RHODE ISLAND MEDICALJOURNAL



A hyperbaric medicine provider attending to a patient receiving hyperbaric oxygen therapy.

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LEPER'S FATHER DEFIES LAW.

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PROVIDENCE, R. I., May 7.—Harry Sheridan, the fifteen-year-old leper of Pawtucket, who was spirited from the Massachusetts General Hospital in Boston to his father's home in Pawtucket,

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Break point

JOSEPH H. FRIEDMAN, MD joseph_friedman@brown.edu

ALL CLINICIANS HAVE anxious patients since anxiety is a common problem, and illnesses both breed and amplify anxiety. In a clever study published by a New York City movement disorders specialist, it was found that the bulk of patient calls from people with Parkinson's Disease (PD)

were made by patients who suffered from anxiety. This not only made sense, but also rang true. I know that I experience a lot more trepidation when I'm calling back my patient who has called three times in the past week with complaints of feeling jittery, medications not working quite right, a bad night's sleep or a variety of other problems. This differs from the calls from the patients who report major problems, a sudden decline, a "should I go to the emergency room" call, or, "he's calling the police about the people in the living room who won't leave." But I've noticed a pattern in some callers and it brings to the surface my own worries about my weaknesses as a doctor.

It took me many years of clinical practice to realize that the major benefits I bring to my patients are stability and comfort. Yes, I'm a presumed expert. I give invited talks. I consult for industry and am considered a "key opinion leader" (KOL) in the pharmaceutical world, which either means I write a lot



of prescriptions or am a recognized expert, depending on the company. I publish papers. I may or may not be a skilled technocrat, but, whether yes or no, assuming I'm at least competent, it became clear to me that the role of most significance I play is the long-term pastoral role.

I've written of this before in this column, but I'm revisiting the topic because of an insight. I have known for many years that certain patients will are becoming disabled to a point they can not tolerate and won't accept.

It takes time to accommodate. While the "degenerative" neurological diseases like PD and Alzheimer's progress at a fairly stable rate, the functional disabilities do not. I often invoke the analogy of the hurdler who, with declining abilities, clears the hurdles by less and less, a decline noted by the coach. The hurdler, however, experiences a different reality. One day he clears the hurdle and the next he hits it. A slow, continuous decline physiologically translates to a sudden step-wise fall-off in function. The degenerative disorders are similar.

What I have witnessed over the years is the patient, grasping at straws, trying to pull up from the abyss, hoping against hope that I have the magic bullet, the new drug, the shuffling of the pill schedule, a research trial, that will stop the decline to the "new normal," which is, of course, not normal at all.

suddenly start calling a lot, and they will do this for weeks to months, several times each week, with the "usual" complaints we hear in PD: I'm falling; I'm having too many movements (dyskinesia); I have more "off" time; my speech is terrible; I'm hallucinating; I'm fatigued all the time; I can't sleep. These are difficult for me, partly, of course, because the calls take time and, at the end of the day, or lunchtime, there are other things I need to do. But, primarily, they are difficult because these patients are usually calling because they are failing. I know this. Their illness has advanced and they A small decline in cognition may lead to a major change in independence. A small change in the number of dopamine receptors may spell a dramatic change in dyskinesias or the severity of a freezing gait.

What I have witnessed over the years is the patient, grasping at straws, trying to pull up from the abyss, hoping against hope that I have the magic bullet, the new drug, the shuffling of the pill schedule, a research trial, that will stop the decline to the "new normal," which is, of course, not normal at all.

I am helpless. I make changes. I raise

this, lower that, alter the schedule, all the while thinking to myself, how long will it take for the patient to realize that this terrible, intolerable situation is going to have to become tolerable, that there is no escape.

Recently the spouse of a patient, who, along with the patient, had been calling frequently, one right after the other, so that I had two calls a day, finally asked, "Is this the way it's going to be? I see people at the support groups and none look like my wife. She looks worse than others who have had the disease for 10 years, and she's had it only three. Is there something different about her condition? Please tell me. Is there anything that can be done?" Once we addressed this issue., "Yes, this disease is worse than the "usual." It probably isn't PD but one of the mimics, which is worse. We've been very aggressive about the treatments. We can't do more. I'm sorry, but I've tried everything." And that cleared it up. They understood. This was the new normal. She was different than the others. I had nothing up my sleeve. No more calls.

I have thought about this a long while and have not decided whether it's better to let patients and family reach this state on their own, or whether I should step in early and say, "This is what's going on. Scale down your expectations. We'll do what we can but there are no miracles, even small ones, here." "So, you're telling me to 'suck it up,' aren't you? There's nothing that can be done," is the response I dread. It has happened. I have done this and it's like telling someone they're going to die. It's difficult no matter how gently I am able to phrase it. Tough love or compassionate realism? In the meanwhile, I answer all my phone

calls, and try, as best I can, to be compassionate. It is not always easy when answering the fifth call from the same patient. But sometimes this is enough. It always stops, but often because they've reached rock bottom. No hope left. Accommodation or surrender? Either way, it makes my life easier and that is the source of my guilt.

Author

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

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Ethical decision-making and patients' beliefs

HERBERT RAKATANSKY, MD

At a RECENT LECTURE by a noted ethicist (also a physician) about sensitivity to patient's values and beliefs, the statement was made that the doctor never should do any thing that s/he thought was wrong.

Rare though they may be, there are situations in which the statement made by the ethicist does

not seem to apply. The problem arises when strongly held beliefs of the doctor conflict with an appropriate medical therapy desired by the patient.

The validity of the admonition of the ethicist to never do anything wrong depends on the definition of wrong. If the doctor has a belief system different from the patient there is a clash of values resulting in differing opinions about the "wrongness" of certain treatment plans.

Autonomy dictates that a competent adult patient may reject any medical treatment, even if such a decision results in harm or death. For example, a patient may refuse blood products, based on the tenets of a religious belief.

But should a doctor who is an observant Jehovah's Witness (JW) decline to order blood transfusions for a bleeding patient who wants them? Online discussions seem to imply that a JW doctor should refer such treatment to another physician. But what if no other qualified physician was available? There is also discussion of the difference between



making the decision to use blood and the actual administration of the blood by a JW professional who is just following the order. Making the decision to give blood seems to be the critical issue to some. Personally I have not encountered or been aware of a JW doctor in any situation.

The problem with the imperative not to do something one knows is "wrong" may appear in a different context. What if a doctor is asked to treat a JW patient

who refuses blood products when they may be an essential part of the treatment? The doctor may construe that "partial"

treatment is wrong. Guidelines for anesthesiologists in the UK¹ address this issue:

"Anaesthetists have the right to refuse to anaesthetise an individual in an elective situation but should attempt to refer the case to a suitably qualified colleague prepared to undertake it....In an emergency, the anaesthetist is obliged to provide care and *must* respect the patient's competently expressed views."

Other consequences may contribute to a doctor's opinion that partial treatment is wrong.

"Working within restrictions imposed by Jehovah's Witness patients can result in diversion of hospital resources from other patients who have a medically indicated need for them." This "may result in a lack of resources being available to other patients. The ripple effect on other members of the theatre teams and ward staff may also be profound. Counseling may be required for the... team who may feel that, whilst adhering to the patient's expressed wishes, they have been unable to provide an optimal level of care that has resulted in a significant morbidity or even death during their care."

In another case, the prohibition of termination of a nonviable fetus for any reason (hospital policy) created the

More commonly, patients may make end-of-life decisions based on values that differ from those of the doctor. What is the doctor to do in these situations?

> situation in which an ER doctor in Muskegon, MI, refused treatment to a woman 18 weeks pregnant whose waters broke and presented with excruciating pain. Definitive treatment was delayed for over 24 hours because of this restriction. Referral was not offered (it is not clear if it was available) and she was finally treated only when she began to have a spontaneous miscarriage. The personal belief system of the doctor(s) was not noted in the report of this incident.

> More commonly, patients may make end-of-life decisions based on values that differ from those of the doctor. What is the doctor to do in these situations?

When a doctor's beliefs impel him to act contrary to the stated wishes of the patient for appropriate medical treatment, the doctor should refer the patient to other doctors or institutions that provide that treatment. But what if there are no other resources available and there is an emergency situation?

The 8th of the 9 principles of medical ethics that define the basic values underlying the entire AMA code of ethics puts the patient first, which is where I like to be when I am the patient. This basic imperative has an overarching reach: "**VIII**. A physician shall, while caring for a patient, regard responsibility to the a patient as paramount."

In accordance with this principle. Opinion 10.06 of the AMA code states in part: "Physicians' freedom to act according to conscience is not unlimited, however. Physicians are expected to provide care in emergencies, honor patients' informed decisions to refuse life-sustaining treatment, and respect basic civil liberties and not discriminate against individuals in deciding whether to enter into a professional relationship with a new patient." Physicians should "inform the patient about all relevant options for treatment, including options to which the physician morally objects..."

Physicians should be aware of this basic moral obligation and strive to avoid putting themselves into situations where this conflict may arise.

It may be difficult to figure out what to advise our patients in a specific situation and we may get it wrong. Being wrong may be the result of many factors including, but not limited to, lack of information, poor judgment, lack of proficiency and others, but should not be the result of a conscious decision due to personal beliefs to act against the best interests of the patient, as defined by the patient. Our patients must trust that we will always be their advocates.

Medical students should understand this value so that they may choose wisely from the many options in medicine.

I interpret the ethicist's statement as meaning that it is wrong to act in a manner contrary to the self-defined best interest of the patient. In this context I conclude he was correct. \diamond

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Author

Herbert Rakatansky, MD, is Clinical Professor of Medicine Emeritus, The Warren Alpert Medical School of Brown University.

Zika Virus: What Clinicians Need to Know

PENELOPE H. DENNEHY, MD

Z IKA VIRUS, A RELATIVELY new mosquito-borne virus, is prompting worldwide concern because of an alarming association with the development of microcephaly in infants born to mothers infected during pregnancy and the rapid spread of the virus across the globe.

Zika virus is a mosquitoborne flavivirus, part of

the same family as yellow fever, West Nile, chikungunya and dengue. The virus was first identified in Uganda in 1947. Before 2007, only sporadic human disease cases were reported from countries in Africa and Asia. In 2007, the first documented outbreak of Zika virus disease was reported in Yap State, Federated States of Micronesia. Subsequent outbreaks occurred in Southeast Asia and the Western Pacific. In May 2015, the World Health Organization reported the first local transmission of Zika virus in the Americas, with cases identified in Brazil. In December, the Ministry of Health of Brazil estimated that 440,000-1,300,000 suspected cases of Zika virus disease had occurred in 2015. By January 20, 2016, locally-transmitted cases had been reported in 20 countries or territories in the Americas including: Barbados, Bolivia, Brazil, Colombia, Ecuador, El Salvador, French Guiana, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Martinique, Mexico, Panama, Paraguay, Puerto Rico, Saint Martin, Suriname, and Venezuela. Spread to other countries in the region is likely.



elers visiting or returning to the United States. In light of the recent outbreaks in the Americas, the number of Zika virus disease cases among travelers visiting or returning to the United States is likely to increase. These imported cases might result in logal human to macquite to human

Although local trans-

mission of Zika virus has

not been documented in

the continental United

States, infections have

been reported among trav-

spread of the virus in limited areas of the continental United States that have the appropriate mosquito vectors.

Zika virus is transmitted primarily by Aedes aegypti mosquitoes although Aedes albopictus mosquitoes also may transmit the virus. These mosquitoes are found throughout much of the Americas, including parts of the United States, and also transmit dengue and chikungunya viruses. During outbreaks, humans are the primary amplifying host for Zika virus. Mosquitoes become infected when they feed on a person already infected with the virus. Infected mosquitoes can then spread the virus to other people through bites. In addition to mosquito-to-human transmission, Zika virus infections have been documented through intrauterine transmission resulting in congenital infection, intrapartum transmission from a viremic mother to her newborn, sexual transmission, blood transfusion, and laboratory exposure. There is a theoretical concern that transmission could occur through organ or tissue transplantation, and although Zika virus RNA has been detected in breast milk, transmission through breastfeeding has not been documented.

An estimated 80% of persons who are infected with Zika virus are asymptomatic. Symptomatic disease generally is mild and characterized by acute onset of fever, maculopapular rash, arthralgia, or nonpurulent conjunctivitis. Symptoms usually last from several days to 1 week. Based on information from previous outbreaks, severe disease requiring hospitalization is uncommon, and fatalities are rare.

During the current outbreak in Brazil, Zika virus RNA has been identified in tissues from several infants with microcephaly and from fetal losses in women who were infected during pregnancy. The Brazil Ministry of Health has reported a marked increase in the number of infants born with microcephaly in 2015, although it is not known how many of these cases are associated with Zika virus infection. Other Latin American countries are now seeing cases in newborns as well, while in the United States one baby in Hawaii was born with microcephaly after his mother returned from Brazil. In Illinois, two pregnant women who traveled to Latin America have tested positive for the virus; health officials are monitoring their pregnancies. Studies are under way to evaluate the risks for Zika virus transmission during pregnancy and the spectrum of outcomes associated with congenital infection. In addition to microcephaly

Guillain-Barre syndrome has been linked to Zika virus infection in several countries. The possible association between Zika virus infection and Guillain-Barré syndrome is being studied.

Zika virus infection should be considered in patients with acute onset of fever, maculopapular rash, arthralgia, or conjunctivitis, who traveled to areas with ongoing transmission in the 2 weeks preceding illness onset. Because dengue and chikungunya virus infections share a similar geographic distribution with Zika virus and symptoms of infection are similar, patients with suspected Zika virus infections also should be evaluated and managed for possible dengue or chikungunya virus infection.

There is no commercially available test for Zika virus. Testing is currently performed at CDC and four state health department laboratories. Health care providers should contact their state or local health department to facilitate testing. To evaluate for evidence of Zika virus infection, testing should be performed on serum specimens collected within the first week of illness.

No specific antiviral treatment is available for Zika virus disease. Treatment is generally supportive and can include rest, fluids, and use of analgesics and antipyretics. Aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs) should be avoided until dengue can be ruled out to reduce the risk of hemorrhage. Febrile pregnant women should be treated with acetaminophen. Persons infected with Zika, dengue, or chikungunya virus should be protected from further mosquito exposure during the first few days of illness to reduce the risk for local transmission.

No vaccine to prevent Zika virus infection is available. The only protection against Zika is to avoid travel to areas with an active infection. If traveling to a country where Zika is present, the CDC advises strict adherence to mosquito protection measures including: use an EPA-approved insect repellent over sunscreen and wearing long pants and long-sleeved shirts thick enough to block a mosquito bite. Most EPA- registered repellents, including DEET, can be used on children aged >2 months. When used according to the product label, EPA-registered insect repellents also are safe for pregnant and lactating women. The female Aedes aegypti, the primary carrier of Zika, is an aggressive biter, preferring daytime to dusk and indoors to outdoors. Keeping screens on windows and doors is critical to preventing mosquito entry into homes and hotel rooms.

In countries where Zika virus is rapidly spreading health officials are implementing traditional mosquito control techniques such as spraying pesticides and emptying standing water receptacles where mosquitoes breed. Studies show local control is only marginally effective, since it is difficult to eliminate all possible breeding areas. In addition, *Aedes aegypti* has evolved to live near humans and can replicate in flower vases and other small sources of water making these mosquitoes particularly difficult to eradicate.

Until more is known, the CDC is recommending that pregnant women should consider postponing travel to any area where Zika virus transmission is ongoing. Pregnant women who do travel to one of these areas should talk to their health care provider before traveling and strictly follow steps to avoid mosquito bites during travel. Pregnant women who develop a clinically compatible illness during or within 2 weeks of returning from an area with Zika virus transmission should be tested for Zika virus infection. Fetuses and infants of women infected with Zika virus during pregnancy should be evaluated for possible congenital infection. *

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Author

Penelope H. Dennehy, MD, Director, Division of Pediatric Infectious Diseases, Hasbro Children's Hospital; Professor and Vice Chair for Academic Affairs, Alpert Medical School of Brown University

Correspondence

Penelope H. Dennehy, MD Rhode Island Hospital 593 Eddy Street, Providence, RI 02903 pdennehy@lifespan.org

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We are read everywhere

MOLOKAI, HAWAII

Mules to Molokai: Treacherous Trail to the Leper Colony To visit the leper colony in Kalaupapa, Molokai, Barrington native **Josh Korr** and other adventurers mounted Molokai mules (this one is named Deuce) and rode the 2.9 mile Kaluapapa Trail. It descends the almost 2,000-foot sea cliffs through a series of 26 harrowing switchbacks.





(*Below*) Josh checks the current issue of RIMJ at the approach to the leper colony. In the background are three hospitals which served those afflicted with Hansen's disease and banished to the island settlement in the mid 1800s to 1969. A few residents still remain here. Kalaupapa became a National Historic Landmark in 1976.

View from Deuce's back at the top of a pali (cliff).











Photo of the leper colony at Kalaupapa in 1899.

Will Represent This Country at World's Congress in Norway.

Honolulu.-Dr. William J. Goodhue, for the last four years resident phy-sician at the Leper Settlement on the Island of Molokal, has been chosen to represent the United States at World's Leprosy congress, w the which meets in Christiania, Norway, this year.

The lepers at the Molokai settlement were never so well cared for medically as since Dr. Goodhue went there, and there can be no doubt that



In 1900, the Hawaii Board of Health planned a major construction program at Kalaupapa, Molokai, the site of the leper colony, building dormitories, hospitals, and individual cottages. In 1902, Dr. William J. Goodhue became resident physician, where he remained until 1925, when he contracted Hansen's disease.

After World War II the discovery of sulfone drugs offered a successful treatment for the disease. In 1969 forced quarantine was abolished by the state of Hawaii.

Editor's Note See Heritage Section, page 66

The Pawtucket Leper Boy and the Penikese Leper Colony off of New Bedford, Mass.

