0)	0.9 (-0.1, 2.0)
Sports-related product	2.3 (0.6, 4.1)	20.7 (15.5, 25.9)	**40.8 (34.7, 46.8)**	**25.4 (20.7, 30.0)**	8.4 (6.4, 10.4)	4.7 (3.1, 6.2)	1.5 (0.2, 2.8)
Glasses	0.7 (0.3, 1.7)	1.0 (-0.1, 2.2)	0.4 (-0.1, 1.0)	1.5 (0.2, 2.8)	2.7 (1.5, 3.9)	2.0 (1.0, 3.0)	2.3 (0.8, 3.9)
Miscellaneous	7.4 (4.1,10.7)	9.3 (5.5, 13.1)	7.2 (4.0, 10.4)	4.6 (2.3, 6.9)	6.1 (4.3, 7.9)	6.5 (4.8, 8.3)	8.9 (6.0, 11.8)
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* 95% confidence intervals are listed below each percent. The consumer product categories causing the highest percent of injury in each age group are bolded.

Table 4. Estimated emergency department visits by diagnosis

Diagnosis	% of ED[a] Visits	National Estimates[b] n (95% CI)	Sample Size[c]
Contusion/abrasion	44%	829,752 (715,569-943,935)	23,317
Foreign body	19%	357,546 (297,797-417,296)	7,989
Dermatitis/conjunctivitis	10%	192,591 (156,773-228,410)	4,949
Burns	6%	121,313 (98,625-144,000)	2,596
Chemical burn	4%	84,381 (68,136-100,626)	2,444
Hemorrhage	2%	45,231 (36,136-54,325)	1,461
Laceration/puncture	2%	39,908 (33,072-46,745)	1,340
Hematoma	.6%	11,727 (9,041-14,412)	285
Strain/sprain	.03%	616 (258-974)	16[d]
Nerve damage	.01%	323 (-22.9-669)	14[d]
Other/unknown	12%	219,881 (180,097-259,666)	6,921
Total	100%	1,903,269 (1,648,723-2,157,815)	51,332

[a] Emergency Department
[b] Weighted frequencies projected by CPSC-NEISS
[c] Actual number of injuries reported by CPSC-NEISS
[d] Numbers <20 are considered unstable by CPSC-NEISS

videos might show a demonstrator wearing eye protection while using the advertised power drill or metal grinder).

The study has several limitations. First, the NEISS database does not provide patient data on visual acuity, use of protective eyewear, or follow-up care, which prevented us from distinguishing the more severe ocular injuries from the minor ones. Second, only eye injuries treated in EDs were included; therefore, the total number of eye injuries may be underestimated and may be more likely to include the more severe cases (Severe injuries would more likely induce a patient to present to the ED). Third, narrative data were used to identify the CP causing each injury, which may have led to interpretation error. To minimize this error, any uncertain product was put in an "Other" category. Finally, due to small sample sizes within certain subgroups, we were unable to form statistically stable national estimates for some variables of interest. However, because of the large volume and variety of cases seen in EDs, the study most likely represents an accurate description of CP-related eye injuries across all age groups in the United States.

Figure 1. Nail glue vs. eye drops: which is which*?

*The leftmost item is nail glue, and the middle and right items are lubricant eye drops.

CONCLUSIONS

In conclusion, this study delineates the highest-risk CP categories by age group: chemicals in the very young (0-4 yr), household items in 5-9 year olds, sports products in 10-24 year olds, cutting and construction tools in 25-64 year olds, and chemicals in the elderly (65+). Characterizing this link between age and cause of CP-related eye injuries will assist in devising more effective interventions regarding the use of protective eyewear while working with higher risk CPs, whether they be through targeting young adults through internet media or minimizing elderly chemical injuries through encouraging glue bottle manufacturers to create more distinctive bottle designs to minimize confusion between chemicals and eye drops. Further research is needed on how to best change the behavior of individuals and their environment so that we can minimize preventable eye injuries from consumer products.

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Youth Homicide Deaths in Rhode Island, 2004–2012

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Youth homicide is a substantial public health problem in the United States, and has had a devastating effect on individuals, families, and communities.[1-3] In 2008, homicide was the second leading cause of death for persons aged 15–24 years based on data from 16 states that participate in the CDC National Violent Death Reporting System.[3] During 2004-2012, homicide was the leading cause of violent deaths including homicides, suicides, legal intervention deaths, unintentional firearm deaths, and deaths of undetermined intent among those <25 years of age in Rhode Island. Over one-third (39%) of the 284 homicides during that time period were among children and youth aged 0-24 years. Youth homicide can be prevented through a strategic public health based approach.[1] It is critical to increase awareness among the general public, public health officials, health care professionals, social service providers, and policy makers. This study provides the best available data on youth homicide from the Rhode Island Violent Death Reporting System to help better understand the pattern of youth homicide and, ultimately, reduce these untimely deaths.

The Rhode Island Violence Death Reporting System (RIVDRS) is a statewide, active surveillance system that links multiple source documents and collects detailed information concerning all violence-related deaths (homicides, suicides, legal intervention deaths, unintentional firearm deaths, and deaths of undetermined intent).[3,4] Rhode Island is one of 18 states currently funded by the CDC National Violence Death Reporting System (NVDRS).

Prior to 2004, Rhode Island violent death data were collected and described independently by several organizations across the state. Although these data were of high quality, single data sources (e.g., death certificates) were not integrated and provided only limited information in efforts to understand patterns of violent death in Rhode Island.

METHODS

RIVDRS uses multiple data sources, including death certificates, medical examiner records, law enforcement reports, and secondary sources (e.g., supplementary homicide reports, hospital data, crime laboratory data, etc.)[4] RIVDRS is an incident-based system, which assures that associated deaths such as homicide-suicides are considered together and collects information regarding demographics, means/weapon used, International Classification of Diseases, Tenth Revision (ICD-10), location and date of death, toxicology test reports, associated circumstances preceding death, etc.[3,4]

RIVDRS defines a homicide as a death resulting from the intentional use of force or power, threatened or actual, against another person, group, or community when a preponderance of evidence indicates that the use of force was intentional.[3,4] RIVDRS case definitions are coded on the basis of the ICD-10. Cases with the following selected ICD-10 codes are defined as homicide: X85–X99, Y00–Y09 for deaths up to one year after injury and Y87.1 for death more than one year after injury.[3,4]

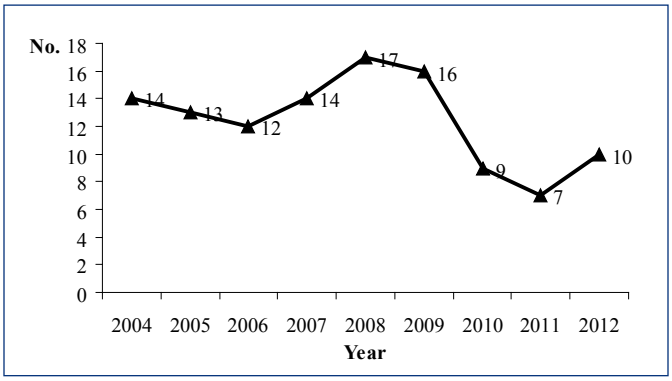
Homicide data during 2004–2012 were obtained from the RIVDRS. Small numbers have substantial year-to-year variation in the study. Statistics were generated from nine years of data to correct for this variation. Information on youth homicide is summarized by 1) counts, which display the most basic measure of youth homicide deaths and are important for quantifying the problem; and 2) percentages, which show distributions in the underlying population relative to demographics, positive toxicology test, and circumstance characteristics.

Because of small counts in some categories, only cells with five or more deaths are shown. The statistical software used for the analysis was SAS version 9.2 (SAS Institute, Cary, NC, 2010).

RESULTS

This study includes 112 youth homicides identified in the RIVDRS during 2004-2012. Overall, the homicide counts slightly increased each year during 2006-2008, then continually decreased each year after 2008 until 2011 (Figure 1).

