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See story, page 21

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IMAGES IN MEDICINE

CASE REPORTS

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PUBLIC HEALTH

Reflections on 2020, the year of COVID

Rhode Island Medical Journal Editors

MARY KORR
RIMJ MANAGING EDITOR

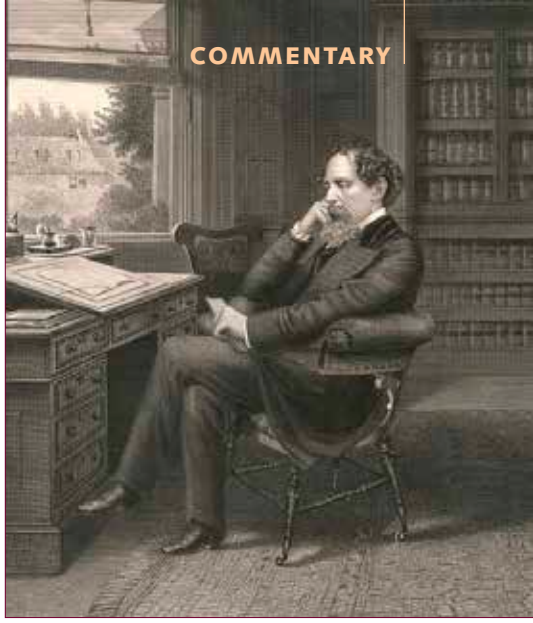
Farewell, 2020. As Charles Dickens (1812–1870) began in *A Tale of Two Cities*, set in London and Paris during the French Revolution of 1789–1799:

> *It was the best of times, it was the worst of times,*
> *it was the age of wisdom, it was the age of foolishness,*
> *it was the epoch of belief, it was the epoch of incredulity,*
> *it was the season of Light, it was the season of Darkness,*
> *it was the spring of hope, it was the winter of despair…*

2020 has truly been a "Dickensian" year, as SARS-CoV-2 engulfed the world.

In this collective commentary, RIMJ editors share patient and personal experiences during the COVID-19 pandemic, and hopes for a better 2021, with safe and efficacious vaccines and therapeutics on the horizon.

In the spirit of the holiday season this month, I know I speak for all the editors in echoing the words of Tiny Tim, in Dickens' *A Christmas Carol:* "God bless us, every one!" ❖



Print shows Charles Dickens seated at desk in his study. [LIBRARY OF CONGRESS]

On the Frontlines

WILLIAM BINDER, MD
CO-EDITOR-IN-CHIEF

Sixty minutes into a recent shift in the emergency department, I was spent. We had three codes: a 52-year-old woman with a ventricular fibrillation arrest, and two septuagenarians presenting from home in asystole, followed by a young man with a fatal gunshot wound to the head after an argument at a carwash, as I later read in the *Providence Journal*. The violence was not isolated – two weeks earlier I attempted to resuscitate a young man with a stab wound to "the box" and recently a colleague of mine performed a thoracotomy on a young man shot in the chest. I don't know whether violence has increased during the pandemic, but its consequences have become magnified – and it feels cold and inadequate to inform and comfort a stunned mother from behind an N-95 surgical mask, goggles, and face shield that her son has been killed.

I have cared for countless "codes" and responded to a barrage of violence in the past. During my first hours of internship, I attempted to resuscitate three men shot a block away from Shock Trauma during a drug deal gone awry. I have had too many shifts in which I "pronounced" three or four patients, and some days it seemed like everyone had a terrible outcome. However, the pandemic marathon and my advancing age – I am closer in age to the coding patients than I was to the residents involved in the resuscitation – has forced me to confront my own physical and emotional limitations.

A number of my colleagues – age-matched peers – have left medicine over the past nine months, as the pandemic catalyzed inner calculations. One is farming, another is teaching, and others are finding their own separate peace after years devoted to a restless discipline. I understand. In my specialty, in order to not overlook a life-threatening disorder, one must consider the worst-case scenario. At baseline this approach is taxing; during a pandemic, it is exhausting. We normally discharge our stress outside of work. However, options are limited during the pandemic. Combined with the uncertainty of whether one's inevitable exposure to Sars-CoV-2 will result in an asymptomatic infection or a lethal cytokine storm, or somewhere in between, half way into a typical shift most of us are depleted and drained.

It is a complex calculus to consider when to hang up the spikes, and I vacillate. After many false starts in my 20s – I attended graduate school, worked in construction, played music – I took a leap and landed in medical school. Bonds were forged and I am fortunate to have worked alongside and become friends with some remarkable people. Decades later I do not regret my decision, but now I feel a disquietude and waning connections as I watch my peers depart. Our good-bye parties are on ZOOM.

Yet, I am not ready to call it a day. I am driven, in part, by fear of what comes next, and largely by a feeling that I am not finished. And so, I ply my craft masked and shielded, preparing to do battle with a nimble pathogen. I am buoyed that we know much more about our common enemy. I have found sources of information that penetrate the miasma of misinformation perpetuated by compromised institutions operating within an Orwellian dystopia. Obtuse Kafkaesque explanations and whipsawing recommendations have ceded ground to science. Rational therapeutics have improved outcomes and emerging data on vaccination are encouraging. I am heartened that reasonable people have prevailed. After an "epoch of incredulity," it is difficult to foresee anything other than a "winter of despair." However, I am cautiously optimistic that rejuvenation will accompany resilience as we anticipate Dickens' "spring of hope." ❖

COVID's Unexpected Gifts

EDWARD FELLER, MD
CO-EDITOR-IN-CHIEF

For me, writing on November 20th, this month is a cruel one. Amidst COVID's horrors, in two days I will commemorate the anniversary of my wife's death in 2013. Wendy died in the room where I now write. This afternoon, I'll also rejoice in the life of Jack Ruddell, a wonderful, talented medical student and person – a favorite young friend who died too young, on November 1st. Online, I'll be at Jack's funeral in LA.

A Tale of Two Cities ignites my indelible memory of the pungent smell of tear gas on the Boulevard Saint Michel in Paris during the 1968–1969 student and worker-led strike and riots; Wendy and I narrowly escaped into a Wimpy's restaurant. We watched, shaking helplessly as riot police with truncheons beat the unfortunates still in the streets.

I lived for four years – the most formative years of my life – as a med student in Dijon, France after rejection from American medical schools. Wendy, later an Equity theater actor and Alpert Medical School standardized patient, supported us by singing in French nightclubs. The day after we got married, we had flown from Philadelphia to Dijon, her first day in France. On that day we learned that I had failed my entire second year of medical school, clearly the best and worst of times. Isolated, we battled together – us against the world. We learned that neither of us was good at backing off in crises – forever together in synch – an irreplaceable lesson when Wendy was diagnosed with acute myelogenous leukemia in 2004 – like COVID, a fierce and implacable foe. Yet, we had the too-rare certainty that our partner would always show up – resilient, undaunted by challenges, mentally tough, determined, intransigent. The horrors of this pandemic test everyone. Yet, many of us will emerge more resourceful, more thoughtful, and stronger. As Hemingway noted, "The world breaks everyone and after, some are strong in the broken places." An unanticipated, but priceless COVID gift. When horrid reality bites, it is easier to learn what matters in life.

Writing now in the room where Wendy died, I envision her mammoth, pulsating waterbed, installed to treat multiple graft vs host ulcers. Happily, my new treadmill arrived yesterday to be placed exactly where Wendy, on the hospital bed, lived out her final days and died...the equipment a reminder of the best of times for me, a life-long, committed runner.

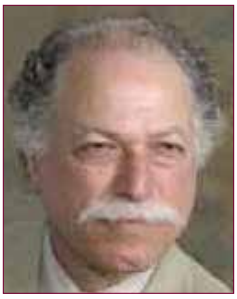
An immortal piece of Jack Ruddell is also with me. I'm startled by the starkness of his obituary – "He took his own life." Jack and I had a long, animated talk the day before he died. He had the wide-open magnanimous smile that so many knew. He was delighted that a beloved friend was driving down from Boston. Jack had parked at my house for the month of October while he visited his parents in California. The day he returned, I walked past the driveway…there was Jack, raking my leaves. What a sweet, thoughtful gift. That was Jack. His car remains at my house; memories of laugh-filled, outdoor summer dinners with Jack and a few med school classmates linger.

I don't like isolation and hate ZOOM as much as ZOOM hates me. Another fierce and implacable foe. I am diminished, losing my take-this-for-granted, daily, in-person chats with colleagues, friends and med students blessing me with a visit to my AMS office. Achingly, I miss my beloved son and daughter, both psychiatrists, and our yearly Thanksgiving trips to wild and beautiful places with and without Wendy. Alex, adjusting seamlessly to ZOOM-based psychotherapy, will drive up from NYC; I haven't seen Sophie, a chief resident at UCLA, in 8 months.

COVID forces painful realities on us, stripping away the less essential, less relevant baggage of our lives. It has allowed me the bliss of writing 5 or 6 hours a day, and the time to work on a myriad of projects for publication with med students, review submissions for this Journal, edit almost two dozen personal statements for residency applications and conduct as many ZOOM-mediated mock interviews.

And what a joy it has been to devour books I've neglected, including a bracing re-reading of Camus' *The Plague,* and taking time to rekindle and reinforce friendships, and revel in my lifelong Shakespearean passion. Fifty years ago, Wendy and I saw *Hamlet* at Shakespeare and Co. in the Berkshires. I've returned every year; this year, it's shuttered by the pandemic. I remain flushed with pride recalling Wendy as a female Shylock in Newport. COVID has also allowed me the time and concentration to attack a decades-long Bucket List wish – complete a manuscript on "*Othello's cognitive biases: How Iago duped him.*"

Reading the Commentary herein by my editorial colleagues reconfirms my pleasure collaborating with smart, savvy people I respect and trust. Kudos to Mary Korr, our Managing Editor, for yet another felicitous insight to suggest this joint reflection. Thanks to Marianne Migliori, our graphic designer, who elevates my prose with her creativity. ❖



Seismic Shifts in Primary-Care Delivery

KENNETH S. KORR, MD
ASSOCIATE EDITOR

The COVID-19 pandemic has resulted in seismic changes in the delivery of healthcare worldwide. While this has been most pronounced in hospitals, EDs and ICUs, it has also had a profound impact on how we provide primary care. In the large outpatient clinic setting where I work, we, like most healthcare providers nationwide, made an initial rapid transition to Telemedicine, which has evolved considerably in the ensuing nine months. We are now exclusively a "phone-first" model with an initial phone evaluation before any in-person visit. We have a photo app for patients to email pictures of rashes and other lesions. Sometimes patients call us from their cars in our parking lot, which can be followed by a brief in-person exam for routine PAPs and vaccinations. In the past few months we have caught up on the backlog of quality measures that were suspended during the early lockdown phase of the pandemic.

We also implemented an acute respiratory clinic where patients with concerning respiratory symptoms could be seen in-person after an initial phone assessment and referral. Staffed by a provider, RN and MA with appropriate PPE, they assess vital signs, pulse oximetry, and do a brief physical exam and a chest X-ray if needed. COVID testing is also available. This has helped determine which patients can be managed at home and who needs to be triaged to the ED. We believe this approach has reduced unnecessary ED visits, keeping patients safe and not overwhelming inpatient facilities.

One aspect of COVID primary care has been the variable clinical presentation and course of this illness. Many of our young healthy patients have been asymptomatic. Some have had a flu-like illness for a week and required supportive care. Others took a longer time to recover. A few older patients with co-morbidities ended up being hospitalized. And a small handful have just been confusing. One patient stands out in particular, a 35-year-old Hispanic female with a flu-like illness in April, who tested positive for COVID. She was referred for persistent pleuritic chest pain and exertional dyspnea despite an unremarkable chest X-ray, CT scan, echocardiogram and negative biomarkers. She had had two ED visits already and was quite anxious, concerned about some serious cardiac consequences, which she had read about on Google. I tried to reassure her, citing the lack of any objective evidence of cardiopulmonary involvement and treated her empirically with high-dose NSAIDs and colchicine, presuming this was some form of an inflammatory pleuro-pericarditis. Her symptoms were marginally controlled as long as she did not overexert herself, but I was unable to taper her medications without a flare in her symptoms. This went on for several months. I spoke with her weekly, trying to reassure her that things would get better, but not really being convinced of that or of what I was even treating. In retrospect, this was probably a manifestation of the "long-hauler's" syndrome, but not much had been reported about it at the time and there was always the nagging doubt that I had missed something but didn't know what.

The impact of these rapid changes in care delivery for patients and providers is hard to fully appreciate at this point. Clearly, Telemedicine has been a game-changer and patients are relieved that they can avoid crowded waiting rooms and EDs. This has kept our providers and staff safe as well. We have observed a substantial decline in no-show rates, as it is easier for patients who do not have to take time off from work to spend several hours in the clinic. In the coming year, as we have access to vaccines and the threat of the pandemic begins to recede, we will continue with our Telemedicine approach and a "phone-first" model.

But there has been a cost in terms of human contact and the difficulty of providing empathetic care at the end of a phone line or from behind a mask. Simple acts of kindness and compassion like a smile or a pat on the hand are no longer possible and it is harder at times to reach out and connect with patients. From the provider standpoint, we have lost some of our sense of camaraderie, with most of us working from home, and with a limited staff at the clinic. Over the span of nine long months, this has contributed to a sense of professional isolation, which daily ZOOM morning reports and weekly ZOOM seminars cannot remedy. Last week, for the first time since this all started, we had a small box luncheon outdoors in a local park with social distancing for a colleague who was leaving. It was like a family reunion. We were all so happy to see each other and share what was going on in our lives, things we used to take for granted when we were all working together. It was the best of times…❖

Social Isolation of the Most Vulnerable; Behind the Mask

JOSEPH H. FREIDMAN, MD
EDITOR EMERITUS

While the social isolation imposed by COVID-19 has affected us all, the impact on the acutely and chronically sick has been the hardest. I'm a movement disorders neurologist and the majority of my patients have Parkinson's disease. Thus, they are generally older, frailer, and more likely than average to live in an institution like a nursing home or an assisted living facility. The rules regulating visitation have varied since the first lockdown. It was heart-wrenching the first time I heard a wife tell me, "This is the first time I've seen him in 4 months," when she joined him in my examination room. At least I felt that I had facilitated a good thing, and lessened the discomfort I feel knowing how hard it is for my nursing home patients to get dressed for an outdoor excursion, take the van and get taken into the foreign terrain of my office. She was, of course, not the only spouse or child who told me this over the next few months. And the pangs of sorrow I felt for their extended separation, not significantly diminished by ZOOM or FaceTime, only got worse with each family.

Families with a loved one who needed to be evaluated at the hospital or moved to a nursing home held off as long as possible. They didn't want to be forced to abandon their loved one in the ED. Better to die at home. Better to risk an injury to the patient or the caregiver. "In normal times I'd tell you to bring her to the emergency department, but it might be better for us to try to take care of this over the phone." "I'm not sure you can take care of him safely by yourself, but if he goes to a nursing home, you may not be able to visit. What do you think?"

I'm a clinician. I was a resident when CT scans were introduced and worked at hospitals that didn't yet have them. I have worked in resource-poor countries with limited testing. I am used to working with suboptimal testing, and manage most of my patients over the phone in the best of times, but the separation of families at the end of their lives is a psychic trauma too far, even for a geriatric geriatric neurologist.

Illustration from *A Tale of Two Cities* shows one of the protagonists, Dr. Alexandre Manette, in the Bastille prison, unjustly held there for nearly two decades and who cobbled shoes to preserve his sanity.

Patient interactions and teaching have taken hits, as well, but without the pathos. With new patients I remove my mask for a minute so they can see me. One of my patients later told me that, "It made a difference." I'm not sure if I had removed my mask for all my new patients, but once she told me this, I have done it every time. I'm sure that patients relate better to doctors whose faces they've see. There are enough barriers between us. One less surprise.

In the office the mask makes a difference. Many of my patients have speech problems, exacerbated by the mask. Many of my patients are hard of hearing, making it more difficult for them to hear me. I ask them to repeat themselves and they ask me to repeat myself. Because of COVID-19 I keep the exam door open to facilitate aeration, but shouting to a deaf person with the door open is certainly a poor way to provide care and a HIPAA violation.

When I meet the rotating housestaff and students, I have them remove their masks for a minute so I can see their faces. It is meaningful to me, as I'm sure seeing mine is to them. My problem is that my memory for faces is poor. This weakness is significant enough that I identify with a newspaper column by a journalist who noted that he liked Game of Thrones so much because his facial agnosia (lack of ability to recognize faces) was less of a problem in this show because he always recognized the dwarf. I can't remember many of my students' faces now, but that's only a mild detriment. Washing the exam chairs between each patient is more of a problem. And having the house officer sit outside the room because the exam room is small contributes to the loss of privacy. ❖

COVID-19, Kids and the Pot of Gold

MARY KORR
RIMJ MANAGING EDITOR

This week I return to the third grade, helping dual-language learners read and write, via ZOOM. Before COVID it was the "best of times." I was an in-person volunteer with the "kiddos," as the principal calls them, four hours a week. Most speak Spanish as their primary language, and are fluent in speaking English but struggle with reading and writing. I work with this "cusp" cohort, who test at 50% below grade level.

My last day of school – what seems like such a long time ago – was in March, just prior to St. Patrick's Day. The kids were writing leprechaun stories. Hamilton circled the table where a small group of us were working and pulled out a small bottle of Purell his father had given him. He poured some on his hands and rubbed them together and then poured some on my hands before I could stop him. He was worried. "My father says maybe I shouldn't go on the field trip tomorrow because of the new coronavirus. He's thinks I could catch it from someone in a crowd."

"Where is the field trip going?" I asked him.

"To the Farmer's Market."

"That sound's healthy," I said. "It won't be crowded. So tell me what your storyline is."

He showed me his outline. The plot was that Hamilton would travel over the rainbow and find the leprechaun and convince him to use his magic to change the Pot of Gold to medicine to cure the new coronavirus. Hamilton would travel back over the rainbow and return to the real world with the pot of cure. I told him I liked his idea and that we had to get the scientific leprechauns to work on it, and then make millions of pots of it, but that they already were on it, no doubt. He offered me his bottle of Purell to take home. I said no, you keep it, but when I got home he had put it in my purse and drawn a little heart on it.

That was on a Wednesday. On Thursday, I received an email that volunteers would not return until next September (maybe) because of COVID-19, and that the school might shut down. It was too risky for the average age of the volunteers, who are all over 50. I went to school to return some literacy materials the next day and ran into the principal. He was clearly worried about the school shutting down. "What will happen to my kiddos? Sixty of them live in shelters. Most are on the food program. How are we going to get food to them?" I could see his mind was ticking away and coming up with ideas to get them over the crisis. "And the sports program for the older kids in middle school – it keeps them out of the gangs. And the chess club…and the mentor program…" He poured a cup of coffee and said he drinks too many cups a day. Then he was off and running down the hall to skype into a conference call on what was clearly going to become a crisis of unforeseen magnitude.

I walked out to my car, thinking, stay safe kiddos, your principal is a leprechaun. I'm sorry I didn't get to say good-bye, but I'll see you in September. I pulled out of the parking lot and in a leprechaun frame-of-mind found myself humming this song:

Somewhere over the rainbow, way up high
There's a land that I heard of once in a lullaby
Somewhere over the rainbow, skies are blue
And the dreams that you dare to dream really do come true…

As the New Year is about to begin, with fears abounding, COVID surging, and field hospitals preparing to open, I am ready to volunteer ZOOM with the little ones, and hope I can help them as we climb over the reading rainbow together, with Purell in our pockets and hopes high during this holiday "season of light" for a "spring of hope." ❖

The London of Charles Dickens: Children gathered on sidewalk in front of buildings, circa 1900. [LIBRARY OF CONGRESS]

A Pandemic-Inspired Transformation of Primary Care

JEFFREY BORKAN, MD, PhD; PAUL GEORGE, MD, MHPE; ELI Y. ADASHI, MD, MS

ABSTRACT

Lessons learned from the current COVID-19 pandemic can be harnessed to reengineer and restructure the current primary care paradigm with an eye toward advancing population health for years to come. During this pandemic, primary care in particular has again demonstrated its value to the healthcare system in the US and elsewhere through its agility to adapt to a broad range of healthcare settings. Guaranteeing the preservation, stabilization and growth of primary care practices and disciplines is paramount to ensure that this foundation of the healthcare system survives. Holding on to pre-pandemic paradigms will also significantly increase the risk of being unprepared for the next challenges to the healthcare system and to the health of the population.

On January 31, 2020, Health and Human Services Secretary Alex M. Azar II declared a Public Health Emergency for the entire US to aid the response of the healthcare community to the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) pandemic. The first death attributable to SARS-CoV-2 infection was reported on February 6, 2020 and, at the time of this writing, the SARS-CoV-2 pandemic continues to foment morbidity and mortality on a scale previously unseen since the 1918 H1N1 influenza pandemic. Concurrently, the pandemic appears to have launched a radical transformation of the US healthcare system, including its primary care enterprise. How primary care is reimagined and reinvigorated by the pandemic is bound to reshape the US healthcare for generations to come. It is the objective of this commentary to advocate that the lessons learned from the pandemic be harnessed to reengineer and restructure the current paradigm with an eye toward advancing population health for years to come.

INTRODUCTION

Over the last decade, a re-energized version of primary care involving family medicine, primary care internal medicine and pediatrics, has emerged with a renewed focus on the health of individuals, communities, and populations. Viewed in this light, the importance of primary care in general to overcoming the pandemic cannot be overstated. Though intensive care units and emergency departments have rightfully assumed the limelight, primary care has quietly emerged as a critical resource during this global calamity. The pandemic has drastically increased the role of primary care as the first point of contact, just as it has amplified the critical role of intensive care units at the other end of the care spectrum. This crisis has made it clear that every American benefits from a robust primary care relationship, if for no other reason than to facilitate screening and triage of SARS-CoV-2-exposed symptomatic and asymptomatic patients. Those without primary care providers (PCP) are left to fend for themselves, replete with the need to secure SARS-CoV-2 testing absent an order by a PCP. In addition, PCPs have continued, albeit with some limitations, to provide preventive services as well as manage the burden of acute and chronic diseases.

PRIMARY CARE RESPONDS TO PANDEMIC

The agility of primary care and of PCPs has been repeatedly showcased during the SARS-CoV-2 pandemic. Indeed, PCPs stepped in at multiple healthcare junctures – be it in primary care clinics, outpatient respiratory clinics, or inpatient hospital wards. In so doing, PCPs have proven invaluable in a context wherein specialties have often been sidelined due to the narrower scope of their practice. Concurrently, long overdue modifications to primary care practices in terms of their care delivery models have been put in place at an unprecedented pace. Telehealth is a case in point. After decades of slow to moderate growth, telehealth has recently expanded at an exponential rate and by all accounts is here to stay. "Going Virtual" and telemedicine are the new buzzwords as primary care practices moved within days and weeks to shift the majority of their visits to virtual telephonic, video, text, and email media.[1] Viewed in hindsight, none of this is surprising. What should have been recognized earlier is the reality that many of the services afforded by PCPs do not require in-person interactions. Moreover, telemedicine has previously been proposed as a potential solution to the provision of healthcare in a public health emergency so as to "provide the right care at the right time in the right place."[2] Finally, greater reliance on telemedicine fits in well with the changing demographic landscape wherein younger generations prefer and expect rapid, convenient responsiveness to their needs and requests. One of the rate-limiting challenges

to the widespread adoption of telemedicine prior to the SARS-CoV-2 pandemic was the element of reimbursement. This stumbling block has since been temporarily rectified by the waiving of section 1135 of the Social Security Act by the Centers for Medicare & Medicaid Services.[3] Continued reliance on virtual medicine post-pandemic seems likely at this point; yet to be determined is the willingness of insurers to continue to cover this vital service.

UNDERFUNDED IN US

While the SARS-CoV-2 pandemic has reaffirmed the importance of primary care to the healthcare system, the foundation upon which it rests remains in peril from years of underfunding and neglect. A recent analysis points out that no more than 5-7% of healthcare dollars were being spent on primary care services in a given year. This level of investment compares poorly with the reality of member nations of the Organization for Economic Co-operation and Development, which spend approximately 14% of their healthcare resources on primary care services and appear to enjoy better healthcare outcomes than the US.[4] Financial issues have also jeopardized much of the US healthcare system. While healthcare systems are overwhelmed with SARS-CoV-2 patients, the Gross Domestic Product (GDP) of the US dropped a record 4.8% in the first quarter of 2020, with a significant drop in healthcare spending being a major cause.[5] Primary care practices are not immune to this drastic reduction in healthcare spending. In fact, in many primary care practices, the in-person visit volumes have dropped by as much as 80%, and are at risk of going out of business. The availability of primary care unequivocally reduces population level mortality,[6] improves health outcomes, and reduces emergency department visits, hospital admission, readmission rates and costs.[3,7,8] Sacrificing primary care now will create a tidal wave of future deleterious consequences including everything from untreated diabetes leading to heart disease, unscreened cancers leading to metastasis, undiagnosed depression leading to substance use and much more – lasting well beyond this global pandemic.

STRENGTHENING PRIMARY CARE NOW AND POST-PANDEMIC

There are both short- and long-term steps to strengthen primary care during this current pandemic and for healthcare's post-pandemic phase. Medicare's announcement of pay parity for telemedicine visits in April 2020 is a step in the right direction and should be moved from "temporary" to "permanent." The Small Business Administration's Paycheck Protection Program (PPP) and the ability of primary care practices to access funds from this program was another key intervention. In the long-term, however, re-examining how PCPs are paid for the care of patients will be critical. The current "fee-for-service" payment paradigm is showing itself to be unworkable during the pandemic. It bears repeating that just as the US is in the midst of the greatest healthcare crisis of the century, healthcare systems – from solo practitioners to the mega-systems – are in financial chaos. This is not happening in countries where universal health care is the rule or wherein value-based payments or capitation arrangements are the status quo. It is uncertain whether or not there exists the necessary political will to overhaul our system. Still, note must be made of renewed calls to move away from payment for episodic care towards global payments for the care of patient populations in a manner that is equitable and just.

Primary care has demonstrated time and time again its value to the healthcare system in the US and elsewhere. During this pandemic it has moved with agility to adapt to a broad range of healthcare settings, proving its worth yet again. To ensure that this foundation of the healthcare system survives, during this healthcare crisis and the likely crises to come, guaranteeing the preservation, stabilization, and growth of primary care practices and disciplines is paramount. Holding on to pre-pandemic paradigms will also significantly increase the risk of being unprepared for the next challenges to the healthcare system and to the health of the population. Finally, we must ask ourselves and our leaders, "If not now, when?" and avoid missing this opportunity for fundamental reform.

References

1. Etz R. COVID-Survey. https://www.green-center.org/covid-survey. Accessed May 8, 2020.
2. Hollander JE, Carr BG. Virtually Perfect? Telemedicine for COVID-19. N Engl J Med. 2020; 382:1679-1681. DOI: 10.1056/NEJMp2003539
3. Medicare Telemedicine Health Care Provider Fact Sheet. Mar 17, 2020. CMS.Gov. https://www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet. Accessed May 8, 2020.
4. Jabbarpour Y, Greiner A, Jetty A, et al. Investing in Primary Care: A State-Level Analysis. July 19, 2019. https://www.milbank.org/publications/investing-in-primary-care-a-state-level-analysis/?gclid=EAIaIQobChMI45_Jm6Cd6QIVqdSzCh1h-1QjkEAAYASAAEgKkIPD_BwE. Accessed May 8, 2020.
5. Federation of American Hospitals. COVID-19 Alert: Dramatic GDP Reduction Reflects Unprecedented Financial Stress on U.S. Hospitals. https://www.fah.org/fah-ee2-uploads/website/documents/COVID-19_Alert-Dramatic_GDP_Reduction.pdf. Accessed May 8, 2020.
6. Basu S, Berkowitz SA, Phillips RL, Bitton A, Landon BE, Phillips RS. Association of Primary Care Physician Supply with Population Mortality in the United States, 2005-2015. JAMA Intern Med. 2019;179(4):506-514.
7. Chetty VK, Culpepper L, Phillips RL, et al. FPs Lower Hospital Readmission Rates and Costs. American Family Physician, May 1, 2011. Am Fam Physician. 2011;83(9):1054.
8. Starfield B, Shi L, Macinko J. Contributions of Primary Care to Health Systems and Health. Milbank Q. 2005;3:457-502.