State of Wound Care in Rhode Island

RAMAN MEHRZAD, MD; BIELINSKY A. BREA, SCM CANDIDATE; BENJAMIN R. JOHNSTON, PHD; MICHAEL VEZERIDIS, MD; PAUL Y. LIU, MD

KEYWORDS: wounds, wound healing, diabetic wounds, pressure ulcers, venous insufficiency

INTRODUCTION

We are grateful to the *Rhode Island Medical Journal* (RIMJ) for encouraging this special issue on wound healing. The authors represented in this issue are active wound healing clinicians or researchers who strive to better the lives of our fellow Rhode Islanders by caring for the many among us who battle chronic or acute wounds that don't heal according to schedule or intention. One of us (PL) served as President of the Wound Healing Society (WHS) for 2013–14, an international group of clinicians, scientists, and people in industry, who are engaged in wound research and product development. One of the WHS Board members used to say that "Superman (aka Christopher Reeves, the actor) didn't die from his broken neck – it was an infected pressure ulcer that proved his undoing."

Unhealed wounds are a largely hidden epidemic, affecting 6.5 million Americans and costing about \$25 billion a year.¹ Rhode Islanders are unfortunately well-represented in this population. Many of our friends, neighbors, and colleagues may be in the cohort, and far too many patients lead lives that are limited by the need to be at home for visiting nurse visits, or by odiferous wounds that prevent socialization. The incidence of chronic wounds is increased among the older population as well, and there is a clear negative impact on quality in this population. It is well established that wound healing slows with age. However, the basic molecular mechanisms underlying chronic wounds and the influence of age-associated changes on wound healing are poorly understood.² Despite this large socioeconomic burden, there have been only a few meaningful advances in the science of wound care. For example, there is only one pharmacologic agent approved by the FDA for use in chronic wounds: recombinant platelet-derived growth factor (becaplermin gel 0.01%, Smith and Nephew, Hull, UK), only for diabetic wounds, and it carries a black box warning.3 A group of WHS members lobbying Congress about the lack of NIH funding for wound research pointed out that there is more funding to study several rare disorders than for all of wound healing.⁴

In this issue, we present different perspectives on this complex problem. *Mehrzad et al.* provide an overview of different types of wounds, standards of care, and recent guidelines in treating chronic and diabetic wounds – the latter being one of the most common causes of chronic wounds. *Johnston et al.*, provide a summary of some of the basic science work attempting to identify molecular cues identifying which patients may respond to hyperbaric oxygen therapy. *DosRemedios et al.*, present current concepts in caring for diabetic foot ulcers from a podiatric perspective. *Kwan et al.*, provide an overview of surgical therapies available for wound coverage, and *Ciombor et al.*, provides a glimpse into the brave new world of stem cells coupled with autologous clot that may aid in tissue regeneration and other therapies for problem wounds.

Rhode Island Dedicated Wound Care Facilities

There is no shortage of specialized centers in Rhode Island that care for chronic wounds. Rhode Island Hospital established its multidisciplinary center in 2013, which includes hyperbaric oxygen therapy (HBOT) as a treatment modality. HBOT is also available at CharterCare (Fatima Hospital in North Providence) and Kent County's Wound Recovery Center in Warwick. In addition, centers devoted to wound care exist at Newport, South County, and Westerly Hospitals. Just over the border in Massachusetts, Southcoast and Sturdy Memorial provide centers for wound healing as well. The first ever regional wound care symposium was hosted by the RIH Center in October 2015, and offered CME for physicians and nurses interested in learning the latest in techniques and materials available to speed healing.

Patient Populations and Demographics

Diabetes is a pandemic in the US. There's an estimated 22.3 million people living with diabetes in America.⁵ Diabetes is one of the most common causes of wounds with approximately 10% of diabetics developing diabetic foot ulcers.⁵ In RI, 7.4% of adults have diabetes.⁵ However, given that 1/3 of patients with diabetes are undiagnosed, there is likely a significantly higher incidence rate of diabetes and thus chronic wound.

Different types of wounds

There are many different types of wounds. Acute surgical wounds and traumatic injury wounds will typically heal well in a healthy person (**Figure 1**). Even without a full recovery, the skin will often close and its barrier function will be re-established (so-called primary intention if repaired, secondary intention if left to contract and re-epithelialize

| | Vascular | Neuropathic/diabetic | Pressure | Venous | |
|-------------------|---|---|--|---|--|
| Definition | Wounds caused by lack of blood supply. | Wounds exacerbated by diabetes, with damaged nerves, and blood vessels. | Wounds caused by pressure on skin tissue and resultant damage to the skin. | Wounds caused by damage to the venous valves which leads to failure to return blood to the heart \rightarrow venous congestion \rightarrow ulcers. | |
| Location | Legs, feet, and toes. | Usually on the foot but could be anywhere in the leg. | Usually over a bony prominence. | Ankle to mid calf. | |
| Size | Small, but increases in size. | Small. | Large or small. | Usually large. | |
| Exudate (pus) | Minimal. | Minimal. | From none to heavy. | From none to heavy. | |
| Peripheral pulses | Reduced or absent | Not reliable | N/A | Normal | |
| Pain | Pain when limb is elevated, at night and at rest. | Either absent or severe. | Present. | Present along with edema. | |
| Treatment | Revascularization and dressing. | Manage good blood sugar control, offloading, maintain moisture. | Remove "dead" tissue, maintain moisture, offloading. | Compression, remove "dead" tissue, offloading. Skin substitute. | |

Table 1. The four most common causes of wounds and their characteristics.⁶

over time). When skin is compromised by inadequate blood supply, presence of bacteria or related biofilm, autoimmune diseases, diabetes, or presence of nonviable tissue or contaminants from the environment wounds are less likely to heal (**Figure 2**). **Table 1** summarizes the four most common types of wounds and their specific characteristics.

Chronic Wounds

Wounds that do not heal in a timely fashion, usually defined as within three months, are considered chronic.⁷ Chronic wounds are complications that are associated with the comorbidities of diabetes and obesity.⁷ These wounds are classified as chronic wounds due to an interruption in the normal wound healing phases: hemostasis (blood clotting), inflammation, proliferation (new tissue growth), and remodeling.⁸ Chronic wounds are in a state of constant inflammation, and the degradation of collagen is greater than the rate at which it is produced. The burden of treating chronic wounds is increasing due to an aging population, increasing prices for health-related treatments, and the rising incidence of diabetes and obesity.⁹

Chronic wounds are caused by multiple factors. Systemic illnesses such as diabetes exacerbate wounds by compromising circulation, and causing increased skin trauma due to neuropathy.⁸ In general, wound healing slows with age and thus, incidence of chronic wounds increases as one gets older.¹⁰ The incidence rate of pressure ulcers, a chronic wound, is five to seven times higher for patients older than 80 years, compared to patients between ages 65 and 70.¹¹

Chronic wounds are often categorized into three groups: diabetic foot ulcers (DFU), venous leg ulcers (VLU), and pressure ulcers (PU).⁷ DFU affect 10% of patients with diabetes and is a leading cause of amputations.¹² Diabetes mellitus affects the normal wound healing response, and a longer inflammation phase is common. Neuropathy, often concurrent with diabetes, indicates that the patient does not feel the pain sensation of the initial wound. Because of the location and the environment of the wound, infection of the non-healing wound would require amputation.¹³ Most chronic wounds are VLUs and the exact cause is still unknown, but they are believed to be triggered by high pressure of the veins, due to improper blood flow.¹⁴ PUs, also known as bedsores, is caused by the pressure applied to skin, often in cases of bedridden individuals.¹⁴

Standard of Care²

The treatment of diabetic foot ulcers focuses on three issues: debridement, offloading, and infection management.¹³

Debridement

Debridement entails removing callus and dead tissue from the wound and surrounding tissue, in order to minimize the chance of infection and reduce the wound pressure, which has the potential to interfere with normal wound healing.¹³ After the tissue removal, saline is used to wash and clean the wound. A dressing is applied to absorb wound fluid, protect the ulcer from infection, and prevent the wound from drying out.¹³

Offloading

Offloading is the process of preventing any weight being applied to the wound.¹³ It is also the most difficult issue for treatment of diabetic foot ulcers.¹³ In addition to the use of crutches and wheelchairs to prevent walking directly on the wound, a cast system is used to cover and protect the foot. The total contact cast (TCC) is non-removable by the patient, and is considered the best treatment option.¹⁶ Even though the TCC is the gold standard, a survey has found that only 2% of the centers in the United States use the TCC as the main method for treatment of DFUs.¹⁷ Most of the ulcers were treated with removable footwear.¹⁷

Infection management

For infection treatment, the standard care of antibiotics is used for treating common pathogens such as Group B

Figure 1.

Venous ulcer (left), and treatment with a skin substitute (middle), as well as its post-operative result (right)



streptococci, enterobacteriaceae, and Pseudomonas aeruginosa.¹⁵ The treatment for venous leg ulcers consists of compression therapy, and is used to decrease the blood vessel pressure.¹⁸ It is used concurrently with leg elevation, for proper distribution of fluids and it is recommended for 30 minutes, three of four times a day.¹⁸ The treatment for pressure ulcers is similar to the diabetic foot ulcers, focusing on debridement and dressing the wound.¹⁹

Recent Wound Care Improvements

In 2006, the WHS published guidelines on how to specifically approach chronic wounds. Since then, thousands of new articles have been published within the field and new evidence has emerged on recommendations for different clinical aspects of wounds. Below are some of the most relevant updates in stepwise approach.

1. Peripheral vascular disease (PAD)

PAD contributes to both the development of chronic and poor wound healing.²⁰ Any patient with a chronic wound should be evaluated for PAD with ankle brachial index (ABI).²⁰

2. Offloading

Ulcerations on the sole of the foot, mostly secondary to diabetes, are often associated with moderate to high pressures because of foot deformity, neuropathy and limited joint mobility.²⁰ Different types of offloading include custom shoes, depth shoes, shoe modifications, walkers, custom inserts, custom relief orthotic walkers, diabetic boots, forefoot and heel relief shoes, and total contact casts.²⁰

3. Prevention of recurrence

Recurrence rates, mainly DFU, are as high as 83% within 1 year because the underlying pathologic factors usually persist.²⁰ In contrast to previous recommendations, it is now unclear if good foot care and daily inspection of the feet will reduce the recurrence of diabetic ulceration.²⁰ However, protective footwear should be prescribed in all cases.²⁰

4. Infections in the wound

The most common underlying reason for amputation and hospitalization in chronic wounds is infection. Removing all necroticordevitalized tissue by surgical, enzymatic, mechanical, biological, or autolytic debridement is therefore essential.20

If there is suspected infection in a debrided ulcer, tissue biopsy or local swab cultures should be performed to determine the type and level of infection. By treating the infection by topical antimicrobial agents the bacterial load is reduced, which improves wound healing.²⁰ Moreover, systemic antibiotics are also effective in the treatment of acute diabetic foot infections.²⁰

5. Dressing changes

There are a large number of types of dressings available for chronic wounds. In contrast to the previous suggestion to keep a wound dry, a moist wound environment physiologically favors cell migration and matrix formation while accelerating healing of wounds by promoting autolytic debridement.²⁰ However, dressing that maintains a moist wound-healing environment has not been shown to be more effective than other dressing approaches.²⁰ Topical silver dressings have not been shown to be effective to treat DFUs.²⁰

6. Topical agents

Diabetic foot wounds are deficient in growth factors, therefore, *cytokine growth factors* are messengers/mediators in wound healing.²⁰ Furthermore, accelerated wound healing is seen with *fibroblast growth factor* and *epidermal growth factor*. Factors that have not been shown to accelerate healing are granulocyte-colony stimulating factor (G-CSF) and vascular endothelial growth factor.²⁰

7. Cellular therapy

Some wounds respond well to the addition of cells, via skin substitutes or grafts. **Figure 1** illustrates the use of cultured epithelium on a collagen substrate used to heal a venous leg ulcer.

8. Surgical treatment

In patients with inadequate arterial blood flow, improvement in blood supply is associated with an increase in oxygenation, nutrition, and wound healing.²⁰ Therefore, these patients should be considered for a revascularization procedure. For other chronic wounds, flap coverage may be indicated. (See **Figure 6** on page 32.)

9. Devices

Negative pressure wound therapy (NPWT), hyperbaric oxygen therapy, bioengineered alternative tissues, and electrical stimulation are a few of the several devices that have more recently been shown to significantly improve wound healing.²⁰ NPWT improve healing by reducing edema, reducing bioburden, and increasing granulation tissue. Bioengineered dermis plays a role in wound healing for several reasons. It increases the proportion of wounds that heal; it increases the rate of wound healing; it reduces the risk of complications.²⁰ Electrical stimulation accelerates wound closure and the proportion of wounds that heal. Hyperbaric oxygen therapy has been shown to prevent amputation.²⁰

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Authors

- Raman Mehrzad, MD, Department of Plastic Surgery, Rhode Island Hospital, Alpert Medical School of Brown University
- Bielinsky A. Brea, ScM candidate, Department of Plastic Surgery, Rhode Island Hospital, Alpert Medical School of Brown University
- Benjamin R. Johnston, PhD, Department of Plastic Surgery, Rhode Island Hospital, Alpert Medical School of Brown University
- Michael Vezeridis, MD, Rhode Island Hospital Center for Advanced Wound Care and Hyperbaric Medicine; Department of Surgery, Rhode Island Hospital, Alpert Medical School of Brown University
- Paul Y. Liu, MD, Department of Plastic Surgery, Rhode Island Hospital, Alpert Medical School of Brown University; Rhode Island Hospital Center for Advanced Wound Care and Hyperbaric Medicine

Disclosures

None

Conflict of interest

None

Correspondence

Paul Y. Liu, MD, FACS Chair, Department of Plastic and Reconstructive Surgery Director, Plastic Surgery Residency Director, Plastic Surgery Research Lab 235 Plain Street Providence, RI 02905 401-444-5495 pliu@lifespan.org

Etiology and Treatment of Pedal Wounds in the Diabetic Patient

EDMUND T. DOSREMEDIOS, DPM, FACFAS; BENJAMIN R. JOHNSTON, PhD; LOUIS R. SIMEONE, DPM, FACFAS

INTRODUCTION

Pedal Wounds secondary to complications related to Diabetes Mellitus

Wounds related to diabetes mellitus are multifactorial in etiology. Primary factors contributing to chronic diabetic foot ulceration include peripheral neuropathy and peripheral vascular disease. Secondary factors including limited joint mobility, neuropathic osteoarthropathy (Charcot foot), and a depressed immune response to infection further complicate treatment. Prompt treatment of diabetic foot wounds with a multidisciplinary approach, coordinating the primary care physician, endocrinologist, vascular surgeon, and podiatrist, can achieve healing, and reduce the chance of amputation.¹

In the United States, approximately 50% of all nontraumatic lower extremity amputations occur in patients with diabetes mellitus. Limb amputation is not an inevitable fact of diabetes with a controlled, organized approach to wound care. Long-term glycemic control is the goal. Identifying the etiology of the wound and then intervening with techniques to allow for an optimal wound climate for healing must be instituted. This includes optimizing arterial perfusion to the wound site. Removal of unhealthy tissue, thereby reducing bacterial bioburden, via debridement is important for wound bed preparation. Depending upon the depth of the wound, other deeper structures such as tendon, muscle, and bone (in osteomyelitis), may require excisional debridement. In addition, evaluation for a neuropathic component or structural deformity of the foot ie hallux valgus, hammertoes, or pes planus is also necessary to properly remove pressure or offload the wound to optimize healing potential. In certain instances, wounds cannot heal due to structural deformity of the foot and surgical correction of the underlying deformity is required.²

Etiology of Diabetic Foot Ulceration

Sensorimotor neuropathy and autonomic neuropathies are primary factors contributing to foot wounds. Sensorimotor neuropathy accounts for reduced or absent reflexes, intrinsic muscle atrophy, resultant musculoskeletal deformity (hammertoes, bunions, prominent metatarsal heads), and sensory loss in a stocking/glove distribution. The insensate foot cannot detect painful stimuli and is more likely to have abnormally high foot pressures because of structural deformity. This predisposes the extremity to injury such as a puncture wound or subsequent plantar ulceration/wound. Autonomic neuropathy is responsible for the decrease or absence of sweating of the lower extremity and arteriovenous shunting resulting in distention of dorsal veins in the foot. The presence of anhidrotic skin leads to cracking, fissuring, and, coupled with abnormally high foot pressures, hyperkeratotic skin or callus, which increases the risk of skin breakdown and development of foot wounds.

Peripheral vascular disease is also a primary causative factor contributing to foot wounds in the diabetic patient. Atherosclerotic occlusive disease of the macrocirculation, especially the distal popliteal and tibial arteries, affects the diabetic foot. Peripheral vascular insufficiency lowers the viability of skin, which reduces the pressure threshold in which ischemia and tissue breakdown occur. In the face of adequate blood supply, neuropathy takes precedence in the pathogenesis of foot ulceration.

Secondary etiologic factors of diabetic foot ulceration play a lesser role overall, but should not be overlooked. Limited joint mobility, caused by non-enzymatic glycosylation of proteins with subsequent rigidity contributes to the development of higher foot pressures and possible ulceration by not permitting adequate compensatory redistribution of high loads. Charcot joint disease compromises structural integrity of the foot causing dislocation with eventual rocker-bottom deformity. This leads to increased plantar midfoot pressures and eventual development of foot ulceration if not heeded. Diabetes is also associated with diminished neutrophil/immune function. The inability to aggressively fight infection allows for necrosis to persist within the wound and prevent healing.^{3,4}

History and Clinical Examination of the Foot

Previous foot ulceration or amputation in the patient with diabetes has a strong predictive value for further foot problems. Diabetic complications such as nephropathy and retinopathy are associated with diabetic foot problems/wounds. Smoking and alcohol consumption also increase the risk of the development of foot wounds. Patient education about the causes and prevention of pedal wounds, including the use of proper fitting supportive shoe gear can greatly reduce the risk of diabetic foot ulceration.