Figure 1. Number of Youth Homicide Deaths by Year, Rhode Island 2004-2012



The majority (74%) of youth homicide decedents were aged 18-24 years. The homicide number for males was 3 times than for females. Hispanics accounted for a high percentage (42%) of youth homicide deaths, followed by white, non-Hispanic (29%) and black, non-Hispanics (25%). According to the 2010 census data there were 67% white, non-Hispanic; 19% Hispanic; and 7% black, non-Hispanic among 0-24 year olds in Rhode Island. Hispanic and black, non-Hispanic youth homicide victims were represented at higher proportions based on the census data. More than two-third (68%) of youth homicide victims resided in the four core cities including Central Falls, Pawtucket, Providence and Woonsocket. RI defines a core city as any city or town where 25% or more of children live below the federal poverty level according to the 2006-2010 American Community Survey, conducted by the US Census. Firearms were used in 69% of youth homicides, followed by sharp instruments, hanging/strangulation/suffocation, and personal weapons. A house or apartment was the most common location of homicide (47%), and the next-most-common location of homicide was a street/road, sidewalk, or alley (33%) (Table 1).

Table 1. Characteristics of Youth Homicide Victims, Rhode Island 2004-2012 (N=112)

Characteristic/Method/Location	n	%
Age group (yrs)		
<1	7	6.3
1-9	7	6.3
10-17	15	13.5
18-24	82	73.9
Sex		
Male	84	75.0
Female	28	25.0
Race/Ethnicity		
White, non-Hispanic	32	29.4
Black, non-Hispanic	27	24.8
Hispanic	46	42.2
City of residence		
Core city*	75	67.6
Non-core city	19	17.1
Out of state	17	15.3
Means/Weapon used		
Firearm	77	69.4
Sharp instrument	9	8.1
Hanging/strangulation/suffocation	8	7.2
Personal weapons	6	5.4
Location		
House, apartment	51	46.8
Street/road, sidewalk, alley	36	33.0
Parking lot/public parking garage	6	5.5
Motor vehicle	6	5.5

Data are not presented for cells containing fewer than 5 cases.
*Core-city: Central Falls, Pawtucket, Providence and Woonsocket.

Alcohol or drug tests were conducted for 96% of youth homicide decedents. Among tested homicide decedents who tested positive for alcohol (24%), 69% had a BAC of ≥0.08 g/dl. Marijuana, opiates, and cocaine were identified in 42%, 10%, and 9% of homicide decedents tested, respectively (Table 2).

Associated circumstances preceding death were identified for 64% of youth homicide decedents. Over a quarter of youth homicides were due to a conflict between the decedent and suspect over something other than money, property, or drugs. Approximately 15% of those homicides were precipitated by another crime. Drug-involvement homicides accounted for 12% of youth homicides. Intimate partner violence was reported as a circumstance in 11% of youth homicides. Other common circumstances were an argument over money or property (7%); drive-by shooting (6%); or gang-related (6%) (Table 3). Since each victim may have more than one circumstance, the total number of circumstances exceeds the total number of homicides.

Table 2. Positive Toxicology Tests of Youth Homicide Victims, Rhode Island 2004-2012 (N=112)

Toxicology test	n	%+
Tested	107	95.5
BAC*	26	24.3
BAC<0.08 g/dl	8	30.8
BAC>=0.08 g/dl	18	69.2
Marijuana	45	42.1
Opiates	11	10.3
Cocaine	10	9.3
Other drug(s)	27	25.1

* BAC: blood alcohol concentration, BAC>=0.08 g/dl used as the standard for intoxication.
+ Subcategories do not sum to 100% because test results of victims can be positive for alcohol or multi-drugs.

Table 3. Circumstances of Youth Homicide Deaths, Rhode Island 2004-2012 (N=112)

Circumstance	n	%+
Other argument, abuse, conflict*	29	25.9
Precipitated by another crime	17	15.2
Drug involvement	13	11.6
Intimate partner-violence-related	12	10.7
Argument over money/property	8	7.1
Drive-by shooting	7	6.3
Gang-related	7	6.3
Jealousy (lover's triangle)	6	5.4
Victim was a bystander	5	4.5
Not Reported	40	35.7

Circumstances are not presented for cells containing fewer than 5 cases.
* Other argument, abuse, conflict: conflict between decedent and suspect was over something other than money, property, or drugs.
+ Percentages might exceed 100% because multiple circumstances might have been coded.

DISCUSSION

During 2004–2012, the percentages for youth homicide remained disproportionately higher among those aged 18–24 years, males, and minority (Hispanics and black, non-Hispanic) populations. The highest number of homicides occurred in the four core cities, which is home to less than one-third (30%) of the state's population and 3.6% of the state's area. Among homicide deaths, firearms were used as weapons in over two-thirds of the incidents. The most common location of these deaths was at a residence (house or apartment).

Of the victims tested for alcohol, almost a quarter tested positive. A majority of victims with a positive test result had a blood alcohol concentration (BAC) that was ≥0.08 g/dl, which defines acute alcohol intoxication. Almost half of the homicide victims tested positive for marijuana. Although information on alcohol/drug use was unavailable for most offenders, the data on the victims provides compelling evidence that alcohol/drug use is an important factor in violence.[3] Alcohol/drug intoxication can reduce awareness of surrounding risks and make victims more vulnerable to violent confrontations.[3,5] Excessive alcohol/drug use might also decrease physical control, increase impulsivity, and help to elevate conflict.[3,5] Policy makers need to provide stricter control policy for alcohol and illegal drugs.

RIVDRS also shows that interpersonal conflicts and relationship problems are common circumstances preceding a homicide event. Reducing illegal economic activities can reduce disputes and violent solutions. Intervention at an early age produces better outcomes than intervention at a later age. Many school-based prevention programs are designed to help youth to improve positive social skills, social problem solving, self-esteem, emotional self-awareness, emotional control, conflict resolution, and team work.[1-3,6] Risk factor-based intervention strategies are more efficient than other intervention strategies, for example, strategies designed to reduce interpersonal problems and relationship conflicts are very valuable for prevention efforts.[1,3]

There is a long history of beneficial partnerships between public health, law enforcement, and communities to enhance public health and safety. Prevention strategies also need to focus on teamwork at the community level.[7] For example, within high-risk communities, strategies focus on changing social norms (e.g., violence cannot resolve conflict), reducing the barriers (e.g., social isolation), and intervening economic conditions (e.g., inequities with access to food supplies, adequate housing, job training programs, counseling services).[3] Prevention programs need to communicate clearly to high-risk youth that violent behavior would not be tolerated and that they have to answer to the community if they behave violently.[7] The community can offer a way out, including education, life skills training, job training, job referrals, substance abuse treatment, etc.[7]

The findings provided in this study are subject to at least five limitations. First, because of small numbers in this study, it is difficult to carry out sex-specific or race/ethnicity-specific analyses to make the percentages stable. Second, circumstance data were not available for all homicides and only 64% of homicide victims had data available for at least one circumstance related to the homicide in the study. Third, RIVDRS only collects risk factors, but does not collect protective factors (i.e., circumstances that reduce the risk for homicide death).[3] Fourth, time of injury, an important factor in homicide, is lacking for most deaths in RIVDRS. Fifth, because gang-related crimes are difficult to identify, these circumstances might be undercounted.[3]

In conclusion, although youth homicide death continues to be a problematic public health concern, youth homicide counts have dropped considerably since 2008 in Rhode Island. RIVDRS can monitor the occurrence of youth homicide and assist public health and other authorities to prevent youth homicide deaths in Rhode Island. To effectively prevent youth homicide, interventions need to focus on high-risk populations, screen for at-risk youth, reduce access to firearms, alcohol and drugs, and, target small geographic areas (e.g., a housing unit or park).[7] Given the high proportion of homicides that are committed with firearms, authorities might consider greater enforcement of firearms laws, e.g., require background checks for all guns sales. In order to warrant future prevention efforts, additional studies need to focus on the characteristics of suspects, including victim and perpetrator relationships, mental health status, previous episodes of violence, and alcohol/drug abuse.