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Turn Inward to Keep the Flame Burning

ELIZABETH T. TOLL, MD

Statue of Liberty crown and torch. [NATIONAL PARK SERVICE]

A few months after the devastating 2015 earthquake in Kathmandu, Nepal, a group gathered in a church basement for a potluck fundraiser for victims. Their curries, casseroles and cookies bespoke those in attendance – church congregants, employees of organizations serving refugees, and members of the Bhutanese-Nepali refugee community.

Informal speeches about the earthquake's destruction followed the meal, along with an introduction to the Bhutanese-Nepali refugee community. Its history stretches back more than a century, when farmers emigrated from Nepal to settle the rich farmland of southern Bhutan, where they maintained their Nepali language and culture. As the farmers became more prosperous, the Bhutanese government perceived the group as a political threat and expelled them violently. Between 1990 and 1993, 100,000 people fled to six refugee camps in eastern Nepal. Life in the camps was tough and dangerous, with families crowded into simple wooden homes and cooking over smoky open fires. Food was scarce and disease common. Nongovernmental organizations helped provide basic housing and medical care. The community prioritized education, including the teaching of English, in anticipation of higher education for some youths in neighboring countries and resettlement for all in an unidentified future homeland.

Remarkably, the refugees succeeded in living peacefully together in the camps for a quarter century, respecting one another's Hindu, Buddhist, and Christian faiths. Elders continued to think of themselves as Bhutanese, young adults as Bhutanese-Nepali, and children as Nepali, reflecting their experience of homeland. When asked if they miss anything from those arduous years, refugees describe the tropical climate and singular flavor of vegetables grown at the base of the Himalayas.

Starting in 2007, the Nepalese government, working with the United Nations High Commission for Refugees and several countries, began resettling this community. The United States accepted 60,000 Bhutanese-Nepali refugees.[1] Rhode Island ultimately welcomed 283 of these individuals,[2] ranging from newborns to nonagenarians. Some of them became my primary care patients. Over the years, the community in our state has dwindled to a few families, as most Bhutanese-Nepalis have migrated to join family members in states like Ohio where job prospects in companies such as Amazon are brighter.

We stand at a crossroads. Shall we choose to follow our better angels or our worser trolls? To those who would steer us toward the darker path, I say, "Give us your tired, your poor, your huddled masses yearning to breathe free."[3]

The potluck ended at dusk with an invitation to create a circle of candles symbolizing solidarity with those suffering in Nepal. We cleared the tables and exited to the parking lot. Each person received a lighted candle and stepped forward to help form the healing circle.

Best-laid plans had not included the brisk wind blowing that night. Organizers scurried about trying to keep the candles burning, only to have them blow out. What was meant to be a peaceful, reflective finale to the evening soon took on a frantic tone.

Then something shifted in the crowd. Spontaneously and without speaking, the Bhutanese-Nepali guests guided us to turn inward, creating small circles of five or six people. Our arching bodies shielded the candles. The crowd morphed into a large circle of small glowing circles, akin to flower petals. The flames remained lit. In my small cluster we all smiled, hands and faces warmed by candlelight. In their instinctive understanding that we must work together as a community, the Bhutanese-Nepali guests had not only helped us keep our collective lights burning but demonstrated that joining together would also nurture our own inner flames. For some, this offered a poignant introduction to the Bhutanese-Nepali refugees. For me, it was a reminder of how much I have learned from working with patients from this community as their primary care physician.

From the outset I have been struck by how this group of Hindus, Buddhists, and Christians respect one another

and support their spiritual differences while focusing on the shared primary goal of their community's wellbeing. As Bhutanese-Nepali patients universally offer the simple greeting of clasped hands, direct eye contact, a smile, and "Namaste," I have learned to open the exam room door, put down my computer and papers, and respond in kind, experiencing a moment of calm and connection, a feeling I strive to bring to other patients.

As I have worked through their medical needs as refugees – screening for infectious diseases, including malaria and tuberculosis, and overseeing the immunizations required for a green card, I have encountered the standard diseases of aging like hypertension, diabetes, and cancer. I have also found conditions seen in patients who have been victims of war or experienced the accidents of daily living commonly encountered in under-resourced areas of the world: the sequelae of gunshot wounds, an unrepaired hip fracture, scars from the goring of a bull, and burns caused by loose clothing ignited near an open fire. Patients have also revealed their psychological wounds – an elderly man's distant, shameful memory of his homesick teen bride from an arranged marriage leaving him to return to her family, and a mother's anguish when her daughter of 18 eloped to marry her boyfriend in a different state. The most common challenges relate to resettlement in a new country and ongoing separation from loved ones remaining in home countries and refugee camps, many in harm's way.

The Bhutanese-Nepali community has also reminded me of the power of gathering to celebrate important life milestones. Several days after the birth of a baby, or at the time of a marriage or death, community members gather to pray, eat, and catch up with one another. Each family brings a simple gift, a household item, or an envelope with a $20 bill. To keep elders vital, every morning families bring them to a rotating series of homes, so the seniors can enjoy one another's company while their children and grandchildren attend work and school. When a loved one is hospitalized, family members work out a schedule so that night or day, the patient is never alone. The same occurs during the vigil for a dying person and then at the funeral. On these occasions, the community swells as relatives and friends resettled elsewhere arrive from Vermont, Pennsylvania, Ohio, and Iowa to share in this passage, offer support, and help defray the costs of a new baby, marriage, or funeral. Families open their apartments and bedrolls to these travelers. I have been honored to participate in these celebrations as cherished patients have entered and left this world and passed through seminal moments in between. On every occasion, I have left feeling uplifted by the community's generosity and caring and more in touch with the flame within. All these customs have been challenged by the pandemic, but here too, I have been impressed to see the care that affected family members have taken to protect and support one another and their willingness to curtail the traditional get-togethers to avoid spreading COVID-19.

It has been equally remarkable to observe community members pull together to find housing and work, learn to drive, help children succeed in school, and otherwise pursue the American dream – a firsthand reminder of the energy and motivation that refugees and immigrants contribute to our nation. With the backdrop of these powerful lessons from the Bhutanese-Nepali community and other refugee and immigrant patients, I find the unremitting efforts of our current leaders to solve our complex immigration problems by decreasing the number of refugees sponsored by the United States, dismantling the overseas infrastructure that makes resettlement possible, impeding the process of obtaining a green card, and making these newcomers feel unwelcome not only repugnant but also baffling.

People who have survived violence, years in the harsh limbo of a refugee camp, and the endless unknowns that accompany immigration have a depth of understanding that seeds compassion and the courage, resilience, and inventiveness to move forward. Our nation stands to gain much from welcoming communities like the Bhutanese-Nepali refugees.

These days, I often imagine the Statue of Liberty being pulled off her pedestal and heaved into a dumpster, along with the powerful symbols of freedom, opportunity, and hope she embodies. We stand at a crossroads. Shall we choose to follow our better angels or our worser trolls? To those who would steer us toward the darker path, I say, "Give us your tired, your poor, your huddled masses yearning to breathe free,"[3] for they can offer new perspectives, remind us of our shared humanity and finest ideals, and demonstrate the power of turning toward one another to light and nurture the flame within our communities and ourselves. ❖

References

1. Hutt, Michael. The history of the Bhutanese refugee crisis. http://bhutaneserefugees.com/history. Accessed May 30, 2019.
2. Source: Refugee Processing Center (http://ireports.wrapsnet.org). Accessed July 2, 2020.
3. Lazarus, Emma. "The New Colossus," 1883, inscribed on the base of the Statue of Liberty in 1903.

Acknowledgment

For my patients from the Bhutanese-Nepali and all refugee communities with sincere thanks and gratitude for all you have taught me.

Disclaimer

The views expressed in this commentary are solely those of the author.

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[Editor's Note: The following commentary, written by the late Stanley M. Aronson, MD, first appeared in the August 2008 issue of the Journal.]

These are the Times that Try Men's Soles

STANLEY M. ARONSON, MD

On memorial day of this year, the New York City Department of Health warned Manhattan citizens to refrain from removing their shoes and socks when walking through Central Park. This edict was not prompted by any imminent threat of hookworm disease [typically transmitted via bare feet] or of an alien virus, heretofore unknown, that thrives in new-mown grass and endangers the lives of those foolhardy enough to expose their toes. No, the warning was issued because of the extremely remote threat of stepping on a rusty nail contaminated with tetanus germs. No actual cases were cited.

There always seems to be someone to take the simple, pastoral joys out of life, to deny humanity certain inalienable pleasures. For a constricted civilization confined to their shoes, ties, beliefs and other paraphernalia, there arises a visceral, indeed atavistic, pleasure in walking barefoot upon a verdant lawn. Imagine if walking barefoot were declared illegal except for one day in mid-June, each year. Oh, how citizens would flock to the parks on that joyous day and revel in experiencing the tingling of grass upon their naked feet, with no intervening socks or shoes. It is perhaps akin to Emerson's observation: "If the stars should appear but one night in a thousand years, how would man believe and adore."

This is not to deny the malign role of the tetanus germs in human history. Admittedly, tetanus infection survives only in a narrow niche of human experience. Unlike the germs that cause great epidemics, it is transmitted neither by air nor contaminated water; nor does it travel from person to person via venereal contact or by contaminated needles or blood specimens; nor even by the intermediacy of an insect such as the anaphelene mosquito. It is a disease which is infectious but not communicable.

Imagine if walking barefoot were declared illegal except for one day in mid-June, each year. Oh, how citizens would flock to the parks on that joyous day and revel in experiencing the tingling of grass upon their naked feet, with no intervening socks or shoes.

The germs of tetanus [*Clostridium tetani*] are extremely hardy, capable of surviving even in the absence of oxygen. They thrive in the manure of domesticated livestock and therefore in the pastures that provide fodder for cattle. The tetanus germ is able to subsist for years as inactive spores intermixed in the top soil of pastureland. But when, for example, fragments of muddied clothing [bearing tetanus spores] are thrust into the body following battle wounds, the tetanus spores become activated, multiply and produce an exotoxin [called tetanospasmin], a nerve poison which is then carried by nerve fibers and the bloodstream to the remainder of the body, thus affecting the connections between motor nerves. This chemical disturbance of the junction between nerve endings causes intense and painful muscle spasms called tetany. The jaw muscles contract, for example, producing a phenomenon called lockjaw. Difficulties in swallowing and even breathing arise, followed by lability in both blood pressure and body temperature. The muscle spasms are unyielding and may result in severe arching of the trunk. If untreated, death generally ensues within days. Tetanus infection is such a common complication of battlefield wounds that members of the military in most armies are routinely immunized against tetanus infection. In World War II, among 4.5 million Americans who were wounded in battle, only four cases of tetanus were recorded, a tribute to the military immunization program.

Deep wounds sustained by civilians are routinely treated with surgical debridement and tetanus immunization. Thus, tetanus infections in nations such as the United States are now rare.

During the last decade there have been about 43 cases of tetanus recorded per year in the United States. The great

majority have been documented in California, Texas and Florida. The protective effects of childhood vaccination against tetanus, [a requirement for entrance into the public school system of all 50 states], tend to diminish over the years, thus making the elderly or foreign-born immigrants substantially more susceptible to tetanus infection. Two other groups are particularly vulnerable: those with diabetes and those chemically dependent who employ illicit drugs such as heroin intravenously. In the case of addicts, the germs are introduced by syringe needles which are contaminated with soil.

Yet tetanus infection persists elsewhere, particularly as a major cause of death amongst newborns, especially in southern Asia and Africa. Two traditional factors contribute materially to the presence of tetanus infection in the newborn. First, in many cultures, the severing of the newborn's umbilical cord is done ritually by using the father's scythe, thus symbolically reaffirming the paternity of the offspring. Yet another source of contamination is the use of mud packed against the umbilical stump of the newborn to diminish the bleeding, a common maneuver in regions without health centers. In both instances – the farming implement and the farmyard mud – the likelihood of contamination from tetanus spores is high. The World Health Organization estimates that 400,000 to 600,000 infants die each year from tetanus infection.

A myth prevails in the United States that penetrating wounds caused by rusty nails result in tetanus. It is not the rust but the soil-contamination with tetanus germs that remains the cause. Tetanus infection, for practical purposes, has now become a burden virtually confined to third world nations, and particularly their rural newborn. The New England states have not seen a case of tetanus for over a decade, even amongst its barefoot-in-the-park population. ❖

Author

Stanley M. Aronson, MD, (1922–2015) was a neuropathologist, Editor-in-Chief of the *Rhode Island Medical Journal*, (1979–1989), and founding Dean of Brown Medical School, (1972–1981).

Thanks to RIMJ's Guest Editors of 2020

As the *Rhode Island Medical Journal* (RIMJ) ends its 103rd year of publication, RIMJ's editors would like to thank the Journal's guest editors of 2020. RIMJ's mission, to report on innovations, initiatives and advances in medicine and healthcare in Rhode Island, could not be accomplished without the commitment and hard work of its guest editors and contributors throughout the year.

Certainly this year is one we will never forget, and the editors and contributors to the issues went into overdrive to supply the Journal with COVID-19-related articles, news and photos in the months following March 2020. We cannot thank them enough for keeping the readership informed of the medical and logistical challenges faced by the Rhode Island healthcare community as they serve the residents of the state during this crisis. ❖

FEBRUARY 2020

TELEHEALTH

DANIEL HALPREN-RUDER, MD, PhD
GUEST EDITOR

The Evolution and Expansion of Telehealth and E-Health
DANIEL HALPREN-RUDER, MD, PhD

E-Health and Healthcare Quality Management: Disruptive Opportunities
DANIEL HALPREN-RUDER, MD, PhD

Telehealth & E-Health in Rhode Island 2020 and Beyond
JAMES V. MCDONALD, MD, MPH

Telehealth: Enhancing Care through Technology
AUGUSTINE MANOCCHIA, MD

Use of Health Information Technology by Rhode Island Physicians and Advanced Practice Providers, 2019
BRITTANY MANDEVILLE, BS
EMILY COOPER, MPH
JACQUELINE HASKELL, MS
SAMARA VINER-BROWN, MS
REBEKAH L. GARDNER, MD

Electronic Consults: Lessons From a Neighboring State
DAREN R. ANDERSON, MD

Emerging Opportunities for Telemedicine Research in Rhode Island
JIANI YU, PhD

Direct-to-Patient Telehealth: Opportunities and Challenges
VANESSA A. DIAZ, MD, MSCR
MARTY S. PLAYER, MD, MSCR

Why Most of Your Patients Aren't Using an Online Portal, and What You Can Do About It
DENISE ANTHONY, PhD
CELESTE CAMPOS-CASTILLO, PhD

MARCH 2020

INFECTION CONTROL

JOHN R. LONKS, MD
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Examining the Components of Effective Infection Control and Prevention
JOHN R. LONKS, MD

MRSA Prevalence in Preoperative *S. aureus* Nasal Culture Isolates is Significantly Different From a Traditional Hospital-wide Antibiogram
ANDREW R. CRAWFORD, MD
NANCY VALLANDE, MS
JOHN R. LONKS, MD

Safety and Nosocomial *Clostridioides difficile* Infections
SUSAN STEEVES, MSN, RN
NANCY VALLANDE, MS
JOHN R. LONKS, MD

Antibiotics and Nosocomial *Clostridioides difficile*, a Retrospective Chart Review
KELLY A. SKRABLE, MD, MPH
JOHN R. LONKS, MD

Rate of *Clostridioides difficile* Culture Positivity Among Hospitalized Patients
JOHN R. LONKS, MD
ERIC NOLETTE, BS
JENNIFER L. CADNUM, BS
CURTIS J. DONSKEY, MD

To Treat or Not to Treat: UTI or Bacteriuria?
RAUL MACIAS-GIL, MD
EMILY O'NEILL, PharmD
MELISSA M. GAITANIS, MD


APRIL 2020

UPDATES IN HEMATOLOGY/ONCOLOGY

ANTHONY E. MEGA, MD
FRED J. SCHIFFMAN, MD
GUEST EDITORS

Declining Cancer Rates, Inclining Local Expertise: We Are Pointed in the Right Direction but Work Remains
ANTHONY E. MEGA, MD
FRED J. SCHIFFMAN, MD

Current Indications for Consideration of Evaluation for Hereditary Cancer Predisposition Syndromes and How They Can Change Management
LAUREN J. MASSINGHAM, MD
ANDRE DE SOUZA, MD

The Sickle Cell Disease Multi-disciplinary Clinic at the Lifespan Cancer Institute
ROBERT SOKOLIC, MD, FACP

Non-Small Cell Lung Cancer in the Era of Personalized Medicine: Molecular Tests that Matter
CHRISTOPHER DEL PRETE, MD
CHRISTOPHER G. AZZOLI, MD, FASCO

Immune Checkpoint Inhibitors in the Treatment of Gastrointestinal Malignancies: A Review of Current and Future Therapies
ANDREW HSU, MD
LAUREN MENDELSON, DO
KHALDOUN ALMHANNA, MD, MPH

Acute Myeloid Leukemia: A Review
ARI PELCOVITS, MD
RABIN NIROULA, MD

Prostate Cancer Therapeutics and Their Complications: A Primer for the Primary Care Provider
ZACHARY BROWNLEE, MD
ANDRE DE SOUZA, MD
PAUL P. KOFFER, MD
THOMAS A. DIPETRILLO, MD
ANTHONY E. MEGA, MD

Risk Stratification of Precursors to Multiple Myeloma in 2020
RANI CHUDASAMA, MD
PETER BARTH, MD

MAY 2020

PAIN MANAGEMENT IN REHABILITATION

JON A. MUKAND, MD, PhD
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Pain Management Strategies & Therapeutic Options in the Rehabilitation Setting
JON A. MUKAND, MD, PhD

Spinal Cord Stimulation: The Use of Neuromodulation for Treatment of Chronic Pain
ALEX HAN, BA, MD'21
ALEXIOS G. CARAYANNOPOULOS, DO, MPH, FAAPMR, FAAOE, FFSMB

Management of Post-Amputation Pain
JACOB M. MODEST, MD
JEREMY E. RADUCHA, MD
EDWARD J. TESTA, MD
CRAIG P. EBERSON, MD

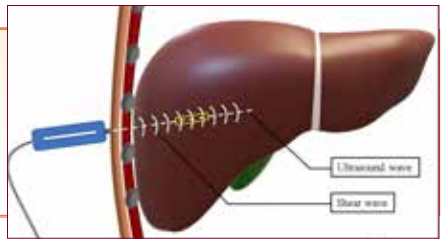
Osteoarthritic Pain: A Brief Review of Nonsurgical, Surgical, and Alternative Treatment Approaches
SHASHANK DWIVEDI, MD
MICHAEL KUTSCHKE, MD
SEBASTIAN ORMAN, MD
ZAINAB IBRAHIM, MD
ERIC M. COHEN, MD

Surgical Management of Rheumatoid Arthritis of the Hand
SHASHANK DWIVEDI, MD
EDWARD TESTA, MD
JACOB M. MODEST, MD
ZAINAB IBRAHIM, MD
JOSEPH A. GIL, MD

JUNE 2020

HCV UPDATES: PREVENTING, TESTING, MANAGING, AND TREATING HEPATITIS C

LYNN E. TAYLOR, MD, FAASLD, FACP
GUEST EDITOR



The Second Biggest Infectious Disease Killer in the US: Hepatitis C Virus Infection and Steps Towards its Elimination in Rhode Island and Beyond
LYNN E. TAYLOR, MD, FAASLD, FACP

Public Health Approaches Toward Eliminating Hepatitis C Virus in Rhode Island
MATTHEW MURPHY, MD, MPH
KATHARINE HOWE, MPH
THEODORE MARAK, MPH
THOMAS BERTRAND, MPH
MICHAELA MAYNARD, MPH, MSN, NP-C
COLLEEN DALEY NDOYE
RAYNALD JOSEPH
JERRY FINGERUT, MD
PHILIP A. CHAN, MD, MS

Liver Ultrasound Elastography: Review of Techniques and Clinical Applications
ADIB R. KARAM, MD
MICHAEL D. BELAND, MD

Intrahepatic Cholangiocarcinoma in a Patient with Hepatitis C: A Cautionary Tale
SOUMITRI BARUA, AB, MD'21
SOPHIE SPRECHT-WALSH, LPN
ZOE WEISS, MD
JAMES N. BUTERA, MD
KHALDOUN ALMHANNA, MD, MPH
SUSAN HART, MD
JAEL RODRIGUEZ, MD
LYNN E. TAYLOR, MD

Comparing Treatment Response Between Older and Younger Patients with Chronic Hepatitis C Virus Infection on Direct-acting Antiviral Agents
ALYSSA K. GREENWOOD FRANCIS, MPH
FRANCESCA L. BEAUDOIN, MD, PhD
SAFIYA S. NAIDJATE, PharmD
CHRISTINE BERARD-COLLINS, MBA, BSPharm
ANDREW R. ZULLO, PharmD, PhD

A Modifiable Barrier to Hepatitis C Virus Elimination in Rhode Island: The Prior Authorization Process for Direct-Acting Antiviral Agents
PATRICK DURYEA
JACKIE HABCHI, PharmD
SOPHIE SPRECHT-WALSH, LPN
AURIELLE THOMAS, MSc
JEFFREY BRATBERG, PharmD

AUGUST 2020

VACCINE UPDATES

MARIA D. MILENO, MD
JENNIE E. JOHNSON, MD
GUEST EDITORS

A Review of Current Vaccine Recommendations, Schedules for Children, Adults
MARIA D. MILENO, MD
JENNIE E. JOHNSON, MD

Talking to Patients about the Influenza Vaccine
KATRINA M. BYRD, MD

Recent Updates to the Advisory Committee on Immunization Practices, Recommendations for Pneumococcal and Herpes Zoster Vaccination
AMY L. BROTHERTON, PharmD, AAHIVP, BCIDP
RAJEEV SHAH, PharmD, AAHIVP, BCIDP

Tetanus Vaccination 2020 and Collateral Protections against Pertussis and Diphtheria
ALEXANDRE KHOURY, MD
JOHN D. CAHILL, MD

An Update on Meningococcal Vaccination
JOSEPH M. GARLAND, MD

Hepatitis A and B Vaccination in the US
MARTHA C. SANCHEZ, MD

Perspective: It's Not Only Vaccine Hesitancy; It's Also Physician Hesitancy
DANIEL B. BLATT, MD
STEVEN D. BLATT, MD
PENELOPE H. DENNEHY, MD

Japanese Encephalitis Vaccine
MARIA D. MILENO, MD

Epidemiology of Rabies and Current US Vaccine Guidelines
CHRISTINA LIU, MD
JOHN D. CAHILL, MD


SEPTEMBER 2020

SPORTS MEDICINE

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RAMIN R. TABADDOR, MD
GUEST EDITORS

Sports Medicine: The Bigger Picture
BRETT D. OWENS, MD
RAMIN R. TABADDOR, MD

COVID-19 and Review of Current Recommendations for Return to Athletic Play
JAMES DOVE, MD
ANDREW GAGE, MD
PETER KRIZ, MD
RAMIN R. TABADDOR, MD
BRETT D. OWENS, MD

Shoulder and Elbow Injuries in the Adolescent Throwing Athlete
STEVEN DeFRODA, MD, MEng
PATRICK McGLONE, BS, MD'21
JAMES LEVINS, MD
RYAN O'DONNELL, MD
ARISTIDES I. CRUZ, MD, MBA
PETER K. KRIZ, MD

Management of Anterior Shoulder Instability for the In-Season Athlete
NICHOLAS J. LEMME, MD
RYAN O'DONNELL, MD
JACOB MODEST, MD
MATTHEW QUINN, MD
BRETT D. OWENS, MD

Bridge-Enhanced Anterior Cruciate Ligament Repair: The Next Step Forward in ACL Treatment
ERIN K. HAGGERTY, MD
STEPHEN E. MARCACCIO, MD
PAUL D. FADALE, MD
MICHAEL J. HULSTYN, MD
BRETT D. OWENS, MD

A Clinician's Guide to Femoacetabular Impingement in Athletes
KEVIN DISILVESTRO, MD
MATTHEW QUINN, MD
RAMIN R. TABADDOR, MD

The Weekend Warrior: Common Hand and Wrist Injuries in Athletes
JOSEPH A. GIL, MD
ARNOLD-PETER C. WEISS, MD

Foundational Health for Runners: Is it the Key to Minimizing Injury?
MICHAEL SILVA, MS, PT, CSCS
LAUREN V. READY, MPH, MD'21
CHRISTINE M. ETZEL, SCB

Images in Medicine: Athletic Pubalgia
WILLIAM BINDER, MD
RAMIN R. TABADDOR, MD
JEFFREY FEDEN, MD

OCTOBER 2020

COVID 19 & KIDNEY DISEASE

JIE TANG, MD, MPH, MSc
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COVID-19 – A Kidney Perspective
JIE TANG, MD, MPH, MSc

Testing for SARS-CoV-2 (COVID-19): A General Review
ERIC W. TANG
APRIL M. BOBENCHIK, PhD, D(ABMM)
SHAOLEI LU, MD, PhD

COVID-19 and Kidney Injury
MATTHEW R. LYNCH, MD
JIE TANG, MD, MPH, MSc

COVID-19 and ESKD, A Rapid Review
ANKUR D. SHAH, MD
NATHAN CALABRO-KAILUKAITIS, MD

Kidney Transplantation and COVID-19
BASMA MERHI, MD
REGINALD GOHH, MD

NOVEMBER 2020

PREVENTIVE CARDIOLOGY

WEN-CHIH WU, MD, MPH

GUEST EDITOR

Topics and Trends in the Evolving Field of Preventive Cardiology

KENNETH S. KORR, MD, FACC

The Landscape and Trends in Preventive Cardiology and its Training

HOJUNE E. CHUNG, DO
GAURAV CHOUDHARY, MD
WEN-CHIH WU, MD, MPH

Ambulatory Intravenous Diuretic Clinic Associated With Short-Term Risk Reduction in Mortality and Rehospitalizations in Patients Discharged With Heart Failure

AMY ST. AMAND, PharmD, BCPS
TRACEY H. TAVEIRA, PharmD, CDOE
KAITLIN E. HENTHORNE, PharmD
WEN-CHIH WU, MD, MPH

Review of Telehealth Solutions for Outpatient Heart Failure Care in a Veterans Health Affairs Hospital in the COVID-19 Era

REEMA O. QURESHI, MD
ARAVIND KOKKIRALA, MD
WEN-CHIH WU, MD, MPH

Transition to Home-Based Treatment Plans for Center-Based Cardiac, Pulmonary, and Vascular Rehabilitation during COVID-19

HAYDEN RILEY, MS;
LOREN STABILE, MS
WEN-CHIH WU, MD, MPH

Important Personal Values of Veterans Enrolled in Home-Based Cardiac Rehabilitation

EMILY C. GATHRIGHT, PhD
LORI A. J. SCOTT-SHELDON, PhD
JEANNIE URSILLO, MSN, APRN-BC
ELIZABETH MEDBURY, BSN, RN
WEN-CHIH WU, MD, MPH

Perspective: Promoting Social Connectedness among Cardiac Rehabilitation Patients During the COVID-19 Pandemic and Beyond

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A Case of the Blue Finger – Achenbach Syndrome

MICHAEL WOODS, BA; SADIA IFTIKHAR, MD

ABSTRACT

Achenbach Syndrome is a self-limiting, benign condition that causes paroxysmal atraumatic hematomas in the volar aspects of fingers.[1] It may be associated with burning, swelling, numbness, painful movement of hand joints, or a tingling sensation, often resembling serious vascular diseases that leads to extensive diagnostic testing. Despite the sometimes intriguing clinical picture, Achenbach Syndrome is self-resolving, and does not require diagnostic testing or treatment. We describe a case of Achenbach syndrome in a 77- year-old patient.