Clinical signs of neurological deficit include an impaired sensation to pain, light-touch, cold, hot, and vibration, in addition to reduced or absent ankle and knee reflexes. These can be easily assessed in the office with use of a 5.07g

| Wound Severity |
|--|
| Intact skin |
| Superficial ulcer of skin or subcutaneous tissue |
| Ulcers extend into tendon, bone, or capsule |
| Deep ulcer with osteomyelitis, or abscess |
| Gangrenous toes or forefoot |
| Gangrenous midfoot or hindfoot |
| |

Table 1. Wagner grading system for diabetic foot infections⁷

Semmes-Weinstein monofilament or a tuning fork test. Clinical changes of vascular compromise are manifest as atrophic skin, hair loss, cool lower leg and foot, increased capillary filling time and diminished or absent pedal pulses. Dorsalis pedis and posterior tibial pulses can be palpated or assessed with a portable Doppler. If vascular compromise is evident further vascular diagnostic evaluation should be pursued. Revascularization of the extremity should be considered to promote wound healing. Appreciation of any digital deformities, bunion, hammertoe, pes planus, and other palpable bony prominences are important because these are areas of increased risk of foot ulceration. Furthermore, the presence of clinical or radiographic Charcot joint changes, and limited subtalar/ankle range of motion should be documented. Areas of dry skin, callus formation, interdigital maceration, bullae, dystrophic onychomycotic nails, tinea pedis, and skin ulceration require evaluation. Evaluation of pedal ulceration/wounds, should include information regarding location, size, depth, and surrounding soft tissue/ bone/ joint involvement. Classification systems such as Wagner's can be utilized to classify the wound and improve communication between medical disciplines.⁵⁻⁷ (Table 1)

Wound Healing and the Approach to Treatment of Diabetic Foot Wounds

The basics of wound healing are reviewed elsewhere in this issue. Specifically, diabetic wounds display reduced growth factor production, decreased or impaired angiogenic response, macrophage function, collagen accumulation and epidermal barrier function. These all maintain a chronic inflammatory state preventing normal wound healing.

Upon determining the extent of neuropathy, structural deformity, and limb perfusion, a wound care algorithm can be initiated. Conservative approaches, surgical intervention, and, at times, a combination of both may be required to achieve complete wound healing. Pressure relief of the wound may be required throughout the treatment protocol.⁸

Initiating a wound environment with proper moisture balance without excessive exudate is the goal. Reduction of lower extremity edema via compression or elevation of the extremity also alleviates unnecessary wound strain and exudate. Topical dressings can be optimized to maintain a moist wound bed and absorb excessive exudative collections of fluid that will macerate adjacent tissue and prevent healing.

Reducing the bacterial bioburden of the wound can also reduce excessive exudate.⁹ There is a spectrum of bacterial presence in a wound ranging from contamination and colonization to critical colonization and infection. Chronic nonhealing wounds are usually contaminated and colonized. Recommendations for conservative treatment include cleansing, debridement (surgical, mechanical, enzymatic, and now ultrasonic), exudate management, and topical and oral antibacterial therapy.^{10,12}

A critically colonized wound in the presence of unhealthy granulation, malodor, possibly deep sinus tracks to exposed bone, erythema, cellulitis, and systemic signs of infection requires a more aggressive treatment protocol. IV antibiotics with operative staged surgical debridement/surgical correction of foot deformity and hospitalization may be necessary to stabilize the infected wound for the eventual progression to less intensive wound healing therapies. The use of topical growth factors can be applied to a wound to stimulate a wound healing cascade, topical matrix preparations can act as scaffolding for wound healing, and external negative pressure wound therapy can be utilized to enhance granulation tissue and reduce exudate within a stable, noninfected wound.¹¹

CASE STUDY

A 38-year-old man with history of diabetes and obesity presented to the emergency room with a large ulcer on his left foot. He stated it began as a blister that he popped and then picked at. A few days later, he noticed the ulceration getting larger, with increasing drainage, and he developed a fever. Exam revealed dorsalis and posterior tibial pulses 2/4 bilateral. He had diminished Semmes Weinstein monofilament 5.07 g thresholds on his toes bilaterally. His left lower extremity was very swollen, especially the foot and ankle. The dorsal aspect of his left foot revealed a large ulceration (**Figure 1**). There was purulent drainage and undermining

Figure 1. The dorsal aspect of his left foot revealed a large ulceration.



Figure 2: The patient was brought to the operating room immediately for incision and drainage of this wound. This resulted in removal of toes 4, 5, and a significant amount of tissue from the dorsum of his left foot.



Figure 3: Given the size and depth of the wound, negative pressure therapy was chosen, and carried on for several weeks. When the granulation tissue completely filled in the wound, other modalities to assist in epithelialization could be considered.



Figure 4: A skin substitute was utilized in this case. The wound subsequently went on to complete closure in four months.



of approximately 5-7 cm, without probe to bone. There was crepitus on palpation in the subcutaneous tissue around the ulceration. X-rays of the foot and ankle revealed gas in the tissue around the ulceration. His lab values revealed a white count of 14.1, and a hemoglobin A1c of 13.1. The patient was brought to the operating room immediately for incision and drainage of this wound. This resulted in removal of toes 4, 5, and a significant amount of tissue from the dorsum of his left foot (**Figure 2**). Then began the challenge of closing this wound.

A few days later, the wound appeared free of infection and any nonviable tissue. Santyl ointment was used during this period to help remove non-viable tissue and promote granulation tissue." At this stage, the wound needed a treatment modality to increase granulation tissue. Options were topical growth factor therapy and negative pressure wound therapy. Given the size and depth of the wound, negative pressure therapy was chosen, and carried on for several weeks. When the granulation tissue completely filled in the wound (Figure 3), other modalities to assist in epithelialization could be considered. Skin grafting may play an important role, either autologous or a skin substitute, of which there are many. They typically take longer to heal than the patient's own skin; however, they can obviate the need for another surgery, and another open wound (the donor site). Skin substitutes are expensive, and usually require more than one application.

A skin substitute was utilized in this case. The wound subsequently went on to complete closure in four months (Figure 4).

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Authors

- Edmund T. DosRemedios, DPM, FACFAS, University Foot and Ankle, Providence, RI; Clinical Assistant Professor of Orthopedic Surgery, Warren Alpert Medical School of Brown University, Providence, RI.
- Benjamin R. Johnston, PhD, Warren Alpert Medical School, Brown University, Providence, RI.
- Louis R. Simeone, DPM, FACFAS, University Foot and Ankle, Providence, RI; Clinical Assistant Professor of Orthopedic Surgery, Warren Alpert Medical School of Brown University, Providence, RI.

Disclosures

None

Correspondence

Edmund T. DosRemedios, DPM, FACFAS University Foot and Ankle Center, Inc. 235 Plain St., Suite 201 Providence, RI 02905 401-861-8830 dos35@cox.net

The Mechanism of Hyperbaric Oxygen Therapy in the Treatment of Chronic Wounds and Diabetic Foot Ulcers

BENJAMIN R. JOHNSTON, PhD; AUSTIN Y. HA, BS; BIELINSKY BREA, BS; PAUL Y. LIU, MD, FACS

ABSTRACT

Non-healing wounds are a growing public health concern, and more than \$25 billion per year in the US are spent caring for patients with chronic wounds. Many of these patients are referred to specialized wound centers, where hyperbaric oxygen therapy (HBOT) has become a mainstay in healing wounds, especially diabetic foot ulcers (DFU). However, it is costly, with a typical course of therapy running into the tens of thousands of dollars. Presently, as many as 30-40% of DFU patients with Wagner's Grade 3 and 4 ulcers treated with HBOT fail to heal by 24 weeks. Unfortunately, the patient will have already received lengthy therapy (30-60 daily treatments over 6-10 week time period) before having the wound deemed non-responsive. Currently, practitioners employ a combination of clinical markers, diagnostic testing and a fourweek preliminary healing response, but this approach is inaccurate and delays definitive identification of HBOT responder and non-responder phenotypes.

KEYWORDS: hyperbaric oxygen therapy, diabetic foot ulcer, chronic wounds, molecular mechanism

are more than 23 million people in the United States with diabetes, and there is an estimated worldwide prevalence of 5%.9 The continued care of DFUs is an expensive and time-consuming process and is exacerbated by a recurrence rate of almost 70% over a 5-year period.9 Severe complications contribute to an annual mortality rate of 11% for those with a DFU and 22% for those with a lower extremity amputation⁹. Older patients are more likely to develop DFUs.9 Management of DFUs begins with debridement, offloading, and infection control.¹⁰ Debridement is the removal of necrotic tissue to expose viable tissue.¹⁰ Offloading by wheelchair, cast, or crutches is very effective for compliant patients, with wound healing rates of 73-100%.¹⁰ Infections at the DFU are common and are usually polymicrobial. Common pathogens found within the ulcer include Staphylococcus aureus, Group B streptococci, enterobacteriaceae, Pseudomonas aeruginosa, and enterococci.¹⁰

When DFUs do not heal despite adequate conservative management or progress to Wagner Grade 3 or 4, HBOT can be considered as an adjuvant therapy.^{2,11} However, its efficacy is not universally accepted.^{2,5,8,11-13} A 2013 study of patients with similar case presentations showed neither

INTRODUCTION

Hyperbaric Oxygen Therapy (HBOT) is a treatment proposed for a myriad of ischemic conditions.¹⁻⁸ In the early 1960s, physicians began to consider its use for treating chronic wounds.^{4,6} A patient prescribed the therapy is sealed within a large chamber (**Figure 1**) filled with 100% oxygen pressurized at 2.0 to 2.5 atmospheres absolute (ATA).⁵ For comparison, this chamber pressure is equivalent to being about 45 feet underwater. The typical therapy session lasts for 1 to 2 hours and may be repeated for 30-40 treatments.^{2,5}

Diabetic foot ulcers (DFU) occur in approximately 10% of diabetic patients and this may lead to serious complications, including amputation, in approximately 2%.⁹ There





improvement in wound healing nor a decrease in amputation following HBOT.¹³ While this work brought significant doubt to the effectiveness of HBOT, a 2015 Cochrane report on HBOT for chronic wounds found that HBOT has strong clinical evidence for improved short-term healing (early wound healing response), limited clinical evidence for improved long-term healing (final stage wound healing), and limited evidence for decreasing the rate of lower limb amputation.^{2,5,11} As cost-effective care becomes an increasing priority under the Patient Protection and Affordable Care Act of 2010, the expense of HBOT may no longer be justified without stronger evidence for consistent benefit. Indeed, each treatment costs between \$200 and \$1,250 and requires significant investment of time and compliance on the part of the patient.²

The subset of patients most likely to benefit from HBOT is still a matter of debate.^{5,8,12} Studies failed to show an association between ankle-brachial index (systolic pressure in the ankle divided by systolic pressure in the arm) or toe blood pressure and healing of ulcers.^{2,5} In-chamber wound-area transcutaneous oxygen pressure (TcP₀₂) less than 200mmHg during HBOT has a 74% reliability of predicting non-healing; however, this is not a screening option available to centers without access to hyperbaric chambers.¹⁴ Genetic assessment of patients may offer a new way of directing HBOT.² The authors of this paper are currently conducting a study to differentiate genetic expression profiles of responders and non-responders to HBOT, such that predictors for response may be identified.

The rest of this paper outlines the cellular and molecular mechanisms by which HBOT promotes wound healing.

HBOT increases oxygen delivery to tissues

At normal atmospheric conditions, nearly 100% of oxygen is transported by binding to hemoglobin, and only a small amount is dissolved in the plasma.^{2,15} Oxygen delivery occurs when oxygen molecules leave the circulatory system and diffuse down their concentration gradient into cells. The concentration gradient is in turn determined by the partial pressures of oxygen in the capillaries and the tissue in immediate proximity.¹⁵ Poorly perfused tissues create steeper gradients that induce greater oxygen delivery, but they also have a larger cumulative demand.¹⁵ Patients suffering from microvasular diseases such as diabetes have fewer capillaries to provide oxygenation to the tissues.2 HBOT combats this state of hypoxia by increasing the amount of oxygen dissolved in plasma as well as the partial pressure of oxygen in the tissue fluid.⁵ This increases the cumulative amount of oxygen available to tissues, thereby meeting the increased oxygen demand of poorly perfused tissues.^{2,3,5,8} Oxygen delivery to hypoxic tissues has been shown by modeling and clinical observation to be approximately 16-fold higher with HBOT.¹⁶

HBOT promotes angiogenesis, wound healing, and immune response through cell signaling

HBOT raises the partial pressure of oxygen in blood and subsequently in tissues, and this has been shown to have many downstream biological effects: angiogenesis, wound healing, and increased immune system response.^{2,3,5,8,17} Various cytokines, gases and other macromolecules mediate these complex cellular responses. Angiogenesis is the process by which existing blood vessel networks expand to meet increased demand for blood and oxygen within tissues.¹⁸ Angiogenesis can proceed by two main processes: endothelial cell migration, in which new vasculature forms as an extension of the existing network, and division of blood vessel lumen, in which the cross-sectional area of the existing capillary network increases.¹⁸ Essential for these processes is having an adequate number of cells to create new blood vessels, and research has shown that circulating progenitor cells are recruited as a result of HBOT.¹¹ HBOT has a stimulatory effect on endothelial nitric oxide synthase (eNOS), which produces nitric oxide (NO), a signal necessary for the activation and recruitment of progenitor cells.11,19,20 In patients with diabetes, eNOS is inhibited; however, HBOT can overwhelm the inhibitory effect of diabetes and induce NO synthesis, thereby promoting angiogenesis and accelerating wound healing.11,21-23

Wound healing is a normal process following injury that comprises four phases: hemostasis, inflammation, proliferation, and tissue remodeling.²⁴ Oxygen availability is critical in wound healing primarily for facilitating oxidative phosphorylation for normal cellular function.²⁴ However, during the initial phases of wound healing, the wound is hypoxic.²⁴ This leads to signaling for angiogenesis and other wound healing factors (hypoxia-inducible factors - HIF, platelet-derived growth factor - PDGF, transforming growth factor beta - TGF-B, vascular endothelial growth factor - VEGF, tumor necrosis factor alpha - TNF-a, and pre-pro-endothelin 1 -PPET-1), but conversely if the wound is chronically hypoxic there will be impaired healing.^{11,24} This temporal difference in the effect of hypoxia is thought to be largely determined by HIF expression where early wound healing was improved with HBOT and HIF levels were decreased. However, HIF expression was elevated in hyperoxic conditions and lead to increased VEFG expression.¹¹ In addition to the aforementioned cytokines, SDF-1 has been shown to be a key determinant of wound healing and is activated by HBOT.²² Lack of SDF-1 expression appears to partially explain why chronic hypoxic wounds (as in diabetes) do not heal.²²

HBOT has been shown to decrease inflammation by inhibiting prostaglandin, IFN- γ , IL-1, and IL-6 formation.²⁵ This anti-inflammatory effect may improve general immune system function by decreasing immunosuppressive agents (prostaglandins, IL-1, IL10).²⁵ The immune system response is further augmented with HBOT by aiding the production of reactive oxygen species (ROS) by leukocytes.^{2,11} In addition to cytokine suppression, anti-inflammatory activity, and immune response, HBOT has effects on anti-oxidant production. ²⁶

HBOT and the antioxidant response pathway

Injury, infection, and chronic disease lead to stress response pathway activation.²⁷ Cells produce antioxidants in response to these stresses.²⁷ The main system that regulates antioxidant production is the Nrf2-Keap1 / cytoplasmic oxididative stress system.²⁷ Keap1 is a cytoplasmic chaperone protein that binds to Nrf2 - a transcription factor.²⁷ Without cellular stress, Nrf2 is ubiquinated and destroyed at a high rate.²⁷ With cellular stress, Nrf2 is no longer ubiquinated at a high rate and is able to translocate to the nucleus to activate antioxidant response elements (AREs) and over 200 antioxidant genes.²⁷⁻³⁰ Gene expression analysis initially suggested that Nrf2 was increased universally following HBOT, suggesting that cytoprotection in endothelial cells by activation of antioxidant pathways was a key mechanism of HBOT.28,29 More refined and longer time-scale expression analysis has revealed a more complex systemic response to HBOT.³⁰. Nrf2 espression peaked at 4 hours after exposure to HBOT and was expressed at control levels at 24 hours following exposure.29 Subsequent studies into the antioxidant pathways activated by HBOT reveal that diabetes activates Nrf2 expression likely because of systemic hyperglycemia and microvascular injury.³⁰ HBOT, although shown to increase Nrf2 expression within a few hours of exposure actually leads to a long-term decrease in Nrf2 expression when HBOT was continued in a clinically relevant exposure pattern in db/db mice.³⁰ This bi-phasic response is thought to indicate a short-term increase in cytoprotective antioxidant proteins that are stimulated by HBOT exposure, but eventually contribute to a long-term decrease in antioxidant production due to the cytoprotective effects of continued HBOT.³⁰

CONCLUSION

For over 50 years HBOT has been regularly used for chronic wound care and yet the underlying mechanisms and clinical effectiveness are rightly still called into question. To provide direction to the field, more advanced analyses of the gene expression may prove to be useful. In addition to providing clarity to the usefulness of HBOT it serves the larger purpose of a more robust understanding of wound healing.

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Authors

- Benjamin R. Johnston, PhD, Warren Alpert Medical School, Brown University
- Austin Y. Ha, BS, Warren Alpert Medical School, Brown University
- Bielinsky Brea, BS, Department of Bioengineering, Brown University
- Paul Y. Liu, MD, FACS, Warren Alpert Medical School, Brown University; Department of Plastic and Reconstructive Surgery, Rhode Island Hospital

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Correspondence

Paul Y. Liu, MD, FACS Chair, Department of Plastic and Reconstructive Surgery Director, Plastic Surgery Residency Director, Plastic Surgery Research Lab 235 Plain Street Providence, RI 02905 401-444-5495 pliu@lifespan.org

Surgical Management of Chronic Wounds

BENJAMIN R. JOHNSTON, PhD; AUSTIN Y. HA, BS; DANIEL KWAN, MD

ABSTRACT

In this article, we outline the important role the surgeon plays in the management of chronic wounds. Debridement and washout are required for grossly infected wounds and necrotizing soft tissue infections. Cutaneous cancers such as squamous cell carcinomas may contribute to chronic wounds and vice versa; if diagnosed, these should be treated with wide local excision. Arterial, venous, and even lymphatic flows can be restored in select cases to enhance delivery of nutrients and removal of metabolic waste and promote wound healing. In cases where vital structures, such as bones, joints, tendons, and nerves, are exposed, vascularized tissue transfers are often required. These tissue transfers can be local or remote, the latter of which necessitates anastomoses of arteries and veins. Pressure sores are managed by relieving pressure, treating acute trauma or infection, and using rotation fasciocutaneous flaps. Lastly, the surgeon must always consider the possibility of osteomyelitis and retained foreign body as etiology for chronic wounds.