For more information and resources for preventing youth violence:

STRYVE: Striving To Reduce Youth Violence Everywhere
CDC national initiative to prevent youth violence:
http://www.cdc.gov/violenceprevention/stryve/index.html

CDC youth violence prevention resources:
http://www.cdc.gov/violenceprevention/youthviolence/index.html

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Disclosure

The authors have no financial interests to disclose.

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VITAL STATISTICS
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COMPILED BY COLLEEN A. FONTANA, STATE REGISTRAR

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

	REPORTING PERIOD		
VITAL EVENTS	JULY 2013	12 MONTHS ENDING WITH JULY 2013	
	Number	Number	Rates
Live Births	1,032	11,618	11.0*
Deaths	803	9,857	9.4*
Infant Deaths	3	62	7.1#
Neonatal Deaths	2	62	5.3#
Marriages	650	6,142	5.8*
Divorces	300	3,365	3.2*
Induced Terminations	No data available		
Spontaneous Fetal Deaths	No data available		
Under 20 weeks gestation	No data available		
20+ weeks gestation	No data available		

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

	REPORTING PERIOD			
Underlying Cause of Death Category	JANUARY 2013	12 MONTHS ENDING WITH JANUARY 2013		
	Number (a)	Number (a)	Rates (b)	YPLL (c)
Diseases of the Heart	229	2,363	224.4	3,379.5
Malignant Neoplasms	203	2,204	209.3	5,837.0
Cerebrovascular Disease	44	460	43.7	754.5
Injuries (Accident/Suicide/Homicide)	54	648	61.5	9,016.5
COPD	75	530	50.3	465.0

(a) Cause of death statistics were derived from the underlying cause of death reported by physicians on death certificates.
(b) Rates per 100,000 estimated population of 1,052,567 (www.census.gov)
(c) Years of Potential Life Lost (YPLL).

NOTE: Totals represent vital events, which occurred in Rhode Island for the reporting periods listed above.
Monthly provisional totals should be analyzed with caution because the numbers may be small and subject to seasonal variation.

Thanks to RI Docs, McGruff the Crime Dog is on the Scent in City Schools

Visit sponsored by RI Medical Society, RI Orthopedic Society

PROVIDENCE – McGruff the Crime Dog sniffed his way into the capital city on Dec. 10, thanks to the Rhode Island Medical Society (RIMS), the R.I. Orthopedic Society, as well as several other groups.

Nora Thurber, RN, a school nurse at the Mary Fogarty School, and Providence Police Department Lt. Mike Perez spearheaded the crime-prevention canine's appearance. The intent was to teach students to regard police officers as members of the community who are there to help, and the duo enlisted the aid of the famed bloodhound to convey this message.

Thurber contacted RIMS for assistance in raising the money necessary to purchase the officially sanctioned National Crime Prevention Council (NCPC) McGruff costume. Megan Turcotte, RIMS' Associate Director of Member Services and Specialty Societies, went to work to raise the $1800 necessary for the purchase.

The RI Orthopedic Society and its members were major contributors. "We were thrilled to play a major role in bringing this nationally-known crime fighter to our state," said Richard Terek, MD, president of the society. "We all want to do what we can to help children be safe in their schools and neighborhoods."

McGruff reaches kids through commercials, songs, educational videos and booklets from the NCPC. He addresses topics such as the dangers of drug use, bullying, safety tips and the importance of staying in school. The character was conceived more than 30 years ago and has become a children's favorite.

"Our goal is have the Providence Police Dept. and McGruff visit every neighborhood school in the city. We are so grateful to Megan and the doctors for their effort and generosity," said Thurber.

The contributors also included the RI Academy of Family Physicians, RI Chapter of the American College of Emergency Physicians, RI Academy of Physician Assistants, and RIM's Insurance Brokerage Corporation. ❖

[*L–R*] Robert Anderson, Director, RIMS-IBC; Richard Terek, MD, President, RI Orthopedic Society; Achyut Kamat, MD, President, RI Chapter of the American College of Emergency Physicians; McGruff; Colonel Hugh T. Clements, Jr; Megan Turcotte, RIMS Associate Director, Specialty Societies & Member Services; Peter Karczmar, MD, RIMS President-Elect; Karen Dalton, Executive Director, RI Academy of Family Physicians; Jim Carney, PA-C, President, RI Academy of Physician Assistants

Colonel Hugh T. Clements, Jr; PPD; Nora Thurber, RN, school nurse, Mary Fogarty School

McGruff with Achyut Kamat, MD, President, RI Chapter of the American College of Emergency Physicians

McGruff with Richard Terek, MD, President, RI Orthopedic Society

Why You Should Join the Rhode Island Medical Society

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

RIMS offers discounts for group membership, spouses, military, and those beginning their practices. Medical students can join for free.

Above: State House press conference on health care, Brown MSS at the AMA, CPT update seminar, bike helmet distribution, medical student volunteers; Upper right: Meeting of RIMS membership committee

APPLY FOR MEMBERSHIP ONLINE

RIMS MEMBERSHIP BENEFITS INCLUDE:

Discounts on career management resources
Insurance, collections, medical banking, and document shredding services

Discounts on Continuing Medical Education
InReach online CME program discounts;
RIMS is an ACCME accrediting agency

Powerful advocacy at every level
Advantages include representation, advocacy, leadership opportunities, and referrals

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

Member Portal on www.rimed.org
Password access to pay dues, access contact information for colleagues and RIMS leadership, RSVP to RIMS events, and share your thoughts with colleagues and RIMS

SPECIAL NOTICE: 2014 AMA DUES PAYMENTS

The American Medical Association (AMA) will direct bill its Rhode Island members for their 2014 dues. Beginning August 2013, AMA members will receive a separate dues statement from the AMA instead of paying AMA membership dues through the Rhode Island Medical Society (RIMS) membership invoice. This is simply an operational change so that both RIMS and AMA can concentrate on their respective member satisfaction. There remains no requirement for RIMS members to join the AMA.

Please let us know if you have questions concerning this change by emailing Megan Turcotte or phoning 401-331-3207.

Lifespan Adopts ED Guidelines to Curb Opioid Misuse and Abuse

PROVIDENCE – As the number of unintentional overdoses involving prescription drugs continues to climb in the U.S. and especially in Rhode Island, emergency medicine physicians from throughout the Lifespan health system are formalizing the way they treat chronic pain to limit opioid medication misuse and abuse.

Lifespan, the state's largest health system, has implemented a formal set of guidelines for its emergency departments at Newport Hospital, The Miriam Hospital and Rhode Island Hospital that sets the stage for treatment of chronic non-cancer pain to limit inappropriate use of opioids and better coordinate care with the patient's primary care physician.

"Deaths from accidental prescription drug overdose and narcotic addiction have become a major public health problem," said **BRIAN ZINK, MD**, chief of emergency medicine at Rhode Island and The Miriam hospitals. "Unfortunately, more people die from opioid medication overdose than from automobile accidents. Just last year, more than 180 Rhode Islanders died from an unintentional overdose, the majority from prescriptions drugs.

He continued, "Every day, coming through the doors of our emergency departments, there are people in pain who need treatment, but also people who are addicted to narcotic medications. Our clinicians have a duty to responsibly care for both groups. For those who are addicted and seeking opioids in the emergency department, prescribing more narcotics is not good care."

Because of the severity of the issue of opioid abuse in Rhode Island (the state is ranked as having the 13th highest drug overdose mortality rate in the country, as well as the highest in New England), the state Department of Health is supportive of the work being done by Lifespan.

"Prescription drug overdose death is the leading cause of premature death in adults in Rhode Island," said **MICHAEL FINE, MD**, director of the Rhode Island Department of Health. "These Lifespan guidelines, along with physician use of the prescription monitoring program every single time they prescribe narcotics and other powerful drugs will go a long way toward stopping this epidemic."