KEYWORDS: Achenbach, finger hematoma

INTRODUCTION

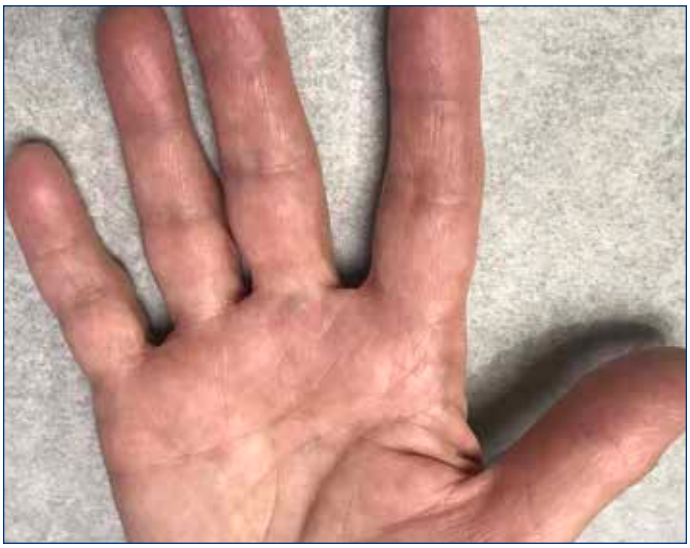
Being an uncommon condition, Achenbach Syndrome's prevalence in the medical literature is scarce. It is, however, important to recognize the syndrome, as it has a vast differential diagnosis, many of which are conditions requiring extensive work-up. This case aims to add to the existing literature, illustrating the self-resolving nature of the syndrome and highlighting the importance of preventing unnecessary testing.

CASE REPORT

A 77-year-old patient with a past medical history of hypertension, osteoporosis and hypothyroidism presented to the clinic with a 15-year history of recurring multiple swellings on the palmar aspect of her fingers, sparing her thumbs. She presented now because these symptoms have increased in frequency and duration over the past year. These swellings last 4–6 weeks, and are followed by severe pain in the involved digits for 1 day, and subsequent bluish, localized discoloration of the area for 2–5 days. When present, the pain is severe, and only occurs when the patient flexes her digit or with pressure, but not at rest. Additionally, the patient reported that the pain leads to difficulty with movement of the fingers. She reported that nothing has helped to relieve these symptoms. She also states that exposing her fingers to cold temperature has had no effect on her symptoms. She denied trauma to her hands.

Her current medications are Fosamax, Hydrochlorothiazide, Levothyroxine, Pravastatin and Atenolol. Her family history is significant for osteoarthritis and emphysema in her father, and ovarian cancer in her mother. The patient smoked one pack of cigarettes per day for one year while in her 20s. She does not drink alcohol or use recreational drugs.

Figures 1 and 2.
Achenbach Syndrome is a benign, self-limiting condition of unknown cause that causes paroxysmal hematomas of the palmar surface of the hands.



PHYSICAL EXAM

Vital signs were within normal limits. Head, ears, eyes, nose and throat examination was normal. No oral ulceration was noted. No lymph nodes were palpable. Inspection of her right and left hands showed 2–4mm non-erythematous immobile firm, non-tender papules on the palmar aspect of her right 2nd DIP, 3rd MCP and 5th PIP joints, as well as her left 4th PIP joint and 5th DIP joint. Additionally, there was localized, bluish discoloration overlying the papule on her right 3rd MCP, but the other papules were not discolored. No other skin lesions were noted. Mild bony hypertrophy and tenderness with palpation of all DIP joints of hand was noted. She had painless and full range of motion of wrists, elbows, shoulders, feet, ankles, knees and hips. Bilateral ulnar and radial pulses were normal. Capillary refill was normal. Cardiac and pulmonary examination were unremarkable. Neurological examination was normal.

DIFFERENTIAL DIAGNOSIS AND MANAGEMENT

Differential diagnosis to be considered include Raynaud's Syndrome, Atherosclerotic Disease, Ulnar artery thrombosis, Radial artery thrombosis, Trauma, Acute limb ischemia, Polycythemia, Cryoglobulinemia and Pernio.

The above list of diseases should be considered when evaluating a patient with suspected Achenbach Syndrome, specifically because it is a diagnosis of exclusion.[2] Because this patient had an extensive history of symptoms before presenting to the office, always resolving without clinical intervention, we concluded that her presenting symptoms were an exacerbation of her underlying, chronic disease and chose to treat supportively, as she had essentially done on her own in previous exacerbations.

Her symptoms resolved within two months.

(Figures 1 and 2)

DISCUSSION

First described by Dr. Walter Achenbach in 1955, Achenbach Syndrome is a benign, self-limiting condition of unknown cause that causes paroxysmal hematomas of the palmar surface of the hands.[3] Additionally, the digits can change color to become blue or black (Achenbach Syndrome is also known as Idiopathic Blue Finger).[4] While it often involves pain, it may be completely painless. It commonly arises in middle-aged women with no specific time course. Most commonly, symptoms occur in the index finger, followed by the middle finger, and rarely do they occur in the thumb.[5]

Because the symptoms of Achenbach Syndrome may resemble those of serious vascular and rheumatologic diseases, some patients undergo extensive diagnostic work-up including hematologic testing, vascular flow studies, hand and joint imaging, and coagulation studies. Achenbach Syndrome is a diagnosis of exclusion, the etiology of which is unknown. Extensive diagnostic testing may be avoided with more awareness of the benign and self-limiting course of this syndrome.

References

1. S. Kämpfen, D.D. Santa, C. Fusetti. A Painful Blue Thumb: A Case of Achenbach's Syndrome. Elsevier. 2005; 10(4): pp. 84-85.
2. Brown P.J., Zirwas, M.J., English, J.C. The Purple Digit: An Algorithmic Approach to Diagnosis. American Journal of Clinical Dermatology. 2010; 11(2): pp. 103–116.
3. Ribeiro, Fani, et al. An Acute Blue Finger: A Case of Achenbach's Syndrome. European Journal of Case Reports in Internal Medicine. 2019; 6(9): doi:10.12890/2019_001231.
4. Ada F, Kasimzade F. Analysis of 24 Patients with Achenbach's Syndrome. World Journal of Clinical Cases. 2019; 7(10): pp. 1103-1110.
5. Eikenboom JC, et al. Paroxysmal Finger Haematoma: a Neglected Syndrome. Thrombosis and Haemostasis, U.S. National Library of Medicine. 1991; 66(2): 266.

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Disclosures

None

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Severe, Symptomatic Reinfection in a Patient with COVID-19

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ABSTRACT

To date, there have only been a few reports of reinfections in COVID-19 patients. The possibility of being reinfected with COVID-19 is poorly understood. In this case report, we describe an individual who was initially diagnosed in April 2020 with COVID-19. Seven months later, he presented again to the hospital with shortness of breath and was found to have COVID-19 reinfection. We also summarize a list of all known cases of COVID-19 reinfection at this time.

KEYWORDS: SARS-CoV-2, COVID-19, reinfection, secondary infection, antibodies

INTRODUCTION

Reinfection with COVID-19 is rare, with only a handful of cases reported among the 42 million cases worldwide. The susceptibility of previously infected patients to reinfection is not well understood. Reports of COVID-19 reinfection have been reported in Hong Kong, The Netherlands, Belgium, Ecuador, Israel and Australia.[1,2,3] The first case of reinfection in the United States was recently reported in a patient in Reno, Nevada.[4] We describe an individual with two instances of COVID-19 infection with distinct illnesses.

CASE PRESENTATION

A male in his 70s tested positive for SARS-CoV2 in early April 2020. Twelve days later, he presented to the hospital with worsening shortness of breath. His past medical history was significant for obesity, chronic low back pain, neuropathy, asthma, obstructive sleep apnea, and hypertension. His home medications included Albuterol, Umeclidinium, Symbicort-Formoterol, Loratadine, Montelukast, Tamsulosin, and Valsartan-hydrochlorothiazide. On physical exam, he was tachypneic and unable to complete full sentences. His C-Reactive Protein (CRP), LDH, and ferritin were noted to be 19mg/L (0–10mg/L), 130IU/L (100–220IU/L), and 337ng/ml (22–322ng/ml). X-ray imaging showed mild, patchy mid- and lower-lung airspace disease bilaterally. He was able to maintain his oxygen saturation levels above 90% while ambulating on ambient air. He was given albuterol, antitussives, and discharged home from the Emergency Department. Follow-up X-ray imaging done three weeks later showed resolution of airspace disease and no acute process.

Nearly seven months later, he presented to the hospital again with shortness of breath and subjective fever. He reported no symptom relief despite using his nebulizer and completing a course of azithromycin. He reported that his wife and daughter tested positive for SARS-CoV-2 ten days prior to his admission. He tested negative for SARS-CoV-2 one week before admission. He also endorsed body aches, nausea, and malaise. On physical exam, he was noted to be hypoxic while ambulating, reaching 87% on ambient air. Lung examination revealed rales at bases. He was hospitalized and started on supplemental oxygen via nasal cannula.

The respiratory viral panel came back only positive for SARS-CoV-2. Immunoglobulin levels were normal. SARS-CoV-2 antibodies, including IgG at the time of admission were negative. His CRP, LDH, and ferritin were noted to be 77mg/L, 256IU/L, and 1,478ng/ml. D dimer level was 269ng/ml (0–230ng/ml). X-ray imaging showed multifocal airspace disease, greatest at the left lung base. He received Dexamethasone, Remdesivir and enrolled in a placebo-controlled Monoclonal Antibody study. He did not require negative SARS-CoV-2 antibodies before enrollment in the study since most cases are new infections. Presumably, a case of reinfection implies a lack of or inadequate serum antibodies to the virus. In view of initial concern for presumed bacterial infection, he also received two doses of ceftriaxone.

CRP trended down to 35.34mg/L at the time of discharge. He was eventually discharged home on 3 Liter/min supplemental oxygen after being hospitalized for three days.

DISCUSSION

The human body has innate and adaptive immunity. When any viral infection occurs, IgM antibodies typically appear within one to two weeks. These antibodies subsequently mobilize against the virus and then begin to disappear slowly after that. A few weeks after an infection has cleared, IgG antibodies appear. Typically, IgG levels persist for many years, especially in cases of certain childhood viruses such as varicella. However, this is not the case with coronavirus infections.

Coronaviruses have been known to cause reinfections, similar to other to other viral causes of upper respiratory

tract infections. It appears that coronaviruses are adept at ensuring that the body's long-term response to the virus is not that powerful. Previous studies of MERS and SARS-CoV infections have shown that total binding and neutralizing antibodies decrease slowly over 1 to 3 years.[5,6] Everyone previously infected will have limited or no ability to protect themselves from reinfection. Studies have also shown that patients with more severe illness and prolonged viral shedding had higher antibody titers present for a longer duration of time.[7]

Most infected patients with SARS-CoV-2 begin to have detectable antibodies 10–14 days after symptom onset, though antibody levels in patients with mild disease may be low or undetectable[8]. There is a paucity of information about the degree to which this immune response provides protective immunity towards subsequent infections and this protection's longevity. A Chinese study showed that forty percent of asymptomatic individuals became seronegative and 12.9% of symptomatic individuals became seronegative in the early convalescent phase (eight weeks after infection).[9] In our case, it is unclear if the patient developed any antibodies following his initial infection or if he became seronegative over time. His SARS-CoV-2 antibodies were negative, although it also remains unknown if he specifically developed antibodies to the spike Receptor Binding Domain (RBD).

Similar to observations from prior case reports, our patient showed increased symptom severity during his reinfection.[1,2,3,4] Patients with mild or asymptomatic disease appear more likely to get reinfected. Postulated mechanisms include a higher dose of the virus, greater virulence, or antibody-dependent enhancement.[4,10] We could not assess if he was infected with phylogenetically different strains as virus samples from his first SARS-CoV-2 infection were not retained. Our patient did not suffer from any immunological disorders and was not taking any immunosuppressive medications that would facilitate his reinfection. His immunoglobulin levels were normal. There have been other case reports of reinfections where patients have also remained mostly asymptomatic or shown decreased symptom severity, implying some degree of immunity from their first infection (**Table 1**).

Our case has implications for the role of monoclonal antibody and vaccination in patients infected with SARS-CoV-2. Based on prior reports of reinfection, it is evident that the body's innate immunity will not provide lifelong protection. There is also an apparent paradox between declining antibody levels and low incidence of reinfection, implying many immune mechanisms at work, including T lymphocytes. Specific questions remain unanswered. The first question is how long will innate, monoclonal antibody-mediated, or vaccine-mediated immunity last. The second question is will one vaccine be sufficient to cover all SARS-CoV2 variant strains. Lastly, will the administration of monoclonal antibody to patients with mild or asymptomatic disease prevent or reduce reinfection rates. Given increased symptom severity during reinfection, our case also highlights the need to monitor these patients more closely on a short-term and long-term basis. As more cases of reinfection arise, we will need more research to better understand the mechanisms that drive it in order to control and reduce infection rates worldwide.

Table 1. Current Cases of COVID-19 Reinfection Worldwide

Countries	Number of Cases	Status	Severity of Reinfection
India	6	Confirmed	Mild
Spain	4	Confirmed	Mild, Serious
Qatar	4	Confirmed	Mild
The Netherlands	4	Confirmed	Mild, Serious
United States	3	Confirmed	Serious
Belgium	3	Confirmed	Mild
Mexico	3	Presumed	Unknown
Hong Kong	1	Confirmed	Mild
Ecuador	1	Confirmed	Serious
Israel	1	Confirmed	Mild
Sweden	1	Confirmed	Mild
Brazil	1	Confirmed	Serious
Pakistan	1	Presumed	Serious
Australia	1	Presumed	Mild

References

1. To KK, Hung IF, Ip JD, et al. COVID-19 re-infection by a phylogenetically distinct SARS-coronavirus-2 strain confirmed by whole genome sequencing. Clin Infect Dis. 2020 Aug 25: ciaa1275. doi: 10.1093/cid/ciaa1275. Epub ahead of print. PMID: 32840608; PMCID: PMC7499500.
2. Van Elslande J, Vermeersch P, Vandervoort K, et al. Symptomatic SARS-CoV-2 reinfection by a phylogenetically distinct strain. Clin Infect Dis. 2020 Sep 5: ciaa1330. doi: 10.1093/cid/ciaa1330. Epub ahead of print. PMID: 32887979; PMCID: PMC7499557.
3. Prado-Vivar B, Becerra-Wong M, Guadalupe JJ, et al. COVID-19 re-infection by a phylogenetically distinct SARS-CoV-2 variant, first confirmed event in South America. *SSRN.* 2020 (published online Sept 8).
4. Tillett RL, Sevinsky JR, Hartley PD, et al. Genomic evidence for reinfection with SARS-CoV-2: a case study. Lancet Infect Dis. 2020 Oct 12: S1473-3099(20)30764-7. doi: 10.1016/S1473-3099(20)30764-7. Epub ahead of print. PMID: 33058797; PMCID: PMC7550103.
5. Payne DC, Iblan I, Rha B, et al. Persistence of antibodies against Middle East respiratory syndrome coronavirus. Emerg Infect Dis 2016; 22:1824–1826.
6. Guo X, Guo Z, Duan C, et al. Long-Term persistence of IgG antibodies in SARS-CoV infected healthcare workers. *medRxiv* 2020.
7. Choe PG, Perera RAPM, Park WB, Song K-H, Bang JH, et al. Mers-Cov antibody responses 1 year after symptom onset, South Korea, 2015. *Emerg Infect Dis* 2017; 23:1079–1084.

8. Zhao J, Yuan Q, Wang H, et al. Antibody responses to SARS-CoV-2 in patients of novel coronavirus disease 2019. *Clin Infect Dis* 2020.
9. Long, Q., Tang, X., Shi, Q, et al. Clinical and immunological assessment of asymptomatic SARS-CoV-2 infections. *Nat Med* 26, 1200–1204 (2020). https://doi.org/10.1038/s41591-020-0965-6.
10. Guallar MP, Meiriño R, Donat-Vargas C, et al. Inoculum at the time of SARS-CoV-2 exposure and risk of disease severity. Int J Infect Dis. 2020 Aug; 97:290-292. doi: 10.1016/j.ijid.2020.06.035. Epub 2020 Jun 14. PMID: 32553720; PMCID: PMC7293836.

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A Case of Interstitial Pneumonia with Features of Autoimmunity

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ABSTRACT

We present a case of a 61-year-old woman with several months of gradually worsening shortness of breath, requiring multiple hospitalizations with acute hypoxemic respiratory failure. She was initially treated for eosinophilic pneumonia presumed to be secondary to medications or rheumatoid lung without much improvement. Her subsequent chest CT showed honeycombing and diffuse ground-glass opacities, and she was found to have elevated rheumatoid factor (RF) and anti-CCP antibody titers without extrathoracic features of rheumatoid arthritis. This clinical scenario was suggestive of an interstitial lung disease (ILD) due to occult underlying connective tissue disorder (CTD), along the lines of the recently proposed entity interstitial pneumonia with autoimmune features (IPAF). She continued to deteriorate rapidly and passed away after experiencing recurrent exacerbations. As there is limited evidence to explain the clinical course of such patients, there is a need for prospective research to develop tailored regimens to prevent progression or even reverse the disease process.

KEYWORDS: interstitial pneumonia with autoimmune features, undifferentiated connective tissue disorder with interstitial lung disease

ABBREVIATIONS: **Anti-CCP**, Anti-cyclic citrullinated peptide; **BAL**, bronchoalveolar lavage; **AE-IPF**, Acute exacerbation of Idiopathic Pulmonary Fibrosis; **CTD**, Connective tissue disorder; **CTD-ILD**, Connective tissue disease-associated interstitial lung disease; **CT**, Computed tomography; **CHF**, Congestive Heart Failure; **COPD,** Chronic Obstructive Pulmonary Disease; **FVC**, Forced vital capacity; **HRCT**, High resolution computed tomography; **IIP**, Idiopathic interstitial pneumonias; **IPAF**, Interstitial pneumonia with autoimmune features; **IPF**, Idiopathic Pulmonary Fibrosis; **ILD**, Interstitial lung disease; **IVIG**, Intravenous immunoglobulin; **NSIP**, Nonspecific interstitial pneumonia; **RA-ILD**, Rheumatoid Arthritis related Interstitial Lung Disease; **RF**, Rheumatoid Factor**;** **UCTD-ILD**, Undifferentiated connective tissue disorder with interstitial lung disease; **UIP**, Usual interstitial pneumonia.

CASE REPORT

A 61-year-old woman with a long standing history of arthralgias due to osteoarthritis, as well as coronary artery disease, hypertension, hyperlipidemia, and a 46-pack-year smoking history, presented with dyspnea on exertion which was gradually worsening over a few months, myalgias and cough with white sputum production.

She was initially treated for pneumonia, presumed COPD, and possible acute CHF secondary to ischemic heart disease. Given her lack of improvement, further workup was performed. The CT scan of the chest showed diffuse bilateral ground-glass opacities (**Figure 1**). She underwent a bronchoscopy that revealed 29% eosinophils on bronchoalveolar lavage (BAL), raising concerns for eosinophilic pneumonia presumed to be due to hydrochlorothiazide or bupropion, two of her home medications. These medications were discontinued, and the patient was discharged on oxygen along with a course of oral steroids. She was readmitted several weeks later with hypoxemia. She was found to have an elevated rheumatoid factor (RF) of 844 IU/ml and anti-cyclic citrullinated peptide (Anti-CCP) antibodies at >200 units, raising a concern for rheumatoid lung. She denied a history of

Figure 1. CT scan of the chest shows diffuse bilateral ground-glass opacities.

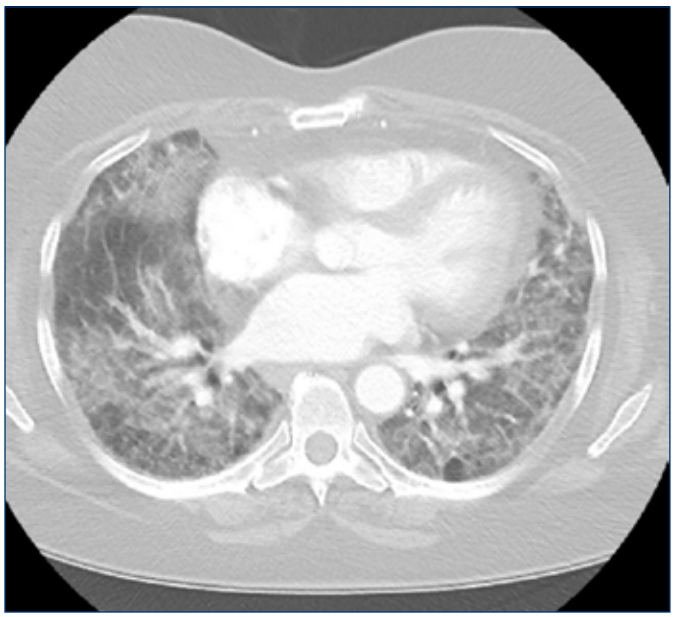
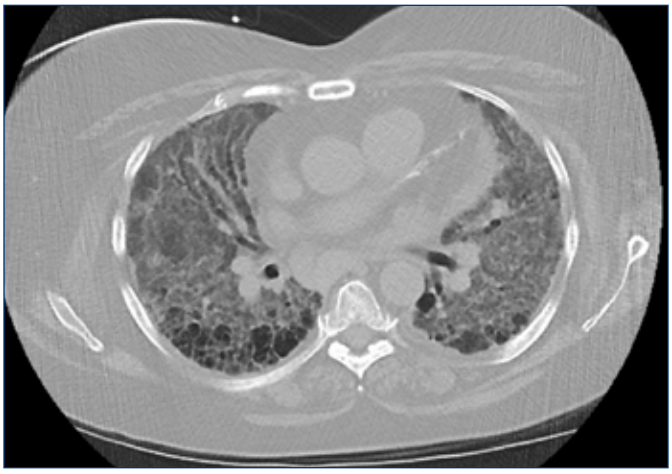


Figure 2. A high resolution chest CT showed diffuse ground-glass opacities, extensive sub-pleural reticulation, traction bronchiectasis, and areas of honeycombing.



morning stiffness and had a remote history of knee effusion with no current joint pain. All other autoimmune workup, including an extended myositis antibody panel, was negative except an initial elevated serum creatine kinase (CK) level at 1,005 IU/L. She eventually was stabilized with high-dose intravenous steroids and mycophenolate after consulting with an interstitial lung disease (ILD) specialist and rheumatologist. Shortly after, the patient had another exacerbation, requiring noninvasive ventilatory support in the intensive care unit where she received intravenous immunoglobulin (IVIG) and was discharged on an increased dose of mycophenolate and oral steroids after a prolonged hospitalization. Since she was at an increased risk of complications from a surgical lung biopsy, she was clinically treated for an occult connective tissue disorder with primary lung involvement.

During her subsequent admission with hypoxemic respiratory failure, a high resolution computed tomography (HRCT) of the chest showed persistent diffuse ground-glass opacities, now with extensive sub-pleural reticulation, traction bronchiectasis, bronchiolectasis, and areas of radiographic honeycombing, suggestive of rapid disease progression (**Figure 2**). She had a prolonged hospital stay where she received IVIG, mycophenolate, steroids, rituximab, and cyclophosphamide. Her hypoxemia progressed and she died approximately 8 months after her initial presentation to the hospital for respiratory symptoms.

DISCUSSION

Up to 30% percent of patients with a new diagnosis of ILD may have a known diagnosis of systemic autoimmunity, yet it is not uncommon to present with lung findings as the primary manifestation of an underlying undiagnosed connective tissue disorder.[1,2] As most patients with connective tissue disease-associated ILD (CTD-ILD) experience better clinical outcomes than idiopathic interstitial pneumonias (IIP), identification of the etiology of ILD is essential for its impact on prognosis and management.[1]

The current European Respiratory Society (ERS) and American Thoracic Society (ATS) guidelines exclude patients with known CTD from the diagnosis of idiopathic interstitial pneumonias (IIP).[3,4] However, some patients have a unique phenotype of underlying undifferentiated connective tissue disorder with otherwise unclear etiology of interstitial lung disease (UCTD-ILD).[2] As per the European Respiratory Society and American Thoracic Society in 2015, a consensus-derived nomenclature interstitial pneumonia with autoimmune features (IPAF) was formed to classify and further study such patients.[1,2]

To be classified as interstitial pneumonia with autoimmune features (IPAF), patients must show interstitial pneumonia on lung HRCT and/or surgical lung biopsy, be unable to meet connective tissue disease (CTD) diagnostic criteria, exclude alternative etiologies, and satisfy criteria from two of the following three domains: clinical, serologic, and morphologic. Clinical criteria include physical manifestations of CTDs; serologic criteria include elevated levels of various auto-antibodies, and morphologic criteria include specific patterns of ILD as suggested by lung HRCT or determined by surgical lung biopsy.[1]

Our patient had significantly elevated RF and anti-CCP serum titers without any symptoms or physical exam findings of defined CTD. Apart from her previous smoking history and a remote history of jewelry washing, she had no environmental exposures or medication use likely to explain the presence of ILD. There is increasing evidence of an association between higher levels of anti-CCP antibodies in patients who do not meet the diagnostic criteria for rheumatoid arthritis and the development of Interstitial Lung Disease.[5] Tobacco smoking can cause Anti-CCP antibody production with site-specific citrullination in the lungs which could predate arthritis. RA-ILD has a poor prognosis, especially with extensive lung involvement.[6] On the initial BAL fluid analysis, our patient had an eosinophil level of 29%. Though remarkably elevated levels of BAL fluid eosinophil percentage ($\geq$25%) is more often found in eosinophilic pneumonia than in Idiopathic Pulmonary Fibrosis (IPF), a modest increase in the percentage of eosinophils in the BAL fluid is one of the predictors of acute exacerbation of IPF (AE-IPF) and has been also associated with a poor prognosis in fibrosing ILDs.[7,8]

She had lung HRCT findings of diffuse ground-glass attenuation with sub-pleural reticulation along with honeycombing and traction bronchiectasis without apicobasal gradient. This HRCT pattern was not felt to be diagnostic of any specific entity but could have represented fibrosing nonspecific interstitial pneumonia (NSIP) or usual interstitial pneumonia (UIP) patterns of disease. A tissue diagnosis would have been beneficial to better classify this patient, but transbronchial lung biopsy is usually of a low yield in fibrotic ILD, and a surgical lung biopsy can be a high-risk procedure in certain patient populations. In a retrospective study, in-hospital mortality post non-elective surgical lung biopsy in ILD patients was 16% and even higher in patients with diffuse ILD and acute hypoxemic respiratory failure.[9,10]

As the proposed criteria for IPAF is yet to undergo validation, management plans for these patients are not well-established and instead are made on a case-by-case basis with involvement of a multidisciplinary team.[10] In patients with

known CTD-ILD, oral steroids and/or immunosuppressive therapy have long been the cornerstone of the treatment.[11,12] While there are no randomized controlled trials supporting the efficacy of immunosuppressive treatment for IPAF, one retrospective study found that mycophenolate treatment was associated with improvement in forced vital capacity (FVC) in patients with CTD-ILD or IPAF.[13] Rituximab treatment has been associated with stability of lung function in refractory IPAF in one case series.[14] Cyclophosphamide treatment has been associated with improvement in FVC in patients with steroid-refractory unclassifiable idiopathic interstitial pneumonias, particularly those patients meeting the criteria for IPAF.[15]

Pulse dose steroid therapy has been used in rapidly progressing IPF as well as fibrosing NSIP.[11] There are a few reported cases where IVIG has been used in myositis-associated ILD and refractory cases of other forms of ILD.[16] Most studies suggest that patients with IPAF have survival benefit as compared to non-IPAF IIP patients.[17] Various studies suggest benefit from lung transplantation in patients with severe CTD-ILD, though there are no guidelines on lung transplantation in IPAF.[18]

CONCLUSION

Our patient was treated with prednisone, mycophenolate, rituximab, IVIG and cyclophosphamide, but her disease continued to progress during 7 hospitalizations, including 2 ICU admits, and the majority of her hospital-free time in a rehabilitation facility, ultimately leading to her death in less than one year after her initial hospital presentation with shortness of breath. It remains unclear if her ILD did in fact represent IPAF, and there is still very little known about the underlying mechanisms driving this entity (or entities). Given the limited data, further studies are needed to refine the IPAF classification criteria, validate the appropriate treatment plans, and understand the trajectory of this disease.