KEYWORDS: chronic wound, surgical management, debridement, flap, pressure sore

INTRODUCTION

In the comprehensive care of chronic wounds, surgical evaluation and monitoring of wound progression are important components. Early involvement of the surgical team creates a collaborative multidisciplinary approach to the care of chronic wounds and greatly increases the probability that they will resolve. This article reviews surgical concerns and treatment options for chronic wounds.

There are certain conditions that warrant urgent or emergency surgical intervention. Gross wound infection or necrotizing soft tissue infections must be controlled with aggressive debridement and drainage of fluid collections. In these wounds, regardless of the root cause, the bacterial load and activation of virulence factors result in the invasion of the host tissue and systemic disease. Removal of necrotic tissue and its bacterial colonies helps to locally control the epicenter of the infection process. Bacterial concentrations found to be in excess of 10⁵ colony forming units (CFUs), or the presences of beta hemolytic streptococci have been used as an objective measure for requiring intervention.¹ Systemic and topical antibiotics are administered to further quell the bacterial assault and move the wound from a state of bacterial invasion to a more quiescent colonization state. Serial debridement and washouts may be necessary until control of bacterial overgrowth is achieved.

The history and timeline of a chronic wound must be considered for concerns of malignancy. A skin malignancy can be the root cause of a chronic wound that cyclically recurs, or one that never fully heals. A chronic wound is also a risk factor for a malignant transformation and the formation of a Marjolin's ulcer, an aggressive squamous cell carcinoma at the site of a chronic wound. If there is suspicion for malignancy, a biopsy from the wound should be sent for pathologic evaluation. If there are no signs of uncontrolled infection or concern for malignancy, a detailed assessment of the wound and the patient proceeds.

The next assessment is often the patient's vascular status. Traditionally, arterial inflow and venous outflow were the primary concerns, but with more recent success in lymphedema surgeries, the lymphatic concerns should be investigated as well. The evaluation for arterial sufficiency in the extremities begins with the presence and quality of palpable pulses. The ankle-brachial index (ABI) and transcutaneous oxygen tension (TcPo2) can identify arterial insufficiency more objectively. ABI less than or equal to 0.7 indicates significant arterial insufficiency and a TcPo2 less than 30 mmHg is associated with impaired healing.² Arterial insufficiency should be evaluated by a vascular surgeon and treated with endovascular or bypass revascularization. Amputation of the extremity should be considered if revascularization is not possible.

After arterial inflow is addressed, venous flow is evaluated by Doppler ultrasound in the deep and superficial venous systems of the extremity for patency and competence. Though compression therapy is the cornerstone in the treatment of venous congestion, several surgical approaches have been successful in improving outcomes. Deep vein thrombosis should be addressed by anticoagulation therapy if appropriate. Furthermore, therapies such as superficial ablation, endovenous ablation, sclerotherapy, and subfascial endoscopic perforator surgery (SEPS) have been reported to be beneficial in combination with compression therapy.³

Lymphedema is a difficult medical condition that can create wound healing complications and lead to chronic

wounds. Patients were traditionally treated with compression protocols, both static and intermittent. More recently, positive clinical outcomes have been reported with combined treatment approaches using microvascular lymphovenous anastomosis and free lymph node transfer with compression therapy. Assessment of the lymphatic system involves imaging with lymphoscintigraphy to identify congestion in the lymphatic circulation of an extremity. Then lymphography is performed where a dye injection in the periphery is followed in real time imaging as it flows proximally. Regions showing lymphatic fluid backup are then addressed by meticulously identifying engorged lymphatic vessels and microsurgically anastomosing them to subcutaneous veins thereby shunting lymphatic fluid into the circulatory system. Greater success is seen when multiple lymphatic vessels are anastomosed to the venous system.⁴ Another surgical approach to lymphedema is microvascular transfer of functional lymph nodes from a normal limb to the diseased.5 When harvesting lymph nodes, care is taken to avoid harvesting nodes that are critical to the drainage of the normal extremity.

If no vascular or lymphatic concerns exist, or have been adequately addressed, the next evaluation is of the wound itself. The wound bed is scrutinized to evaluate for vascular tissue, necrotic tissue, and exposed structures. Necrotic tissue or eschar on a non-infected wound does not necessitate

immediate debridement or surgery. If there is tight adherence of viable and non-viable tissue, the autolytic process can be allowed to proceed to better define a plane of what needs to be removed. A healthy cellular immune system will effectively remove necrotic tissue; however, this process does require more time than surgical debridement. Tissue that is debrided in this manner is less likely to bleed. If significant bleeding is encountered, this is a sign that viable tissue has been excessively damaged in a healthy wound bed. For wounds with only scant amounts of debris, enzymatic debriders may help to keep the wound bed clean and promote healing. In anatomical regions with little soft tissue to spare, such as the anterior leg, dorsal foot, and ankle, these conservative approaches help preserve viable tissue and prevent exposure of critical structures. More aggressive debridement of wounds is warranted if adequate healthy soft tissue is found under necrotic tissue. Thorough debridement of non-viable tissue with immediate graft or flap can greatly speed the healing process. Using a hydrodebrider machine in these cases has been helpful to more precisely control the depth of debridement while assisting in the removal of all non-viable tissue and debris.6

If exposed bone, cartilage, and tendon are noted, surgical treatment is indicated sooner

rather than later to protect these structures from infection and desiccation. Such structures have insufficient vascularity to encourage soft tissue overgrowth or accommodate a skin graft and will likely result in a chronic wound. To cover these wounds, soft tissue with intact vascular supply can be borrowed either locally with adjacent soft tissue rearrangement, or more distantly with pedicled and free flaps. This allows taking soft tissue from areas of relative excess to cover wounds that are deficient in necessary vascularized tissue.

Adjacent skin and subcutaneous tissue can sometimes be moved as a flap by extending incisions from the wound. Local flap techniques include rotation, advancement, and transposition of the nearby tissue relying on its elasticity and laxity. Incisions around the wound can help to shift tension from one direction to provide more laxity in another. One common example is a V shaped incision that is then closed as a Y shape recruiting laxity in the perpendicular plane to allow more advancement to the tissue between the limbs of the V shape. Combining several techniques can be beneficial such as in a keystone flap which consists of one large advancement flap that is augmented by 2 V-Y advancement flaps (**Figures 1–4**).⁷

Pedicled flaps and free flaps involve mobilizing soft tissue based on an angiosome.⁸ This is a portion of tissue that can be isolated on a single vascular pedicle. By doing this, the

Figure 1. Rotation flap and transposition flap with skin graft to donor site for ankle wound and exposed hardware.

Figure 2. Transposition flap with skin graft to donor site for chronic leg wound.



Figure 3. Rotation flap with V-Y Advancement



Figure 4. Keystone flap diagram. A: original wound margins and flap outline. B: flap creation and transposition. C: final flap position and suture lines.



tissue can be moved a greater distance by freeing the artery and vein to allow mobility, or the vascular pedicle can be divided and anastomosed to an artery and vein closer to the wound. Knowledge of the local vasculature and perforator anatomy helps in successful transfer of tissue. If possible, donor sites are closed primarily; however, skin grafts are often necessary.

Pressure ulcers can result from either longterm conditions or acute events. In chronic conditions where mobility and sensation are affected, the importance of establishing a pressure relief protocol is the most vital component in treatment.⁹ After addressing the root of the cause, these wounds will often heal with time and there is no urgency to operate in most instances. Monitoring the wound closely helps to evaluate the success and adherence to the

Figure 5. Progression of ankle wound with concern of impending hardware exposure. Treated with conservative debridement, wound care, and monitoring. A: initial wound presentation. B: wound healing progression. C: wound healed.



Figure 6. Gluteal rotation flap with buried de-epithelialized portion to fill in soft tissue defect.

pressure management giving valuable feedback to attentive daily caretakers (**Figure 5**). Surgical debridement and closure is warranted in patients if bone or other vital structures are exposed, or if the dressings and wound care regimen is not tolerated. Acute incapacitation due to trauma or illness can also lead to pressure ulcers. Often, after the injury is addressed, the underlying issue with mobility and



sensation is also resolved. Pressure ulcers tend to form in regions of the body with more soft tissue available for re-arrangement such as the sacrum and buttock. If these sores do not heal, large rotation fasciocutaneous flaps are used to provide wound coverage. Figure 6 demonstrates the technique of a large gluteal rotation flap with a de-epithelialized portion used to fill a soft tissue void following excision of a chronic sacral wound. (**Figure 6**).

At times, chronic wounds involve a small tunneling wound with slow fluid discharge. If no progression of the wound is seen after a reasonable amount of time with regular wound therapy, the clinician must consider the possibility of an underlying osteomyelitis or retained foreign material. Exploration of the wound and associated sinus tract can sometimes reveal the reason for the chronic wound. To trace the extent of the sinus tract, methylene blue can be carefully injected into the sinus with a small syringe and angiocatheter.

At times, previous gauze packing, pieces of negative pressure wound therapy (NPWT) sponge material, and portions of drainage catheters can get trapped in a closing or tunneling wound and lead to an indolent bacterial colonization. If the sinus tract leads to bone, a biopsy should be sent to evaluate for osteomyelitis, which can be a cause of chronic wounds.

Medical and surgical assessments of chronic wounds are interdependent and must be coordinated and collaborative. Nutrition, diabetes monitoring, pressure relief, social support, fluid management, cardiac status, and a myriad of other concerns need to be addressed for the optimal and successful care of patients. Surgical considerations for a chronic wound involve a more detailed examination of the surrounding tissue to find clues as to what may be preventing normal wound healing.

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Authors

Benjamin R. Johnston, PhD, Warren Alpert Medical School, Brown University

Austin Y. Ha, BS, Warren Alpert Medical School, Brown University

Daniel Kwan, MD, Department of Plastic and Reconstructive Surgery, Rhode Island Hospital

Disclosures

National Heart, Lung and Blood Institute (T35 HL094308) (BRJ)

Correspondence

Daniel Kwan, MD Department of Plastic and Reconstructive Surgery Rhode Island Hospital 235 Plain Street Providence, RI 02905 401-444-5495

Wound Healing in Older Adults

LISA J. GOULD, MD, PhD, FACS; ANA TUYA FULTON, MD, FACP

ABSTRACT ⁻

Impaired wound healing in the elderly represents a major clinical problem that is growing as our population ages. Wound healing is affected by age and by co-morbid conditions, particularly diabetes and obesity. This is particularly important in Rhode Island as the state has a very high percentage of vulnerable older adults. A multidisciplinary approach that incorporates the skills of a comprehensive wound center with specialized nursing, geriatric medicine and palliative care will facilitate rapid wound healing, reduce costs and improve outcomes for our older adults that suffer from 'problem wounds'.

KEYWORDS: wound healing, diabetes, obesity, aging

BACKGROUND

Wound healing is a complex process that can be de-railed by multiple factors including obesity, diabetes, smoking, vascular disease, infection, renal failure and malnutrition. The current incidence of chronic non-healing cutaneous wounds is estimated at 5-7 million in the United States, with total annual wound care expenditures exceeding \$25 billion.¹ We are now entering a 'perfect storm' in which there is rapid expansion of the population over 65 years of age, combined with an exponential increase in diabetes and obesity worldwide. The fastest growing segment of this population, those over 85 years of age, is also the cohort with the highest incidence of chronic wounds, particularly venous leg ulcers and pressure ulcers.²⁻⁴ Meanwhile, older adults have significantly higher rates of surgical procedures, with increased potential for wound complications.5 The full impact of caring for chronic wounds includes direct costs (wound care supplies, hospital and nursing costs), indirect costs (lost wages for patient or caregiver) and intangible costs (pain and suffering). Thus, in addition to the effect on morbidity and mortality, we can expect that chronic wounds in the elderly will account for a disproportionate share of our nation's healthcare expenditures.

PATHOPHYSIOLOGY

The healthy octogenarian with a traumatic or surgical wound normally heals at a slower rate than a healthy young adult. This effect of "pure aging" is clinically apparent by age 60 and becomes statistically significant at age 70.6 However, because wound healing is a complex, highly orchestrated process, disruption of even a single aspect can delay

healing.7 The development of chronic wounds is multifactorial and depends upon both intrinsic and extrinsic factors. The four principle aging processes are changes in body composition, energy imbalance, homeostatic disequilibrium and neurodegeneration. These 'intrinsic' factors can have a major effect on wound healing. Specifically, alteration of the skin architecture with loss of elasticity, thinning of the dermis and reduced capacity of keratinocytes to proliferate and migrate, make the skin vulnerable to even minor trauma. A recent study using an ex-vivo model demonstrated that application of a compressive load to ischemic aged skin resulted in sub-epidermal separation and altered orientation of the collagen fibers similar to that seen in patients with pressure ulcers.8 Other changes in body composition include an increase in fat mass (FM) and decline in fat-free mass (FFM). Healthy, weight-stable men and women, between the ages of 68 and 78, lose approximately 1% of FFM per year. This loss of lean muscle translates to a 3-fold loss of strength and is a primary predictor of disability.9 Age-induced dysregulation of energy intake and utilization is brought about through a combination of reduced perception of hunger, early satiety, changes in the hormonal mediators associated with energy balance and reduced energy expenditure.¹⁰ The net effect in terms of weight gain or loss depends on a number of factors, including the overall health of the individual. However, all aspects of wound healing increase protein and energy requirements. In an elderly person who is already at high risk for malnutrition, the presence of a wound can tip the balance toward involuntary weight loss, development of sarcopenia, impaired immunity and increased risk of infection.¹¹ Sarcopenia, reduced functional ability and malnutrition, combined with the inability of aged skin to distribute a pressure load substantially increases the vulnerability of older adults to developing pressure ulcers.

Alterations in the homeostatic balance include increased pro-inflammatory markers, decreased antioxidants, decreased anabolic hormones, increased catabolic hormones and insulin resistance. All of these factors contribute to impaired wound healing and affect the skin's ability to function as an immune organ. Finally, neurodegeneration combined with impaired cognition, gait imbalance and slow reaction times contribute to immobility and decreased ability for self-care.¹²

RISK FACTORS & CO-MORBIDITY

While intrinsic factors clearly increase the risk for developing wounds, the most vulnerable patients are those with multiple concurrent illnesses. Data from the U.S. Wound Registry indicate that patients in outpatient wound centers have an average of six comorbid conditions, including a high prevalence of renal failure, peripheral vascular disease, diabetes and malnutrition.¹³ Multi-morbidity, defined by the National Quality Forum as "two or more chronic conditions that collectively have an adverse effect on health status, function, or quality of life" is known to be associated with an increased risk of death and disability. The complexity of these wound care patients is made evident by considering that only 14% of Medicare beneficiaries have 6 or more chronic conditions.¹⁴

Obesity, defined as body mass index greater than 30, is a major public health problem that is not included in the indices of multi-morbidity. The incidence of obesity in the United States increased dramatically between 1980 and 2008, doubling for adults and tripling for children.¹⁵ Although not often thought of as being a problem of aging, the startling reality is that more than one third of adults over the age of 65 are obese. What is concerning is that between 1990 and 2010 there has been a linear increase in the prevalence of obesity in older men. Thus, the prevalence of obesity has increased from 31.6% to 41.5% among men aged 65-74, while the prevalence among men 75 and older has increased from 17.7% to 26.5%.16 In Rhode Island the prevalence of obesity among adults aged 65 and older has increased from 22.2% to 26.8% in 2 years, a rate of 21% (August 2015, retrieved from http:// www.americashealthrankings.org/Senior/RI#sthash.znb3kS7a. dpuf). This alarming trend comes at great cost, with a health burden that includes an increased risk of diabetes, cardiovascular disease, osteoarthritis, stroke and cancer, all co-morbidities that impact wound healing.17 Furthermore, obesity increases the risk of some of the most difficult wound healing problems: lymphedema and venous insufficiency.18,19 Presenting with chronically erythematous, edematous and weepy legs, these patients are often admitted to the hospital for treatment of 'cellulitis' and account for approximately 50% of visits to outpatient wound centers. Because bilateral lower extremity erythema and edema is more likely to be related to an exacerbation of congestive heart failure than acute infection, treatment requires a multidisciplinary approach, particularly in older adults who are at high risk for complications from repetitive antibiotic administration, fluid overload and progressive disability. Older adults who are obese are also at risk for sarcopenia as fat replaces muscle mass. Intake of a calorically dense diet with increased carbohydrates and fat at the expense of protein, vitamins and minerals, paradoxically puts obese individuals at high risk for malnutrition. Involuntary weight loss occurs disproportionately in older obese individuals and is associated with high mortality.¹⁰

Diabetes is one of the most common co-morbidities among people presenting to wound clinics. As our population lives longer and grows heavier, the prevalence of type 2 diabetes is steadily increasing. Current estimates are that over one quarter of individuals over the age of 65 are diabetic. (*National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the Unites States*, 2014) Although the risk of type 2 diabetes is increased by obesity, both insulin resistance and reduced pancreatic islet cell function are age-related changes that can result in diabetes in older adults of normal weight.²⁰ Diabetes accelerates the normal rate of aging in a wide variety of physiological processes. Diabetes management is more complex in the older adult with multiple co-morbidities, impaired nutrition, polypharmacy and functional disabilities. The combination of peripheral neuropathy and peripheral vascular disease greatly increases the risk of wound healing complications, foot ulcers and lower extremity amputations in the elderly patient with diabetes. Co-existing visual impairment and impaired cognitive function may lead to delayed presentation with greater severity and more difficult management. The good news is that the rate of hospital admissions for diabetics with lower extremity amputation and ulcers declined between 1988 and 2007. Although the discharge rate in 2007 for lower extremity condition (peripheral arterial disease, ulcer/inflammation/infection, and neuropathy) as the first-listed diagnosis among diabetics aged 75 years or older was 21.6%, the rate has been steadily declining (www.cdc.gov). The rate of non-traumatic lower extremity amputation in diabetics has steadily declined since 1996, particularly for those over 75 (dropping from 19.4% in 1996 to 3.7% in 2009). One interpretation is that outpatient care is improving, preventing the necessity of hospital admission.