At Lifespan, the decision to move toward a defined guideline began in the emergency department at Newport Hospital. "We watched as more and more people came into our emergency department asking for opioid pain medication. Many of these patients have a very legitimate need for pain relief," said **GLENN HEBEL, MD**, Newport Hospital's chairman of the department of emergency medicine. "Unfortunately, many other patients are not using these medications appropriately, and this can turn into a dangerous or even deadly problem. In the ED, we are at a crossroads for people seeking these medications and it means we are also well positioned to implement guidelines that can really make a difference."

While Newport Hospital worked on its guidelines, the emergency departments at Rhode Island Hospital and The Miriam Hospital, which are staffed by physicians from University Emergency Medicine Foundation, began working on their own set of guidelines through the efforts of **TOM HARONIAN, MD**, **LIBBY NESTOR, MD**, and **JASON HACK, MD**. Realizing strength came through a system approach, the two groups began working together to develop a single guideline that could be used throughout Lifespan and serve as a model for the state.

The Lifespan Emergency Department Opioid Guideline is for chronic non-cancer pain, and includes limiting the amount of opioid pain medication provided on discharge and encouraging patients to get refills from the provider who ordinarily prescribes the medication rather than the emergency medicine physician. Physicians are also encouraged to refer patients with suspected substance abuse behavior for appropriate treatment and to provide patients with information about the addictive nature and potential misuse of these medications. Emergency physicians are also using Lifespan electronic health records and state prescription monitoring databases to identify patterns of opioid misuse in patients.

Dr. Zink estimates that at the Rhode Island Hospital Anderson Emergency Center and The Miriam Hospital Emergency Department, 15 to 20 patients per day present seeking opioid medications – people who are either addicted to opioids or who want to sell these prescription medications to others. ❖

Aquidneck Medical Associates Merge with University Medicine Foundation

University Medicine also in discussions with other RI physician groups

PROVIDENCE – Aquidneck Medical Associates and University Medicine Foundation merged operations effective January 1, 2014. The new medical group will include 185 physicians and 200 staff who will serve more than 100,000 patients throughout most of Rhode Island.

KEIVAN ETTEFAGH, MD, president of Aquidneck Medical Associates, said, "We expect that in the near future this merger to bring high quality specialty care closer to the residents of Newport and Portsmouth. It will allow us to expand on our 50-year tradition of great service, and soon patients will no longer have to cross two bridges and drive 30 miles to reach many specialists." Aquidneck Medical Associates is comprised of 11 primary care physicians and 38 support staff.

University Medicine has 15 locations throughout the state that offer primary care and 10 different medical specialties. University Medicine is an independent group which is affiliated with Brown University and Lifespan Health System. **Lou Rice, MD**, president of University Medicine Foundation, said, "The combined operations will allow us to expand services to more patients, participate in new programs with insurers, enhance our technology and improve administrative services."

Joining University Medicine will enable Aquidneck to offer innovative clinical care such as their patient-centered medical homes (PCMHs); and will enhance its ability to participate in new healthcare models under the Affordable Care Act, such as accountable care organizations (ACOs).

University Medicine also has made it a priority to add more primary care physicians, which is critical given the current and projected shortage of access to primary care providers. Dr. Rice said, "The opportunity to affiliate with a high quality group like Aquidneck comes at the right time. We'll be better able to participate in new models of care that will give patients better service and access to care while keeping healthcare costs under control."

University Medicine is also in discussions with other physician groups in Rhode Island. Dr. Rice commented, "Our flexible approach makes us attractive to medical groups who want the administrative and support services we can provide, but who also want to maintain some autonomy in their operations, staffing, and clinical care delivery." ❖

Cigna adds Kent to network

WARWICK – Cigna and Kent Hospital have entered into a multi-year contract that adds the hospital and its employed physicians to Cigna's network of participating hospitals and doctors in Rhode Island. The agreement became effective December 1, 2013.

Cigna customers who receive health care services from Kent Hospital or its doctors will now be covered at the in-network benefit level, according to the terms of their health care benefits plan. ❖

MIRIAM HOSPITAL

Philip Chan, MD, with patient.

Miriam Hospital launches new HIV prevention program

PrEP program offers daily pill that can help prevent HIV infection

PROVIDENCE – The Miriam Hospital Immunology Clinic has launched the pre-exposure prophylaxis, or PrEP program, which offers a single, daily pill to Rhode Islanders at higher risk for HIV exposure.

PHILIP CHAN, MD, of The Miriam Hospital's Division of Infectious Diseases, is leading the PrEP program, one of the first clinical programs in the country to offer PrEP to at-risk patients in a clinical setting.

"The Miriam's PrEP program is designed to address the ongoing HIV epidemic in the state," said Dr. Chan. "Given that Rhode Island is a small state with a relatively close community, PrEP in combination with other available HIV prevention strategies, offers the chance to reduce the number of new HIV diagnoses to near zero in the future."

For Rhode Islanders who are HIV-negative and at higher risk, PrEP can help prevent them from becoming infected. Higher risk groups include gay, bisexual, and other men who have unprotected sex with one or more men a year, and both HIV-negative men and women in a relationship with an HIV-positive person.

"While PrEP does offer an additional layer of protection, it's not 100 percent effective. Condoms, the easiest prevention mechanism, should still always be used," said Dr. Chan. "The PrEP program is part of our larger HIV/STD prevention program, which offers free testing to avoid the spread of sexually transmitted diseases." ❖

Research News

Oncologist publishes research on ovarian cancer survival rates

W&I

Richard G. Moore, MD

PROVIDENCE – **RICHARD G. MOORE, MD**, director of the Center for Biomarkers and Emerging Technologies and a gynecologic oncologist with the Program in Women's Oncology at Women & Infants Hospital, is part of a team of researchers who published an article on the use of a chemoresponse assay to guide the treatment of women with persistent or recurrent ovarian cancer.

The article was published in the November issue of *Gynecologic Oncology* and illustrates how the team's use of a chemoresponse assay on tissue samples from ovarian tumors can help tailor the most effective treatment for them.

Dr. Moore, who is also a professor of obstetrics and gynecology at The Warren Alpert Medical School, and the team spent eight years studying the assay's effectiveness in choosing course of treatment in women with platinum-sensitive and platinum-resistant tumors. Such tumors do not respond to many types of treatment and are labeled "persistent," or they return after treatment, making them "recurrent."

The publication capped the release of the results of the eight-year study, which showed that women diagnosed with ovarian cancer who undergo cancer tumor testing to determine the best treatment have better survival rates than women who do not.

"We demonstrated that using a tissue sample from the woman's tumor and a chemoresponse assay can help us determine the best treatment for her," Dr. Moore said. "Such testing allows us to identify the chemotherapeutics that are active against the individual patient's disease and those that are not, which would result in decreased toxicity from ineffective treatments."

The use of such personal-directed therapies increases overall survival, making the results of this work by Dr. Moore and his team the first in two decades to show a significant impact on ovarian cancer survival. The work was key in light of the fact that epithelial ovarian cancer is the leading cause of gynecologic cancer deaths in the United States.

"Despite the achievement of high response rates, improvements in survival with aggressive surgical debulking and the use of platinum/taxane combination chemotherapy, the disease recurs in the majority of the patients," Dr. Moore explained.

The study was launched in 2004 and included 262 evaluable women. Their biopsies were successfully treated in vitro, or in a test tube. The assay ChemoFx® by Precision Therapeutics tested up to 15 approved treatment regimens on the samples, identifying chemotherapy drugs and regimens to which each tumor might be sensitive. The study was non-interventional, meaning that physicians chose the treatment regimens without knowing the assay results.

"The assay identified at least one treatment to which the tumor would be sensitive in 52% of patients in the study," Dr. Moore said. "At the same time, it is interesting to note that no single treatment accounted for more than 30% of the treatments assessed in this study, demonstrating the lack of a standard care in this patient population."

Median survival for the women in the study was 37.5 months for patients with treatment-sensitive tumors, compared to 23.0 months for intermediate and resistant tumors.