References

1. Fischer A. Interstitial Pneumonia with Autoimmune Features. *Clinics in Chest Medicine*. 2019.40(3):609-616.
2. Fischer A, Antoniou KM, Brown KK, Cadranel J, et al. An Official European Respiratory Society/American Thoracic Society Research Statement: Interstitial Pneumonia With Autoimmune Features. *Eur Respir J.* 2015 Oct;46(4):976-87
3. Travis W, Costabel U, Hansell DM, King TE Jr., et al. An Official American Thoracic Society/European Respiratory Society Statement: Update of the International Multidisciplinary Classification of the Idiopathic Interstitial Pneumonias. *Am J Respir Crit Care Med.* 2013 Sep 15;188(6):733-48
4. Raghu G, Remy-Jardin M, Myers JL, Richeldi L, Ryerson CJ, et al. Diagnosis of Idiopathic Pulmonary Fibrosis. An Official ATS/ERS/JRS/ALAT Clinical Practice Guideline. *Am J Respir Crit Care Med.* 2018 Sep 1;198(5):e44-e68.
5. Correia CS, Briones MR, Guo R, Ostrowski RA. Elevated anti-cyclic citrullinated peptide antibody titer is associated with increased risk for interstitial lung disease. *Clin Rheumatol*. 2019 Apr;38(4):1201-1206.
6. Kelly CA, Saravanan V, Nisar M, et al. Rheumatoid arthritis-related interstitial lung disease: associations, prognostic factors and physiological and radiological characteristics – a large multicentre UK study. *Rheumatology (Oxford)*. 2014 Sep;53(9):1676-82.
7. Kakugawa T, Sakamoto N, Sato S, et al. Risk factors for an acute exacerbation of idiopathic pulmonary fibrosis. *Respiratory Research*. 2016;17(1):79.
8. American Thoracic Society. Idiopathic pulmonary fibrosis: diagnosis and treatment. International consensus statement. American Thoracic Society (ATS), and the European Respiratory Society (ERS). *Am J Respir Crit Care Med.* 2000;161(2 Pt 1):646-664.
9. Hutchinson JP, Fogarty AW, McKeever TM, Hubbard RB. In-Hospital Mortality after Surgical Lung Biopsy for Interstitial Lung Disease in the United States. 2000 to 2011. *Am J Respir Crit Care Med.* 2016;193(10):1161–7.
10. Wilfong EM, Lentz RJ, Guttentag A, Tolle JJ, Johnson JE, Kropski JA, et al. Interstitial pneumonia with autoimmune features: an emerging challenge at the intersection of rheumatology and pulmonology. *Arthritis Rheumatol.* 2018;70:1901–13.
11. Kondoh Y, Taniguchi H, Yokoi T, Nishiyama O, et al. Cyclophosphamide and low-dose prednisolone in idiopathic pulmonary fibrosis and fibrosing nonspecific interstitial pneumonia. *Eur Respir J.* 2005;25(3):528.
12. Yamano Y, Taniguchi H et al. Multidimensional improvement in connective tissue disease-associated interstitial lung disease: Two courses of pulse dose methylprednisolone followed by low-dose prednisone and tacrolimus. *Respirology.* 2018 Nov;23(11):1041-1048.
13. Fischer A, Brown KK, Du Bois RM, Frankel SK, Cosgrove GP, Fernandez-Perez ER, et al. Mycophenolate mofetil improves lung function in connective tissue disease-associated interstitial lung disease. *J Rheumatol.* 2013;40(5):640–6.
14. Keir GJ, Maher TM, Ming D, Abdullah R, de Lauretis A, Wickremasinghe M, et al. Rituximab in severe, treatment-refractory interstitial lung disease. *Respirology.* 2014;19(3):353–9.
15. Wiertz IA, Moorsel C, Vorselaars A, et al. Cyclophosphamide in steroid refractory unclassifiable idiopathic interstitial pneumonia and interstitial pneumonia with autoimmune features (IPAF). *European Respiratory Journa.l* 2018;51:1702519.
16. Hallowell R, Amariei D, Danoff S. Intravenous Immunoglobulin as Potential Adjunct Therapy for Interstitial Lung Disease. *Ann Am Thorac Soc*. 2016 Oct;13(10):1682-1688.
17. Yoshimura K, Kono M, Enomoto Y, Nishimoto K, Oyama Y, Yasui H, et al. Distinctive Characteristics and Prognostic Significance of Interstitial Pneumonia with Autoimmune Features in Patients with Chronic Fibrosing Interstitial Pneumonia. *Respir Med*. (2018) 137:16-175.
18. Fernandez-Codina A, Berastegui A, Pinal-Fernandez A, Silveira MG, Lopez-Meseguer M, Monforte M, et al. Lung Transplantation in Systemic Sclerosis: A Single Center Cohort Study. *Joint Bone Spine*. 2018;85(1):79-84.

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The Great Imposter: A Confusing Case of a Rare Renal Cell Carcinoma

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ABSTRACT

We report a 61-year-old male with sarcomatoid renal cell carcinoma (sRCC) in the context of multiple paraneoplastic syndromes, including thrombocytosis, leukemoid reaction, and paraneoplastic hepatopathy (Stauffer syndrome). The patient's clinical course was complicated by multiple medical challenges, extensive metastases, and persistent infection. This confusing presentation of a rare subtype of renal cell carcinoma (RCC) highlights the diverse and often misleading manifestations of this aggressive malignancy. Clinicians should be aware of the association between RCC, multiple paraneoplastic syndromes, and its propensity to present with systemic, non-renal symptoms.

KEYWORDS: sarcomatoid, renal cell carcinoma, paraneoplastic syndrome, leukemoid reaction

INTRODUCTION

With nearly 14,000 deaths and 63,000 new cases a year in the United States,[1] renal cell carcinoma (RCC) is a significant cause of malignancy-related morbidity and mortality. RCC is often termed the "great imposter" or the "Internist's tumor" due to its variable presentation, which increases risk of delayed or missed diagnosis.[2] Sarcomatoid renal cell carcinoma (sRCC) is a rare, highly aggressive form that independently predicts poor survival[3] and is often unresponsive to standard RCC treatments. Given sRCC's potential for non-specific or misleading clinical manifestations, it is important for clinicians to recognize the protean presentations associated with sRCC. Here, we discuss a patient with sRCC presenting with multiple paraneoplastic syndromes and complicated by extensive metastases, persistent infection, and multiple medical challenges such as renal failure, hypotension, and deranged electrolyte levels.

CASE REPORT

A 61-year-old male without prior interaction with the medical system presented to the emergency department with hypotension and two months of progressively severe right lower quadrant (RLQ) abdominal pain. The pain was accompanied by anorexia, nausea, vomiting, and an unintentional 20–30-pound weight loss. At presentation, he was hypotensive (96/59, supine), tachycardic (115), and afebrile (97.6 F). Physical exam revealed temporal wasting, general weakness, evidence of dehydration, and right flank tenderness without palpable mass. There was no anterior abdominal tenderness. Laboratory values revealed acidosis (anion gap: 22; HCO_3-: 12 mEq/L), hyponatremia (125 mEq/L), hyperkalemia (6.5 mmol/L), thrombocytosis (1,176,000/mm^3), leukocytosis (WBC 57,100/mm^3), low hemoglobin (11.9 g/dL), elevated PT (14.4 sec), and elevated alkaline phosphatase (187 U/L). The patient's elevated creatinine level of 6.68 mg/dL indicated renal failure. Urinalysis showed evidence of infection (160+ WBCs, many bacteria) and hematuria (2+ blood).

An abdominal/pelvic Computerized Tomography (CT) scan showed a large heterogeneous 10 x 10 x 19 cm obstructive right renal mass (**Figures 1 and 2**), with lytic lesions in the right femur and right iliac bones. The mass nearly obliterated the right kidney. Imaging also revealed an indeterminate 3 cm left lower pole renal lesion and indeterminate hepatic lesions. A CT Pulmonary Embolism (PE) demonstrated extensive bilateral parenchymal and pleural metastatic lesions.

The patient was stabilized and urgently treated for suspected tumor lysis syndrome and septic shock. The septic shock was potentially due to infected perinephric fluid positive for *E. coli* secondary to a bloodstream infection, pleural effusion, or pyelonephritis; or secondary infection from metastatic sites. Once stable, he required continued perinephric drainage and antibiotics.

A biopsy of the right pleural mass demonstrated malignant spindle cells, characterized by nuclear pleomorphism and numerous mitotic figures (**Figure 3**). The tumor was positive for cytokeratin; multiple additional immunohistochemical stains were performed, excluding the possibility of melanoma, solitary fibrous tumor, mesothelioma, and rhabdomyosarcoma. The presence of cytokeratin expression, multiple bilateral pulmonary nodules, and large renal mass was compatible with metastatic sarcomatoid renal cell carcinoma.

Subsequent imaging revealed numerous bilateral pulmonary nodules, suspicious for metastatic disease, that had enlarged since initial imaging 14 days prior. The patient's course was complicated by recurrent pleural effusions which eventually required constant drainage and may have

contributed to his persistent infection. Imaging additionally demonstrated right retroperitoneal, perirenal, pelvic, right gluteal, and paraspinal rim-enhancing abscesses as well as multifocal pyelonephritis of the left kidney.

Figure 1. A CT abdomen pelvis with IV contrast (coronal) demonstrates a large heterogeneous 10 x 10 x 19 cm right renal mass (red arrow), largely replacing the right renal parenchyma.

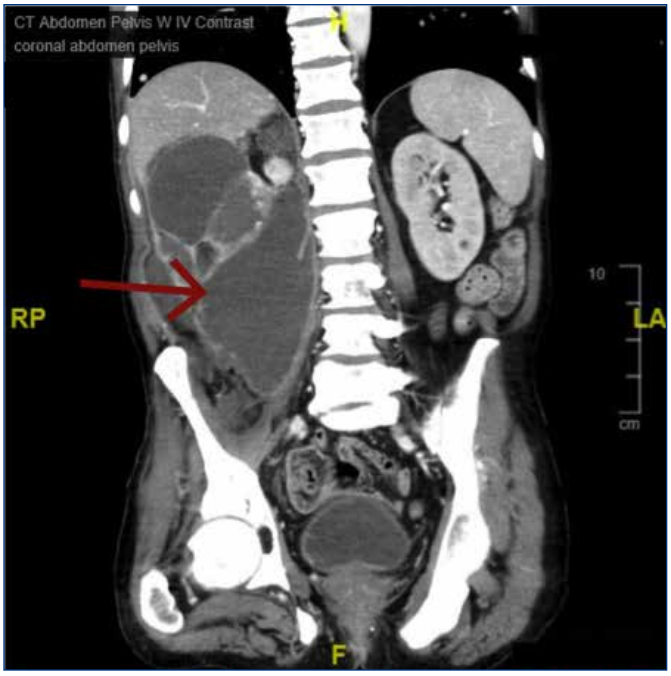
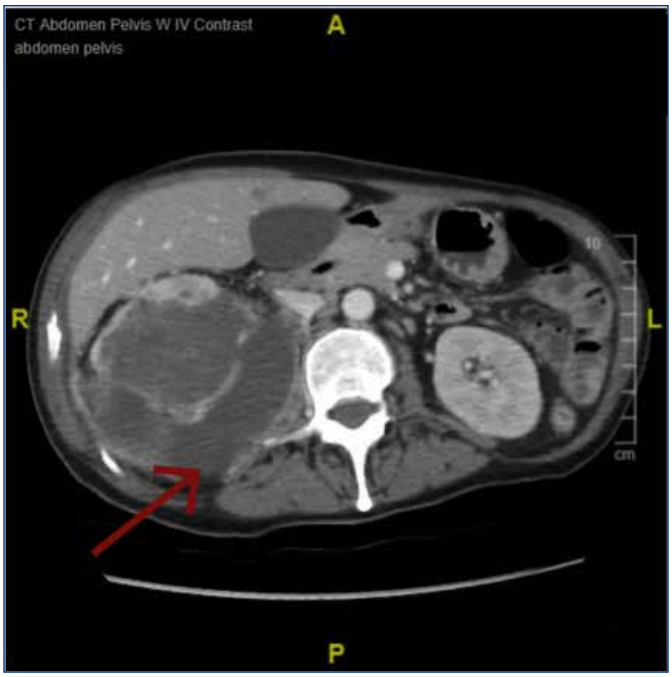
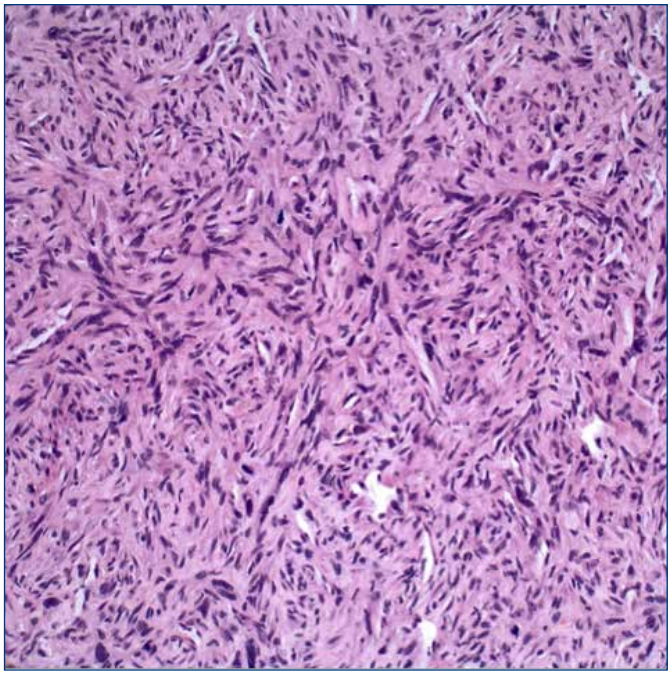


Figure 2. CT abdomen pelvis with IV contrast (transverse) again demonstrates a 10 x 10 x 19 cm right renal mass (red arrow).



The patient's deteriorating condition and persistent infection limited chemotherapeutic or surgical options; care was transitioned to comfort measures. He died 39 days after admission.

Figure 3. A high power view of the tumor demonstrates a malignant spindle cell tumor with nuclear pleomorphism and numerous mitotic figures (H&E, 200X)



DISCUSSION

Renal cell carcinoma classically presents as gross hematuria, flank mass, and flank pain, though the entire triad is present in less than 15% of patients.[4,5] Up to 10–40% of patients develop paraneoplastic syndromes.[4] Our patient's initial, non-specific symptoms of hypotension, nausea, and weight loss, in addition to the absence of gross hematuria or palpable flank mass, mimicked symptoms of more common infectious, inflammatory, or neoplastic disorders.

Our patient notably presented with multiple paraneoplastic syndromes associated with RCC, including thrombocytosis and leukemoid reaction. The mechanism underlying thrombocytosis in solid tumors is poorly understood, but may be associated with platelet release of angiogenic growth factors such as Vascular Endothelial Growth Factor (VEGF).[6] Thrombocytosis in RCC is an independent predictor of poor prognosis, with higher platelet levels correlated to advanced stage.[6] The patient's markedly elevated WBC count of 57.1 x 10^9 L indicated a leukemoid reaction, defined by a peripheral WBC count of greater than 50 x 10^9 L and persistent neutrophilia. Commonly associated with solid tumors of the lung, bladder, and ovary, leukemoid reaction has rarely been reported in RCC.[7] Furthermore, malignancy is a common underlying cause of unintentional weight loss. Our patient's weight loss, anorexia, and nausea may have resulted from

renal failure, leading to cachexia and wasting; or from cancer cachexia, a muscle-wasting syndrome common in metastatic malignancies.[8]

In diagnosing renal cell carcinoma, it is important for clinicians to consider paraneoplastic hepatopathy (Stauffer's syndrome), a rare manifestation of renal cell carcinoma characterized by cholestasis with elevated alkaline phosphatase, erythrocyte sedimentation rate, alpha-2-globulin, and gamma-glutamyl transferase in combination with prolonged prothrombin and thrombin times and hepatosplenomegaly, without hepatic lesions.[9] Stauffer's syndrome is a clinical diagnosis, reported rarely in other solid tumors. Each component noted is variably present, sometimes absent. The pathophysiology behind Stauffer's syndrome is poorly understood, but associations with elevated IL-6 are frequently reported.[9] Our patient's liver dysfunction in the context of RCC is suggestive of Stauffer's syndrome.

Further complicating management, our patient presented with a rare, highly aggressive variant of renal cell carcinoma, sarcomatoid RCC (sRCC). sRCC accounts for a disproportionate fraction – around 15–20% – of stage IV RCC cases.[10] Incidence of metastatic disease upon presentation is approximately 20–30%,[11] most commonly to the lungs, bone, lymph nodes, liver, and brain.[10] Sarcomatoid differentiation can occur in any histologic subtype of RCC. The presence of sarcomatoid features is associated with a less favorable prognosis[12] and poor survival.[13]

Treatment options for sRCC are limited. While cytoreductive nephrectomy is the standard treatment, 5-year survival rates are as low as 14.8%.[14] Trials of systemic therapies such as anti-VEGF therapy and IL-2 based immunotherapies have failed to improve outcomes.[13] Early diagnosis and detection are important in establishing early intervention and may improve outcomes.[13] Consequently, is important for clinicians to understand the diverse, often non-specific, and confusing non-renal manifestations of RCC, particularly as paraneoplastic features may be the only presenting clues.

CONCLUSION

Sarcomatoid renal cell carcinoma is a rare, aggressive cancer with extremely poor outcomes. We present a patient with sRCC in the context of numerous challenging medical problems and multiple paraneoplastic syndromes. Our patient's non-specific presentation exemplifies the potentially misleading features of sRCC. Clinicians should consider renal cell cancer in selected patients with multiple, confusing paraneoplastic associations of thrombocytosis, leukemoid reaction, and unintentional weight loss.

References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2016. *CA Cancer J Clin.* 2016; 66(1):7-30.
2. Hegemann M, Kroeger N, Stenzl A, Bedke J. Rare and changeable as a chameleon: paraneoplastic syndromes in renal cell carcinoma. *World J Urol.* 2018; 36(6):849-54.
3. de Peralta-Venturina M, Moch H, Amin M, et al. Sarcomatoid differentiation in renal cell carcinoma: a study of 101 cases. *Am J Surg Pathol.* 2001; 25(3):275-84.
4. Palapattu GS, Kristo B, Rajfer J. Paraneoplastic syndromes in urologic malignancy: the many faces of renal cell carcinoma. *Reviews in urology.* 2002; 4(4):163-70.
5. Lee CT, Katz J, Fearn PA, Russo P. Mode of presentation of renal cell carcinoma provides prognostic information. *Urol Oncol.* 2002; 7(4):135-40.
6. Bensalah K, Leray E, Fergelot P, et al. Prognostic value of thrombocytosis in renal cell carcinoma. *J Urol.* 2006; 175(3 Pt 1):859-63.
7. Mandal S, Ganguly J, Sil K, Mondal S, Sardar D, Sarkar P. Renal cell carcinoma with paraneoplastic leucocytosis. *Journal of Cancer Research and Therapeutics.* 2015; 11(3):660.
8. Biswas AK, Acharyya S. Understanding cachexia in the context of metastatic progression. *Nature Reviews Cancer.* 2020; 20(5):274-84.
9. Fontes-Sousa M, Magalhães H, da Silva FC, Maurício MJ. Stauffer's syndrome: A comprehensive review and proposed updated diagnostic criteria. *Urol Oncol.* 2018; 36(7):321-6.
10. Shuch B, Bratslavsky G, Shih J, et al. Impact of pathological tumour characteristics in patients with sarcomatoid renal cell carcinoma. *BJU Int.* 2012; 109(11):1600-6.
11. Chin AI, Lam JS, Figlin RA, Belldegrun AS. Surveillance strategies for renal cell carcinoma patients following nephrectomy. *Rev Urol.* 2006; 8(1):1-7.
12. Kyriakopoulos CE, Chittoria N, Choueiri TK, et al. Outcome of Patients With Metastatic Sarcomatoid Renal Cell Carcinoma: Results From the International Metastatic Renal Cell Carcinoma Database Consortium. *Clinical Genitourinary Cancer.* 2015; 13(2):e79-e85.
13. Shuch B, Bratslavsky G, Linehan WM, Srinivasan R. Sarcomatoid renal cell carcinoma: a comprehensive review of the biology and current treatment strategies. *Oncologist.* 2012; 17(1):46-54.
14. Silagy AW, Mano R, Blum KA, et al. The Role of Cytoreductive Nephrectomy for Sarcomatoid Renal Cell Carcinoma: A 29-Year Institutional Experience. *Urology.* 2020; 136169

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Common Variable Immunodeficiency Presenting as Anti-GAD Cerebellar Ataxia

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INTRODUCTION

Anti-glutamic acid decarboxylase (anti-GAD) autoantibodies are associated with several neurological syndromes, including cerebellar ataxia, limbic encephalitis, and stiff-person syndrome.[1] Although some evidence supports the pathogenic link between anti-GAD autoantibodies and neurological syndromes, the immunopathogenic trigger remains unclear.[1] Common variable immunodeficiency (CVID) is associated with numerous autoimmune neurological disorders, of which there is only one reported case with anti-GAD autoantibodies.[2] To our knowledge, this is the first report of anti-GAD cerebellar ataxia as the presenting symptom of CVID.

CASE REPORT

A 19-year-old man with a history of recurrent childhood ear infections and recent admission for pneumonia, presented with cough, fever, weight loss, and vomiting. Family history was unremarkable and he had no history of alcohol, tobacco, or substance use. On hospital day 6, he acutely developed nystagmus, dysmetria, dysarthria, and severe gait ataxia. CT of head, and MRI, MRA, and MRV of brain showed no abnormalities. He was empirically treated for meningitis as cerebrospinal fluid (CSF) studies showed polymorphonuclear pleocytosis and elevated protein (**Table**). Extensive work-up for infectious, neoplastic, toxic, and metabolic etiologies were negative (**Table**). Shortly thereafter, he was found to have hypogammaglobulinemia and CD4+ T-cell deficiency and was subsequently diagnosed with CVID. He became more lethargic and developed new onset refractory status epilepticus. Treatment with IVIG and steroids resulted in significant symptom improvement. Serum anti-Yo, anti-Hu, and anti-Ri antibodies were negative. Further testing revealed serum anti-GAD antibodies 83 IU/mL (< 5 IU/mL).

Table. Overview of Evaluation

Cerebrospinal Fluid Analysis	
Glucose	50 (38–85 mg/dL)
Protein	117 (15–45 mg/dL)
Red blood cells	3 (0–5/mm^3)
Nucleated cells	148 (0–5/mm^3)
Polymorphonuclear cells	23 (0–2%)
Lymphocytes	76 (63–99%)
Monocytes	1 (3–37%)
Blast	0 (0%)
Cerebrospinal Fluid PCR	
Escherichia Coli K, Haemophilus Influenzae, Listeria Monocytogenes, Neisseria Meningitidis, Streptococcus Agalactiae, Streptococcus Pneumoniae, CMV, Enterovirus, HSV 1, HSV 2, HHV 6, Human Parechovirus, VZV, Cryptococcus Neoformans/Gattii, Lyme, West Nile IgM/IgG	Negative
Serum Antibodies	
Anti-GAD	83 (< 5 IU/mL)
Anti-Hu, Anti-Yo, and Anti-Ri	Negative

Abbreviations: CMV = Cytomegalovirus, HSV = herpes simplex virus; Human Herpesvirus = HHV; VZV = varicella zoster virus; GAD = glutamic acid decarboxylase

DISCUSSION

We present the first case of CVID manifesting as acute cerebellar ataxia. Cerebellar ataxia is often associated with paraneoplastic and immune-mediated autoantibodies, most notably anti-GAD autoantibodies.[1,3] Controversy exists regarding the evidence of the direct pathogenic role of anti-GAD antibodies and there are no established diagnostic criteria for anti-GAD mediated neurological syndromes.[1] The recommended diagnostic criteria for anti-GAD cerebellar ataxia includes serum anti-GAD, CSF anti-GAD, and subacute cerebellar symptoms[1]. Although serum anti-GAD was elevated in our patient, CSF anti-GAD was not available. Serum titers of anti-GAD autoantibodies in cerebellar ataxia are generally >1800 IU/mL and remain elevated for up to two years.[1,4] However, there are reports of anti-GAD cerebellar ataxia with anti-GAD serum titer of <100 U/mL, which is consistent with the low titer in our case report.[5] Improvement of his neurologic symptoms after steroids supports an autoimmune-mediated pathogenesis of his cerebellar dysfunction and seizures.[6]

Common variable immunodeficiency (CVID) is a heterogenous group of disorders characterized by hypogammaglobulinemia and abnormalities of B and T cells.[6] It is a primary immunodeficiency classically associated with recurrent

infections, but can also present paradoxically with features of autoimmunity.[6] Autoimmune mediated cytopenias (AICs) have been examined in CVID patients to better characterize the pathogenesis of autoimmunity.[7] AICs include autoimmune hemolytic anemia, immune thrombocytopenia, or both (Evans syndrome). Patients with CVID who develop AICs have naive B cells that express immunoglobulin variable heavy chain 4-34 (VH4-34) which encodes for autoreactive antibodies that recognize motifs on commensal bacteria. These same autoreactive antibodies recognize conserved I/i carbohydrate self-antigen found on hematopoietic cells, possibly providing an immunologic trigger for AICs in patients with CVID.[7] We propose that our patient may have also developed autoreactive antibodies to motif shared by commensal bacteria and GAD, thereby triggering the production of anti-GAD antibodies.

CONCLUSION

This case underlines the importance of considering immunodeficiency disorders in patients with new neurological symptoms. CVID can present with many different neurological syndromes including anti-GAD cerebellar ataxia. The immunopathogenesis of anti-GAD cerebellar ataxia remains to be elucidated.

References

1. Graus F, Saiz A, Dalmau J. GAD antibodies in neurological disorders – insights and challenges. Nat Rev Neurol. 2020;16: 353–365.
2. Akman CI, Patterson MC, Rubinstein A, Herzog R. Limbic encephalitis associated with anti-GAD antibody and common variable immune deficiency. Developmental Medicine & Child Neurology. 2009;51:563–567.
3. Jarius S, Wildemann B. 'Medusa head ataxia': the expanding spectrum of Purkinje cell antibodies in autoimmune cerebellar ataxia. Part 1: Anti-mGluR1, anti-Homer-3, anti-Sj/ITPR1 and anti-CARP VIII. J Neuroinflammation. 2015;12:166.
4. Nakajima H, Nakamura Y, Inaba Y, et al. Neurologic disorders associated with anti-glutamic acid decarboxylase antibodies: A comparison of anti-GAD antibody titers and time-dependent changes between neurologic disease and type I diabetes mellitus. Journal of Neuroimmunology. 2018;317:84–89.
5. Nanri K, Niwa H, Mitoma H, et al. Low-Titer Anti-GAD-Antibody-Positive Cerebellar Ataxia. The Cerebellum. 2013;12:171–175.
6. Agarwal S, Cunningham-Rundles C. Autoimmunity in common variable immunodeficiency. Annals of Allergy, Asthma & Immunology. 2019;123:454–460.
7. Romberg N, Le Coz C, Glauzy S, et al. Patients with common variable immunodeficiency with autoimmune cytopenias exhibit hyperplastic yet inefficient germinal center responses. Journal of Allergy and Clinical Immunology. 2019;143:258–265.

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Takotsubo Cardiomyopathy and LV Outflow Tract Obstruction after Initiation of Novel Oral Chemotherapy

KARUPPIAH ARUNACHALAM, MD; SUBRAMANIAN GNANAGURUPARAN, MD; JOHN PAULOWSKI, MD, FACC

ABSTRACT

BACKGROUND: Japanese authors first reported a reversible cardiomyopathy due to emotional stress known as Takotsubo cardiomyopathy or stress-induced cardiomyopathy or apical ballooning syndrome. In this case report, we describe Takotsubo cardiomyopathy associated with use of a chemotherapy drug, Regorafenib (Stivarga).

CASE HISTORY: **A** 72-year-old female with history of metastatic colon cancer, with liver metastasis status post-resection and a recent diagnosis of primary non-small cell lung cancer on chemotherapy presented with shortness of breath exacerbated on exertion for 3 days. Patient was treated with Regorafenib for 10 days. EKG done showed 2mm ST elevation in V2-V4 leads and troponin was elevated to 6.8 ng/ml. The patient was taken for emergency cardiac catheterization which revealed normal coronaries but left ventriculogram showed low ejection fraction of 30% with apical akinesis and basal hyperkinesis with typical Takotsubo pattern.