DISCUSSION & CLINICAL IMPLICATIONS

From the foregoing discussion it should be clear that care of the patient with chronic wounds requires a multidisciplinary approach and that this is even more critical in the elderly patient. Many of these wounds require specialty care that is beyond the scope of what the primary care physician can provide. Specialized wound centers have been developed to facilitate healing of the most difficult wounds and need to be prepared to manage the complexities of the elderly patient. Additionally, providers trained in geriatrics and palliative care are often involved in the care of these complicated patients to assist with symptom management, goals of care clarification, and to prevent functional decline, polypharmacy and to maximize quality of life. In Rhode Island this is particularly important as the state ranks 8th nationally in percentage of people over 65 and 4th in those age 70 and older. (2006 US Census) In 2013, 59% of patients treated at the Kent Hospital Wound Recovery Center were at least 65 years old and 28% were over the age of 80. The goal of the comprehensive wound center is to promote wound healing through evidence-based protocols. An early and aggressive approach to wound closure reduces cost, improves quality of life and prevents re-admission to the hospital. The wound care clinician will assist with the diagnosis, provide appropriate debridement to remove necrotic tissue and prescribe treatments that move the wound towards bacterial balance and promote healing.

However, older adults have additional special needs that merit multidisciplinary care and comprehensive assessment. According to the US Census Bureau, 20% of people over age 65 have some chronic disability with 8% having significant cognitive impairment and 30% having difficulty with mobility. More than 40% of individuals over the age of 85 living in the community have difficulty performing activities of daily living and 1 in 6 report cognitive limitations (Rising demand for long-term services and supports for elderly people, 2013.

www.cbo.gov/publications/4240. Retrieved August 18, 2015). Some older adults with wounds require more emphasis on palliation with control of symptoms and avoidance of infectious complications. Interestingly, more than 50% of wounds treated with a palliative approach ultimately heal.²¹ Wound specialists have an in-depth knowledge of and access to advanced wound care modalities that promote healing, reduce odor and increase comfort. The multidisciplinary approach emphasizes optimization of medical management, nutrition, mobility, pressure reduction, and perfusion while exploring barriers to care. For the elderly patient these barriers may include financial stress and lack of social support. Furthermore, best practice, evidence-based wound healing modalities such as diabetic foot off-loading and compression wrapping need to be modified for the elderly patient with gait disturbances, risk of falls or congestive heart failure. Teamwork is critical to facilitate care across the continuum and requires coordination with the family, with home health services and with the primary care physician.

The \$5 billion global market for 'advanced wound management' is expected to triple in the next ten years. Our nation's older adults will receive a disproportionate share of this advanced care. Because of the high proportion of older adults in Rhode Island we are positioned to be leaders in the development of evidence-based wound care protocols that focus on the special needs of the geriatric patient, decrease cost, reduce the need for admission to the hospital and improve outcomes.

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Authors

- Lisa J. Gould, MD, PhD, FACS, Medical Director, Kent Hospital Wound Recovery and Hyperbaric Medicine Center
- Ana Tuya Fulton, MD, FACP, Director of Geriatric Medicine, Care New England; Chief of Internal Medicine, Butler Hospital; Associate Professor of Medicine (Clinical) and Associate Professor of Psychiatry and Human Behavior (Clinical), The Warren Alpert Medical School of Brown University

Correspondence

Lisa J. Gould, MD, PhD, FACS Medical Director Kent Hospital Wound Recovery and Hyperbaric Medicine Center 455 Tollgate Rd Warwick, RI 02886 401-736-4646 Fax 401-736-4248 ljgould@kentri.org Ana Tuya Fulton, MD, FACP 345 Blackstone Blvd Center House Rear 211 Providence RI 02906 401-680-4128/401-455-6362 Fax 401-680-4288 afulton@butler.org

A Demographic Exploration of Whole Body Donors at the Alpert Medical School of Brown University

BREANNA JEDRZEJEWSKI, MPH, MD'17; DALE RITTER, PhD

ABSTRACT

OBJECTIVE: To examine and characterize the occupational histories of individuals who donated their whole bodies to the Anatomical Gift Program at Warren Alpert Medical School (AMS) from the academic years 2003–2004 to 2013–2014.

DESIGN AND METHODS: A retrospective chart review of 491 individuals who donated their whole bodies to Alpert Medical School was conducted upon IRB approval from Brown University. Demographic, social, and occupational histories were abstracted for analysis and review. There were no interventions. Descriptive statistics, Student T-test and Difference in Proportions Test were used to characterize information abstracted from donor applications to the Anatomical Gift Program.

PRIMARY RESULTS: From academic years 2003-2004 to 2013-2014, 491 individuals donated their bodies to the Anatomical Gift Program. Donors were split equally by gender (female = 52%; male = 48%). The median age of donors was 82 years; the vast majority self-identified as white (98%). The majority of donors came from occupations involved with industry (23%) or office work, hospitality and retail (24%). Of the 491 body donors, 2 were physicians (0.4%).

PRINCIPAL CONCLUSIONS: Our data demonstrate that in the past decade, physicians have made few contributions to AMS. This remains in concert with current literature showing a lack of physician whole body donors. Future research must explore physician attitudes towards whole body donation.

INTRODUCTION

The desire to contribute to a common good through the advancement of medicine is a cornerstone of many physicians' journeys. Interestingly, this same desire accounts for 80–90% of whole body donors' primary motivation for gifting their body to an anatomy program.^{1,2,3,4}

Whole body donation appears to be an extension of the physician's ethical commitment to facilitate the donation of blood, bone marrow, and viable organs. However, physicians remain underrepresented in the whole body donor population, despite having directly benefited from the donation of others' bodies towards their own medical training. One study surveying a cohort of newly-registered future body donors noted that the group consisted of few individuals who worked in healthcare and did not include physicians.⁴

Existing literature suggests that dissection may decrease a medical student's willingness to donate his or her own body or the bodies of their loved ones as year of medical study increases.^{5,6} While some might think that clinical experience may modulate this disinclination towards body donation over time and perhaps even reverse it, the dearth of physicians recorded in the occupational histories of the donors may suggest otherwise.⁷ The issue of physician privilege of knowledge arises from the paradox created by doctors being expected to promote body donation for the benefit of medical science and their own careers, yet vastly underrepresenting themselves in the donor cohort.

Inspired to learn more about how physicians are represented within Brown University's whole body donation cohort and ultimately increase whole body donation, this study sought to learn more about the demographics of its body donors by examining and characterizing the occupational histories of individuals who donated their whole bodies to the Anatomical Gift Program at Warren Alpert Medical School within the past decade.

METHODS

A retrospective chart review of 491 individuals who donated their whole bodies to Brown University's Anatomical Gift Program was conducted; all donors whose gift went into effect within the academic calendar from 2003–2004 to 2013–2014 were included in the study. The cohort of donors in this study included donors whose bodies were dissected, donors who were deemed unfit for dissection, and donors who were in storage awaiting dissection Demographic and clinical information was collected for analysis and review using SPSS (Version 20). Descriptive statistics, Student T-test, and Difference in Proportions Test were used to characterize donors' demographic information. This study took place at The Warren Alpert Medical School of Brown University in Providence, RI, and received IRB approval prior to commencement of data collection. Figure 1. Donors by Gender



Figure 2. Donor Ethnicity



Figure 3. Donors by Civil Status and Request to Return Remains



Figure 4. Donors by Occupational History



RESULTS

In the past decade, 491 individuals donated their bodies to the Anatomical Gift Program. Gender breakdown of donors was 52% female and 48% male with a median age of 82 years (range 40-104 years) (Figure 1). Nearly all donors identified themselves as white (98%), with the remainder comprising of African American (0.8%), Native American (0.6%), and white Latino (0.4%) (Figure 2). Civil status of the donors was: 67% married, 45% widowed, 29% divorced, 11% never married, and 2% undisclosed (Figure 3).

The median time elapsed between donor consent and death was 4 years (range 0-40 years). Over half of the total donor population requested the return of cremated remains to their families (57%); whether the donor was married or not did not seem to influence whether or not remains were requested to be returned (alpha = 0.05). Only 2 physicians (0.4%) were among the 491 individuals who gifted their bodies to Brown University's Anatomical Gift Program in the last decade. The largest contribution of whole body donation came from working class individuals representing industry (23%); and office work, hospitality, and retail (24%). Males made up the majority of donors from the industry group (86%) while women represented the majority of workers from office work, hospitality and retail group (75%). Donors from healthcare occupations accounted for 7% of all donor occupations with a gender breakdown of 7% males and 28% females. Nurses contributed most towards donations from healthcare occupations comprising almost half of all donors from the healthcare industry (49%) (Figure 4).

DISCUSSION

Despite the significant role anatomical dissection plays in their educational training, physicians comprised a very minor portion of whole body donors who contributed to Brown's Anatomical Gift Program in the last decade. Physicians comprise 0.2% of the US population (and 0.3% of the Rhode Island population), a statistic that appears to make

the 0.4% physician composition of the body donors in the study seem appropriate on a population level.⁸ However, physicians have a higher stake in whole body donation than the general population as it inherently impacts their medical education and practice.

The external validity of the data from this single center study is supported by similar results from previously published studies demonstrating that there is a lack of physician whole body donation.^{1,2,4,6} The general trend of few documented physician whole body donors in the literature challenges the idea that decreased demand for whole body donors in certain geographic locations may partially explain the lack of physician donors. Furthermore, an underrepresentation of physician participation in other donation pathways with universally high demand, such as blood donation, emphasizes the need to re-examine physicians' relationship to all aspects of medical donation as they represent a substantial potential donor pool.⁹

Hopefully, our results will provoke further discussion and reflection among medical students and physicians about how their values and views of dissection align with their willingness to donate. Perhaps some physicians feel that they have already fulfilled the urge to advance medicine through the choice of their careers and thus lack this strong motivating factor cited by previous donor while others have had a bad experience with anatomy dissection during training that deters them from the idea of potentially participating in the future as a donor.^{10,11} More research must be conducted to further understand the complexities of the physician's relationship to whole body donation (and other types of donation) not only as an institution to support but also a deeply personal decision of whether or not to take part in this long-established cornerstone of medical education.

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Disclaimer

The views expressed herein are those of the authors and do not necessarily reflect the views of Brown University.

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Authors

Breanna Jedrzejewski, MPH, MD'17; Warren Alpert Medical School of Brown University, Providence, RI.

Dale Ritter, PhD, Evolutionary Biology, Brown University, Providence, RI.

Correspondence

Breanna Jedrzejewski Box G-9460 Providence, RI 02912 818-325-5737 breanna_jedrzejewski@brown.edu

A Case of Stroke due to Pulmonary Venous Thrombosis

SAMUEL BELOK, MD; LESLIE PARIKH, MD; JAMIE ROBERTSON, MD

ABSTRACT

Pulmonary vein thrombosis (PVT) is a rare but potentially lethal disease. It most commonly occurs as a complication of malignancy, post-lung surgery or atrial fibrillation. Thrombi are typically detected using a variety of imaging modalities including transesophageal echo, CT-scan, magnetic resonance imaging (MRI) or pulmonary angiography. Treatment consists of anticoagulation. Here we report a case of a middle-aged male with systolic left ventricular dysfunction who presented with a stroke due to embolization from a pulmonary vein thrombus diagnosed on CT scan. Etiology of the thrombosis was felt to be secondary to severe systolic dysfunction. Based upon this case report, we believe that pulmonary venous embolism should be considered as a cause of cryptogenic stroke in patients with a significantly reduced cardiac systolic function.

KEYWORDS: Pulmonary venous thrombosis, stroke, atrial fibrillation

INTRODUCTION

Pulmonary venous thrombosis (PVT) is an infrequent phenomenon that usually develops secondary to pulmonary neoplasm or post pulmonary surgery.^{1, 2} Symptoms can manifest as dyspnea, cough or hemoptysis. ³ Diagnosis is often difficult and can be missed if there is not a high level of suspicion. Without proper identification and prompt treatment, peripheral embolization including acute stroke can occur and have catastrophic results. Here were present a case of stroke likely due to embolization from a pulmonary vein thrombus.

CASE REPORT

A 54-year-old male with a past medical history significant for paroxysmal atrial fibrillation (not on anticoagulation) and non-ischemic cardiomyopathy status post-implantable cardiac defibrillator (ICD) presented to the emergency room with new-onset weakness and aphasia. Initial physical exam revealed a normal heart and lung exam and an abnormal neurologic exam characterized by aphasia, disconjugate gaze and leftward gaze paresis. A brain CT scan did not demonstrate any acute intracranial process. The patient was evaluated by neurology and the diagnosis of acute stroke was made. Subsequently, the patient was administered tissue plasminogen activator (tPA). Following tPA administration, the patient experienced a brief episode of hypotension so a CT scan of his chest, abdomen and pelvis were obtained to evaluate for an acute bleed. No hemorrhage was detected but the

Figure 1. Contrast-enhanced axial chest CT shows a filling defect in the left superior pulmonary vein at the junction of the left atrium (arrow).



Figure 2. Contrast-enhanced coronal chest CT shows a filling defect in the left superior pulmonary vein at the junction of the left atrium (arrow).



imaging revealed a large filling defect in the superior left pulmonary vein immediately prior to its union with the left atrium suggestive of a pulmonary vein thrombosis (**Figures 1–2**). An echocardiogram was performed and showed stable cardiomyopathy with reduced ejection fraction, estimated at 15%, and no evidence of left atrial thrombus or left ventricular thrombus. The patient's pacemaker was interrogated and was notable for sinus rhythm with less than thirty seconds of atrial fibrillation over the prior months. Hematology-Oncology was consulted and hypercoaguable work-up was performed and was negative.

Through the course of the admission, the patient's neurologic exam and functional status improved to his baseline. Systemic anticoagulation with subcutaneous enoxaparin and oral warfarin was initiated and the patient was discharged.

DISCUSSION

Pulmonary vein thrombosis is a rare diagnosis. Distal embolization resulting in cerebrovascular accident (CVA) as a complication from PVT is multiplicatively more rare. A review of the literature demonstrates fairly few case reports highlighting stroke and systemic embolization from PVT. There have been no randomized control trials to date. A study by Grau et al in 2002, evaluated multiple patients with cryptogenic stroke for PVT by Magnetic Resonance Venography and did not find PVT to be significant contributor to the etiology of ischemic stroke in these patients. However, the study was significantly limited by frequent inadequate visualization of the left pulmonary veins due to limitations in MRI technique.⁴ In our case, the thrombus was found in the left superior pulmonary vein. Perhaps with the improved radiologic techniques developed over the last 10-15 years, more cases of PVT could be discovered particularly in the left side of the pulmonary venous system. We propose that our patient's acute CVA was a result of embolization from a thrombosis in the left superior pulmonary vein. We hypothesize that the patient's poor systolic function contributed to a low flow state and stasis of blood which predisposed him to thrombosis. This is further supported by the fact that he had no known malignancy or recent surgery. He has a history of atrial fibrillation; however, on interrogation of the pacemaker, only several seconds of atrial fibrillation over the past months was noted and thus was unlikely to be the etiology.

This case raises two important points. First, in patients with cryptogenic stroke or systemic emboli it is reasonable for clinicians to evaluate for pulmonary vein thrombosis. The diagnosis of PVT can be made with transesophageal echocardiography, CT scan, MRI or pulmonary angiogram. Second, in patients with pulmonary vein thrombosis of unknown etiology, severe systolic dysfunction with resultant low flow cardiac state should be considered as a potential trigger. In regards to treatment, while there are no universally accepted guidelines, both short- and long-term anticoagulation have been utilized successfully in the literature. ^{5,6}

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Authors

- Samuel Belok, MD, Internal Medicine PGY2 Resident, Warren Alpert Medical School of Brown University; Rhode Island Hospital
- Leslie Parikh, MD, Cardiology Fellow, Warren Alpert Medical School of Brown University; Rhode Island Hospital
- Jamie Robertson, MD, Clinical Assistant Professor, Cardiology, Dept. of Medicine, Warren Alpert Medical School of Brown University; Rhode Island Hospital

Conflict of Interest

None

Correspondence:

Samuel Belok, MD 394 Angell St, Apt #3 Providence RI 02906 617-308-2758 samuel.belok@gmail.com

An Atypical Presentation of a Thalamic Stroke in a Young Adult with Ankylosing Spondylitis and an Atrial Septal Defect

XIAO C. ZHANG, MD, MS; MATTHEW S. SIKET, MD, MS; BRIAN SILVER, MD

INTRODUCTION

Acute ischemic stroke (AIS) recently declined from the 3rd to the 5th leading cause of death in the United States, due in large part to advances in the prevention of cerebrovascular disease risk factors, such as cigarette smoking, diabetes, hypertension, hypercholesterolemia and better acute treatments, such as IV tPA and the development of stroke centers. However, ischemic stroke remains a leading cause of longterm disability worldwide. The annual incidence for young white and black adult populations (less than 45 years old) is estimated to be 3.4 to 11.3 per 100,000 and 22.8 per 100,000, respectively.¹⁻³ While 40% of strokes in young patients are cryptogenic, common risk factors include untreated microvascular diseases (i.e. hypertension, diabetes), dissection of blood vessels (accounting for about 10-25% of early AIS), and illicit drug use.4-6 A prothrombotic state, characterized by genetic thrombophilia, Protein C deficiency, antiphospholipid antibodies, elevated lipoprotein(a), Factor V Leiden mutation, prothrombin gene mutation, MTHFR TT genotype have been associated with venous thromboembolism, but not clearly with AIS.9-10 Arterial dissection, often precipitated by trauma, is still considered as the most common vascular abnormalities in young adults with AIS; non-traumatic, spontaneous dissection occurs at a reduced frequency and can be associated with connective tissue disorders such as Ehlers-Danlos syndrome and Marfan syndrome.8-11

Figure 1. Non-Contrast CT Brain of acute right thalamic infarction.