Dr. Terek gets $1.4M NIH grant to study bone cancer

BROWN

Richard M. Terek, MD

PROVIDENCE – **RICHARD M. TEREK, MD, FACS** has been awarded a $1.4 million research grant from the National Cancer Institute of the National Institutes of Health to study bone cancer.

The research will be focused on mechanisms to develop new therapies and strategies to prevent metastasis of chondrosarcoma based on microRNA and nanotechnology. The grant is an R01 grant, the original and oldest grant mechanism used by the National Institutes of Health. "R01 grants from the National Institutes of Health are highly competitive, and there are very few orthopaedic surgeon – scientists who are successful at competing for these grants," says Dr. Terek.

"The research environment and collaborators in the Orthopaedic Research Laboratories, built and expanded over the years by philanthropy, prior grants, and the department, all contribute to the success of our research program," said Dr. Michael Ehrlich, Chairman of the Department of Orthopaedic Surgery at the Alpert Medical School and CEO of University Orthopediccs, Inc. ❖

Research News

Presurgery Treatment Combo More Effective for Women with Triple-Negative Breast Cancer

PROVIDENCE – Adding the chemotherapy drug carboplatin and/or the antibody therapy bevacizumab to standard presurgery chemotherapy increased the number of women with triple-negative breast cancer who had no residual cancer detected at surgery, according to results of a randomized, phase II clinical trial presented at the 2013 San Antonio Breast Cancer Symposium, held December 10–14, 2013.

An increasing number of patients with triple-negative breast cancer are receiving chemotherapy before surgery, a treatment approach called neoadjuvant chemotherapy. In about one-third of these patients, no identifiable cancer cells are found in breast tissue and lymph nodes removed at surgery performed after the neoadjuvant chemotherapy. These patients are said to have had a pathologic complete response and have a much lower risk of cancer recurrence compared with patients whose cancers do not respond this well to the neoadjuvant chemotherapy.

"Our study was designed to find out if adding either carboplatin or bevacizumab to standard preoperative chemotherapy would increase the percentage of patients in whom cancer is eliminated before surgery," said **WILLIAM M. SIKOV, MD, FACP**, associate professor of medicine at the Alpert Medical School. "We are excited to report that adding either therapy significantly increased the percentage of patients in whom cancer was eliminated from the breast, and that adding both was even more effective.

"While our results show increases in pathologic complete response rates with both carboplatin and bevacizumab, we do not yet know how large an impact, if any, these differences will have on cancer recurrences or deaths. Although the study is not large enough to detect significant differences in these endpoints, we plan to follow patients for 10 years after their surgery to see if patient outcomes suggest long-term benefits from the investigational treatments."

Sikov and colleagues treated 443 patients with operable, stage 2 or 3 triple-negative breast cancer in the randomized, phase II clinical trial. The study was conducted by the Cancer and Leukemia Group B, which is now part of the Alliance for Clinical Trials in Oncology, and is called CALGB/Alliance 40603. Patients were randomly assigned to standard neoadjuvant chemotherapy, standard neoadjuvant chemotherapy plus carboplatin, standard neoadjuvant chemotherapy plus bevacizumab, or standard neoadjuvant chemotherapy plus carboplatin and bevacizumab. Surgery was performed from four to eight weeks after the completion of neoadjuvant treatment.

The researchers found that among the 108 patients who were randomly assigned to standard neoadjuvant chemotherapy alone, at surgery, cancer had been eliminated from the breast in 42 percent of these patients and from both the breast and lymph nodes in 39 percent. These proportions increased to 50 percent and 43 percent, respectively, for the 110 patients who were randomly assigned to standard neoadjuvant chemotherapy plus bevacizumab; 53 percent and 49 percent, respectively, for the 113 patients who were randomly assigned to standard neoadjuvant chemotherapy plus carboplatin; and 67 percent and 60 percent, respectively, for the 112 patients who were randomly assigned to standard neoadjuvant chemotherapy plus carboplatin and bevacizumab.

W&I

William M. Sikov, MD

The increases in the pathologic complete response rates in the breast and in the breast and lymph nodes observed among patients randomly assigned to standard neoadjuvant chemotherapy plus carboplatin were statistically significant. Among patients randomly assigned to standard neoadjuvant chemotherapy plus bevacizumab, only the increase in the pathologic complete response rate in the breast met the study's criteria for significance.

"Patients who were treated with carboplatin had more problems with low blood counts and were more likely to miss doses of chemotherapy or to have their chemotherapy treatments delayed or the doses of the chemotherapy drugs reduced compared with patients who did not receive carboplatin," said Dr. Sikov. "In addition, about 10 percent of patients who were treated with bevacizumab developed high blood pressure and more of these patients had problems with blood clots, bleeding, and infections."

This study was funded by the National Institutes of Health, Genentech, and the Breast Cancer Research Foundation. ❖

Alpert medical students dispel fears at Teddy Bear Clinic

DEBBIE M. FRIEDMAN

Adam Driesman MD'16 shows a young student how to listen to a heartbeat.

For three years now, Alpert Medical School students have been educating Providence's youth and their parents about health and medicine through an event called The Teddy Bear Clinic. This year's clinic was held in November at the Providence Children's Museum, where more than 100 children were given teddy bears and wended their way through the clinic's various stations. They learned everything from good nutrition to how to listen to their heartbeats, and practiced on their donated teddy bears – which they kept to accompany them on future doctor's visits.

This year's clinic co-organizer, **NAN DU MD'16**, believes the clinic not only educates children, but also helps to ease their anxiety about visiting the doctor. "We think it is incredibly important for children to be comfortable with physicians and to understand why they go to the doctor's office each year."

But the kids aren't the only ones who benefit from the clinic. Medical students learn to communicate complex ideas in simple ways for their young audiences to understand. And families receive important medical information while their children run around in the "fitness" station and play OPERATION in the "surgery" station.

In an interview with RIMJ, Du and fellow volunteers **STEPHANIE LEE MD'16** and **JUAN PABLO ZHENLIO MD'16** talked about the origins of the clinic and the "Teddy Bear" factor in their "clinical" interactions with the children.

How did the clinics begin?

Nan Du: The idea actually originated from a Brown medical student, **STEPHANIE LE '10 MD'14** who was inspired by the "Teddyklinik" – the German clinic – after she visited Germany on an Alpert Medical School exchange program. She spearheaded the idea and established the first Teddy Bear Clinic here in 2011.

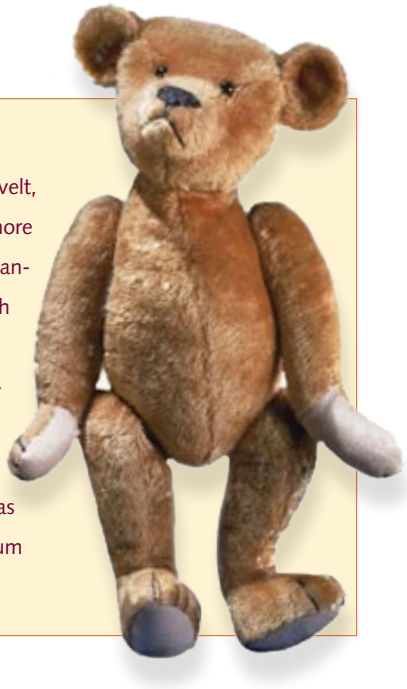
What are the goals of the clinic?

Nan Du: It aims to reach out and teach young children from Providence about going to the doctor and about certain aspects of health, such as oral hygiene, nutrition, and immunizations. The children bring their teddy bears (or are provided one at the event) to learn about the routine components of a doctor's visit, with some chances to practice these skills on their teddy bears. For instance, at the "heart and lungs" station, children are taught about the cardiac rhythm. From there, they attempt to listen to the teddy bear's heart and then listen to their own.