DISCUSSION: Regorafenib is a multi-kinase inhibitor, approved by the FDA for metastatic colon carcinoma, hepatic carcinoma and advanced gastrointestinal stromal tumors. The stress of cancer diagnosis and chemotherapeutic agents can cause significant cardiac mortality including Takotsubo cardiomyopathy. Cardiogenic shock and thromboembolic complications are an important cause of mortality.

CONCLUSION: This is a rare presentation of Takotsubo cardiomyopathy associated with use of Regorafenib along with dynamic LVOT obstruction and systolic anterior motion of the mitral valve.

KEYWORDS:
Takotsubo cardiomyopathy, Regorafenib, systolic anterior motion of mitral valve

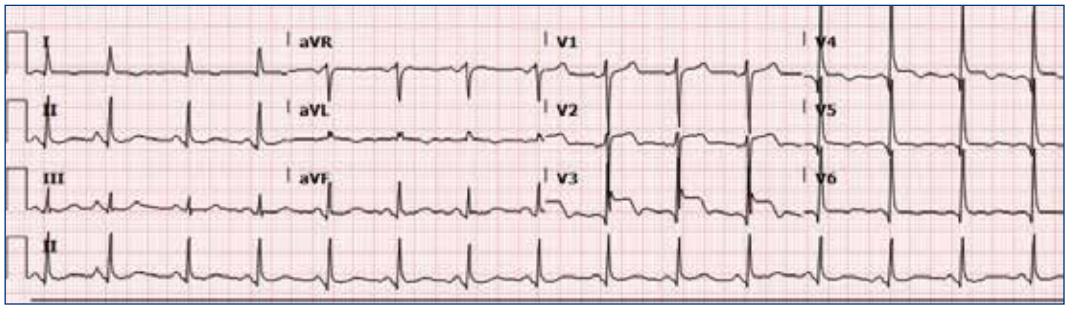
INTRODUCTION

Japanese authors first described Takotsubo cardiomyopathy secondary to emotional stress and it was first reported in 1990 by Sato et al as a reversible cardiomyopathy with a Takotsubo-like pattern.[1] The appearance of the left ventricle (LV) during systole resembles a Japanese octopus fishing pot called Tako-Tsubo. Other names for Takotsubo cardiomyopathy include stress-induced cardiomyopathy and transient apical systolic ballooning syndrome. Apart from emotional stress, new drugs, intracranial process and surgical procedures are also known to cause Takotsubo cardiomyopathy. In this case report, we describe a patient with Takotsubo cardiomyopathy and LV outflow tract obstruction related to the novel chemotherapeutic agent, Regorafenib (Stivarga).

CASE REPORT

A 72-year-old female with a history of metastatic colon cancer and liver metastasis, treated with surgical resection and a recent diagnosis of primary non-small cell lung cancer on chemotherapy presented with shortness of breath on exertion for 3 days. The patient had been started on the new oral chemotherapy drug, Regorafenib 10 days prior to presentation. She stopped the drug one day prior to hospitalization and presented to the emergency department with progressively worse shortness of breath. She had no past history of smoking or myocardial infarction. On presentation, the patient was tachypneic with a respiratory rate of 26/min and a blood pressure of 140/80 mm hg. Auscultation revealed a systolic ejection systolic murmur in the left parasternal area and bibasilar crackles. The patient's EKG showed 2 mm ST elevation in leads V2-V4. [**Figure 1**]

Figure 1. EKG showing ST elevation in V2-V4.



Laboratory data was remarkable for anelevated white cell count of 12500 cells/cu.mm and a troponin I of 6.8 ng/ml. The patient underwent emergency cardiac catheterization which revealed normal coronary arteries and a left ventriculogram with apical akinesis, basal hyperkinesis and a depressed ejection fraction of 30%. [**Figure 2**]

A transthoracic echocardiogram demonstrated reduced left ventricle systolic function of 30–35%, basal hyperkinesis and a dynamic left ventricle outflow tract (LVOT) obstruction with peak gradient of more than 100 mm Hg due to basal hyperkinesis and systolic anterior motion (SAM) of mitral valve. [**Figures 3–5** and **Video 1**]

Figure 2. Left ventriculogram depicting the classical apical ballooning with basal contraction suggestive of Takotsubo pattern.

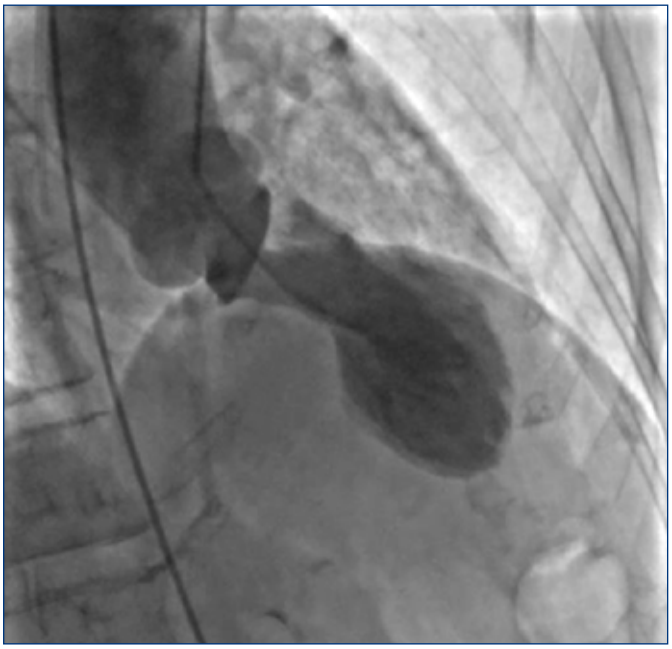


Figure 3. Color doppler image of the apical 5 chamber view showing flow acceleration (yellow arrow) near left ventricle outflow tract region when anterior mitral valve leaflet moves towards the septum during the systole.

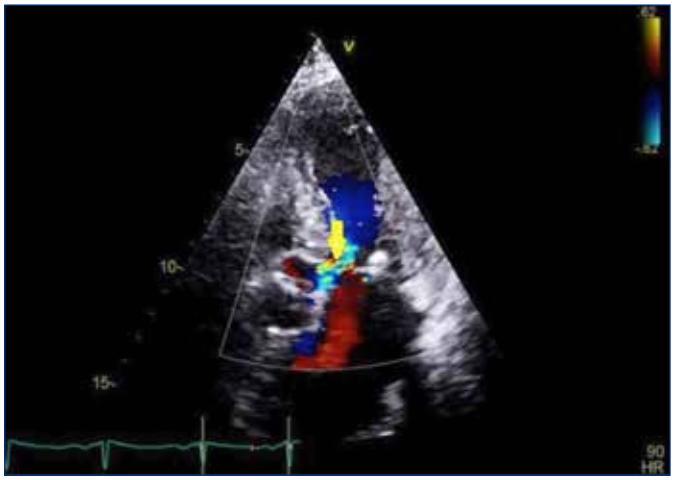


Figure 4. Magnified image demonstrating systolic anterior motion of mitral (SAM) valve. (yellow arrow)

Figure 5A. Pulse wave doppler depicting the significantly increased velocity and gradient across LVOT. Double density noted is contamination from mitral regurgitation.

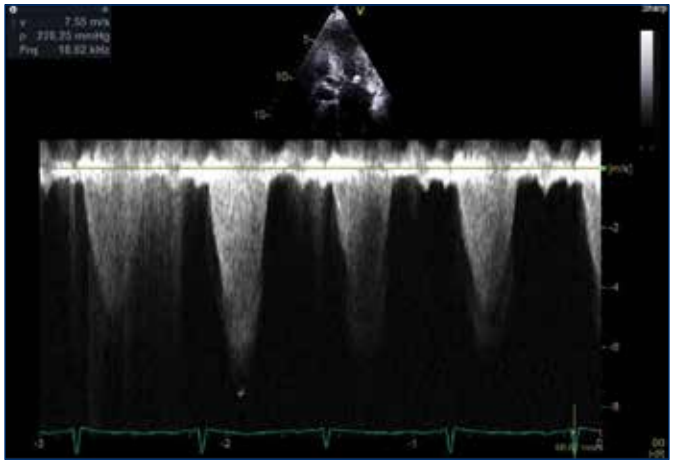
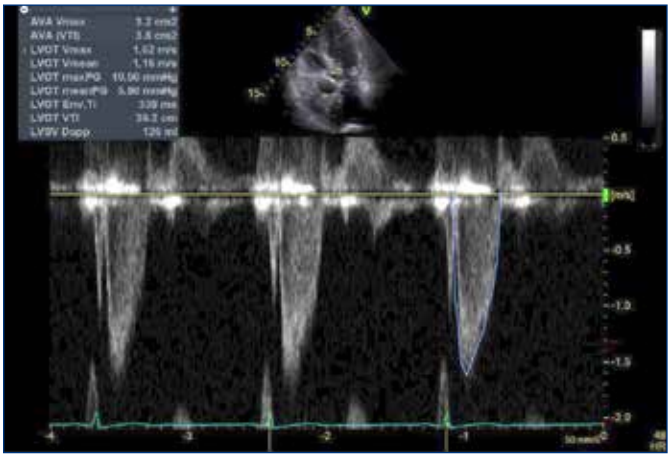


Figure 5B. Pulse wave doppler image demonstrating normal LVOT velocity and gradient 6 weeks after discharge from hospital.



Video 1. 2D Echocardiographic video of apical 4 chamber view demonstrating anterior mitral valve leaflet impinging on the septum during systole, hyperkinetic base of left ventricle with akinetic apical segment. [CLICK TO VIEW VIDEO]

The patient developed hypotension and atrial fibrillation and was treated initially with fluid resuscitation and IV amiodarone infusion. LVOT obstruction and hypotension resolved clinically within 24 hours and blood pressure remained stable for the next 48 hours. Guideline-directed medical therapy was initiated with metoprolol succinate and losartan. After recovery, the patient was discharged to a skilled nursing facility; complete recovery of left ventricle ejection fraction to 60–65% was noted 6 weeks later. There was no evidence of dynamic LV outflow tract obstruction on repeat echocardiogram.

DISCUSSION

Approximately 1–2% of acute myocardial infarctions are due to Takotsubo cardiomyopathy.[2] Takotsubo cardiomyopathy is more common in post-menopausal women from age 62 to 75 years and women accounted for 82% to 100% of patients. Most studies documented ST elevation myocardial infarction in 90% of the patients. Left ventricle function often normalizes in 1 to 3 months. Catecholamines are felt to be an important component of the pathophysiology behind the development of Takotsubo cardiomyopathy. Microvascular ischemia and multivessel epicardial spasm have also been hypothesized as part of the pathogenesis.[3]

Common complications reported are hypotension, atrial and ventricular arrhythmias. Cardiogenic shock, LV free wall rupture, ventricular septal defect and LV mural thrombus can occur rarely. Cardiogenic shock and thromboembolic complications are important causes of mortality.[4] LVOT obstruction due to SAM of the mitral valve is also one of the complications which may occur with Takotsubo cardiomyopathy.

This is the first case of Takotsubo cardiomyopathy reported with Regorafenib, a drug which is a multi-kinase inhibitor approved by the FDA for metastatic colon carcinoma, hepatic carcinoma and advanced gastro intestinal stromal tumors. Literature review showed that side effects like hypertension and hemorrhage are the most common adverse events associated with Regorafenib.[5] The stress associated with a cancer diagnosis and novel chemotherapeutic agents can cause significant adverse cardiac events.[6] Similar to this case report, Takotsubo cardiomyopathy with SAM of the mitral valve and severe LVOT obstruction was reported in a patient with melanoma treated with the immunomodulator drug ipilimumab.[7] Interestingly, our patient also had dynamic LVOT obstruction due to basal hyperkinesis and SAM of the mitral valve which is a known complication associated with Takotsubo cardiomyopathy. LVOT obstruction is reported to occur in 25% of patients. Apart from coronary angiography, with left ventriculography and transthoracic echocardiography, cardiac MRI may also be useful to differentiate Takotsubo cardiomyopathy from acute myocardial infarction or myocarditis. Cardiac MRI typically shows absence of delayed gadolinium hyperenhancement.[8]

During the acute phase, management is mainly symptomatic with supportive therapy. Stress- induced cardiomyopathy is usually well tolerated and complete recovery is expected within a few days to months. Intra-aortic balloon pump counterpulsation, cardiopulmonary circulatory support and continuous veno-venous hemofiltration are very rarely required for hemodynamically unstable patients. There is no consensus regarding long-term management of TCM, although it is reasonable to treat patients with β-blockers and ACE inhibitors during the ventricular recovery period. There is no data to support the continuous use of these drugs for the prevention of TCM recurrence or improvement in long-term survival. After LV function normalizes, physicians may consider discontinuation of these drugs. Anti-arrhythmic medications are not indicated for arrhythmia prevention.[9,10]

CONCLUSION

It is important to recognize and manage Takotsubo cardiomyopathy and its complications in a prompt fashion. This case report is unique in that Takotsubo cardiomyopathy occurred after initiating the chemotherapeutic drug Regorafenib and was associated with basal hyperkinesis and SAM leading to LVOT obstruction and hypotension. Though no causal association can be proven, physicians should be cautioned to recognize stress-induced cardiomyopathy during chemotherapy.

References

1. Sato H, Tateishi H, Uchida T. Takotsubo-type cardiomyopathy due to multivessel spasm. In: Kodama K, Haze K, Hon M, eds. Clinical Aspect of Myocardial Injury: From Ischemia to Heart Failure. Tokyo, Japan: Kagakuhyouronsha; 1990: 56–64.
2. Kurowski V, Kaiser A, von Hof K, Killermann DP, Mayer B, Hartmann F, Schunkert H, Radke PW. Apical and midventricular transient left ventricular dysfunction syndrome (tako-tsubo cardiomyopathy): frequency, mechanisms, and prognosis. Chest. 2007; 132: 809–816.
3. Nef HM, Mollman H, Kostin S, Troidl C, Voss S, Weber M, Dill T, Rolf A, Brandt R, Hamm CW, Elsasser A. Takotsubo cardiomyopathy: interindividual structural analysis in the acute phase and after functional recovery. Eur Heart J. 2007; 28: 2456–2464.
4. Donahue D, Movahed MR. Clinical characteristics, demographics and prognosis of transient left ventricular apical ballooning syndrome. Heart Fail Rev. 2005; 10: 311–316.
5. Chen J, Wang J. Risk of regorafenib-induced cardiovascular events in patients with solid tumors: A systematic review and meta-analysis. Medicine (Baltimore). 2018;97(41).
6. Achuta K, Gagan K, Iuliana S, Parijat S. Outcomes of cancer patients with takotsubo cardiomyopathy. Journal of Clinical Oncology. 10.1200/JCO.2017.35.15.
7. Benjamin P, Roy A, Diana E, Elad S, David R. Apical ballooning and cardiomyopathy in a melanoma patient treated with ipilimumab: a case of takotsubo-like syndrome. J Immunother Cancer. 2015 Feb 17;3:4.
8. Abisse SS, Poppas A. Takotsubo cardiomyopathy: a clinical review. Rhode Island Medical Journal (2013). 2014 Feb;97(2):23-27.
9. Elesber AA, Prasad A, Lennon RJ, Wright RS, Lerman A, Rihal CS. Four-year recurrence rate and prognosis of the apical ballooning syndrome. J Am Coll Cardiol. 2007; 50: 448–452.
10. Konety SH, Horwitz P, Lindower P, Olshansky B. Arrhythmias in takotsubo syndrome: benign or malignant? Int J Cardiol. 2007; 114: 141–144.

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Initial Opioid Prescription and Number Needed to Harm

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ABSTRACT

Prescription opioids are an important step in the development of persistent opioid use. Our study estimates the change in long-term opioid use before and after a 2017 regulatory update on acute pain prescribing. Prescribing information was abstracted from the Rhode Island Prescription Drug Monitoring Program (PDMP). Using the changed rates of initial opioid prescriptions of 8 or more days, and a calculated Number Needed to Harm for prescriptions of that duration, the rates of long-term opioid use were estimated decrease by 111 long-term opioid users per month.

KEYWORDS: opioids, primary prevention, regulations, acute pain management, prescription drug monitoring program

INTRODUCTION

In every patient experience we endeavor to provide the safest, most effective treatment for our patients while balancing risks of doing nothing versus treatment. Our struggle is as old as Hippocrates as noted in *Of The Epidemics*:

> *"The physician must be able to tell the antecedents, know the present, and foretell the future – must mediate these things, and have two special objects in view with regard to disease, namely, to do good or to do no harm. The art consists in three things – the disease, the patient, and the physician. The physician is the servant of the art, and the patient must combat the disease along with the physician."*

Relieving pain remains an important consideration of medicine. However, exposure to opioids is increasingly being recognized as a first step towards long-term opioid use. Therefore, opioid prescribing is balanced by compassionate treatment of pain with an understanding of the potential for harm.

In clinical practice the Number Needed to Harm (NNH) is used to estimate the number of patients exposed to an intervention to cause harm in one excess patient. Prior studies have evaluated prescription and patient characteristics and have calculated rates of long-term opioid use.[1,2] Our group has previously assessed the effects of the update to the Rhode Island Department of Health Acute Pain regulations on prescribing patterns of opioids.[3] This current study demonstrates a calculated NNH, to estimate the changed rates of new long-term opioid users before and after the 2017 update, as a result of changes in opioid prescribing patterns.

METHODS

Opioid prescribing within the state of Rhode Island was studied before and after an update to Rhode Island's regulations concerning opioid prescribing in 2017. Information regarding opioid prescribing within the state was obtained by extracting information from the Prescription Drug Monitoring Program (PDMP). The information extracted included whether a prescription was to an initiate, or to a non-opioid naïve patient. Initiate prescriptions were defined as those not having had an active prescription for an opioid in the preceding 60 days. Prescription characteristics extracted included the duration in days, number of doses and the dose in morphine milliequivalents (MME). Duration was categorized as fewer than 8 days, 8–30 days, and more than 30 days. Initiate prescriptions for each duration category were analyzed by statistical process control methodology.

The duration categories chosen were informed by previously published risk categories of initial prescriptions.[2,4] Published rates of long-term opioid use after initial prescriptions of fewer than 8 days, 8 or more days, and more than 30 days database were used to estimate changes in absolute risk and the number needed to harm.[2] Long-term opioid use in this analysis is defined as continued opioid use at 1 year after initial prescription.

Using the previously calculated absolute risk of long-term opioid use by duration and Rhode Island's rates of initiate opioid prescriptions, we estimate the number of new long-term opioid users before and after the promulgation of the 2017 regulation update.[5]

IRB application from the Rhode Island Department of Health occurred on March 1, 2018 for expedited review and exemption was received on April 9, 2018.

RESULTS

Number needed to harm

Long-term opioid use at one year post initial opioid prescription is reported in 6% of patients who received at least

one day of opioid therapy. This rate increases to 13.5% of patients whose first prescription was 8 or more days.[2,6] Based on those absolute risks, the Number Needed to Harm (NNH) is 14 (13.3). In other words, giving 14 patients an 8 or more days supply initially, as opposed to shorter than 8 days, will result in 1 additional long-term user.

Rhode Island Initiates

Figure 1 shows a Statistical Process Control X chart[7] of the monthly rate of initiate prescriptions of 8 or more days. Control limits on the chart are set at 3 standard deviations. The mean rate of those prescriptions was 4021.3 prior to the regulation update, which decreased to 2464.3 after the update. Prescriptions of 8 or more days to initiates decreased by an average of 1557 per month, which was considered to be statistically significant with a t test p value less than 0.0001.

Figure 2 shows the monthly rate of initiate prescriptions of any duration (i.e., including both less than and more than 8 days duration). There was no significant change in the monthly average number of initiate prescriptions over this period of time.

Figure 1. Initiate Prescriptions per Month of 8 or More Days

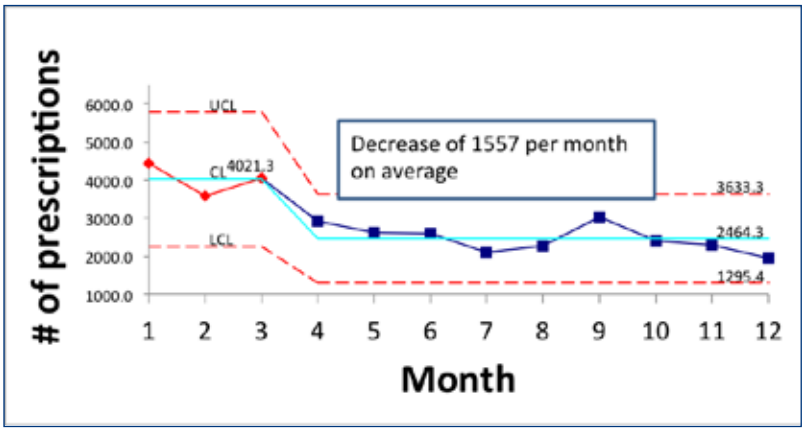
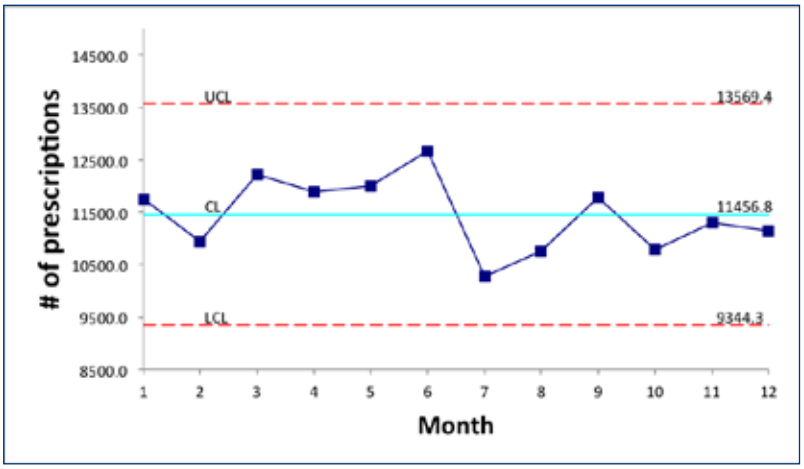


Figure 2. Initiate Prescriptions per Month, 2017



Harm avoided

While the total number of initial prescriptions remained unchanged, Rhode Island saw a monthly average decrease of 1557 initiate prescriptions of 8 or more days. Initiate prescriptions of 8 or more days have a documented number needed to harm of 14 (13.3). Therefore, there would be a theoretical decrease of 111 new long-term opioid users per month.

DISCUSSION

Rhode Island regulations concerning opioid prescribing were updated in 2017 based on a process that included stakeholders and an evaluation of the evidence regarding the characteristics of prescriptions that cause harm to patients.

It has been previously described that longer duration initiate prescriptions increase the risk of harm, by potentially creating a long-term opioid use, dependency and increasing the risk of overdose. The updated regulations in Rhode Island were successful in changing the prescribing of opioids to fewer longer duration initiate opioid prescriptions.

Clinicians are well acquainted with the concept of the NNH, and use it routinely to evaluate the risk of testing and treatments. The NNH of 14 of a longer duration initiate opioid prescription is surprisingly low compared to other commonly prescribed medications. Compared to significant GI bleeding in patients taking dual antiplatelet therapy (aspirin and Plavix®) the NNH is 51; in other words 51 patients need to be prescribed dual antiplatelet therapy to cause 1 additional GI bleed.[8] The immunosuppressant Rituximab® has the feared complication of causing Progressive Multifocal Leukoencephalopathy (PML); however, in that case, the NNH is more than 25,000.[9,10]

Estimating the impact of public health interventions is difficult. However, using the concept of NNH and calculating a predicted harm avoided, the change in initiate opioid prescribing is estimated to reduce new long-term opioid users by 111 per month.

Prescribing that leads to long-term opioid use is harmful to patients. Understanding the impact of such primary preventive efforts in reducing this harm is important. A great deal of focus is correctly geared towards secondary and tertiary prevention by identifying cases of addiction, increasing the availability of Narcan and improving the availability of addiction treatment. However, given the scope of the opioid epidemic, particularly with the many competing interests currently facing healthcare, we need to stop prescribing ourselves into problems if we ever want to get out of this opioid epidemic.

LIMITATIONS

The rates of long-term opioid use that were subsequently used in the calculation of NNH, were based on data from the IMS Lifelink+. While this data set is broad and intended to be similar to the national commercially insured population, it may not accurately represent Rhode Island demographics or the risk among patients over 65. However, it should be noted, that similar increases in the rates of long-term opioid use have been shown in that demographic.

Additionally, initiates in this data set were captured when a patient did not have a prescription in the PDMP in the prior 60 days. However, some patients meeting this definition might not be true initiates in the case where patient entries in the PDMP contain clerical entry errors, and in cases where patients are new to Rhode Island and were established on opioids elsewhere.

CONCLUSION AND RECOMMENDATIONS

Opioids remain part of the treatment algorithm for certain painful conditions. The appropriate prescribing of opioids must balance the knowledge of alternative treatments, and the potential harm of opioid prescribing itself.

Our study shows that Rhode Island's acute pain management regulations, updated in March 2017, had a dramatic impact on opioid prescribing, particularly in opioid naïve patients. Understanding that short prescription opioids may still be necessary in certain situations, shorter duration prescriptions pose less harm to patients. By reducing the rate of longer duration initial prescriptions, with an understanding of the NNH of such prescriptions, we show the primary preventive effect of those regulations in decreasing the rate of new long-term opioid users. This should encourage physicians to strongly consider non-opioid options when attempting to treat pain in a patient new to the prescription of opioids to do so in a manner so as to Do No Harm.

References

1. Mohamadi A, Chan JJ, Lian J, et al. Risk Factors and Pooled Rate of Prolonged Opioid Use Following Trauma or Surgery. *J Bone Jt Surg*. 2018;100(15):1332-1340. doi:10.2106/JBJS.17.01239
2. Shah A, Hayes CJ, Martin BC. Characteristics of Initial Prescription Episodes and Likelihood of Long-Term Opioid Use — United States, 2006–2015. *MMWR Morb Mortal Wkly Rep*. 2017;66(10):265-269. doi:10.15585/mmwr.mm6610a1
3. Barre L, Oliver B, Alexander-Scott N, Mccormick M, Elmaleh R, Mcdonald J V. Impact of State Regulations on Initial Opioid Prescribing Behavior in Rhode Island. *rimed.org*. 2019.
4. Scully RE, Schoenfeld AJ, Jiang W, et al. Defining Optimal Length of Opioid Pain Medication Prescription After Common Surgical Procedures. *JAMA Surg*. 2018;153(1):37. doi:10.1001/jamasurg.2017.3132
5. *Licensure and Discipline of Physicians*. Rhode Island Department of State rules.sos.ri.gov/regulations/part/216-40-05-1.
6. Arthritis and Rheumatism Council for Research in Great Britain and the Commonwealth. *Annals of the Rheumatic Diseases.* BMJ Pub. Group http://ry2ue4ek7d.search.serialssolutions.com/?sid=google&auinit=C&aulast=Gaujoux-Viala&atitle=Efficacy+and+safety+of+steroid+injections+for+shoulder+and+elbow+tendonitis:+a+meta-analysis+of+randomised+controlled+trials&id=pmid:19054817. Accessed January 22, 2019.
7. Mohammed MA, Panesar JS, Laney DB, Wilson R. Statistical process control charts for attribute data involving very large sample sizes: A review of problems and solutions. *BMJ Qual Saf*. 2013;22(4):362-368. doi:10.1136/bmjqs-2012-001373
8. Abraham NS, Hartman C, Richardson P, Castillo D, Street RL, Naik AD. Risk of lower and upper gastrointestinal bleeding, transfusions, and hospitalizations with complex antithrombotic therapy in elderly patients. *Circulation*. 2013;128(17):1869-1877. doi:10.1161/CIRCULATIONAHA.113.004747
9. Clifford DB, Ances B, Costello C, et al. Rituximab-associated progressive multifocal leukoencephalopathy in rheumatoid arthritis. *Arch Neurol*. 2011;68(9):1156-1164. doi:10.1001/archneurol.2011.103
10. Focosi D, Tuccori M, Maggi F. Progressive multifocal leukoencephalopathy and anti-CD20 monoclonal antibodies: What do we know after 20 years of rituximab. *Rev Med Virol*. 2019;29(6). doi:10.1002/rmv.2077

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Physical Medicine and Rehabilitation in Rhode Island during the COVID-19 Pandemic

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ABSTRACT

The COVID-19 pandemic has transformed the practice of medicine. We interviewed Physical Medicine and Rehabilitation (PM&R) specialist physicians providing rehabilitation services throughout Rhode Island to organize a narrative assessing the pandemic's impact on the state's rehabilitation community and the responses of its leaders. Almost half of rehabilitation providers needed to suspend their services during the initial peak of the pandemic. Most experienced reductions in the size of their practices, as well as personnel issues that contributed to burnout. All physicians used telemedicine to connect with patients. Many reported issues with accessing personal protective equipment and providing clinical opportunities for trainees. Inpatient rehabilitation policies and practices helped to maintain access for COVID-positive and negative patients, yet challenges were faced when configuring physical space to abide by CDC social distancing guidelines and providing care without patient visitors. Despite setbacks, the pandemic outlined opportunities for improvement of healthcare organization and delivery.