(A) Frontal and (B) coronal views demonstrating an anterior right thalamus infarction (arrow) in a young patient with ankylosing spondylitis, presenting with gradual, intermittent memory loss.



CASE REPORT

A 23-year-old man was brought to the ED by his elderly grandparents reporting 4 days of profound fatigue, headache, and a subjective sensation of the right corner of his mouth being "pulled to the side" when he talked. The patient reported he recently participated in a body building competition 5 days prior to the ED presentation, with 2 months of rigorous training that involved diet, exercise, weight loss, but without any anabolic steroid use. He reported newonset memory deficits, occasionally forgetting events that occurred earlier during the day, generalized weakness, and a 5 out-of-10, gradually developing dull frontal headache that began shortly after the competition. The patient's past medical history was notable for ankylosing spondylitis for which he started taking etanercept (TNF α inhibitor) 5 years earlier.

The patient went to an urgent care center 2 days prior to the ED presentation, where he was diagnosed with dehydration and discharged home after being given 1 liter of IV normal saline. The patient subsequently returned to the ED due to persistent symptoms.

On arrival to the ED, he was afebrile with blood pressure 110/60 mm Hg and pulse rate 64 beats/min. There were no focal neurological deficits; he was alert and oriented x4, and he did not demonstrate any memory deficits. Complete blood count (CBC), comprehensive metabolic panel (CMP), thyroid-stimulating hormone (TSH) -reflex, urinalysis, drug

Figure 2. MRI without contrast of acute right thalamic infarction. (A) Axial T2-weighted and (B) diffuse weighted imaging (DWI) confirms a right thalamic infarction (arrow) in the same young patient with anky-losing spondylitis.



of abuse screen were unremarkable; an insidious infectious workup was initiated, including rapid HIV, RPR, and Lyme reflex that were ultimately negative. ECG showed sinus rhythm of 51 beats per minute and the chest X-ray was normal. A non-contrast head CT showed an acute infarction in the anterior aspect of the right thalamus (**Figure 1**). An MRI of the head and neck confirmed the thalamic infarction (**Figure 2**); MRA of the head and neck was unremarkable. During hospitalization, a bubble echocardiogram revealed an atrial septal defect (ASD); the blood work, including hypercoagulability studies, lipid panel, and HbA1c were normal. The patient has remained free from recurrent events and maintains a secondary prevention medication regimen including 81mg of aspirin and 80mg of atorvastatin.

DISCUSSION

We report an unusual presentation of a thalamic infarction in a young adult male without cerebrovascular disease risk factors, but with two potentially contributory, but controversial etiologies: ankylosing spondylitis and atrial septal defect.

The thalamus is a midline symmetrical structure within the vertebrate brain, situated between the cerebral cortex and the midbrain, responsible for relaying sensory and motor signals to the cerebral cortex. ¹² The anterior nucleus of the thalamus (ANT) contains 13 nuclei, all of which have very different roles in memory processing and emotional and executive functions. Clinical and experimental studies have shown that unilateral damage to the ANT in the paramedian artery territory produces neuropsychological disturbances, including episodic memory deficits, as observed in Wernicke-Korsakoff syndrome. 13-14 Early stages of unilateral ischemic involvement include impairment of arousal with decreased level of consciousness, lasting from hours to days, with potential persistent features such as confusion, agitation, aggression. Hypophonia (soft speech), dysprosody (disordered melody, intonation, or accents), reduced verbal fluency, and frequent perseveration may also be observed, but syntactic structure is generally preserved. ¹³

Ankylosing spondylitis (AS) is a chronic inflammatory disease of the axial spine, characterized by chronic back pain and progressive stiffness of the spine with extraarticular comorbidities including uveitis, inflammatory bowel disease, cardiovascular disease and restrictive pulmonary diseases.¹⁵ While observational studies have shown an increased risk for cardiovascular complications, such as increased aortic regurgitation with patients with AS¹⁶⁻¹⁸, the risk for stroke in patients with AS remains controversial. A prospective, Taiwanese population-based longitudinal follow-up study showed an increased risk of developing ischemic stroke in young patients with AS¹⁹; meanwhile, a meta-analysis comparing the occurrence of stroke in AS patients (1004/9791) and healthy controls (22,899/1,239,041)

showed a significantly increased occurrence of strokes in AS patients as compared to healthy controls, 3.6% vs. 1.78% respectively [OR = 1.5, 95% CI].²⁰ Another source of controversy lies within the role of TNF- α and its inhibitor, such as etanercept in ischemic stroke. While the reported risk of stroke of 3% with etanercept led to the initial diagnosis of our patient's thalamic stroke, a recent multivariate meta-analysis revealed that certain TNF- α polymorphisms, such as the TNF- α -238G/A was associated with increased ischemic stroke risk in Asian adults.²¹ Furthermore, etanercept used in rat studies showed significantly protection against ischemic strokes, and when it is used in conjunction with α -lipoic acid, they promoted improved stroke recovery rates.²²

Finally, the role of common cardiac abnormalities such as patent foramen ovale (PFO), atrial septal defect (ASD), atrial septal aneurysm (ASA) remain controversial in the implication of embolic causes for AIS, with studies suggesting an increased prevalence of PFO and ASA in patients with cryptogenic stroke, without sufficient data to implicate causality. 23-24 Meta-analyses of RCTs and observational studies on patients with crytogenic stroke with confirmed PFO or ASD failed to show any significant benefit from percutaneous catheter-based closure of PFO as compared with antiplatelet or anticoagulant therapies in reduction of recurrent strokes.²⁵ Our patient was found to have an ASD, in which it is biologically plausible that he may have had a transient hypercoagulability due to the weight-loss regimen with dehydration that bodybuilders undergo; a large right-to-left shunt coupled with a Valsalva maneuver during vigorous lifting of weights could have caused a clot ejection, resulting in AIS.

CONCLUSION

Three current controversies in stroke are simultaneously explored in this case: the diagnosis of stroke in a young patient without focal neurologic deficits, the risk of stroke in ankylosing spondylitis, and the optimal management of atrial septal defects in the stroke population. Acute injury to the anterior thalamus may result in memory deficits similar to Wernicke-Korsakoff syndrome and recent meta-analysis suggests an increase in occurrence of AIS in AS patients. Etanercept, a TNF- α inhibitor, has been shown to prevent and even promote recovery rates in ischemic strokes in animal models, despite pharmaceutical warnings of potential AIS. Finally, while right to left shunt coupled with valsalva maneuver (i.e. weightlifting) in patients with ASD may lead to a clot ejection causing AIS, percutaneous catheter-based closure of PFO has not been shown to provide significant benefit as compared with antiplatelet or anticoagulant therapies in reduction of recurrent strokes. Patients diagnosed with thalamic strokes should undergo inpatient studies, including hypercoagulopathy studies, advanced imaging, and echocardiograms, with close outpatient follow-up.

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Authors

- Xiao C. Zhang, MD, MS; Department of Emergency Medicine, Alpert Medical School of Brown University, Providence, RI.
- Matthew S. Siket, MD, MS; Department of Emergency Medicine, Alpert Medical School of Brown University, Providence, RI.
- Brian Silver, MD; Department of Neurology, Comprehensive Stroke Center, Rhode Island Hospital, Providence, RI.

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Correspondence

Xiao Chi Zhang, MD, MS Rhode Island Hospital 593 Eddy Street, Claverick 100 Providence, RI 02903 xzhang1@lifespan.org



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

| | REPORTING PERIOD |) | | |
|--------------------------|------------------|---|--------|--|
| | AUGUST 2015 | IST 2015 12 MONTHS ENDING WITH AUGUST 201 | | |
| VITAL EVENTS | Number | Number | Rates | |
| Live Births | 1,052 | 11,522 | 10.9* | |
| Deaths | 787 | 10,360 | 9.8* | |
| Infant Deaths | 5 | 67 | 5.8# | |
| Neonatal Deaths | 5 | 57 | 4.9# | |
| Marriages | 917 | 6,612 | 6.3* | |
| Divorces | 284 | 3,001 | 2.8* | |
| Induced Terminations | 212 | 2,640 | 229.1# | |
| Spontaneous Fetal Deaths | 41 | 624 | 54.2# | |
| Under 20 weeks gestation | 36 | 568 | 54.8# | |
| 20+ weeks gestation | 52 | 56 | 4.9# | |

* Rates per 1,000 estimated population

Rates per 1,000 live births

| | REPORTING PERIOD | | | | |
|--------------------------------------|------------------|-------------------------------------|-----------|----------|--|
| Underlying Cause of Death Category | FEBRUARY 2015 | 12 MONTHS ENDING WITH FEBRUARY 2015 | | | |
| Underlying Cause of Death Category | Number (a) | Number (a) | Rates (b) | YPLL (c) | |
| Diseases of the Heart | 225 | 2,404 | 228.3 | 3,582.0 | |
| Malignant Neoplasms | 163 | 2,249 | 213.5 | 5,607.0 | |
| Cerebrovascular Disease | 31 | 414 | 39.3 | 470.0 | |
| Injuries (Accident/Suicide/Homicide) | 69 | 776 | 73.7 | 11,668.5 | |
| COPD | 41 | 541 | 51.4 | 602.5 | |

(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 1,055,173 (www.census.gov)

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

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

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Working for You: RIMS advocacy activities

January 5, Tuesday

RIMS Physician Health Committee: Herbert Rakatansky, MD, Chair General Assembly Convenes 2016 Session

RIMS Board of Directors meeting

January 6-9, Wednesday-Saturday

AMA State Legislative Strategy Conference, Michael Migliori, MD, Chair of Public Laws Committee and Staff

January 12, Tuesday

Prevent Opiate Abuse Coalition Legislative hearings

January 13, Wednesday Legislative hearings

January 14, Thursday Legislative hearings

January 19, Tuesday

DOH Health Services Council regarding free-standing emergency room application OHIC Health Insurance Advisory Committee

Legislative hearings

January 20, Wednesday

Primary Care Physician Advisory Committee-Department of Health OHIC Administrative Simplification Task Force

Legislative Commission on Board of Medical Licensure and Discipline, Newell Warde, PhD, presenting

Legislative hearings

January 21, Thursday

RI Kids Count meeting on physical activity in schools Legislative hearings

Speaker Mattiello fundraiser

January 22, Friday

Meeting with OHIC regarding legislation Meeting with Blue Cross Blue Shield of RI regarding legislation Conference call with Pfizer regarding legislation

January 25, Monday

Meeting of YMCA Alliance of RI RIMS Finance Committee: Jose R. Polanco, MD, Chair



On January 27, RIMS held its **Paint & Wine Class**, a social event in which members and their guests had fun displaying their artistic abilities recreating Edvard Munch's expressionist painting, "The Scream." The class was held at Muse PaintBar in Providence.



January 26, Tuesday Legislative hearings

January 27, Wednesday

Legislative hearings EOHHS Provider Advisory Council, RIMS Offices

RIMS "Paint and Wine" event

January 28, Thursday

Meeting with RI Board of Medical Licensure and Discipline and Board of Pharmacy regarding I-Connect Interstate Sharing of Prescription Monitoring Data

Legislative hearings

Senate President Paiva Weed fundraiser Meeting of Mental Health and Substance Use Coalition







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Butler joins efforts of Global Alzheimer's Platform Foundation and Brain Health Registry partner to accelerate Alzheimer's treatment by 2025



PROVIDENCE – Butler Hospital is one of six key institutions supporting the efforts of a new partnership between the Global Alzheimer's Platform Foundation and the Brain Health Registry at the University of California at San Francisco to grow its global registry of potential Alzheimer's clinical trial candidates.

"This is not only an exciting advancement, but an essential endeavor if we hope to achieve the national goal of finding a treatment for Alzheimer's by 2025," said **STEPHEN**

SALLOWAY, MD, MS, director of the Memory and Aging Program at Butler Hospital, and professor of neurology and psychiatry at the Alpert Medical School. Currently enrolling participants in 11 Alzheimer's research studies at Butler Hospital, Dr. Salloway knows firsthand the benefits a robust database could provide both in the form of cost-savings and in accelerating the timelines of the recruitment phase of research.

Other participants include:

- Atlanta: Allan Levey, MD, PhD (Emory University Alzheimer's Disease Research Center) and Marshall L. Nash, MD (Neurostudies.net)
- Boston: Dorene Rentz, PsyD and Gad Marshall, MD (Brigham and Women's Hospital; MassachusettsGeneral Hospital; Harvard Medical School)
- Las Vegas: Jeffrey Cummings, MD (Cleveland Clinic's Lou Ruvo Center for Brain Health)
- San Francisco: Michael Weiner, MD (UCSF)
- South Florida: Mark Brody, MD (Brain Matters Research)

Global Alzheimer's Platform, headquartered in Washington, D.C., was launched in 2014 by UsAgainstAlzheimer's and the Global CEO Initiative on Alzheimer's disease. The organization's goal is to reduce the duration (by up to two years), the cost and the risk of Alzheimer's disease clinical trials, and turn Alzheimer's Disease sufferers into survivors. Brain Health Registry is a free web-based effort led by researchers at UCSF designed to more quickly identify appropriate clinical trial candidates and speed the path to cures for Alzheimer's disease and other brain disorders. \diamondsuit

South County Hospital opens inpatient palliative care program

WAKEFIELD – On Monday, January 18, South County Hospital launched an inpatient palliative care program. The initiative was led by South County Hospital's Palliative Care Task Force, headed by **RUSS CORCORAN**, **MD**, in collaboration with Home & Hospice Care of Rhode Island.

The hospital is partnering with two board-certified palliative care specialists from Home & Hospice Care of Rhode Island: **AMY CHARRON**, **NP**, and **MERCEDES PACHECO**, **MD**. Hospital Case Manager HOLLY **FUSCALDO** will act as a full-time, on-site palliative care social worker. The Hospital is also employing a chaplain to support the psychosocial needs of patients receiving palliative care.

All physicians and nurses within the South County Medical Group practices—part of the South County Health system – are being trained in palliative care. To date, 60- to 70-percent of them have completed the training.

Hasbro specialty clinics offer new outpatient services

Cardiology, hematology and urology among services added to Fall River and East Greenwich sites

PROVIDENCE – Hasbro Children's Hospital has expanded clinical offerings at its Fall River Multispecialty Clinic and East Greenwich Specialty Clinic, providing a wider range of services conveniently located in those communities and closer to the families the clinics serve.

"Last year, we opened these outpatient clinic locations to better reach the children and families in our community who need our specialized care," said Tracey Wallace, vice president of pediatric services at Lifespan. "Based on the needs of our patients, we've now streamlined our outpatient services to best maximize what we can offer to communities through our partnerships."

Hasbro Children's Specialty Practice opened its Fall River Multispecialty Clinic to expand Hasbro Children's Hospital's offerings in the region, which already included a partnership with Saint Anne's Hospital, where Hasbro Children's Hospital specialists care for patients at the Fernandes Center for Children & Families.

Hasbro Children's Specialty Practice services offered at the Fall River Multispecialty Clinic, include:

- Gastrointestinal medicine
- Cardiology
- Endocrinology
- Nephrology
- Pulmonology
- Urology, genetics and hematology services will also be added this year.

Additionally, the East Greenwich Specialty Clinic, now provides:

- Gastrointestinal medicine
- Child and adolescent eating disorders
- Endocrinology
- Rehabilitation services
- Nephrology
- Pulmonology
- Cardiology
- Psychiatry

In 2016, both clinic locations will also start offering Saturday services, for the added convenience of patients. *



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Peter Kriz, MD, study shows that less physically adolescent ice hockey players have prolonged concussion symptoms

Players should be discouraged from 'playing up' in youth and high school sports leagues

PROVIDENCE – A study led by a Hasbro Children's Hospital sports medicine physician **PETER KRIZ**, **MD**, found that male student ice hockey players in ear-

lier pubertal stages had a significantly increased risk of prolonged symptoms from concussion compared with advanced pubertal and postpubescent players.

Research by Dr. Kriz found that less physically mature players took on average 54 days – 21 days

or nearly 40 percent longer – to recover compared to more physically mature players. Dr. Kriz said the findings further highlight the need for student athletes in collision sports to compete with similar-aged players and that there is risk in having younger, more talented athletes "play up" on varsity teams.

"Unlike other contact-collision scholastic sports with a high incidence of concussion, high school ice hockey lacks stratification by age grouping, largely because of prohibitive costs associated with equipment, transportation and ice time incurred with fielding varsity, junior varsity and freshman teams," he said. "Consequently, it's not uncommon at the varsity level for younger, less physically mature players to oppose older players with increased strength, power and speed."

The study, currently published online in the Journal of Pediatrics, assessed disparities in age, size, and physical maturity level among concussed adolescent ice hockey players 13 to18 years of age, and was performed at Hasbro Children's Hospital, Boston Children's Hospital, and South Shore Hospital, in Weymouth, Mass. Additionally, the study also found that lighter weight among males and heavier weight among females increased the probability of experiencing prolonged concussion. Concussion has been reported to be the most common youth ice hockey injury, representing more than 15 percent of all injuries in nine to 16-year-

old players and nearly 25 percent of injuries among male high school players.

The study's results challenge recent opinion, which has suggested that collision sport participation be postponed until freshman year or 14 years of age. "Sixty-five percent of freshman male ice hockey play-

ers in our study were in early stages of pubertal development and none were postpubertal," said Kriz.

The findings also support concerns within the youth athletic community that adolescents might have longer recoveries from concussions than adults.