In immunizations, we teach the children about the importance of shots and why we get them every year. Furthermore, at the end the students give a "shot" to their teddy bear. The shot is just a syringe filled with water. At another station, we demonstrate wound healing and casting by putting ACE bandages on teddy bears and explaining various x-rays. There is also information

First Teddy Bear

Teddy Bears, named after President Theodore Roosevelt, have been comforting and enchanting children for more than a century. The first Teddy in this country was manufactured in Brooklyn, NY, in 1903, by Russian Jewish immigrants Morris Michtom and his wife, Rose. The plush toy became wildly popular and soon the Michtom's candy story morphed into an enterprise called the Ideal Toy Company. This Teddy was presented to Kermit Roosevelt, the president's son, when he was a boy and is now at the Smithsonian National Museum of American History.



SMITHSONIAN NATIONAL MUSEUM OF AMERICAN HISTORY

available for parents and students about dental care, nutrition, health insurance, and other health issues.

What is the most rewarding thing that comes from doing the clinics?

Stephanie Lee: I still remember what it was like as a child to visit the doctors, whether it was for something as simple as an annual check-up, or more serious, a surgery. I did not like it when these big people in white coats invaded my personal space for the physical exam, and especially when they stuck me with painful needles. I just didn't understand what they were doing or why. Now, as I crossover into the role of that "scary" doctor, I want to help kids become more comfortable during a doctor's visit by taking the time to show and explain things in a more friendly environment at the Teddy Bear Clinic. It is amazing to see the change from hesitation to eagerness to learning when kids are given the opportunity to participate in the various health-related stations with their new friends – their teddy bears.

Juan Pablo Zhenlio: One moment will always stand out for me. There was a little girl who hid behind her mother's legs – too afraid to approach the other group of kids at our "wound healing" station. I approached her with a teddy bear and asked if she wanted to join us to learn how to put on a band-aid. She remained too nervous and shy to come over but accepted my offer of a teddy. I returned to the station and after a while, many of the kids left and moved on to the next station. As soon as our table emptied, the little girl came up to me, grasping her teddy tightly, and said that she and her new friend were ready to play. She was so enthusiastic about taking care of her teddy's booboos that within a few minutes she had covered its entire arm with Disney Princess band-aids.

From left, Olivia Linden MD'16, Stephanie Lee MD'16 and Patrick Lec MD'16 were "on call" at the "surgery station," using the game OPERATION as a learning tool.

What are the children most anxious about?

Nan Du: Most of the children tend to fear the immunization table and we will have to coax them over to the station and explain why it is important. At the recent clinic, one of the parents told me that after their child attended our last Teddy Bear Clinic, their daughter had declared that she wanted to be a doctor in the future. Every child's experience will be different but the general consensus we feel at the end of the clinic is that the children are more curious about medicine, and a bit more accepting to individuals who carry a stethoscope. ❖

PHOTOS COURTESY OF ALPERT MEDICAL SCHOOL STUDENTS

Alpert Medical School students organized a Teddy Bear Clinic for Providence elementary school children on November 15, 2013 at the Providence Children's Museum. Participating were: *[Front row, from left]* Emily Davis MD'17, Jenna Kahn MD'16, co-organizer Nan Du MD'16, Alissa Cooper MD'17, Kelly Fitzgerald MD'17, Nery Moises Porras MD'17, Natasha Kumar MD'17, Holly Brindeau MD'17, Sanchita Singal MD'17, Stephanie Lee MD'16, Emily Shelkowitz MD'16, Nicole Noronha MD'16. *[Back row, from left]* Rachel Sargent MD'17, Eduardo Garza MD'17, Joseph Carnevale MD'17, David Lee MD'16, Juan Pablo Zhenlio MD'16, Olivia Linden MD'16, Brian Joo MD'16, Patrick Lec MD'16, Andrew Katz MD'17.

Author

Debbie M. Friedman, a 2005 graduate of Brown University, is an editorial extern at RIMJ for 2013–14 and is a freelance copy editor.

Appointments

Uma Kolli, MD, joins Southcoast family practice group

WESTPORT, MASS. – Westport Family Medicine, part of Southcoast® Physicians Group, has moved to the new location at 827 American Legion Highway. The practice includes **SCOTT LAUERMANN, MD**, **JANE LI, MD**, and **MARK RICHARD, NP**, and welcomed **UMA KOLLI, MD**, in November.


SOUTHCOAST
Uma Kolli, MD

Dr. Kolli holds a Doctorate of Medicine from Osmania Medical College in Hyderabad, India. She completed her family medicine residency at Memorial Hospital of Rhode Island where she served as an associate chief resident. She is a clinical assistant professor of family medicine at Brown University.

Board-certified in family medicine, she is fluent in Hindi and Telugu. Her areas of special interest include women's health and diabetes. ❖

Dr. Grant joins Westerly staff in family medicine


WESTERLY HOSPITAL
Meghan Grant, DO

WESTERLY – **MEGHAN GRANT, DO**, Family Medicine, has joined Westerly Hospital's medical staff. Dr. Grant will provide comprehensive primary care to children and adults.

She received her medical degree from the University Of New England College Of Osteopathic Medicine in Biddeford, ME, and completed her residency in Family Medicine at Eastern Maine Medical Center in Bangor, ME.

Her special interests include women's health including prenatal care, dermatology, office-based procedures including vasectomies, and osteopathic manipulative medicine. ❖

Chief of pediatric ophthalmology named at Hasbro


BROWN
Wendy Chen, MD

PROVIDENCE – **WENDY CHEN, MD, PhD** has been named the new chief of pediatric ophthalmology at Hasbro Children's Hospital.

Dr. Chen received her combined MD and PhD, in medicine and neuroscience, from the Alpert Medical School. She completed her residency in ophthalmology at the University of Pittsburgh Medical Center and fellowship in pediatric ophthalmology at Children's Hospital of Philadelphia.

Dr. Chen is the recipient of numerous awards and is an active member of several professional societies, including the American Association of Pediatric Ophthalmology and Strabismus, the Association for Research in Vision and Ophthalmology, the American Academy of Ophthalmology, the Pittsburgh Ophthalmology Society, the American Association for the Advancement of Science, and the Society for Neuroscience. ❖

Dr. Johnson named to ophthalmology positions


BROWN
Lenworth N. Johnson, MD

PROVIDENCE – The Division of Ophthalmology at the Alpert Medical School welcomed **LENWORTH N. JOHNSON, MD**, as its Deputy Chief of Ophthalmology and Director of Neuro-ophthalmology.

Dr. Johnson is a graduate of the combined BS/MD degree program at Rensselaer Polytechnic Institute and Albany Medical College. He completed his preliminary year in internal medicine and another year of neurology at UC Irvine, followed by his ophthalmology residency at Albany Medical Center and neuro-ophthalmology fellowship at Jules Stein Eye Institute at UCLA.

Dr. Johnson previously worked at the Mason Eye Institute, University of Missouri School of Medicine, where he served as Professor of Ophthalmology & Neurology, Ophthalmology Residency Program Director, and Director of the Neuro-Ophthalmology Service. ❖

RWMC names infection control director


RWMC
Dr. Richa Tandon

PROVIDENCE – **DR. RICHA TANDON** has been named Director of Infection Control at Roger Williams Medical Center. She trained in infectious diseases at Boston University Medical Center (BUMC), where she was a faculty member for six years prior to joining Roger Williams. She has extensive clinical experience in general infectious diseases and managing complicated immunosuppressed patients. She cared for a large panel of HIV/AIDS patients at BUMC and specialized in managing HIV infected women to prevent perinatal transmission.

Dr. Tandon will pursue her interest of working with immunosuppressed patients by collaborating with the transplant team at Roger Williams. She has extensive clinical research experience and will work with residents and fellows on various projects. ❖

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Appointments

Three MDs join Kent, Primary Medical Group

WARWICK – Kent Hospital welcomed three new physicians to the Kent Hospital medical staff and Affinity Physicians, an affiliate of Kent Hospital. Drs. Christopher M. Furey, MD; Manisha Kumar, MD, MPH; and Mirela Nicolescu, MD will practice out of the Primary Medical Group of Warwick.