KEYWORDS: physical medicine and rehabilitation, physiatry, COVID-19, pandemic, Rhode Island

INTRODUCTION

The first cases of novel coronavirus infection were reported in Hubei, China on December 31, 2019.[1] The newly identified virus quickly spread to create the global COVID-19 pandemic. The first case in the United Stated was reported on January 20, 2020 in Washington[2]; within weeks it had spread to the East Coast. Rhode Island is positioned between two initially heavily burdened areas, New York and Boston. The first case in Rhode Island was reported on March 1, 2020,[3] and Governor Gina Raimondo declared a State of Emergency on March 9.[4] Rhode Island followed national guidance to ban public gatherings of 25 or more people, and closed many in-person businesses including restaurants, malls, and gyms. Healthcare underwent many rapid changes during the initial surge of the COVID-19 pandemic in March 2020, with effects across different specialties and modes of delivery.

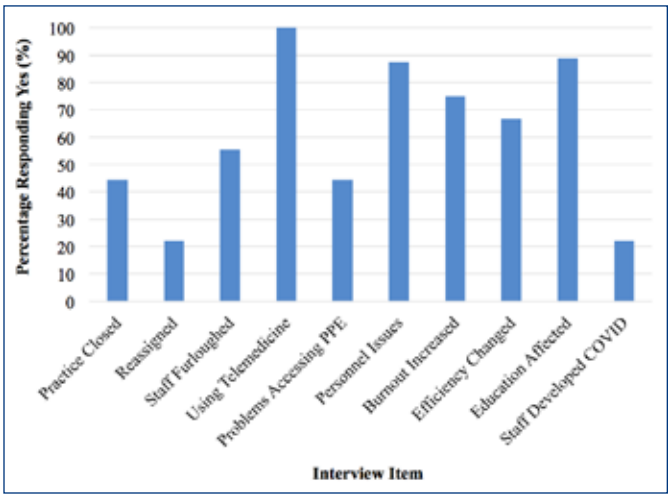
Physical Medicine and Rehabilitation (PM&R), or physiatry, is a medical specialty that provides care for people with disability or functional deficits. Physiatrists serve a distinct patient population, including people with stroke, brain injury, spinal injury, musculoskeletal injury, amputation, pain, congenital anomaly, and other neurological or medical diseases. Physiatrists treat patients in inpatient rehabilitation units (IRU), nursing homes, long-term care facilities, and outpatient clinics.

Although the initial surge of the pandemic briefly subsided in the northeast of the United States, lockdown gave way to a "new normal" mode of operation. Clinicians grappled with emerging challenges and interruptions to established practices while attempting to provide the same quality of care to patients. We hypothesized that there may be important lessons to be learned from studying the response of the PM&R community in Rhode Island to disruption caused by the COVID-19 pandemic. We interviewed nine PM&R physicians in the state of Rhode Island during July 2020 in

Table 1. Interview Responses of Rhode Island Rehabilitation Physicians

Item	Yes (N)	Yes (%)
Did your practice close at any point due to the pandemic?	4/9	44.4
Were you reassigned to provide care in a different setting or location?	2/9	22.2
Did your workplace furlough any employees?	5/9	55.6
Did you use telemedicine to provide virtual patient care?	9/9	100
Did you have problems with accessing the personal protective equipment necessary to work safely?	4/9	44.4
Have there been personnel issues at work related to the pandemic, such as transportation or childcare?	7/8	87.5
Did office changes and personnel issues lead to increased burnout?	6/8	75
Has your workflow efficiency been affected by COVID-related workplace changes?	6/9	66.7
Was student and staff education affected by the pandemic?	8/9	88.9
Did any employees at your workplace develop COVID?	2/9	22.2

Figure 1. Percentage of Physicians Reporting Changes in Practice Due to COVID-19 Pandemic



an effort to understand how they adapted to various challenges initially presented by the pandemic. We asked a standardized set of targeted questions of all physicians we interviewed. Additional questions were asked of physiatrists providing inpatient rehabilitation care during the pandemic. The responses of all physicians to the general set of questions are displayed in **Table 1** and **Figure 1**.

EFFECTS OF THE PANDEMIC ON REHABILITATION PRACTICES

The COVID-19 pandemic presented many challenges to providing outpatient care. Many physician practices temporarily closed until they were able to create protocols and procedures to adequately protect patients, providers, and support staff. Of the Rhode Island PM&R physicians interviewed, four out of nine needed to close their practice at some point during the initial surge of the pandemic. Lengths of closures ranged from one week to six weeks. Two of the physicians were reassigned in order to cover inpatient rehabilitation units on days they were not working, typically weekends.

While closures were temporary, six of the nine physicians reported that their practices had to furlough staff permanently in order to remain viable. All interviewees who reported furloughs in their practices noted that furloughed employees were either advanced practice providers or support/administrative staff. At one group, healthcare providers voluntarily left due to perceived occupational risk. As a result, physicians had to complete tasks normally delegated to support staff, such as scheduling and checking in patients.

Not only did physicians assume greater responsibilities within their organizations, but all nine physicians interviewed also adopted telemedicine during the initial surge of the pandemic. Only one of these physicians had experience in using telemedicine before the pandemic began, which led to a steep learning curve to implement. The majority of physicians continue to see patients by telemedicine on a regular basis, although all are seeing a larger proportion of their patients on an in-person basis again.

Access to personal protective equipment (PPE) was problematic both nationally and in Rhode Island. Four of nine physicians interviewed reported difficulty accessing adequate PPE. The most commonly needed items were masks, which were rationed at all the physician practices. Other physicians reported that although access to PPE was adequate according to guidelines issued by their organizational leadership, infection control PPE measures were more lenient due to short supply. For instance, at Kent Hospital, providers were given N-95 respirators to wear until soiled. At Lifespan and at the Veteran's Administration, providers were given surgical masks to replace every two days or until soiled.

The rapid changes in medical practice and workplace demands were taxing on the physician workforce. Seven of eight physicians reported personnel or staffing issues during the initial surge of the pandemic. The most common issues revolved around staffing to accommodate changes in office schedules and transportation or childcare for staff families. These demands contributed to an increased rate of burnout, as reported by six of the eight physicians. Data was missing for one of the nine physicians, who was unable to elaborate on these questions due to time restrictions.

Ultimately, considering all changes to the workflow and resources of individual practices, six of nine physicians reported that their work efficiency was still impacted as of July 15, 2020, well after the initial COVID-19 surge. Five physicians reported being able to see fewer patients per hour, with up to a 50% loss in daily productivity. These physicians cited greater administrative responsibilities as well as time spent on infection control measures. Paradoxically, one physician reported greater efficiency at work from a more streamlined workflow with adaptation of telemedicine, whereas three reported no change in work efficiency. Additional effects of the pandemic were reported by eight of the physicians who had to limit trainees in clinical environments, resulting in limited educational opportunities. Fortunately, only two of nine physicians reported COVID infections among staff at their practices.

EFFECTS ON INPATIENT REHABILITATION

Inpatient rehabilitation faced unique challenges during the initial wave of the pandemic in spring of 2020. At Lifespan, space within the inpatient rehabilitation unit (IRU) at Rhode Island Hospital was re-purposed to care for COVID-positive patients. Care for acute rehabilitation patients was

subsequently transferred to the Vanderbilt Rehabilitation Center (VRC) at Newport Hospital, increasing the capacity of VRC from twelve to twenty-six acute rehabilitation beds on the IRU, with an additional seven acute rehabilitation beds located on other floors of the hospital. This was, in part, because VRC was the only IRU to accept COVID-positive patients as well as a temporary relaxation of Center of Medicare and Medicaid Services (CMS) criteria regarding patients qualifying for acute rehabilitation. The sudden increase in bed capacity at VRC allowed for separate, dedicated sections for COVID-positive and COVID-negative patients. Likewise at Kent Hospital, the acute rehabilitation unit opened an additional floor to care for COVID-positive acute rehabilitation patients. At both hospitals, admission to the COVID-negative unit generally required at least two negative tests within 48 hours of admission.

To facilitate IRU admissions, the CMS relaxed many inpatient rehabilitation requirements, such as a "three-hour rule" requiring that 15 hours per week were dedicated to therapy for each acute rehabilitation patient as well as the 60% rule, which normally requires that IRUs treat a majority of patients with typical rehabilitation diagnoses such as stroke or spinal cord injury.[6] All four of the interviewed physicians who provided IRU care reported that such changes were helpful but not specifically needed in Rhode Island due to the limited COVID-19 surge. However, three physicians managing IRU patients felt that the Medicare waiver allowing off-unit beds to be used for rehabilitation patients facilitated ongoing access for lower-risk acute rehabilitation patients. The physiatrists generally did not notice a change in the average level of disability (zero of four physicians) or medical acuity (one of four physicians) on their respective units. One physician noted greater medical acuity of acute rehabilitation patients as acute hospital patients flowed through their hospital system. Specifically, their IRU had to manage higher acuity patients in the IRU, who otherwise would have been further medically or surgically managed prior to acute rehabilitation admission.

All of the inpatient rehabilitation physicians reported that increased infection control requirements challenged normal operations on their unit. Communal gyms, which normally allowed multiple patients to participate in therapy simultaneously, could not operate as such due to social distancing. Rounding on patients was reduced to limit repetitive contact with patients. Restriction of patient visitors challenged discharge planning, as families and friends often facilitated disposition of these patients. Also, visitor restrictions complicated education and training of important post-discharge tasks such as activities of daily living (ADLs) and medical care for wounds or ostomies. Physicians had to devise creative solutions, including telemedicine technology such as telephone video-calling patients and their families to demonstrate aspects of post-discharge care.

OPPORTUNITIES AHEAD

The disruption imposed by the COVID-19 pandemic did create setbacks, but it also created opportunities to improve rehabilitation care. One major opportunity has been the rapid expansion of telemedicine services. Physicians interviewed universally expanded telemedicine to primarily maintain safe, physically distanced access to care. Additional benefits of telemedicine included enhanced efficiency of patient triage and new opportunities for patient education, such as screen sharing of clinical images and direct observation of the patient's home environment. Other physicians indicated that some patients preferred televisits because it eliminated logistical concerns of transportation to the clinic, as well as medical concerns regarding contracting the virus. One physician reported benefit from the ability to see the patient's home environment on camera, which provided clinically relevant information to individualize treatment and limit safety concerns including fall risks. Unfortunately, both physicians and patients experienced technological challenges using telemedicine. Nevertheless, telemedicine has the potential to improve healthcare delivery in times of crisis and for a cohort of patients with disabilities.

Heightened public awareness of risks in contracting COVID-19 as well as limitations of healthcare resource allocation during the pandemic created unique challenges to providing care, particularly concerning elective procedures. As CMS recommended a temporary restriction on elective procedures,[7] PM&R was particularly affected, as it is a specialty that incorporates both diagnostic and therapeutic procedures. While some interventional pain and spasticity treatments deemed essential continued without interruption, other interventions including peripheral joint injections, dry needling, trigger point injections, and electromyography (EMG) were placed on hold.[8] Physicians interviewed expressed concern about limited access to care for patients, but reported that patients were usually understanding because of the crisis at hand. Interestingly, physicians reported more pushback from referring providers than from patients themselves when deferring elective procedures.

Finally, the disruption from the initial wave of the pandemic encouraged enhanced workforce organization. In Rhode Island, many practices reduced staffing and roles shifted within organizations to provide coverage. In other areas of the country, organizational changes split roles of providers, whereby some maintained access through telemedicine, while others were deployed to relieve physicians on the front line.[9] In heavily burdened areas such as New York, organizational adaptations resulted in deployment of PM&R physicians to other medical specialty services lines or in support roles such as remote chart review.[10] Additionally, organizational changes led to medical students confronting limited educational opportunities. Although some were able to find virtual clinical clerkships to continue learning, limitations in providing opportunities to interact with patients and practice physical examination skills were noted.

CONCLUSIONS

The COVID-19 pandemic has resulted in rapid and unprecedented change to the practice of medicine. Rhode Island has remained ahead of the curve and emerged as a national leader in its pandemic response.[11] Rhode Island's successful response was bolstered by continued collaborative efforts of healthcare leaders to maintain an appropriate standard of care despite challenges in resource allocation. The specialty of physical medicine and rehabilitation was uniquely challenged by the vulnerability of its patient population, telerehabilitation, procedural restrictions, staffing, and medical education. The ongoing success of PM&R in Rhode Island will depend on lessons learned during the initial surge of COVID-19 and efforts of leaders to continue to adapt in face of future challenges.

References

1. World Health Organization. *Pneumonia of unknown cause – China, 2020.* Available at: https://www.who.int/csr/don/05-january-2020-pneumonia-of-unkown-cause-china/en/. Accessed 22 July, 2020.
2. Holshue ML, DeBolt C, Lindquist S, et al: First Case of 2019 Novel Coronavirus in the United States. N Engl J Med 382:929-936, 2020
3. Martinez A: Rhode Island reports first case of coronavirus, Boston Herald, 2020
4. Plantations SoRIaP: Executive Order 20-02: Delcaration of Disaster Emergency, 2020
5. Lee PK: Defining physiatry and future scope of rehabilitation medicine. Ann Rehabil Med 35:445-9, 2011
6. Inpatient Rehabilitation Facilities: CMS Flexibilities to Fight COVID-19 Center for Medicare & Medicaid Services, 2020
7. Non-Emergent, Elective Medical Services, and Treatment Recommendations Center for Medicare and Medicaid Services, 2020
8. Kassardjian CD, Desai U, Narayanaswami P: Practical guidance for managing electromyography requests and testing during the COVID-19 pandemic. Muscle Nerve 62:30-33, 2020
9. Physical Medicine and Rehabilitation During The COVID-19 Pandemic. University of Pittsburgh Medical Center Physician Resources, 2020
10. Stein J, Visco CJ, Barbuto S: Rehabilitation Medicine Response to the COVID-19 Pandemic. Am J Phys Med Rehabil 99:573-579, 2020
11. Grunwald M. *How the Smallest State Engineered a Big Covid Comeback*. Available at: https://www.politico.com/news/magazine/2020/07/08/gina-raimondo-interview-rhode-island-governor-covid-353799/. Accessed 23 July, 2020.

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Lessons Learned from a Rhode Island Academic Out-Patient Lyme and Tick-Borne Disease Clinic

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ABSTRACT

Although the prevalence of Lyme and tick-borne diseases (TBDs) continues to rise, there is conflicting information regarding the best approach to management. The Lifespan Lyme Disease Clinic (LDC) is an academic out-patient clinic for Lyme and other TBDs. A chart review of 218 new patients between March and November 2018 was conducted. Symptoms most commonly reported included fatigue (66.5%), joint pain (58.2%), cognitive difficulty (32.1%), and headaches (27.9%). Most (87.1%) patients had received TBD-directed antibiotic treatment prior to their first appointment. Of the 136 patients who had experienced more than 6 months of symptoms attributed to Lyme, 55.1% had positive two-tiered serologies. Many patients characterized themselves as having "chronic Lyme" or had a diagnosis of "post-treatment Lyme disease syndrome," a condition for which there is no clear consensus on pathophysiology or treatment. Outlined here are some lessons learned and practical approaches used by LDC physicians in caring for this patient population.

KEYWORDS: Lyme disease, tick-borne disease, post-treatment Lyme disease, patient-centered care

INTRODUCTION

Lyme and other tick-borne diseases (TBDs) are on the rise in Rhode Island and throughout the United States.[1] Conflicting information on how to diagnose and treat TBD has created a great deal of confusion for patients and medical providers alike, and there remains a high need in the community for healthcare services for Lyme and other TBD.[2]

In 2016, a group of board-certified Infectious Disease physicians at The Miriam Hospital established the Lyme Disease Center (LDC). Patients (18 years or older) are seen at this out-patient clinic for a wide variety of TBDs, including Lyme disease, Anaplasmosis, Babesiosis and *Borrelia miyamotoi* infection. New patient appointments last one hour, and follow-up appointments are scheduled in 20-minute blocks. Due to high demand and limited capacity, services for acute needs (e.g. urgent appointment for tick bite, erythema migrans, etc.) are not currently available. In this study, a retrospective chart review was conducted to characterize the types of patients seen at the LDC and highlight the unique aspects of providing care for this patient population. The authors hope that this paper will provide practical information on approaches and strategies for caring for patients with Lyme and other TBDs.

METHODS

A retrospective chart review was conducted of all new patients visiting the LDC between March and November 2018. This study period was chosen as it encompasses the months associated with the highest number of new TBD infections each year.[1] The time frame of this study period also allowed for follow-up among new patients to be assessed. Data abstracted from the electronic health records included demographic characteristics, laboratory data, and clinical information.

RESULTS

A total of 228 new patients visited the LDC between March and November 2018. Data from 218 records were abstracted through March 2020 (10 records were excluded due to restricted access). As shown in **Table 1**, 59% of patients were female and 41% were male. More than half of the patients were 50 years of age or older (121, 55.5%).

While patients can be seen for any TBD, the majority (173, 79.4%) of patients primarily sought care for symptoms attributed to Lyme disease. 17 (7.8%) of patients sought care for a combination of TBDs (i.e. coinfection or two separate TBDs) and 28 (12.8%) sought care only for a TBD other than Lyme. (**Table 1**)

Symptoms most commonly reported by patients included fatigue (66.5%), joint pain/swelling (58.2%), cognitive difficulty (32.1%), headaches (27.9%) and sleep disturbance (27.5%). 43 (19.7%) had a history of erythema migrans (i.e., "bulls-eye rash") reported in the chart. A history of Bell's palsy was reported in the chart for 10 patients (4.6%). Over half of the patients (133, 62.4%) reported having experienced symptoms for greater than 6 months at the time of their first appointment, with 76 (34.4%) of all patients reporting symptoms for 2 years or more. Most patients (87.1%) had already received antibiotic treatment directed toward TBD prior to their first visit. (**Table 1**)

Table 1. General characteristics of New Patients at LDC seen between March and November 2018.

Patient characteristics	N	%
Sex		
Male	90	41.2%
Female	128	58.7%
Age		
18–29	27	12.4%
30–50	70	32.1%
> 50	121	55.5%
Reason for consult		
Lyme	173	79.4%
Combination (Lyme + other TBD)	17	7.8%
Other TBD alone	28	12.8%
Types of symptoms reported		
Fatigue	145	66.5%
Joint pain/swelling	127	58.2%
Cognitive difficulty/ "brain fog"	70	32.1%
Headache	61	27.9%
Sleep disturbance	60	27.5%
History of EM rash	43	19.7%
Back pain	33	15.1%
Night sweats	10	4.6%
History of Bell's palsy	10	4.6%
Dizziness/vertigo	7	3.2%
Vision problems	4	1.8%
Duration of symptoms reported		
< 6 months	80	37.5%
6 months–2 years	57	26.8%
>2 years	76	35.7%
Follow-up care		
Seen for follow-up appointment	67	30.7%
Scheduled for follow-up, but did not attend	71	32.6%
No follow-up scheduled	80	36.7%
Received TBD-directed antibiotic treatment prior to New Patient appointment?		
Yes	190	87.1%
No	28	12.9%

Among all new patients during the study period, 97 (46.6%) had negative Lyme serological testing while 111 (50.9%) had positive serological testing according to CDC two-tiered testing criteria. Among those with positive testing, 33 (15.9%) had only IgM positive Western Blots and 78 (37.5%) had IgG positive Western Blots. Among all patients who reported having a history of Lyme disease and symptoms attributed to Lyme disease for more than 6 months, 61 (44.8%) had negative Lyme testing while 75 (55.1%) had positive testing (25, 18.4% had only IgM positive Western Blots and 50, 36.8% had IgG positive Western Blots). (**Table 2**)

While more than half (138, 63.3%) of patients were scheduled for follow-up visits after their first appointment, only 67 (30.7%) of these patients were seen again in clinic as of March 2020. (**Table 1**)

DISCUSSION

Providers at LDC usually begin with a patient-centered approach to hear the patient's illness narrative. Particular attention is paid toward other illnesses that may mimic TBDs. Additional testing is often done for endocrine and autoimmune diseases (e.g., thyroid conditions) as well as routine screening for other infectious diseases (e.g., Hepatitis C) utilizing approved guidelines.[3] Results from any testing for tick-borne diseases are reviewed in detail, including any changes in serologies over time. Prior antibiotic treatment is also reviewed carefully. Attention is focused toward therapeutic approaches that have provided symptom relief and improved function for patients, particularly non-antibiotic treatments, including unconventional therapies such as the herbal creams, acupuncture, and other supportive therapies. (**Table 3**)

Patients come to LDC with a variety of symptoms, ranging from well-documented Lyme disease with positive serological testing and a well-described clinical syndrome to non-specific symptoms that are ascribed to Lyme with little or no documentation. A majority of patients (62.5%) reported

Table 2. CDC criteria for standard two-tiered serological testing and number of patients seen at LDC with corresponding results on record. Two-tiered testing method for Lyme includes an initial enzyme or immunofluorescence assay ("Reflex"), with a subsequent IgM/IgG Western Blot assay if positive/equivocal.

Lyme testing result	CDC two-tiered Lyme testing criteria	All patients seen with testing for Lyme available in chart[1] N=208	Patients with history of Lyme and symptoms > 6 months[2] N=136
Negative	Negative reflex OR Positive reflex + Negative western blot (IgG and IgM)	97 (46.6%)	61 (44.8%)
Positive IgM Western Blot only	Positive Reflex + minimum of 2/3 IgM bands present on Western blot	33 (15.9%)	25 (18.4%)
Positive IgG Western Blot (+/– Positive IgM)	Positive Reflex + minimum of 5/10 IgG bands present on Western blot	78 (37.5%)	50 (36.8%)

[1] Includes those seen for other tick-borne disease but also had Lyme testing recorded in the chart.
[2] Includes patients with positive serologies and/or a history of symptoms attributed to Lyme for at least 6 months.

Table 3. Clinical services offered at LDC.

Review and interpretation of testing and serologies for Lyme and other TBDs.
Evaluation for need of additional testing for Lyme or co-infection with other TBDs.
Evaluation for testing and/or screening for non-Lyme and non-TBD etiologies.1
Evaluation for the need for antibiotic treatment for Lyme disease or other TBDs.
Discussion of inflammation associated with Lyme infection and the use of non-steroidal anti-inflammatory medication and creams and other over-the-counter anti-inflammatories.
Education and discussion on Post-Treatment Lyme Disease Syndrome and methods to address fatigue, sleep, exercise, smoking cessation to reduce inflammation.
Referral to other care providers, such as physical therapy, mental health support, etc.
Counseling on tick safety and prevention of TBD with tick repellants, frequent tick checks, etc.

[1]Other causes include routine testing for infectious diseases and endocrine/autoimmune conditions.

symptoms for 6 months or longer at the time of their first appointment. Almost all patients (87%) had received antibiotic treatment directed towards Lyme or another TBDs prior to their first appointment. The overall predominance of female patients in this chart review (59%) is similar to what has been described in other reports of Post-Treatment Lyme Disease Syndrome.[4] The following section outlines various lessons learned and information about practical approaches used by LDC providers in clinical practice in their approach to care for these patients.

Serological testing for Lyme disease

Testing for Lyme disease is a significant source of confusion for patients. The serological testing results of patients seen at LDC by CDC criteria are outlined in **Table 2**.[5] As serological testing can only confirm exposure rather than disease activity, testing can be difficult to interpret, especially in the context of ongoing Lyme-related symptoms. It is important to acknowledge the confusion caused by Lyme testing with the patient, and in this section, the authors have highlighted some important points to consider.

Immunoglobulin G (IgG) and M (IgM) antibodies seen on Western Blots (WB) can remain reactive for up to 20 years after resolution of infection.[6] This is frequently misinterpreted as ongoing infection. For this reason, repeating Lyme testing in patients who already have fully positive results is generally discouraged. However, when evaluating relatively recent illness (within the last 6 months) and the initial IgM and/or IgG WB is negative, repeating serological testing can be helpful to see if serology has evolved (i.e. from IgM to IgG positive).

In addition, a positive IgM WB (in the absence of a positive IgG WB result) can be a confusing result in the context of ongoing Lyme-related symptoms. As shown in **Table 2,** about 30% of all patients who have any positive Lyme testing have only a positive IgM WB. A positive IgM WB can represent a false positive result.[7] However, antibiotic treatment can prevent the evolution of a fully positive IgG WB even in the presence of acute Lyme disease, so a positive IgM WB can also be the result of a true Lyme infection following appropriate antibiotic treatment.[8]

Another validated testing option is the single-step C6 peptide ELISA. This serodiagnostic test recognizes a different antigenic variant than that used in standard two-tiered Lyme testing and has been shown to be more sensitive in early Lyme disease. [9] This can be a helpful tool to reassure patients with ongoing symptoms but negative Lyme testing that they do not in fact have *B. burgdorferi* infection.

Patients should be discouraged from seeking alternative unvalidated Lyme testing that is not CLIA-approved. Examples of unvalidated tests that have been developed for Lyme include quantitative CD57 lymphocyte assays, capture assays for antigens in urine, and "Reverse Western Blots."[10]

Management of long-term, non-specific symptoms associated with Lyme disease

It is important to educate patients that the majority of people who contract Lyme disease recover fully after treatment within six months. However, 10–20% of these patients experience ongoing symptoms for 6 months following appropriate antibiotic treatment.[11] There is no clear consensus on the pathophysiology or treatment for this condition, often referred to as "Post-treatment Lyme Disease Syndrome" (PTLDS).[11] A simple Google search reveals many stories of life-altering chronic illness attributed to Lyme disease and conflicting information about best practices for treating and managing persistent symptoms.

More than half of new patients at LDC report having symptoms for more than six months after targeted antibiotic therapy. It is important to have tools and treatment options to address this condition. Due to the controversy surrounding PTLDS within the medical community, many patients come to the LDC to have questions answered because their care providers want to avoid care of these conditions or because they continue to suffer without relief. Many patients have had antagonistic interactions with the healthcare system and are resentful that their symptoms have not been validated by the medical community.[12] Many of our patients describe what has been reported in the literature including confronting "dismissive" and "condescending" attitudes towards their condition by other providers.[12] Therefore, acknowledging the impact of their illness while practicing empathetic and patient-centered care can be an

important first step when approaching the patient.

It is not uncommon for patients to ask if they need an additional course of antibiotic treatment in the context of ongoing symptoms. If there is concern that they did not complete the course of treatment or that their treatment course occurred at a sub-therapeutic dose (i.e. it was taken simultaneously with Calcium or Magnesium which can bind to doxycycline), a repeat course of antibiotic treatment can be prescribed.