"Our findings have important implications for policy decisions related to grouping for high school ice hockey players," explained Dr. Kriz. "While economic considerations often dictate whether a school fields ice hockey teams other than varsity, we support, at the very least, the establishment of junior varsity ice hockey by state interscholastic leagues for the purposes of player development and improved safety for undersized, peripubertal male players."

Additionally, policies pertaining to high school football and boys' lacrosse – two other collision sports which commonly permit underclassmen to "play up" on varsity teams – may ultimately be impacted by these findings, as lighter, less physically mature players may be at risk of prolonged concussion symptoms.

Dr. Kriz recommends that, until further studies determine valid physical maturity indicators, arbitrary age and grade cutoffs should not be used to determine when adolescent athletes are ready to participate in collision sports. "Until such studies are available, collision-sport high school athletes should play in leagues grouped by relative age," he said. "Highly-skilled, peripubertal collision sport athletes should also be discouraged from 'playing up' at the varsity level with post-pubertal competitors three to four years their senior."

In accordance with recommendations from the American Academy of Pediatrics, Dr. Kriz encourages youth hockey organizations to provide the option of non-checking divisions for players who remain in earlier stages of pubertal development, players who are undersized, players who have significant concussion histories precluding them from participating in collision sport participation or for players 13 years old or younger seeking safer alternatives to body checking leagues.

This study was funded in part by the National Federation of State High School Associations Foundation and the Rhode Island Foundation. *



Lifespan Physician Group, Inc.

PART-TIME PHYSICIAN - The Weight Management Program at The Miriam Hospital has openings for a part-time physician, 15-20 hours weekly, and a per diem physician. Shifts available include: Tuesday, Wednesday, Saturday 8-11:30am, and Monday, Thursday 2:30-6:30pm. The physician will provide outpatient medical evaluation and follow up for patients undergoing weight management treatment. With more than a 25-year history, the comprehensive program relies on a multi-disciplinary team. Physician must be licensed to practice internal medical in the State of Rhode Island and be on the staff of The Miriam Hospital. Apply on line to: www.lifespancareers.org req# LPG5444 (part-time)

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Sandra J. Pattie, BankNewport president and CEO; William Marcello, BankNewport vice president and Coventry branch manager; Michael Dacey, MD, MS, FACP, president and chief operating officer, Kent Hospital; Lorraine Fowler, Rehab Aide; Meghan Seyboth, PT; Aaron Guckian, BankNewport vice president and East Greenwich branch manager; Danielle Keough, PTA; Carl Oliveira, PTA

BankNewport Awards Rehabilitation Grant to Kent

WARWICK – BankNewport recently presented a grant in the amount of \$16,000 to Kent Hospital to purchase new equipment for the hospital's Acute Rehabilitation Unit.

The BankNewport grant was awarded to purchase LiteGait[®] an innovative, partial weight- bearing harness to help patients with standing, weight-bearing and walking. This new equipment will continue to enhance the unit's capabilities of care and increase patients level of function to perform tasks and return home.

"We are honored to receive this grant from BankNewport. We appreciate their commitment and dedication to enhance our services and care for the patients of Kent Hospital," said **MICHAEL DACEY, MD, MS, FACP**, president and chief operating officer at Kent Hospital. "Kent's Acute Rehab patients will benefit greatly from their generosity." *****

Bradley enrolling adolescents with OCD, anxiety disorders for study

Research aims to improve available treatment for families

EAST PROVIDENCE – The Pediatric Anxiety Research Center at Bradley Hospital is enrolling children and teens with obsessive-compulsive disorder (OCD) or anxiety for a study focused on exposure-based cognitive behavioral therapy (CBT). The researchers' goal is to identify the best methods to help clinicians improve treatment for this pediatric population.

CBT is a form of psychotherapy that addresses a patient's anxious thoughts and then works toward changing his or her behavior in response to those thoughts. The study will specifically look at a form of CBT called exposure-based therapy. "Through exposure therapy, therapists work together with patients and families to bring them gradually closer to the things or situations that are anxiety-provoking," said **KRISTEN BENITO**, **PhD**, co-principal investigator.

The study team hopes to find the most effective ways to train community therapists in the treatment of pediatric anxiety and OCD by improving their delivery of CBT, which is the treatment method that previous research has shown to be most effective. The team will examine which therapist, child, and parent behaviors during therapy lead to better treatment outcomes.

"This study will help to optimize treatment for those suffering from pediatric anxiety and/or OCD," said JEN-NIFER FREEMAN, PhD, co-principal investigator. "There are currently very few providers who offer evidence-based treatment for adolescents with anxiety or OCD, meaning that effective training approaches may increase access to care and improve the quality of resources available."

The study is currently enrolling children five to 17 years old who display symptoms of obsessive-compulsive disorder, social anxiety, separation anxiety, panic disorder or a specific phobia. Participants will be asked to:

- Complete a pre-screening survey
- Meet with a study therapist and begin CBT treatment
- Complete questionnaires intermittently throughout the study
- Participate in a post-treatment follow-up assessment

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Appointments

Christopher McManus joins CharterCARE in senior administrative role

PROVIDENCE – **CHRISTOPHER J. MCMANUS** (of Newport) has joined CharterCARE Health Partners as Assistant Administrator for Roger Williams Medical Center.



With extensive health-related experience in operations and continuous improvement, McManus will share responsibility for general operations and management of the hospital and related facilities, including coordination of all department strategic planning, program development, productivity and best practices.

Prior to joining CharterCARE, McManus held a number of progressive management roles with Blue Cross Blue Shield of Rhode Island, including provider operations, relations and enrollment. He is a Lean Six Sigma Black Belt and led systemwide process improvement teams and programming at Blue Cross. He also served as a Hospital Corpsman with the United States Navy in multiple locations, such as the naval health care facility in Newport.

McManus is a graduate of Roger Williams University and received his Master's in health services administration from Salve Regina University. He has recently completed all course requirements in the Executive Master of Healthcare Leadership program at Brown University. He is a member of the American Society for Quality and the American College of Healthcare Executives, where he serves as the treasurer for the Rhode Island Chapter. \diamondsuit

Care New England Names Charles R. Reppucci New Board Chairman

PROVIDENCE – **CHARLES R. REPPUCCI**, of Narragansett, executive director and chief operating officer of the Providence law firm Hinckley Allen & Snyder, LLC, was elected chairman of the Board of Directors of Care New England at the health care system's recent annual meeting. Reppucci succeeds George W. Shuster of Harmony who joined the Care New England board in 1996 and served with distinction as chairman since 2011.



Reppucci has a strong history of service with the Care New England family of institutions. He first joined the Butler Hospital board in 1984, and he became a member of the Care New England board in 1996. He has gone on to serve as a member of the Governance and Nominating, Strategic Planning, Compensation, and Finance Committees. He was elected vice chairman of the board in 2012.

Active in the community, Reppucci serves as vice chair of the board of the Rhode Island Blood Center and also as past chairman of Vector Health Systems and treasurer of the Legal Aid Society of Rhode Island. He earned a degree in accounting from the University of Rhode Island and a master's in business administration from Providence College. He is the senior non-lawyer executive at Hinckley Allen & Snyder, LLC, where he has worked for 30 years.

Shuster presided over the Care New England board during a period of tremendous industry change and organizational growth. He led the initiative which consolidated the separate hospital and agency boards into a single system level board, oversaw the addition of Memorial Hospital and The Providence Center into Care New England, guided Care New England's immersion into new forms of health care delivery and payment reform, and shepherded a strategic partner evaluation process which culminated in the decision, announced in November, that Care New England and Southcoast Health System would work toward the creation of a new non-profit parent organization to oversee both systems.

Recognition

Drs. Reginald Gohh, Paul Morrissey share Milton Hamolsky Outstanding Physician Award

PROVIDENCE – The medical staff of Rhode Island Hospital awarded **PAUL MORRISSEY, MD**, and **REGINALD GOHH**, **MD**, the 2015 Annual Milton Hamolsky Outstanding Physician Award. Both men work in the division of organ transplantation and are kidney specialists. They are recognized for developing, nurturing, and ensuring the success of the kidney transplantation program.

"Besides being terrific clinicians, Drs. Morrissey and Gohh lecture, teach, conduct research, are involved with national organ donation and allocation policy, and in every way bring distinction to Rhode Island Hospital," said Douglas Shemin, MD, who nominated his colleagues for the award. "They have made the transplant program a true collaborative effort, not only between nephrology and transplant surgery, but also involving nutrition, clinical social work, nursing, pharmacy, infectious disease, and psychiatry."

Dr. Morrissey is also an associate professor of transplant and general surgery at the Alpert Medical School of Brown University. After general surgery training at Yale-New Haven Hospital, he completed a fellowship in abdominal organ transplantation at Beth Israel-Deaconess Medical Center, Harvard Medical School. He is the assistant medical director of the New England Organ Bank and his clinical expertise is in renal transplantation and dialysis access surgery.

Dr. Gohh is the medical director and transplant nephrologist at Rhode Island Hospital and directs the pre-transplant and post-transplant care of the majority of kidney transplant recipients. He is an associate professor of medicine at the Alpert Medical School of Brown University and a member of the division of hypertension and kidney diseases at University Medicine, Providence. He earned his medical degree from Meharry Medical College in Nashville, Tennessee and completed a residency



Dr. Reginald Gohh, at left, and Dr. Paul Morrissey received the 2015 Annual Milton Hamolsky Outstanding Physician Award at Rhode Island Hospital.

at Rhode Island Hospital. He is a former recipient of the Young Investigator's Award of the American Society of Transplant Physicians.

The Milton W. Hamolsky Outstanding Physician Award is presented each year to a doctor who has made exceptional contributions to patient care and leadership. The late Milton Hamolsky, MD, was an endocrinologist who came to Rhode Island Hospital in 1963 and served as the first full-time physician-in-chief. Dr. Hamolsky served as the chief administrative officer of the Rhode Island Board of Medical Licensure and Discipline and was a noted pioneer of medical education in Rhode Island. *****



Singular Distinction Award winners (from left) Kathy Cateon, LPN; Judy LaChance, RN and Kathy McKenna, RN

Southcoast presents Singular Distinction Award to three nurses

FALL RIVER, MASS. — Southcoast® Health recently presented the Singular Distinction Award to three employees who helped to save a local man's life at a community event in Fall River this past summer. **KATHY CATEON, LPN, JUDY LACHANCE, RN**, and **KATHY MCKENNA, RN**, were part of a small group that performed life-saving CPR on a 50-year-old man suffering from cardiac arrest. They were participating in the annual American Cancer Society Relay for Life at Bishop Connolly High School on June 26 when they encountered a man slumped over in the parking area. Along with at least two others, including a Fall River police officer, the trio performed CPR until paramedics arrived to transport the man to Charlton Memorial Hospital.

The Singular Distinction Award recognizes Southcoast Health employees who, in a specific spontaneous act, deliver more than medicine. It also celebrates employees who provide an action that demonstrates kindness, compassion and caring to patients, visitors and fellow colleagues. \diamondsuit

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Recognition

Dr. Gregory Austin, Dr. Alan Epstein Recognized with Distinguished Service Award at RWMC

PROVIDENCE – Dr. Gregory Austin and Dr. Alan Epstein were recently recognized with the Distinguished Service Award by the medical staff of Roger Williams Medical Center. The award is presented annually to physicians from Roger Williams Medical who have made significant contributions to the medical staff, hospitals, and patient care.

About the physician honorees:

GREGORY AUSTIN, MD, is a surgeon from Orthopaedic Associates, specializing in hand surgery. He graduated from Princeton University and University of

Pittsburgh School of Medicine. He completed his orthopaedic surgery residency and a hand surgery fellowship at Tufts University/New England Medical Center. Dr. Austin has been on the staff of both Roger Williams and Fatima since 1987. He previously served as Chief at Fatima and has been taking emergency calls for patients needing hand surgery at one CharterCARE hospital or the other for more than 25 years. He currently serves as President of the Rhode Island Orthopaedic Society.

ALAN EPSTEIN, MD, is Director of Gastroenterology at Roger Williams Medical Center, a position he has held since 1992. He graduated from Harvard University and then Boston University School of Medicine. Dr. Epstein completed his internship, residency and fellowship in Gastroenterology, all from Beth Israel



[L-R] Lester Schindel, CEO, Dr. Alan Epstein, Kim O'Connell, president, Dr. Gregory Austin, and Dr. Cynthia Alves, medical staff president.

Deaconess Hospital. In September, he was recognized as the American Liver Foundation's "Medical Partner of the Year." At this event, Dr. Epstein was honored for his 23 years as an active member of the American Liver Foundation's New England Division's Medical Advisory Committee. He was also recognized as medical chairman of several Liver Life Walk fundraisers and for his advocacy for treatment, education, and funding for liverrelated causes.

"We are proud to honor these medical professionals, each of whom embodies the qualities of an outstanding physician," said Lester Schindel, CEO of CharterCARE Health Partners. "Our hospitals – and more importantly, our community – has benefited greatly from their expertise, dedication and compassion." *

CNE'S Palliative Care Program Selected to Participate in Practice Change Leaders Program *Kelly Baxter, APRN ACHPN One of 10 People Selected Nationally*



WARWICK-Care New England announced today that **KELLY BAXTER, APRN** for CNE Palliative Care was selected to participate in the national Practice Change Leaders (PCL) Program for Aging and Health. PCL is aimed at build-

ing leadership skills among professionals who have a leadership role in a health care delivery organization, health-related institution, or community-based organization with direct responsibility for care that impacts older adults.

Kelly Baxter MS, APRN, ACHPN, was one of 10 people selected nationally to join the fourth class of PCL. Baxter, will receive a \$45,000 grant to implement Improving Transitions of Care for Vulnerable Elderly Palliative Care Patients in Rhode Island. Baxter, will lead an initiative to evaluate, measure and enhance transitions of care for vulnerable elderly palliative care patients. Kent Hospital will serve as the host institution for this project. The goals of the project are to streamline information and develop tracking systems that will allow for a seamless transition of care for older adults who are cared for by the palliative care service at Kent Hospital, as well as those who receive home-based palliative care services through the VNA of Care New England.

The Practice Change Leaders program is made possible by the support of the Atlantic Philanthropies, a limited life foundation, and the John A. Hartford Foundation. To learn more about the program, visit www.changeleaders.org. \Leftrightarrow

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Recognition

Dr. Robert P. Sarni Recognized with Distinguished Service Award

N. PROVIDENCE – **ROBERT P. SARNI, MD,** was recently recognized with the Distinguished Service Award by the medical staff of Our Lady of Fatima Hospital. The award is presented annually to physicians from Fatima Hospital who have made significant contributions to the medical staff, hospitals, and patient care.

Dr. Sarni, who retired this year, had a distinguished career as a physician that spanned more than 50 years. After graduating from the University of Rhode Island, Dr. Sarni joined the United States Army, serving in Germany and rising to the rank

of Lieutenant. He graduated from the University of Maryland School of Medicine, before completing his internship at Rhode Island Hospital and his residency at St. Joseph Hospital. He joined the St. Joseph Hospital medical staff in 1961 and began his private practice in Cranston where he would care for generations of families. During his career, he served in numerous leadership roles including President of the St. Joseph medical staff,

Schindel, CEO.

member of the St. Joseph Board of Trustees, and Chairman of the Department of Family Medicine for more than two decades.

Thomas Hughes, president, Dr. Robert Sarni, Dr. Raffi Calikyan, medical staff president and Lester

"We are proud to honor Dr. Sarni, who embodies the qualities of an outstanding physician," said Lester Schindel, CEO of CharterCARE Health Partners. "Fatima Hospital – and more importantly, our community – has benefited greatly from his expertise, dedication and compassion." *



Clinical Award winning team Fusun Gundogan, MD; Svetlana Shapiro, PPA; Larry Young, PPA and Monique DePaepe, MD; Mary Welch, in front; Non-Clinical Award winner Noelle Siravo; and Mark Marcantano, President and COO of Women & Infants Hospital.

PROVIDENCE – Women & Infants Hospital recently awarded its Richard P. Welch Awards for Continued Excellence in Patient and Family Centered Care in both clinical and non-clinical categories. The clinical award winner was a team of pathologists' assistants and pathologists: LARRY YOUNG, PPA, of Cranston, SVETLANA SHAPIRO, PPA, and MONIQUE DEPAEPE, MD, of Barrington, and FUSUN GUNDOGAN, MD, of Providence. The 2016 non-clinical winner was NOELLE SIRAVO, of Pawtucket, of the neonatal intensive care unit (NICU).

The pathology team, 2016 clinical winner of the Welch Award, works collaboratively surrounding infant and stillborn death. Together, they work to find answers for families, dress babies for families to have meaningful time after death, and above all, care for families and their children with dignity, attentiveness, and loving care.

Established in 2006 by the family and friends of the late Richard "Dick" Welch, the award was inspired by his unwavering commitment to excellence in patient- and family-centered care during his 35-year tenure serving Women & Infants as a trustee, board chair and chief operating officer. Awards are presented annually for a clinical and non-clinical employee. This year, the awards were presented by **MARY WELCH**, Dick Welch's wife, and Mary Pat Denci, his daughter. *****



AFFINITY PROGRAM

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

RIMS thanks these participants for their support of our membership.

Contact Megan Turcotte for more information: 401-331-3207 mturcotte@rimed.org

RIMS CORPORATE AFFILIATES

CARE NEW ENGLAND

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the vision that we can build a better system of health care for the people and communities of southeastern New England. An integrated health system that offers a continuum of quality care, Care New England is comprised of five members: Butler Hospital, Rhode Island's only private, nonprofit psychiatric and substance abuse hospital for adults, adolescents, children and seniors; Kent Hospital, the largest community hospital in the state, providing a full spectrum of primary and secondary acute care services; Women & Infants Hospital of Rhode Island, one of the nation's busiest obstetrical facilities with the one of the nation's largest single-family room neonatal intensive care units; the VNA of Care New England, which provides a broad spectrum of home health, hospice and private duty nursing services; and the Care New England Wellness Center, which offers an array of rehabilitation, wellness, and fitness programs.