CHRISTOPHER M. FUREY, MD, is a primary care physician who comes to Kent Hospital from Memorial Hospital of Rhode Island where he served as chief resident for the Family Medicine Residency Program through the Alpert Medical School of Brown University. Dr. Furey received his medical degree from Brown University and also served as the first family medicine resident instructor in the Alpert Medical School Doctoring Course. Dr. Furey also serves as an Assistant Professor of Family Medicine (Clinical) at the Alpert Medical School of Brown University.

MANISHA KUMAR, MD, MPH, is a family medicine physician who will also provide obstetric services and will begin working at Primary Medical Group of Warwick in January, 2014. Dr. Kumar comes to Kent from Lawrence General Hospital in Lawrence, Massachusetts, where she completed an obstetrics fellowship. Dr. Kumar completed a family medicine residency at Memorial Hospital of Rhode Island in 2012. She attended medical school at Tufts University School of Medicine in Boston, Massachusetts.

MIRELA NICOLESCU, MD, is a primary care physician who comes to Kent Hospital from the Yale University affiliated, Saint Mary's Hospital, in Waterbury, Connecticut. It is there where she completed an internal medicine residency. The first few years of her residency were spent at the Emergency University Hospital in Bucharest, Romania. Dr. Nicolescu attended medical school at Carol Davila University of Medicine and Pharmacy in Bucharest, Romania. ❖

Dr. Pagidas named REI interim director at W&I

PROVIDENCE – **KELLY PAGIDAS, MD**, was recently named interim division director for the Division of Reproductive Endocrinology and Infertility at Women & Infants Hospital.


W&I

Kelly Pagidas, MD

Dr. Pagidas, a member of the Department of Obstetrics and Gynecology since 1998, is associate professor of obstetrics and gynecology at the Alpert Medical School. This year, she received the Council on Resident Education in Obstetrics and Gynecology (CREOG) Excellence in Teaching Award for her academic excellence in medical education. CREOG is affiliated with the American Congress of Obstetricians and Gynecologists (ACOG).

"Dr. Pagidas has been an essential asset to the department as a clinician, teacher and researcher," said Maureen G. Phipps, MD, MPH, chief of the Department of Obstetrics and Gynecology. "She has paved the way in incorporating ultrasound training in obstetrics and gynecology residency education."

In research, Dr. Pagidas' interests span the realm of reproductive genetics and the role of the Fragile X Protein (FMRP) on ovarian aging and function. This complements her clinical expertise in the area of recurrent pregnancy loss and preimplantation genetic diagnosis. ❖

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Obituaries

MARVIN S. KERZNER, MD, 83, died in Boston on Dec. 5, 2013 surrounded by his loving family. He leaves his beloved wife of 57 years, the former Thelma S. Resnick, his daughters Irene, Debbie and Lisa and 6 grandchildren.

A lifelong Providence resident, he was an internist for 50 years with a large practice on the East Side of Providence. He was the founder of the Summit Medical Center, Pavilion and Highland Court, a life care community, as well as the Summit Medical Office Building. Dr. Kerzner earned a BS from Boston University and an MS in physical chemistry from Tufts University. He worked at U.S. Steel as a chemist before attending medical school at the University of Bologna (Italy).

In addition to his medical practice and pioneering senior living communities, he was also a Clinical Assistant Professor of Medicine at Brown University and his medical practice was a clinical rotation sited for the Physicians Assistants program at Northeastern University, part of the Physicians Assistants program at Northeastern University.

He was the recipient of the Preceptorship Award from the Miriam and Rhode Island Hospitals and Brown University for outstanding teacher in the field of internal medicine.

Born in Providence, he was the son of Etta (Labush) and Louis Kerzner, the second of their 5 children. He is also survived by his brother Arnold and sisters Dorothy and Karen and was pre-deceased by his sister Arlene.

Dr. Kerzner was guide, muse and protector for his siblings and later his many nieces and nephews. He and his wife were lifelong runners and competed in marathons together; he was also an avid sailor. His legacy is one of loving and supportive father, brother, uncle and grandfather and professionally as a tireless searcher and advocate for the thousands of individuals and families he cared for, often through multiple generations and as a teacher to many who aspired to the same calling.

Donations in his memory may be made to the Dr. Marvin S. Kerzner Memorial Fund, c/o Dr. Dorothy Kerzner Lipsky, 99 Battery Place, 26D, New York, New York 10280.

M. HOWARD TRIEDMAN, MD, 83, passed away on Dec. 14, 2013 after a long illness. He was the husband of Dr. Ruth (Seiden) Triedman, and father of Karen (Ronald Markoff) and Nancy (Louis Goldman) of Providence and J. Russell Triedman (Melissa) of New York.

A graduate of Moses Brown School, Dr. Triedman graduated summa cum laude from Brown University where he was elected in his junior year to Phi Beta Kappa and Sigma Xi, the national honor societies. He received his medical degree from Columbia University College of Physicians and Surgeons, where he was elected to membership in the medical honor society, Alpha Omega Alpha.

Dr. Triedman served in the United States Navy prior to establishing his neurological practice in Providence where he was on the staff of the Rhode Island and Miriam Hospitals. He was Professor Emeritus of Neurology at Brown University's Warren Alpert Medical School and Chief of the Neurological Service at Miriam Hospital where he served as a president of the medical staff. He was also a member of the Investment Board of Lifespan and the Rhode Island Workmen's Compensation Board.

In addition to his wife and children, Dr. Triedman is survived by his brother, Dr. Leonard J. Triedman (Cynthia) of Narragansett and his grandchildren, Sidra and Allegra Scharff, Stephanie (Charles Cohen), Miranda, Thomas and Eleanor Triedman. He was the son of the late Dr. Harry and Charlotte (Freedman) Triedman. He will be missed by his devoted caregivers, Courtney Whynter, Gina Robinson and Richard Mayanjo.

In his memory, donations to The Miriam Hospital or to your favorite charity would be appreciated.

Bullets and Brains: Essays probe the intersection of neurology and society

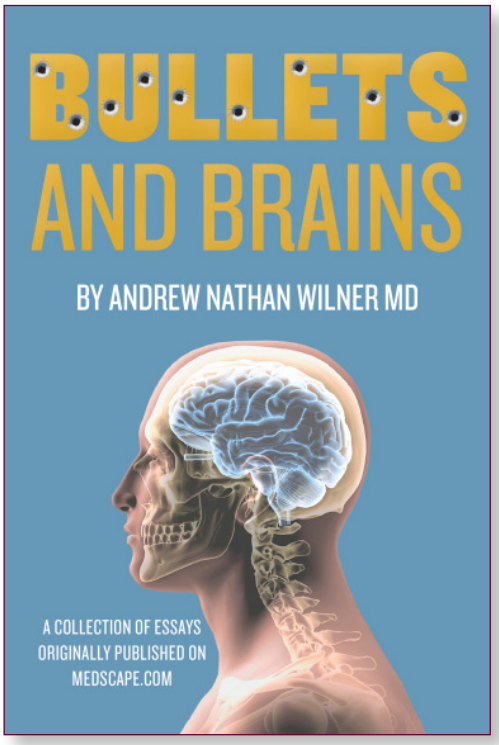
DR. JOSEPH H. FRIEDMAN
RIMJ EDITOR-IN-CHIEF

Bullets and Brains, by Andrew Nathan Wilner, MD, is a collection of over 100 essays from his weekly blogs and columns for Medscape.com that are fairly short, uniformly interesting, and which cover a smorgasbord of fascinating neurological topics as well as subjects that may be of greater public health importance than scientific interest, like an early essay on the incompatibility of brains and bullets, slowly moving on to the related incompatibility of trauma and the brain. I found no politics here, "just the facts." While recognizing the attraction of boxing to many people, including himself, he is clear that blows to the head are bad for the brain and should be avoided at all costs.