The risks and the ever-diminishing benefit of each additional course of antibiotics are often reviewed with the patient. Several clinical trials have shown that additional courses of antibiotics to treat this condition does not significantly improve outcomes related to quality of life among patients with ongoing symptoms attributed to Lyme disease.[13,14] In the absence of validation by the mainstream medical community, many patients seek out unconventional treatment methods offered by other providers, including long-term courses of combination antibiotic therapy, chelation therapy, or others.[15] LDC clinicians often have difficulty providing guidance regarding these unconventional or complementary medicinal therapies. These therapies are discouraged if there are concerns regarding toxicity or prohibitive cost. Providers generally follow CDC guidelines on antibiotic prescribing. However, many patients insist on a repeat course of antibiotic therapy. Many patients are knowledgeable of the literature from the CDC as well as from alternative Lyme providers. The risks and benefits of repeating antibiotic therapy are described in detail with the patient. A shared decision-making approach can be utilized to navigate treatments and ongoing care for these patients.[16] An additional short-term antibiotic course may be preferable to many months of combination therapy that is typically recommended by some providers who specialize in Lyme disease.[17]

Patients at LDC report fatigue symptoms that are worse than had been reported among patients with cancer and chronic pain.[18] As with chronic fatigue syndrome (CFS), initial qualitative narratives from LDC patients (unpublished data) suggest that there may be a complex relationship between physical activity and fatigue.[19] For example, when patients resume their level of exercise prior to their "Chronic Lyme," they often report "hitting the wall" and experiencing increased symptoms of fatigue. Patients are therefore counseled to resume exercise and physical activity in a slow graded fashion. A better understanding of the relationship between physical activity and fatigue overtime will be critical to future research and patient care.

LDC providers have therefore adopted an alternative multidisciplinary approach to caring for these patients. LDC providers generally offer interventions to alleviate commonly reported symptoms, including fatigue, joint pain and cognitive difficulties. Some of these interventions have proven helpful for similar clinical syndromes, including chronic fatigue syndrome and fibromyalgia.[20] These approaches include sleep hygiene counseling, encouraging healthy physical activity, modifying diet or nutritional intake, referral to physical therapy, mental health support, over-the-counter anti-inflammatory medicines and creams as well as other herbal or natural medicines. The informational pamphlet developed by the authors summarizing these recommendations can be found at this link.

Patients are often understandably frustrated that they cannot return right away to their previous levels of wellness and functioning. It is important to reassure patients that recovery, particularly if the illness is extended, can take time. Improving function and meaningful activity even while symptoms persist is often the primary goal. Articulating functional goals such as walking a certain distance daily or participating in meaningful activities may be more helpful than focusing on more subjective goals such as having more energy or feeling "totally well again."

As shown in **Table 1,** only about half of patients who schedule a follow-up appointment come into clinic again. It is unclear whether this is because the treatment modalities offered helped and patients felt another visit was unnecessary, or because they did not help sufficiently, and patients continued to seek care elsewhere. An evaluation of patient satisfaction at LDC is ongoing to answer this question.

LIMITATIONS

This study seeks to describe the patient population seen at an out-patient clinic for Lyme and other TBDs and offer some practical approaches for caring for these patients. There are some limitations to report. Due to the retrospective nature of this chart review, some information was difficult to ascertain, and data abstraction relied on what was reported by patients and recorded by physicians in the chart. In addition, although the approaches described here represent the consensus of clinicians at LDC as a whole, it is important to note that each clinician can vary their approach with each individual patient.

CONCLUSIONS

As the prevalence of Lyme and other TBDs continues to rise, the demand for high-quality and accessible care for TBDs will also continue to increase. In the midst of conflicting information and controversy in best practices for the treatment and management of Lyme disease, it is important for patients to have access to reliable information and treatment options for acute and ongoing symptoms. Meanwhile, the Lyme-treating community should continue to learn from ongoing experience. Prospective evaluation of standardized approaches is needed to determine which therapeutic interventions provide the most functional benefit for patients.

References

1. Lyme Disease Charts and Figures: Historical Data | Lyme Disease | CDC. Centers for Disease Control and Prevention. https://www.cdc.gov/lyme/stats/graphs.html. Accessed March 23, 2020.
2. Aguero-Rosenfeld ME, Wormser GP. Lyme disease: Diagnostic issues and controversies. *Expert Rev Mol Diagn*. 2015;15(1):1-4.
3. Testing Recommendations for Hepatitis C Virus Infection, CDC. https://www.cdc.gov/hepatitis/hcv/guidelinesc.htm. Accessed March 26, 2020.
4. Wormser GP, Shapiro ED. Implications of gender in chronic lyme disease. *J Women's Heal*. 2009;18(6):831-834.
5. Diagnosis and Testing | Lyme Disease | CDC. https://www.cdc.gov/lyme/diagnosistesting/index.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Flyme%2Fdiagnosistesting%2Flabtest%2Ftwostep%2Findex.html. Accessed March 25, 2020.
6. Feder HM, Gerber MA, Luger SW, Ryan RW. Persistence of serum antibodies to Borrelia burgdorferi in patients treated for Lyme disease. *Clin Infect Dis*. 1992;15(5):788-793.
7. Seriburi V, Ndukwe N, Chang Z, Cox ME, Wormser GP. High frequency of false positive IgM immunoblots for Borrelia burgdorferi in Clinical Practice. *Clin Microbiol Infect*. 2012;18(12):1236-1240.
8. Aguero-Rosenfeld ME, Wang G, Schwartz I, Wormser GP. Diagnosis of lyme borreliosis. *Clin Microbiol Rev*. 2005;18(3):484-509.
9. Wormser GP, Schriefer M, Aguero-Rosenfeld ME, et al. Single-tier testing with the C6 peptide ELISA kit compared with two-tier testing for Lyme disease. *Diagn Microbiol Infect Dis*. 2013;75(1):9-15.
10. Laboratory tests that are not recommended | Lyme Disease | CDC. https://www.cdc.gov/lyme/diagnosistesting/labtest/otherlab/index.html. Accessed March 24, 2020.
11. Aucott JN, Rebman AW, Crowder LA, Kortte KB. Post-treatment Lyme disease syndrome symptomatology and the impact on life functioning: is there something here? Qual Life Res. 2013 Feb;22(1):75-84
12. Ali A, Vitulano L, Lee R, Weiss TR, Colson ER. Experiences of patients identifying with chronic Lyme disease in the healthcare system: A qualitative study. *BMC Fam Pract*. 2014;15(1):79.
13. Berende A, Ter Hofstede HJM, Vos FJ, et al. Effect of prolonged antibiotic treatment on cognition in patients with Lyme borreliosis. *Neurology*. 2019;92(13):E1447-E1455.
14. Berende A, Hofstede HJMT, Vos FJ, et al. Randomized trial of longer-term therapy for symptoms attributed to lyme disease. *N Engl J Med*. 2016;374(13):1209-1220.
15. Paul M. Lantos, Eugene D. Shapiro, Paul G. Auwaerter, et al. Unorthodox Alternative Therapies Marketed to Treat Lyme Disease. *Clin Infect Dis*. 2015;60(12):1776-1782.
16. Barry MJ, Edgman-Levitan S. Shared decision making - The pinnacle of patient-centered care. *N Engl J Med*. 2012;366(9):780-781.
17. Feder HM, Johnson BJB, O'Connell S, et al. A Critical Appraisal of "Chronic Lyme Disease." *N Engl J Med*. 2007;357(14):1422-1430.
18. Vargas, SE, Boudreau, M, McCarthy, M, Canfield, D, Reece, RM, & Flanigan T. Chronic Lyme patients report levels of fatigue similar to patients with other chronic illness: A symptom survey study. In: *Society of Behavioral Medicine*. Washington, D.C.; 2019.
19. Black CD, O'connor PJ, Mccully KK. Increased daily physical activity and fatigue symptoms in chronic fatigue syndrome. *Dyn Med*. 2005;4(3):3.
20. Goldenberg DL, Burckhardt C, Crofford L. Management of fibromyalgia syndrome. *J Am Med Assoc*. 2004;292(19):2388-2395.

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A Spatial Analysis of the Food Environment and Overweight and Obesity Among Rhode Island Youth

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ABSTRACT

BACKGROUND: This study examined how proximity to food sources differed at the block group and town level, stratified by socioeconomic risk, and how the average distance to a food source was associated with child overweight and obesity rates in Rhode Island.

METHODS: Eight correlated variables from the 2014–2018 American Community Survey were used to measure high and low socioeconomic risk at the block group and town level. Linear regression models were used to assess the association between mean driving distance to food sources and prevalence of child overweight and obesity.

RESULTS: All food sources were closer to residences in the high-risk group than the low-risk group at the block group and town level. Convenience stores, sit-down restaurants, and snack and beverage stores showed the largest associations with prevalence of overweight and obesity.

CONCLUSION: Efforts to better understand the food environment are needed to address overweight and obesity among youth.

KEYWORDS: food environment, children, overweight and obesity, spatial analysis

INTRODUCTION

Childhood obesity is a major health issue that affects 18.5% of children and adolescents across the country.[1] Children with obesity have an increased risk of developing chronic diseases including diabetes and cardiovascular diseases, which can reduce life expectancy and affect quality of life.[1] Ethnic and racial minorities have higher rates of obesity and higher risks of becoming obese.[1] In Rhode Island, 36% of Hispanic children and 37% of Non-Hispanic Black children ages 2 to 17 are overweight or obese.[2]

Food accessibility has been shown to influence a person's dietary behavior and weight.[3,4] Previous research has found that individuals without access to supermarkets near their homes are less likely to have healthy diets.[3] Additionally, living in close proximity to convenience stores was associated with low Healthy Eating Index (HEI) scores among children 11–14,[5] and also associated with higher BMI among 8th and 10th graders.[6] Moreover, children and adolescents have greater odds of obesity the shorter the distance from their home to a fast food establishment[7] and are significantly more likely to be obese if they attend a school within a half mile of a fast food restaurant.[8] However, other studies have shown no association between the food environment and obesity among children and adolescents.[9,10]

Using Rhode Island statewide food environment data, we examined how distance to food source locations varied by high and low socioeconomic risk, at the block group and town level, using risk indices created from eight highly correlated variables. We also assessed whether the town level distance to food sources was associated with town levels of overweight and obesity rates among children 2–17.

METHODS

Overview

This study included a statewide analysis of the food environment using data from multiple online sources. Rhode Island childhood overweight and obesity rates were obtained through Rhode Island KIDS COUNT published data[2] and demographic characteristics were obtained from the American Community Survey (ACS). We examined the mean distance to the nearest food source from every residence at the block group and town level, stratified by socioeconomic risk.

Data

Residential addresses were extracted from the Rhode Island Enhanced 9-1-1 (E911) database.[11] The E911 database includes all known buildings and structures in the state. We limited the structures to those identified as primary residences, multifamily, mobile homes, other residential, and seasonal homes.

For each block group, a socioeconomic risk index was constructed using eight highly correlated measures obtained from the 2014-2018 ACS: percentage of adults without high school education, percentage of single-parent households, percentage of household crowding (>1 person per room), percentage of renter occupied housing units, percentage of vacant homes (excluding vacation homes), percentage of families below 100% of the federal poverty level, percentage

of non-white residents, and percentage of housing units built before 1950.[12] Quintiles were computed for each of the eight measures and summed, resulting in a scale ranging from 8-40, with higher scores indicating greater risk. Block groups were categorized as high (≥75th percentile) and low risk (<75th percentile), a dichotomization we have implemented previously.[12] The same process was repeated for each town to create a town level risk index and classify towns as high and low risk.

Food environment data included food markets, restaurants, and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) sites, accessed in 2019 from the Rhode Island Department of Health website (https://health.ri.gov/licenses/index.php). Additional food variables included community gardens, farmer's markets, food assistance providers, and Supplemental Nutrition Assistance Program (SNAP) locations, accessed from July-August 2019 and identified from website searches including the Rhode Island Community Food Bank, Southside Community Land Trust, Farm Fresh RI, Rhode Island Department of Human Services and the U.S. Department of Agriculture.

Food environment classification

Food markets were categorized based on the number of cash registers in the store and previous literature.[13,14] Categories included supermarkets, grocery stores, convenience stores, specialty food stores and other. Supermarkets and grocery store categories were created to differentiate between big and small grocery stores. Supermarkets included well-known, large chain stores and stores with six or more cash registers. Grocery stores included smaller stores such as local, ethnic and non-corporate owned food markets with fewer than six cash registers.[13] Convenience store establishments primarily sold limited amounts of food, mainly packaged snack foods, and the majority had one to two cash registers.[14] Specialty food stores included stores that only sold fruits and vegetables, or meat and fish. All other food markets in the dataset were included in the category 'other' if they did not fall under any of the previous categories, including dollar stores, candy shops and pharmacies.

Restaurants were categorized into the following categories: fast food restaurants, sit-down restaurants, and snack and beverage stores. Fast food restaurants included places with a drive through, locations whose primary business was take-out or had take-out or express in the name; places that sold quick, ready-to-eat food and required customers to pay at the counter.[15,16] Sit-down restaurants included locations offering full service dining.[17] Snack and beverage stores included places such as donut, coffee, ice cream, tea shops and liquor stores.[16]

Businesses that held a retail food peddler license were excluded from the analysis sample since they were mainly catering companies. Food pantries with a market (non-profit) license were included under food assistance providers. Restaurants with a vending unit license or a mobile food service license were excluded because they were vending machines or food trucks and not always in the same area. If it was required to pay a fee to have access to the food place, it was excluded (hotels, country clubs, bowling alleys).

Analyses

Food environment and residential addresses were geocoded using ArcGIS 10.7.1. All food environment variables were successfully geocoded, with a 100 percent match rate. A network database was created from 2019 TIGER/Line shapefiles maintained by the Census Bureau for Rhode Island, Massachusetts, and Connecticut.[18] Network distances were calculated using an Origin Destination (OD) cost matrix in ArcGIS. The least-cost driving path for every residence to food source location was computed at the block group and town level. The network databases included information for one-way traffic flow and other traffic laws. Data were analyzed using Stata 16 and SAS 9.4. Descriptive statistics were calculated for variables included in the socioeconomic risk index and weighted mean driving distances to food sources at the block group and town level. Unadjusted and adjusted weighted linear regression analyses were conducted to assess the relation between mean driving distance to a food source location in each town and the prevalence of child overweight and obesity.

RESULTS

Socioeconomic characteristics and the food environment

Block group level analysis

The mean percentage for each of the factors in the socioeconomic risk index is shown in **Table 1**. As expected, the mean percentage for each factor is greater in the high-risk group. Nearly 25% of families in the high-risk block groups lived below the federal poverty level, compared to 5% in the low-risk block groups.

Table 1. Characteristics of Rhode Island block groups by block group level risk index

	Low Risk (N=609)		High Risk (N=199)	
Block group characteristics (%)	Mean	Standard deviation	Mean	Standard deviation
Non-white	15.53	15.17	63.82	25.04
Single parent households	10.58	11.19	31.25	15.23
Adults 25+ with no high school education	8.27	6.73	24.40	11.44
Families below 100% FPL	4.93	7.46	24.92	15.11
Renter-occupied households	30.05	22.19	70.32	15.62
Vacant homes	6.50	6.23	14.88	10.10
Household crowding	0.90	2.22	4.71	5.58
Housing units built before 1950	34.79	24.15	62.12	17.92

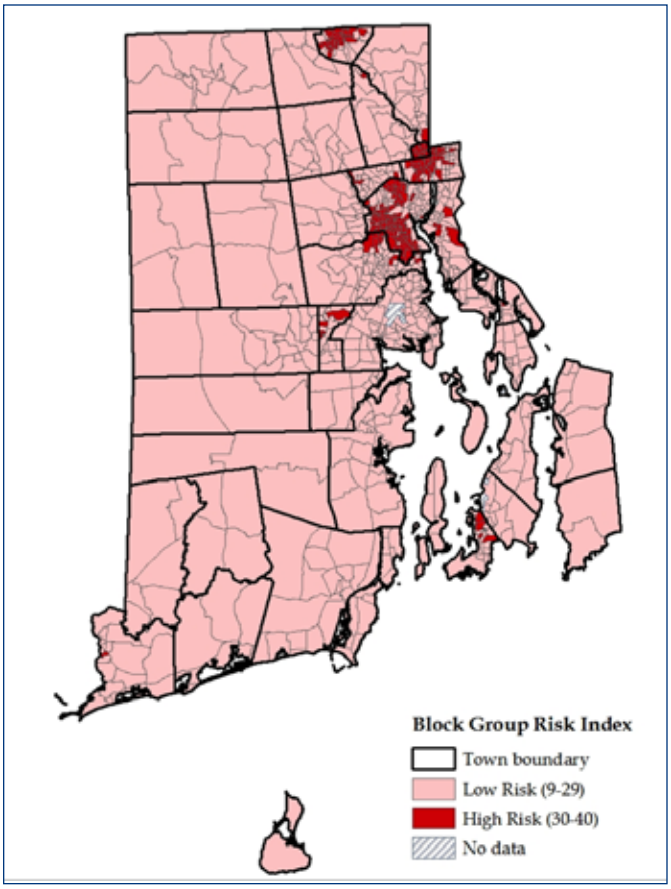
Table 2. Weighted average distance to a food source location by block group level risk index

	Low Risk (N=609)		High Risk (N=199)		
Food Source	**Distance (miles)**	**95% CI**	**Distance (miles)**	**95% CI**	**p-value**
Supermarket	2.32	2.12, 2.53	0.88	0.82, 0.95	<.0001
Grocery store	4.31	4.04, 4.57	0.78	0.62, 0.94	<.0001
Convenience store	1.11	1.04, 1.18	0.28	0.26, 0.29	<.0001
Specialty	2.76	2.57, 2.96	0.85	0.74, 0.97	<.0001
Other	1.28	1.23, 1.33	0.90	0.87, 0.93	<.0001
Sit down	1.00	0.92, 1.07	0.28	0.26, 0.31	<.0001
Fast food	1.16	1.07, 1.25	0.29	0.27, 0.31	<.0001
Snack and beverage	1.53	1.43, 1.63	0.60	0.56, 0.65	<.0001
Farmers market	3.21	3.02, 3.41	1.21	1.12, 1.30	<.0001
Community garden	13.28	12.37, 14.20	3.47	2.56, 4.37	<.0001
Food assistance provider	2.33	2.19, 2.47	1.21	1.15, 1.27	<.0001
WIC	4.53	4.21, 4.86	1.16	1.06, 1.26	<.0001
SNAP	7.28	6.85, 7.71	1.11	1.83, 2.38	<.0001

All food sources included in this study were closer to residences in the high-risk block groups than the low-risk block groups (**Table 2**). Mean distances for all food sources in the high-risk block groups ranged from 0.28 to 3.47 miles compared to food sources in the low-risk block groups whose mean distances ranged from 1.00 to 13.28 miles. For high-risk block groups, the average distance to a convenience store and sit-down restaurants were within 0.28 miles, compared to the low-risk block groups where the average distances were 1.11 and 1.00 miles, respectively. Fast food restaurants were 0.29 miles from residences in the high-risk block groups compared to 1.16 miles for the low-risk block groups. Supermarkets were, on average, 0.88 miles from residences in the high-risk block groups compared to 2.32 miles from residences in the low-risk block groups. For residences in the high-risk block groups, the average distance to a grocery store was 0.78 miles compared to 4.31 miles for the low-risk block groups.

Food sources offering the most energy dense foods including convenience stores, fast food restaurants and snack and beverage stores were the nearest places for both high-risk and low-risk block groups. High- and low-risk block groups had the furthest mean distances to food sources providing the healthiest food options. High-risk block groups were mainly located in urban areas of the state including Providence, Pawtucket, Central Falls and Woonsocket (**Figure 1**).

Figure 1. Location of high and low risk block groups



Town level analysis

The mean percentage for each of the factors in the town level risk index is shown in **Table 3**. As expected, the mean percentage for each factor is greater in the high-risk group. Almost 14% of families in the low-risk towns lived below the federal poverty level, compared to nearly 5% in the low-risk towns.

Table 3. Characteristics of Rhode Island towns by town level risk index

	Low Risk (N=29)		High Risk (N=10)	
Town Characteristics (%):	**Mean**	**Standard deviation**	**Mean**	**Standard deviation**
Non-white	8.49	3.55	35.27	23.16
Single parent households	9.05	3.88	19.81	7.24
Adults 25+ with no high school education	6.57	2.94	16.01	8.89
Families below 100% FPL	4.23	2.47	13.05	7.80
Renter-occupied households	23.39	9.35	52.26	15.10
Vacant homes	5.97	2.03	9.45	3.09
Household crowding	0.85	0.72	2.67	1.93
Housing units built before 1950	24.98	9.00	47.25	16.06

Table 4. Weighted average distance to a food source location by town level risk index

	Low Risk (N=29)		High Risk (N=10)		
Food Source:	**Distance (miles)**	**95% CI**	**Distance (miles)**	**95% CI**	**p-value**
Supermarket	2.92	1.94, 3.89	1.05	0.82, 1.29	.0006
Grocery store	5.48	4.40, 6.57	1.53	0.50, 2.56	<.0001
Convenience store	1.37	1.12, 1.63	0.47	0.30, 0.64	<.0001
Specialty	3.26	2.32, 4.20	1.43	0.64, 2.22	.0070
Other	1.37	1.19, 1.55	1.03	0.80, 1.26	.0154
Sit down	1.23	1.00, 1.46	0.44	0.30, 0.59	<.0001
Fast food	1.46	1.10, 1.83	0.46	0.32, 0.60	<.0001
Snack and beverage	1.86	1.48, 2.24	0.78	0.62, 0.93	<.0001
Farmers market	3.92	3.04, 4.79	1.59	1.15, 2.04	<.0001
Community garden	15.42	11.61, 19.23	6.98	0.00, 15.44	.0633
Food assistance provider	2.70	2.04, 3.36	1.46	1.11, 1.81	.0014
WIC	5.75	4.14, 7.36	1.77	1.24, 2.29	<.0001
SNAP	8.14	6.34, 9.95	4.28	0.68, 7.89	0.0516

Similar to the block group analysis, all food sources were closest to residences in high-risk towns (**Table 4**). Mean distances for all food sources in the high-risk towns ranged from 0.44 to 6.98 miles compared to food sources in the low-risk towns whose mean distances ranged from 1.23 to 15.42 miles. Additionally, residences in both high- and low-risk towns were closest to food sources with limited amounts of healthy food options. Fast food restaurants were within 0.46 miles and convenience stores were within 0.47 miles of residences in high-risk towns compared to 1.46 miles and 1.37 miles, respectively, of residences in low-risk towns. Sit-down restaurants were the closest food source to residences in the high- and low-risk towns (0.44 miles vs. 1.23 miles, respectively). For residences in the high- and low-risk towns, the furthest places were food sources offering a greater variety of healthy food options and food assistance programs (SNAP and WIC). Supermarkets and grocery stores were, on average, 1.05 miles and 1.53 miles from residences in the high-risk towns compared to 2.92 miles and 5.48 miles from residences in the low-risk towns. The high-risk areas were primarily the more densely populated cities in Rhode Island (**Figure 2**).

Food environment and childhood overweight and obesity

Table 5 displays the results of weighted linear regression models, which assessed the relationship between the

Figure 2. Location of high and low risk towns

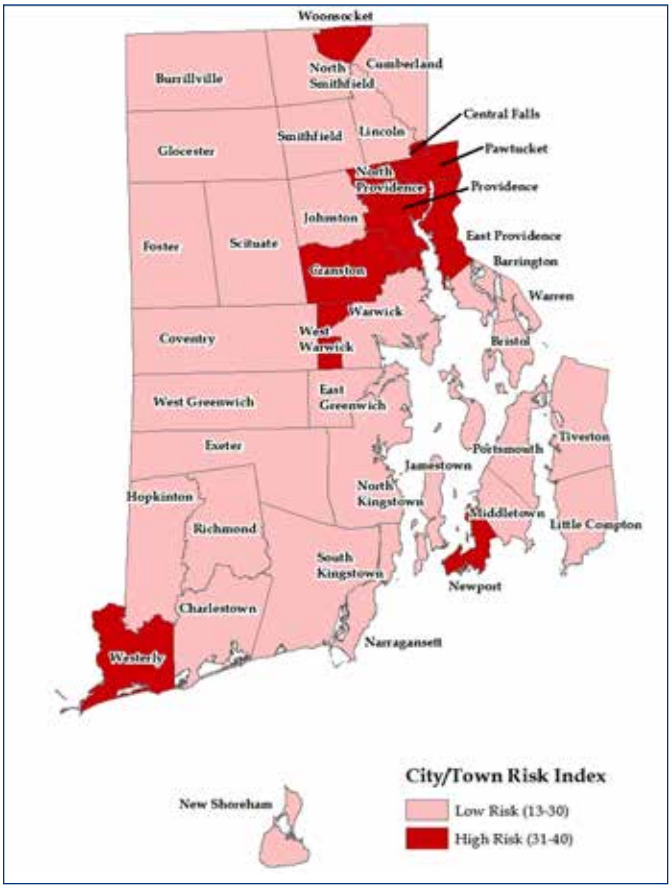


Table 5. Unadjusted and adjusted weighted regression models of town level overweight/obesity rates among Rhode Island children ages 2–17

	Unadjusted		Adjusted *	
Average distance to:	**Beta (95% CI)**	**p-value**	**Beta (95% CI)**	**p-value**
Supermarket	-1.21 (-2.11, -0.30)	.0102	-0.48 (-1.34, 0.38)	.2625
Grocery store	-1.23 (-1.79, -0.67)	<.0001	-0.65 (-1.34, 0.04)	.0639
Convenience store	-5.88 (-8.23, -3.53)	<.0001	-3.67 (-6.63, -0.71)	.0165
Specialty store	-1.32 (-2.20, -0.45)	.0039	-0.66 (-1.48, 0.16)	.1119
Other	-5.61 (-9.99, -1.23)	.0136	-2.52 (-6.50, 1.47)	.2086
Sit down	-6.45 (-9.15, -3.75)	<.0001	-3.85 (-7.17, -0.53)	.0185
Fast food	-3.87 (-5.90, -1.84)	.0004	-1.89 (-4.12, 0.34)	.0949
Snack and beverage	-4.16 (-5.95, -2.38)	<.001	-2.53 (-4.56, -0.49)	.0086
Farmers market	-1.43 (-2.31, -0.56)	.0021	-0.56 (-1.49, 0.37)	.2295
Community garden	-0.27 (-0.43, -0.11)	.0018	-0.16 (-0.31, -0.01)	.0325
Food assistance provider	-2.10 (-3.35, -0.84)	.0017	-1.15 (-2.34, 0.04)	.0576
WIC	-0.68 (-1.20, -0.17)	.0110	-0.16 (-0.68, 0.36)	.5432
SNAP	-0.65 (-1.00, -0.30)	.0005	-0.42 (-0.74, -0.10)	.0111

*Adjusted for town level risk index

average town level distance to each of the food environment variables and town level prevalence of child overweight and obesity. Unadjusted linear regression showed that mean distance to all food sources had significant inverse relations with prevalence of child overweight and obesity. After adjusting for the town level risk index, we found the shorter the average distance to a food source, the higher the rate of child overweight and obesity. However, most relationships were no longer statistically significant. Sit-down restaurants (adjusted beta: -3.85; 95% CI: -7.17, -0.53), convenience stores (adjusted beta: -3.67; 95% CI: -6.63, -0.71) and snack and beverage stores (adjusted beta: -2.53; 95% CI: -4.56, -0.49) showed the strongest associations with child overweight and obesity. Additionally, there was evidence that average distance to a food source that provides healthy options, such as community gardens, had a negative but small association with overweight and obesity (adjusted beta: -0.16; 95% CI: -0.31, -0.01).

DISCUSSION

Contrary to what was expected based on the concept of "food deserts,"[19] our study found that Rhode Islanders living in high-risk block groups and towns, as defined by our socioeconomic risk indices, lived closer to all food sources than those living in low-risk areas. While high-risk areas may be closer to food sources, the distance may still be a barrier. Food sources offering an assortment of healthy food options including supermarkets and grocery stores were more than a half mile away at the block group level and over one mile at the town level for high-risk areas.

Additionally, we found that community gardens, which are created as an effort to address food deserts and improve access to healthy foods, were the farthest of all food sources, requiring residences in high-risk block groups to travel, on average, over 3 miles and nearly 7 miles for high-risk towns. Food assistance programs, like WIC and SNAP, which provide needy families with support to afford healthy foods were among the farthest food sources. These findings indicate the need to expand resources in high-risk areas.