Care New England, 45 Willard Avenue, Providence RI Contact May Kernan, Senior Vice President, Marketing Communications



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for over 340,000 patients throughout the state of Rhode Island. The IPA was formed to provide a venue for the smaller independent practices to work together with the ultimate goal of improving quality of care for our patients.

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Recognition

Southcoast Health named among top 5 percent of hospitals in the nation for clinical outcomes

NEW BEDFORD, MASS. — Southcoast Health has received the Healthgrades 2016 Distinguished Hospital Award for Clinical Excellence. The distinction makes Southcoast Health one of the top five percent of more than 4,500 hospitals nationwide in clinical performance as measured by Healthgrades, the leading online resource for healthcare consumers.

Southcoast Health is one of only two hospitals in Southeastern Massachusetts and Rhode Island to place among the top five percent of hospitals in the nation with high quality care across at least 21 of 32 common inpatient conditions and procedures, as evaluated by Healthgrades.

Some specific examples of hospital initiatives undertaken to reach this quality achievement are:

- Implementing a fully-integrated electronic medical record system, Epic.
- Reducing Catheter Associated Urinary Tract Infections (CAUTI) on surgical floors and medical ICUs.
- Improving Venous Thromboembolism Prophylaxis in a timely manner.
- Achieving successful results on all stroke measures from the Centers for Medicare & Medicaid Services (CMS).
- Creating vaccination and tobacco cessation programs for inpatients.
- Developing of a pharmacy discharge liaison program in which prescriptions can be filled prior to a patient's discharge.
- Reducing readmissions for chronic diseases, such as COPD, diabetes and heart failure.
- Improving the utilization of antibiotics to reduce the risk of side effects.
- Refining access and scheduling of preventive care that focuses on improving patient health.
- Improving management of sepsis and associated reductions in mortality through evidence-based protocols.
- Better assessing and managing patients who are at risk for falls. *



Jennifer Silva presents at national neonatololgy conference

Hot Topics in Neonatology conference hosts more than 1,200 neonatologists in December 2015

PROVIDENCE – **JENNIFER SILVA**, of Rehoboth, MA, a family resource specialist with the Partnering with Parents Program of the neonatal intensive care unit (NICU) at Women & Infants Hospital,

was invited to present at the Hot Topics in Neonatology conference in Washington, DC, in December.

Silva was asked to present on behalf of the Partnering with Parents Program, an expansion of the Transition Home Plus Program, because of its innovative use of family resource specialists as key figures in the NICU research program. Family resource specialists are trained parent paraprofessionals who share the personal experience of having had an infant treated in the NICU. These specialists provide emotional support to parents and help them navigate their time in the NICU in ways unique to an experienced NICU parent. The staff play a role in supporting families during their stay in the NICU and with successful transition from the NICU back home.

The overall goal of the Partnering with Parents Program is to improve transitions home from the hospital, provide added support for NICU families, improve readiness for discharge, and reduce return visits to the hospital in the first three months after discharge. To achieve this, parents were given one-on-one support and education from either a family resource specialist or social worker. After discharge, families were communicated with multiple times at certain points in the baby's first months home. The families received a call in the first 24 hours after discharge to answer any questions and assess any needs. One week post discharge, all babies received a NICU nurse practitioner home visit. One month post discharge and at three months corrected age, all babies are seen in the Neonatal Follow-Up Clinic.

"Despite a population of both in-state and out-of-state residents, the program achieved follow-up rates of 94% at one month and 84% at three months," said Silva. *

Women & Infants among America's Best Hospitals for Obstetrics for Second Consecutive Year

PROVIDENCE – Women & Infants Hospital of Rhode Island has been recognized for its obstetric care for the second consecutive year, receiving the 2016 Women's Choice Award® as one of America's Best Hospitals for Obstetrics. This evidence-based designation identifies the country's best health care institutions based on robust criteria that consider female patient satisfaction, clinical excellence and what women say they want from a hospital.

The list of approximately 430 award winners represents hospitals, including Women & Infants, that women can feel confident in choosing for their maternity needs. \diamond

Recognition

CharterCARE excellence affirmed with more than a dozen quality awards

PROVIDENCE – In the last year, the care delivered through CharterCARE's hospital and nursing home affiliates was affirmed with more than a dozen quality awards, accreditations, and certifications. These awards were delivered by the country's leading health care accrediting agencies like The Joint Commission, the American College of Surgeons, and the American Nurses Association.

Roger Williams Medical Center, Our Lady of Fatima Hospital, and Elmhurst Extended Care were recognized for safety, positive patient outcomes, and excellent clinical care. The programs that received recognition for quality in 2015 included cancer, nursing, weight loss surgery, stroke, orthopaedic surgery, sleep medicine, diabetes, laboratory medicine, and elder care.

"These national quality awards and accreditations reflect our uncompromised commitment to excellence in patient care," said Lester Schindel, CEO of CharterCARE.

Among the certifications and accreditations achieved over the past year:

Roger Williams Medical Center:

- Re-certified as a Primary Stroke Care Center by The Joint Commission.
- Our Bariatric Surgery was reaccredited by the Metabolic and Bariatric Surgery Accredited and Quality Improvement Program.
- Our Breast Health Program was accredited in mammography by the American College of Radiology.
- Roger Williams Center has been designated as an Academic Comprehensive Cancer Center by the American College of Surgeons.
- The Cancer Center received Gold Level Accreditation Status from the American College of Surgeons.

- The American Orthopaedic Association has designated our orthopaedics program as a Star performer in its national Own the Bone quality campaign.
- The American Academy of Sleep Medicine (AASM) reaccredited the Sleep Disorders Center at Roger Williams for five years.

Our Lady of Fatima Hospital:

- Recertified as a Primary Stroke Care Center by The Joint Commission
- Our clinical laboratory received full recertification from the College of American Pathologists.
- Fatima's total hip and knee surgery program the first in the state to be certified by The Joint Commission was recertified.
- Fatima was the first hospital in New England to be certified in Advanced Diabetes Care by The Joint Commission.
- Fatima was awarded the prestigious Pathways to Excellence designation from the American Nurses Association's Credentialing Center.
- Fatima was awarded Exemplar status for its NICHE program (Nurses Improving Care for Health System Elders), which is focused on quality care for hospitalized seniors.
- Fatima-based Southern New England Rehabilitation Center received full accreditation from the Commission on Accreditation of Rehabilitation Facilities (CARF).

Elmhurst Extended Care:

Received a deficiency-free inspection from the Rhode Island Department of Health.









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Obituaries

ANDREW JOSEPH DOWD, MD, 52, of Westerly, passed away on Dec. 29, 2015 at his home. He was the beloved husband of Stephanie (Lynes) Dowd. Besides his wife, he is survived by his loving children, John "Jack", Caroline and Julia Dowd; he was also the brother of Matthew, John and Mark Dowd. In lieu of flowers, memorial contribu-



tions may be made to The Prout School, 4640 Tower Hill Rd, Wakefield, RI 02879 or Monsignor Matthew F. Clarke Catholic Regional School, 5074 Tower Hill Road, Wakefield, RI 02879.



HOWARD S. LAMPAL, MD, died December 26, 2015. Loving husband, father, grandfather, he is survived by his wife Dorothy Bennett Lampal; daughter Loren Gale (Lampal) Goldman and husband Rick Goldman; son Gary Bennett Lampal and wife Robin Madison; grandchildren Seth Goldman, Jared, Adam and Livia Lampal, Reid and Cory Madison.

Dr. Lampal was a graduate of Tufts College and Chicago Medical School. He did his internship and residency at Rhode Island Hospital. He practiced pediatrics for over 50 years.

Loved by his patients and their families (some third generation), upon his impending retirement one parent wrote to the Providence Journal. "A Doctor Who Cares: Dr. Howard Lampal will be retiring at the end of this year. My children (now grown) loved Dr. Lampal. As young parents, my husband and I had a wonderful friend in Dr. Lampal. He answered his own telephone when we called in the middle of the night. He opened his office on Sundays. He dispensed great advice with wit and humor. His retirement from the medical profession will leave a hole that simply cannot be filled."

Contributions in his memory can be made to the Herman L. Bennett Chapel Fund at Temple Beth-El.

RICHARD KEY MEAD, MD, FACP, 85, died January 11, 2016 at Rhode Island Hospital in the company of his beloved wife, Virginia Irma (Abrams) Mead.

He received a BS from Haverford College (Class of '52) and received his MD from Cornell School of Medicine (Class of '56). He began his medical training at RI Hospital from 1956 to 1958 and continued with the US

Navy (Sasebo, Japan) from 1958-1960. After the completion of his Navy service commitment, he returned to a Fellowship in Cardiology at RI Hospital (1960-1962).

Dr. Mead went on to enjoy a long, successful career as a primary care physician and cardiologist until he retired in 2000. He loved the practice of medicine and considered the lasting relationships with his patients as an extension of his life and family. He participated in the start-up of the Brown Medical School as an instructor in clinical medicine, advancing to the position of Associate Professor and to Associate Professor Emeritus. He was presented with the Teaching Award by the RI Hospital House Staff in 1986 and the Laureate Award from the American College of Physicians in 1995. He was a board member of the Providence Child Guidance Clinic, Hattie Ide Chafee Home and former Chairman of the RI Branch of the Episcopal Church Foundation, and former senior warden St. John's Episcopal Church in Barrington. As an Eagle Scout he continued as Assistant Scout Master and was a member of the Barrington Yacht Club and the Harwich Guild of Artists. A lover of music, he played the piano and sang with various groups including the Haverford Glee Club, University Glee Club, Central Congregational Church Choir (Providence), St. John's Episcopal Church (Barrington) and St Christopher's Episcopal Church (Chatham, MA). In addition he loved literature and even more so, books and book collecting.

Dr. Mead is survived by his wife of 52 years, his son Carl Mead (MaryBeth), daughter Kristen Materne (David), grandchildren Maximilian and Haley Mead, Brian and Beatrice Materne. He was the brother of Donald Mead and the late Brian Mead Jr. He will also be missed by many nieces, nephews and a bevy of cousins.

Contributions to his memory may be made to Haverford College, 370 Lancaster, Ave, Haverford, PA 19041, Weil Cornell Medicine, 1300 York Ave, New York, NY 10065 or Department of Cardiology, RI Hospital, 593 Eddy Street, Providence, RI 02905.

S. FREDERICK SLAFSKY, MD, a retired general surgeon who practiced in Providence for 38 years, died Jan. 8, 2016 at Philip Hulitar Hospice Center in Providence.



One of the first surgical appointees to the Brown University Medical School, he was a Clinical Associate Professor of Surgery from 1986-2002 and was named Surgeon Emeritus when he retired in 2004. He was a com-

passionate physician and a dedicated and committed teacher who built strong bonds with his patients, students and professional colleagues whom he valued and respected.

A native of Gloucester, MA, where he spent summers working on the docks, he retained a love for the ocean and fishing throughout his life. He graduated from Cornell University in 1954 and Cornell University Medical College in 1958.

He served the first two years of his surgical residency at Boston City Hospital from 1958-60 and continued his training at St. Vincent's Hospital in New York, where he was chief resident in 1963. He was chief surgical resident at Boston Floating Hospital from 1963-64 and a research fellow and instructor of surgery at Peter Bent Brigham Hospital, where he worked in the animal laboratories of pioneering transplant surgeon and future Nobel Prize winner Dr. Joseph E. Murray from 1964-65.

Committed to quality care throughout his career, Dr. Slafsky joined The Miriam Hospital in 1965 and was the first director of the Surgical Intensive Care Unit. He served on many hospital committees, the board of directors of the RI State Review Organization and participated on multiple levels in the development of Lifespan. He had clinical appointments at Roger Williams Medical Center, Women and Infants Hospital and the VA Medical Center. He was president of the board of Moshassuck Medical Center.

He leaves his wife Joan Temkin Slafsky, his sons John (Amy Rosenberg) of Palo Alto, CA, and Ted (Diane Prescott) of Vienna, VA, and four grandchildren, Rachel, Adam, Ethan, and Jessie.

Gifts in his memory may be made to The Miriam Hospital, 164 Summit Avenue, Providence and WaterFire Providence at 101 Regent Avenue, Providence RI 02908.



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The Leper Boy of Pawtucket

Mass. leper colony off nearby New Bedford, Mass., refuses to accept patient

MARY KORR RIMJ MANAGING EDITOR

The newspaper headlines in May 1911 called him the leper boy of Pawtucket or Pawtucket's boy leper. His name was Harry Sheridan. He was 15 years old at the time of his diagnosis, arrived at by doctors at the Massachusetts General Hospital, where his father, Edward P. Sheridan, superintendent of the Lumb Knitting Co. in Pawtucket, had taken him for care. When news of Harry's leprosy

LEPER'S FATHER DEFIES LAW.

Refuses to Surrender Boy to be Confined in Pest House or Hospital. Special to The New York Times.

PROVIDENCE, R. I., May 7.—Harry Sheridan, the fifteen-year-old leper of Pawtucket, who was spirited from the Massachusetts General Hospital in Boston to his father's home in Pawtucket,

Newspaper clippings from May 1911 told the story of 15-year-old Harry Sheridan, the leper boy from Pawtucket, as they referred to him.

off New Bedford, Mass., and run by the state of Massachusetts, or, alternatively, to house him at the Pawtucket Pest House for the remainder of his life. The so-called pest house on Brook Street had been used to quarantine patients with smallpox and other communicable diseases, but was unused at the time.

Despite his father's reluctance, The Health Department applied for young Harry to be

spread, parents in the Darlington, Pawtucket school where the boy was a student became alarmed, although Pawtucket physicians said that "no danger of contagion menaces the other pupils," according to one newspaper report. The school was

LEPER BOY PROVIDED FOR AT PAWTUCKET

After failing to get permission for the admission of Harry Sheridan, the boy leper of Pawtucket, to Penikeso Island, the Pawtucket board of health has decided to isolate the lad at the detention hospital farm in that city. This building has been used for pesthouse purposes in the cases of smallpox from time to time, but is now unoccupied. The health board takes this action after receiving from Gov. Pothler a communication that his efforts failed. The boy is the son of Edward P. Sheridan of \$5 Kenyon evenue and has been at his home ever since the agitation of his case has been under way. The arrangements for the transfer are not yet made, but will be in a few days. In the meantime the home of the boy is under close quarantine, police officers guarding the doors. closed for fumigation and then re-opened.

When Harry's father brought him home from the hospital, "or spirited him away," as the New York Times of May 8, 1911 reported, four policemen were sent to guard the Sheridan home, barring visitors from entering and Harry from leav-

ing. Four siblings inside showed no signs of the disease. The article suggested the Boston hospital and Harry's father could be held liable for bringing "a contagious disease into the state." The father promised to keep him isolated, but this was unacceptable to local and state health officials.

The *Times* further reported that the father refused to adhere to the request by city health officer, **DR. B.U. RICHARDS**, after consulting with **DR. GARDNER T. SWARTS**, secretary of the Rhode Island Board of Health, to try and get Harry admitted to the Penikese Leper Colony located on an island admitted to Penikese. The state of Massachusetts did not want to set a precedent in accepting out-of-state patients and declined the request, according to an article in the *Boston Globe*. RI Gov. Aram Pothier tried to intercede with Mas-

sachusetts officials, to no avail.

Ultimately, Edward Sheridan had no choice. The boy was removed to the Pawtucket Pest House, which was renovated for his arrival. One newspaper reported Harry was sent to the "newly equipped detention hospital on the Pawtucket City Farm where he will probably spend the remainder of his life in isolation."

The account reported the city hired one medical worker to live there, with Harry's parents allowed to visit once a month.

On June 15, 1911, Dr.

LEPER HURRIED FROM BOSTON Pawiucket Lad Suifered W.th Disease Four Years A PUBLIC SCHOOL ATTENDANT Utter Isolation Except From Persons Similarly Afflicted Awaits Young Son of Wealthy Mill Superintendent --Nature of Disease Revealed After Diagnosis by Experts In Massachusets General Hospital

Boston, May S.—Four years a sufferer from leprosy, yot in daily attendance at a public school during all that time, Harry Sheridan, the 15year-old Pawiucket, R. I., schoolboy whose examination by experts at the Massachusetts general hospital revealed the true nature of his dread disease, now faces the fate of his kind.

Virtually a prisoner in the house of his wealthy parents, about which policemen detailed from the Pawtuckol force stand guard, the fact of his having been-allowed to return to that efty at all has aroused the iro of Dr. litchards, the Pawtucket efty physician, who is at a loss what to do. Swarts issued a report on Harry for public health officials. He noted: "the symptoms of the disease probably date back five years," and described the "type of the disease as nodular and tubercular...affecting the nose and the lips and is quite typical in appearance...the leonine expression is present. Lepra bacilli are present in large quantities in secretions from the nose. The hands are slightly thickened." There is no mention or speculation as to how Harry contracted the disease.

Harry lived the remainder of his life, a mere four years,

tending a garden and a chicken coop on the premises. He died on March 6, 1915, at the age of 19, from "laryngitis believed to have been super-induced by leprosy," according to a report in the *Boston Globe*.

Six years after Harry's death, the Penikese leper colony was abandoned, and the buildings and cemetery demolished. Its thirteen patients were sent to a leprosarium in Carville, La., in a sealed-off train, the locale closer than the only other leper colony in the United States, in Molokai, Hawaii. *



Original farmhouse used by the Agassiz School of Biology, later by the Penikese Hospital as administration building and superintendent's residence. Destroyed by fire in January, 1912. Second administration building and superintendent's quarters built in 1912 to replace the one destroyed by fire. The annex at the right, added to provide laboratory facilities.



Hospital building (rear view).

Cemetery for leprous patients.

Photos of the Penikese Island Hospital and leper colony located in the Elizabethan Islands 13 miles off the coast of New Bedford, Mass. It was open from 1905–1921 and administered by the Massachusetts State Board of Charity. The photos were printed in a 1944 report by Herman E. Hasseltine, medical director of the US Public Health Service, entitled: History of Leprosy in the New England States.