Dr. Wilner speculates about the influences on the brain in essays on love, sexual attraction and bonding, and appears to be even-handed, willing to listen to people who, at least on the surface, appear to be inhabiting a parallel universe which is less scientific than our own. On the other hand, he holds no sympathy for parents who deny their children the protection from inoculation, preferring them to risk permanent brain damage from an infection, than to suffer the risk, manufactured by their own fears, of other brain damage from the inoculations themselves. He discusses his medical missionary work in the Philippines, although not discussing how well-received childhood inoculations are for people in poor areas who actually have first-hand experience with the devastation caused by infectious neurological disorders now uncommon in wealthier countries.

He addresses the unusual – "Blue Person Syndrome," for example, is a chapter which describes a starling side effect of an epilepsy drug which may cause blue-gray skin discoloration. Other essays address clinical advances, as in a non-technical review of carotid stenting, and clinical setbacks, as occurred with a *New England Journal of Medicine* article that found a strong association between caffeine consumption and pancreatic disease, only to be later refuted by an equally well-performed study published in the same journal. Clinical medicine, like biology in general, is not a physics experiment. Diversity often influences outcome.

Dr. Wilner is optimistic about the future of neurology, a good vantage point for writing a book focused on diseases and malfunction. He has an inquiring and intellectual mind, a strong scientific background and an engaging literary style. These combine in an interesting and well-written compendium covering a wide spectrum of medicine, with a neurological focus. Readers won't be disappointed. In the meantime, you can catch his blogs on Medscape.com/neurology or http://blogs.medscape.com/neuronotes.



Bullets and Brains by Andrew N. Wilner, MD
(October 15, 2013)
Paperback: 532 pages; also available in e-formats

ANDREW NATHAN WILNER, MD

Author Andrew N. Wilner, MD, grew up in Fall River, Mass., and graduated from Yale University '77 and Brown University Medical School '81. Medicine and neurology residencies in California and fellowship training in electroencephalography at the Montreal Neurological Institute, McGill University, followed.

He joined the Brown neurology faculty and worked at Rhode Island Hospital for a short period of time, and has also held positions in North Carolina as a medical director of an epilepsy center and a clinic neurologist. In addition, he has worked as a neurohospitalist in Connecticut and on a *locum-tenens* basis.

An interest in nonfiction and medical writing led him to embark on a professional writing career, covering neurological topics for Medscape.com/neurology. He has also written two books on epilepsy for his patients: *Epilepsy in Clinical Practice* and *Epilepsy: 199 Answers (A Doctor Responds to His Patients' Questions)*.

In addition to writing, another of Dr. Wilner's passion is medical missionary work. While he began as a volunteer doing basic neurological work in the Philippines, he eventually became medical director of Lingkod Timog, a nonprofit medical mission organization that delivers health care to rural areas of that country.

http://bulletsandbrains.net/video-book-trailer/

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What's in a Name? The Medical Profession

STANLEY M. ARONSON, MD

A NAME MAY SERVE TO IDENTIFY AN OCCUPATION OR A PROFESSION, but rarely does it clarify the profession's essential purpose, its evolving history or the many advances it has achieved since the name had been adopted. Consider, for example, some names of ancient origin associated with modern medicine.

The word, physician, has a bicameral past. The Greek noun, *phusis*, meaning to bring forth or even 'the nature of things', served to define the study of the natural world in all of its aspects.

Accordingly, two closely related names arose: *phusike episteme* (the study of nature) and *phusike* (the student of nature). And so one branch evolved into the English, physics, the science that studies energy, matter, force and motion; and physic, the alternate medieval term for a medical doctor (or physician). The boundary between physics, the science, and physic, the practice of medicine, remains quite porous. A physic, of course, defines a laxative or purge. But a *physicien*, in French, means a physicist; while a physician, in English, defines a practitioner of medicine. The ambiguity prevails with English words such as physique, physiology, physiotherapy and metaphysics.

The word, medicine, also derives from Greek, through Latin (*mederi*, to heal, and *medicus*, a physician) to its present connotation as a practitioner of the healing arts. Related words in English include medicate, medico, remedy and medicinal.

The word, science, has also followed a circuitous path. A Greek word, *scierin*, led to the Latin verb, *scire*, both meaning to know; and later, to s*cientia*, a noun embracing the widening body of rational knowledge now including such studies as the many forms of the physical sciences. By the 14th Century, the domain of science was narrowed to embrace specifically those disciplines rooted in mathematics, astronomy, chemistry, biology or physics, while the other learned disciplines such as poetry, painting, history and philosophic thought were subsumed by The Arts. A hint of the archaic meanings of science lingers in such contemporary English words as prescience, conscientious and omniscience.

When the insight and clarity of an occupation resists skeptical challenge, when it remains rigidly fixed in time, and when its purpose and accomplishment stay unaltered from the First to the 21st Century, it can no longer be called a science; as so, society now has a choice between the separated disciplines of astrology and astronomy.

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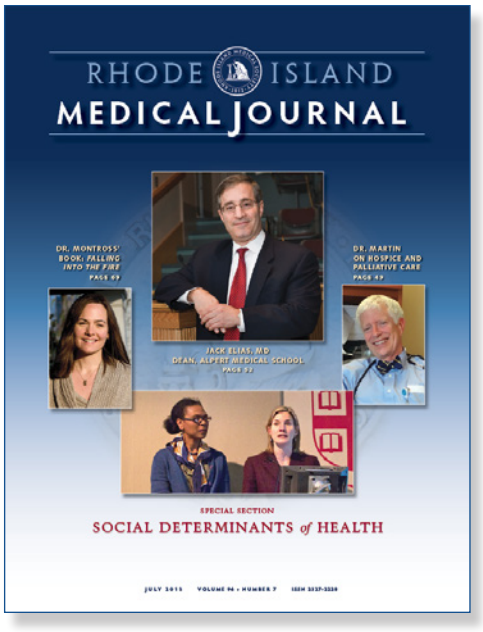
E-RIMJ Celebrates First Anniversary

Just a little more than one year ago, **NEWELL E. WARDE, PhD**, executive director of the Rhode Island Medical Society, propelled the almost century-and-a-half *Rhode Island Medical Journal* into the e-world, with the sanction of Editor-in-Chief **JOSEPH H. FRIEDMAN, MD**, and Editor Emeritus **STANLEY M. ARONSON, MD**.

The RIMJ would like to extend its profuse thanks to the 2013 guest editors who contributed time, resources, and FAITH in this endeavor: **DENICE SPERO, PhD**/Bioscience Showcase; **LEE E. RUBIN, MD**/Arthroplasty; **SHARON SU, MD**/Pulse of Pediatrics; **JON MUKAND, MD**/Orthopedics & Rehabilitation; **TERRIE FOX WETLE, PhD**, Dean, Brown School of Public Health; **DANNIE RITCHIE, MD**/Social Determinants of Health; **CHARLES SHERMAN, MD** and **JANE CARTER, MD**/Brown Kenya Medical Exchange Program; **MICHAEL FINE, MD**, Director, RI Dept. of Health/Integrity in the Health Professions; and **KENNETH A. WILLIAMS, MD**, and **FRANCIS COLLINS, MD**/Emergency Medical Services.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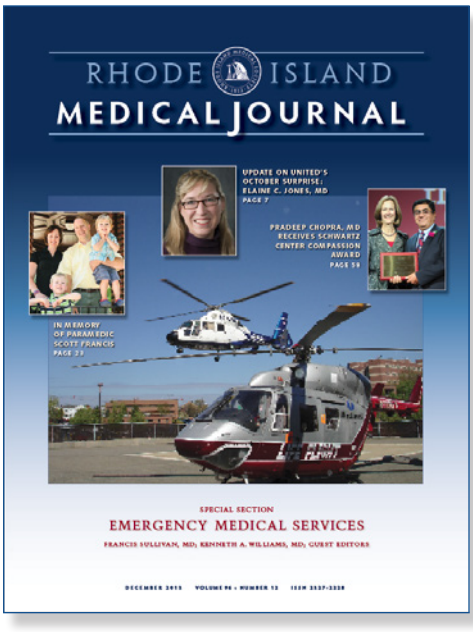
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