When assessing the association between food source mean distance and prevalence of child overweight and obesity rates, we found the shorter the distance to a food source, the higher the prevalence of childhood overweight and obesity. Convenience stores had a large association with increased overweight and obesity rates, consistent with previous literature,[6] as well as sit-down restaurants and snack and beverage stores. The reduction of overweight and obesity associated with SNAP locations and community gardens was significant but rather small. This suggests that proximity to unhealthy food sources may be more important than access to healthy food sources and more focus should be placed on limiting access to these places. Furthermore, additional factors may be contributing to the increase of overweight and obesity, including the combination of proximity with abundance of places offering energy-dense foods that overtake the number of healthy food sources, a concept called "food swamp."[20] Food swamps have been shown to increase overweight and obesity rates.[21]

LIMITATIONS

Our study had some limitations. When calculating distance, we only accounted for driving distance via motor vehicle and not for other modes of transportation such as public transit or walking. We also only examined the distance to the closest food sources, not the density of food sources in the block groups or towns. Additionally, KIDS COUNT overweight and obesity data were collected from electronic clinical and billing records and released publicly as town-level estimates. Although this is also a strength given it is not reliant on self-reported data that is more commonly available, the dataset did not account for all Rhode Island youth, potentially under- or overestimating the number of children ages 2–17 that are overweight or obese. Furthermore, given the data were only available as town-level summary statistics, individual characteristics could not be examined.

Our study provides evidence that suggests that distance to food sources may not be the only factor contributing to prevalence of overweight and obesity among Rhode Island youth. Further research should assess how additional factors may contribute to increased weight in children such as measuring distance to food sources using different modes of transportation, calculating the number or density of food sources in an area, assessing food prices, and other aspects of healthy food access. Lastly, policies need to address the issue associated with proximity to energy-dense food places and increased weight. Efforts to understand how people are interacting with their local environment, in addition to establishing interventions that encourage healthy eating could help reduce prevalence of child overweight and obesity.

References

1. Childhood Overweight and Obesity. Centers for Disease Control and Prevention. https://www.cdc.gov/obesity/childhood/. Published September 11, 2018.
2. 2020 Rhode Island Kids Count Factbook. Providence, RI: Rhode Island KIDS COUNT http://www.rikidscount.org/Portals/0/Uploads/Documents/Factbook%202020/RIKCFactbook2020.pdf?ver=2020-04-03-124327-163.%20 Pages 82-83
3. Moore L V., Diez Roux A V., Nettleton JA, Jacobs DR. Associations of the Local Food Environment with Diet Quality--A Comparison of Assessments based on Surveys and Geographic Information Systems: The Multi-Ethnic Study of Atherosclerosis. *Am J Epidemiol*. 2008;167(8):917-924. doi:10.1093/aje/kwm394
4. Mylona EK, Fadi Shehadeh F, Fleury E, Kalligeros M, Mylonakis E. Neighborhood-Level Analysis of the Impact of Accessibility to Fast Food and Open Green Spaces on the Prevalence of Obesity. *Amer J Med*. 2020;133:340-346

5. He M, Tucker P, Irwin JD, Gilliland J, Larsen K, Hess P. Obesogenic neighborhoods: the impact of neighborhood restaurants and convenience stores on adolescents' food consumption behaviours. *Public Health Nutr*. 2012;15(12):2331-2339. doi:10.1017/S1368980012000584
6. Powell LM, Auld MC, Chaloupka FJ, O'Malley PM, Johnston LD. Associations Between Access to Food Stores and Adolescent Body Mass Index. *Am J Prev Med*. 2007;33(4 SUPPL.):S301-7. doi:10.1016/j.amepre.2007.07.007
7. Mellor JM, Dolan CB, Rapoport RB. Child body mass index, obesity, and proximity to fast food restaurants. *Int J Pediatr Obes*. 2011;6(1):60-68. doi:10.3109/17477161003777433
8. Davis B, Carpenter C. Proximity of fast-food restaurants to schools and adolescent obesity. *Am J Public Health*. 2009;99(3):505-510. doi:10.2105/AJPH.2008.137638
9. Burdette H. Neighborhood playgrounds, fast food restaurants, and crime: relationships to overweight in low-income preschool children. *Prev Med (Baltim)*. 2004;38(1):57-63. doi:10.1016/j.ypmed.2003.09.029
10. Shier V, Nicosia N, Datar A. Neighborhood and home food environment and children's diet and obesity: Evidence from military personnel's installation assignment. *Soc Sci Med*. 2016;158:122-131. doi:10.1016/j.socscimed.2016.03.043
11. RIGIS, 2018. RI E-911 Sites; e911Sites18r1. Rhode Island Geographic Information System (RIGIS) Data Distribution System, http://www.rigis.org, Environmental Data Center, University of Rhode Island, Kingston, Rhode Island.
12. Gjelsvik A, Rogers ML, Garro A, Sullivan A, Koinis-Mitchell D, McQuaid EL, et al. Neighborhood risk and hospital use for pediatric asthma, Rhode Island, 2005-2014. Prev Chronic Dis. 2019. doi:10.5888/pcd16.180490
13. Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. *Am J Prev Med*. 2002;22(1):23-29. doi:10.1016/S0749-3797(01)00403-2
14. Chung C, Myers SL. Do the Poor Pay More for Food? An Analysis of Grocery Store Availability and Food Price Disparities. *J Consum Aff*. 1999;33(2):276-296. doi:10.1111/j.1745-6606.1999.tb00071.x
15. Jilcott SB, McGuirt JT, Imai S, Evenson KR. Measuring the Retail Food Environment in Rural and Urban North Carolina Counties. *J Public Heal Manag Pract*. 2010;16(5):432-440. doi:10.1097/PHH.0b013e3181bdebe4
16. Black JL, Macinko J, Dixon LB, Fryer, Jr. GE. Neighborhoods and obesity in New York City. *Health Place*. 2010;16(3):489-499. doi:10.1016/J.HEALTHPLACE.2009.12.007
17. Saelens BE, Glanz K, Sallis JF, Frank LD. Nutrition Environment Measures Study in Restaurants (NEMS-R). Development and Evaluation. *Am J Prev Med*. 2007;32(4):273-281. doi:10.1016/j.amepre.2006.12.022
18. US Census Bureau. (2019). TIGER/Line Shapefiles Technical Documentation. https://www2.census.gov/geo/pdfs/maps-data/data/tiger/tgrshp2019/TGRSHP2019_TechDoc.pdf
19. Dutko, Paula, Michele Ver Ploeg, Tracey Farrigan. Characteristics and Influential Factors of Food Deserts, ERR-140, U.S. Department of Agriculture, Economic Research Service, August 2012.
20. Rose, D; Bodor, N; Swalm, C; Rice, J; Farley, T; Hutchinson, P. *Deserts in New Orleans? Illustrations of Urban Food access and Implications for Policy*; University of Michigan National Poverty Center; USDA Economic Research Service Research: Ann Arbor, MI, USA, 2009.
21. Cooksey-Stowers K, Schwartz MB, Brownell KD. Food Swamps Predict Obesity Rates Better Than Food Deserts in the United States. *Int J Environ Res Public Health*. 2017;14(11). doi:10.3390/ijerph14111366

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Disclaimer

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Accidental Drug Overdose Deaths in Rhode Island: January 1, 2016–July 31, 2020

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INTRODUCTION

Over the past 20 years, overdose deaths have been increasing nationally and particularly in Rhode Island.[1,2] To address this epidemic, the Rhode Island Department of Health (RIDOH), in collaboration with state and community partners, has implemented a comprehensive portfolio of interventions to prevent drug-related harms in Rhode Island. Presumably due to these efforts, from 2016 to 2019, Rhode Island overdose deaths began to decline. However, due to increasing rates of overdose deaths in 2020, Rhode Island is on track to have the highest number of accidental overdose deaths ever recorded in the Ocean State.

Causes for the rise of overdose deaths in 2020 are currently unknown. Although factors related to the COVID-19 pandemic likely contribute, deaths began to increase in December 2019, months before the first case of COVID-19 in Rhode Island. In order to successfully address the worsening overdose crisis, it is crucial to identify and understand factors contributing to rising deaths, how 2020 fatal overdoses may be different from fatal overdoses in prior years, and changes in affected populations over time. This information can be used to develop more informed and targeted interventions to prevent future overdose deaths.

METHODS

We analyzed data on accidental overdose deaths from the Rhode Island Office of the State Medical Examiners from January 1, 2016 to July 31, 2020. Rhode Island Medical Examiners determine an individual's cause and manner of death based on an autopsy, toxicology panels, scene investigation notes, and medical history.

Drugs contributing to the cause of death were extracted from the cause of death fields and categorized into a drug class variable. Drug class categories were not mutually exclusive, and individuals who were not positive for any of the six pre-selected drug classes were categorized as other. All categories with small cell counts (<5) were suppressed. Demographic and overdose characteristics (location, drug class, drug type) were compared by year of death using chi-square tests. Additionally, deaths occurring in 2020 were compared pre/post COVID-19 (January–March 2020 to April–June 2020) using chi-square tests. When comparing overdose deaths over time, data were limited to the first 7 months of each year to improve comparability. All analyses were performed in SAS (Version 9.4).

FINDINGS

Between January 1, 2016 and July 31, 2020, 1,515 individuals died of an accidental drug overdose in Rhode Island. Overall, most accidental overdose deaths occurred in males (73.5%), non-Hispanic whites (80.5%), and individuals 25–54 years of age (73.6%; **Table 1**). Additionally, the location of overdose exhibited little variation over time with 69.6% of individuals passing in private locations, 4.2% in public areas, 4.4% in semi-public areas, and 21.9% with location unknown.

When looking at drug classes that contributed to the cause of death, opioids (86.3%), cocaine (43.8%), and alcohol (30.4%) were the most common. More than 75% of the opioid-related deaths involved fentanyl (67.4% overall, 78.1% among opioid-related deaths). When comparing fatal overdoses over time, the proportion involving fentanyl (2016: 58.6%; 2020: 76%) and cocaine (2016: 38.4%; 2020: 49.4%) are increasing, while the proportion involving benzodiazepines has declined (2016: 23.2%; 2020: 11.2%; **Table 1**). From 2016 to 2020, the proportion of overdoses that involved amphetamines more than doubled (2016: 3.0%; 2020: 6.9%). Most fatal overdoses were due to illicit drugs alone (64.2%), with 23.0% of fatal overdoses involving illicit and prescription medications, and 12.8% involving exclusively prescription medications. From 2016 to 2020, the proportion of fatal overdoses involving exclusively illicit drugs increased from 63.7% to 72.1%, while the proportion involving exclusively prescription drugs decreased from 16.7% to 8.2%.

When comparing fatal overdoses occurring in January–March of 2020 to April–June of 2020, no significant differences were observed (results not shown).

Overall, fatal overdoses have increased 25.9% in January –July of 2020 when compared to the same time period in 2019, while opioid-involved fatal overdoses have increased 33.3% over the same period (**Figure 1**).

Table 1. Demographics and overdose characteristics for individuals who died of an accidental overdose in Rhode Island: January 1, 2016–July 31, 2020[1]

	Overall n=1,515 n (%)	2016 n=336 n (%)	2017 n=324 n (%)	2018 n=314 n (%)	2019 n=308 n (%)	2020[2] n=233 n (%)	p–value[3]
Demographic Characteristics							
Age							
0–18	<5	<5	<5	<5	<5	<5	0.0416
18–24	85 (5.6)	24 (7.1)	18 (5.6)	16 (5.1)	18 (5.8)	9 (3.9)	
25–34	381 (25.2)	96 (28.6)	84 (25.9)	69 (22.0)	78 (25.3)	54 (23.2)	
35–44	379 (25.0)	64 (19.1)	83 (25.6)	92 (29.3)	82 (26.6)	58 (24.9)	
45–54	355 (23.4)	97 (28.9)	77 (23.8)	59 (18.8)	65 (21.1)	57 (24.5)	
55–64	261 (17.2)	49 (14.6)	49 (15.1)	60 (19.1)	55 (17.9)	48 (20.6)	
65+	53 (3.5)	6 (1.8)	12 (3.7)	18 (5.7)	10 (3.3)	7 (3.0)	
Sex							
Female	401 (26.5)	91 (27.1)	106 (32.7)	66 (21.0)	84 (27.3)	54 (23.2)	0.0125
Male	1,114 (73.5)	245 (72.9)	218 (67.3)	248 (79.0)	224 (72.7)	179 (76.8)	
Race/Ethnicity							
Non–Hispanic White	1,219 (80.5)	292 (86.9)	257 (79.3)	253 (80.6)	234 (76.0)	183 (78.5)	0.1655
Non–Hispanic Black	111 (7.3)	13 (3.9)	27 (8.3)	22 (7.0)	30 (9.7)	19 (8.2)	
Hispanic	169 (11.2)	28 (8.3)	37 (11.4)	37 (11.8)	40 (13.0)	27 (11.6)	
Other	16 (1.1)	<5	<5	<5	<5	<5	
Overdose Characteristics							
Drug Type							
Illicit	972 (64.2)	214 (63.7)	180 (55.6)	213 (67.8)	197 (64.0)	168 (72.1)	<0.0001
Illicit and Prescription	349 (23.0)	66 (19.6)	86 (26.5)	66 (21.0)	85 (27.6)	46 (19.7)	
Prescription	194 (12.8)	56 (16.7)	58 (17.9)	35 (11.2)	26 (8.4)	19 (8.2)	
Drug Class							
Opioid	1,308 (86.3)	290 (86.3)	286 (88.3)	272 (86.6)	256 (83.1)	204 (87.6)	0.3993
Fentanyl	1,021 (67.4)	197 (58.6)	207 (63.9)	226 (72.0)	214 (69.5)	177 (76.0)	<0.0001
Cocaine	663 (43.8)	129 (38.4)	119 (36.7)	143 (45.5)	157 (51.0)	115 (49.4)	0.0004
Alcohol	461 (30.4)	85 (25.3)	88 (27.2)	102 (32.5)	106 (34.4)	80 (34.3)	0.0337
Benzodiazepine	267 (17.6)	78 (23.2)	78 (24.1)	44 (14.0)	41 (13.3)	26 (11.2)	<0.0001
Amphetamines	74 (4.9)	10 (3.0)	14 (4.3)	13 (4.1)	21(6.8)	16 (6.9)	0.1040
Other[4]	21 (1.4)	6 (1.8)	6 (1.9)	7 (2.2)	<5	<5	0.1339
Location of overdose[5]							
Private	1,054 (69.6)	237 (70.5)	210 (64.8)	228 (72.6)	213 (69.2)	166 (71.2)	0.2190
Public	64 (4.2)	16 (4.8)	10 (3.1)	16 (5.1)	12 (3.9)	10 (4.3)	
Semi–private	66 (4.4)	9 (2.7)	17 (5.3)	15 (4.8)	18 (5.8)	7 (3.0)	
Unknown/Missing	331 (21.9)	74 (22.0)	87 (26.9)	55 (17.5)	65 (21.1)	50 (21.5)	

[1] Source: Office of the State Medical Examiners.
[2] January–July.
[3] Chi-square test.
[4] Individuals who had none of the pre-selected drug categories contributing to their cause of death were classified as other.
[5] Private included apartment or residence, semi-public included hotel, motel, shelter, nursing home, hospital, prison, group home, assisted living, or treatment facility, while public included theater, concert, show, office, park, school, bar/restaurant, roadway, or cemetery.

Figure 1. Fatal Overdoses in Rhode Island, January-July 2016-2020[1]

DISCUSSION

Consistent with national trends, Rhode Island has experienced an increase in accidental overdose fatalities in 2020 when compared to prior years.[3] Individuals who died of a fatal overdose in 2020 appear to be similar in demographic characteristics and overdose location when compared to prior years. Notably, we have seen an increase in fatal overdoses which involved illicit drugs, fentanyl, cocaine, and alcohol over time; however, 2020 is not unique in this regard.

Unfortunately, these data do not explain the increase in overdose deaths in Rhode Island that began in December of 2019. Though we are not sure why the number of overdose deaths increased, this could be due to a variety of factors, including increased potency of illicit drugs, increased polysubstance use, or factors exacerbated by COVID-19, such as reduced access to treatment, harm-reduction, and recovery support services. Additionally, it is possible that the COVID-19 pandemic simultaneously exacerbated existing stressors and isolation, which might lead to increased drug use and reduced individual's willingness to use drugs with others and/or call emergency medical services for fear of exposure.[4]

In this study, the breakdown of overdose deaths exhibited a similar demographic profile by age, sex, race/ethnicity, and overdose location to what is observed in national trends.[5,6] When comparing substances that contributed to the cause of death, Rhode Island overdose deaths had a slightly higher proportion of cases in which illicit (64.2% vs 58.7%) or a combination of illicit and prescription medications were used (23.0% vs 18.5%) when compared to national numbers.[6] By substance, opioids (86.3% vs 81.5%), fentanyl (67.4% vs 61.5%) and cocaine (43.8% vs 28.3%) were slightly higher in Rhode Island than observed nationally.[5] While our analysis shows an increase in overall deaths in 2020, it does not appear that any demographic group is disproportionally impacted when compared to prior years.

The Drug Overdose Prevention Program at RIDOH, in collaboration with sister state agencies, community-based organizations, and the Drug Overdose Surveillance Program, continues to implement various interventions aimed at preventing drug-related harm in Rhode Island. On July 28, 2020 RIDOH convened a meeting with key stakeholders and community partners in overdose hotspots to discuss how to address rising overdose deaths during COVID-19. Key strategies identified included expanding and improving coordination of targeted street outreach efforts to vulnerable populations in overdose hotspots and the establishment of overdose prevention centers. Other strategies currently supported by RIDOH include: increasing availability of harm-reduction services such as naloxone and fentanyl test strips; expansion of office-based medication for opioid use disorder; establishment of the Buprenorphine Hotline and BH Link to connect individuals to treatment 24/7; provision of buprenorphine for treatment initiation in emergency departments (EDs); embedding peer recovery specialists in the ED to connect patients to treatment, recovery and basic needs; expanding use of peer recovery and community health worker services; addressing social determinants of substance use and recovery; decriminalization of buprenorphine; one-on-one, targeted prescriber education on responsible prescribing, including the co-prescription of naloxone, and provider reimbursement for the use of non-opioid pain management strategies; supporting overdose hotspots to develop, implement, and evaluate community-level, data-driven needs assessments and overdose-prevention plans; using overdose data to develop messaging for communications campaigns to reach at-risk populations; and developing the Rhode Island Heroin Opioid Prevention Effort (HOPE) Initiative where law enforcement officers partner with peer recovery specialists to reach out to individuals after an overdose to connect them with treatment and recovery resources.

To further understand who is contributing to the increase in overdose deaths, future analyses should utilize other data sources such as the Rhode Island Prescription Drug Monitoring Program and Behavioral Healthcare, Developmental Disabilities and Hospitals treatment data to analyze buprenorphine and methadone treatment history for this population. Though we were unable to determine the prevalence of polysubstance use with these data, information from the State Unintentional Overdose Death Reporting System (SUDORS) dataset should be used in future analyses to provide insight into its role in overdose deaths in Rhode Island. Additionally, this dataset could be used to ascertain if individuals were more likely to use alone at the time of death when compared to prior years.

References

1. https://www.cdc.gov/drugoverdose/epidemic/index.html. Accessed 11/2/2020
2. Nechuta SJ, Tyndall BD, Mukhopadhyay S, McPheeters ML. Sociodemographic factors, prescription history and opioid overdose deaths: a statewide analysis using linked PDMP and mortality data. *Drug Alcohol Depend*. 2018;190:62-71. doi:10.1016/j.drugalcdep.2018.05.004
3. Katz, J., Goodnough, A., & Sanger-Katz, M. In shadow of pandemic, US drug overdose deaths resurge to record. *The New York Times.* July 15, 2020.
4. Slavova S, Rock P, Bush HM, Quesinberry D, Walsh SL. Signal of increased opioid overdose during COVID-19 from emergency medical services data. *Drug Alcohol Depend*. 2020;214:108176. doi:10.1016/j.drugalcdep.2020.108176
5. O'Donnell, J., Gladden, R. M., Mattson, C. L., Hunter, C. T., & Davis, N. L. (2020). Vital Signs: Characteristics of Drug Overdose Deaths Involving Opioids and Stimulants—24 States and the District of Columbia, January–June 2019. *Morbidity and Mortality Weekly Report*, *69*(35),1189.
6. Mattson CL, O'Donnell J, Kariisa M, Seth P, Scholl L, Gladden RM. Opportunities to Prevent Overdose Deaths Involving Prescription and Illicit Opioids, 11 States, July 2016-June 2017. *MMWR Morb Mortal Wkly Rep*. 2018;67(34):945-951. Published 2018 Aug 31. doi:10.15585/mmwr.mm6734a2

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

VITAL EVENTS	REPORTING PERIOD		
	JUNE 2020	12 MONTHS ENDING WITH JUNE 2020	
	Number	Number	Rates
Live Births	937	11,198	10.6*
Deaths	953	11,505	10.9*
Infant Deaths	2	59	5.3#
Neonatal Deaths	1	47	4.2#
Marriages	367	5.477	5.2*
Divorces	165	2,631	2.5*

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

Underlying Cause of Death Category	REPORTING PERIOD			
	DECEMBER 2019	12 MONTHS ENDING WITH DECEMBER 2019		
	Number (a)	Number (a)	Rates (b)	YPLL (c)
Diseases of the Heart	233	2,454	231.6	3,426.5
Malignant Neoplasms	186	2,279	215.1	5,124.0
Cerebrovascular Disease	40	466	44.0	447.5
Injuries (Accident/Suicide/Homicide)	76	895	84.5	12,285.5
COPD	42	509	48.0	592.5

(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 1,056,298 (www.census.gov)
(c) Years of Potential Life Lost (YPLL).

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

Are *you* e-reading

RIMS NOTES: *News You Can Use*

RHODE ISLAND MEDICAL SOCIETY

Friday, June 19, 2020

RIMS NOTES: NEWS YOU CAN USE

Welcome to the current issue of *RIMS Notes*, an exclusive member benefit. At this time, we are focusing our efforts on delivering timely information on COVID-19. Please check our website for up-to-the-hour updates, and your inbox for breaking news.

Volume 6 - Number 13

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A Message from RIMS President

MEDICAL SOCIETY STATEMENT ON DEATH OF GEORGE FLOYD Attached is a statement of the Rhode Island Medical Society regarding recent events.

Advocacy

June is Pride Month. Click here for a brief reflection on the significance for organized medicine.

GENERAL ASSEMBLY: Both chambers returned to the State House this week to pass a supplemental budget for the current state fiscal year that ends on June 30, and bills specific to certain cities and towns. The State House remained closed to the public. Leadership is targeting the week of July 13 to re-convene to finish crafting a new state budget for FY 22 and to deal with some of the large amount of proposed legislation that was left up in the air when the Governor declared the COVID-19 public health emergency in mid-March.

Physician Wellness and Stress

Physician Support Line for physicians and other healthcare workers:

- **Care New England/Lifespan Support Hotline for ANY healthcare worker: 401-606-6000**
- **National Physician Support Line: 888-408-0141 (9:00 AM to 3:00 AM next day EST)**
  https://www.physiciansupportline.com/

The Physician Support Line was created in March to provide confidential peer-to-peer support for MD's/DO's working on the frontlines of COVID-19. The Line is staffed by over 700 volunteer psychiatrists from across the country seven days per week.

What's New from the AMA

US Health and Human Services to distribute $15 billion to eligible Medicaid and CHIP physicians and organizations. Webcasts on 6/23 and 6/25 for interested physicians. Registration is required.

Q: Why is there a new Provider Relief Fund Payment Portal?
A: Portal will initially be used for new submissions from Medicaid and Children's Health Insurance Program (CHIP) providers seeking payments under the Provider Relief Fund starting Wednesday, June 10, 2020. At this time, this portal will serve as the point of entry for providers who have received Medicaid and CHIP payments in 2017, 2018, 2019 or 2020 and who have not already received any payments from the $50 billion Provider Relief Fund General Distribution.

What's New

Kathleen Boyd, MSW, LICSW, Director of RIMS' Physician Health Program, has been elected to the Board of Directors of the Federation of State Physician Health Programs (FSPHP). The FSPHP is an independent, non-profit, professional organization that supports education and research and promotes best practices to enhance the effectiveness of its 40 state physician health program members. Ms. Boyd also serves on the Performance Enhancement and Effectiveness Review (PEER) Committee of the FSPHP.

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Contact Dulce Cosme if you've missed an issue, dcosme@rimed.org.

Working for You: RIMS advocacy activities

November 2, Monday

American Medical Association (AMA) conference call with State Medical Society lead staff members regarding vaccine distribution

Rhode Island Department of Education (RIDE) conference call regarding Medical Preparatory (MEDPREP) Charter school: Bradley Collins, MD

RIMS Board of Directors meeting: Catherine A. Cummings, MD, President (via teleconference)

November 3, Tuesday

Election Day

RIMS Physician Health Committee: Herbert Rakatansky, MD, Chair (via teleconference)

November 5, Thursday

Joint Underwriting Association of RI Board of Directors: Newell Warde, PhD

November 6, Friday

Overdose Prevention Center call regarding letter to the Governor

November 9, Monday

Governor's Overdose Intervention and Prevention Task Force: Sarah Fessler, MD, RIMS Past President

Interview with Department of Behavioral Health, Developmental Disabilities and Hospitals (BHDDH) regarding Governor's Overdose Task Force: Catherine A. Cummings, MD, President

November 10, Tuesday

Governor's Overdose Intervention and Prevention Taskforce: Harm Reduction Work Group

New England Medical Society Executives conference call

November 11, Wednesday

Veteran's Day

November 12, Thursday

Office of the Health Insurance Commissioner (OHIC) Telemedicine Advisory Group: Peter Hollmann, MD, Past President

Rhode Island Public Health Association annual meeting

November 13, Friday

Overdose Prevention Center call regarding letter to the Governor

November 14–17, Saturday–Tuesday

AMA Interim meeting: Peter Hollmann, MD, Senior Delegate; Alyn Adrain, MD, Delegate; Sarah Fessler, MD, Alternate Delegate; Catherine A. Cummings, MD, Alternate Delegate

November 16, Monday

RIMS – BCBSRI Meeting: Catherine A. Cummings, MD, President; Elizabeth Lange, MD, President-elect

November 17, Tuesday

OHIC Payment and Care Delivery Advisory Committee: Elizabeth Lange, MD, President-elect; Peter Hollmann, MD, Past President

November 18, Wednesday

DOH Primary Care Physician Advisory Committee: Elizabeth Lange, MD, President-elect

DOH Board of Medical Licensure and Discipline (BMLD)

November 19, Thursday

Health Information Technology 2020–2021 Survey Design Working Group

November 20, Friday

Overdose Prevention Center conference call

November 26, Thursday

Thanksgiving

November 30, Monday

RIMS Board of Directors meeting (via teleconference)

RIMS CORPORATE AFFILIATES

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 Marc Bialek for more information: 401-331-3207 or mbialek@rimed.org

www.nhpri.org

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

www.ripcpc.com

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

RIMS gratefully acknowledges the practices who participate in our discounted Group Membership Program

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We are read everywhere

In 2020 to date, more than **17,500** readers from more than **122** countries have read articles in the *Rhode Island Medical Journal* (RIMJ) or researched its archives. More than **9,400** others have accessed full-text pdfs via the PubMed Linkout feature.

Top 10 countries in November 2020:

1. US
2. Canada
3. UK
4. Australia
5. Germany
6. India
7. Finland
8. United Arab Emirates
9. China
10. Netherlands

BRECKENRIDGE, COLORADO

East Coast native **Neil Rubinstein**, who spent much of his professional career working for Pfizer Animal Health, reads the latest issue of the *Rhode Island Medical Journal*, in Breckenridge, Colorado, where he now lives. He is on the staff of the Breckenridge Outdoor Education Center in its adaptive skiing and snowboarding program for people with disabilities and special needs. This year the program has adapted to the COVID-19 pandemic, and has initiated safety protocols, which include mask wearing, reduced capacity, daily health screenings and social distancing. [PHOTOS BY PHYL GREENBLATT RUBINSTEIN]

Wherever you happen to be quarantining or social distancing, visit the Journal on your mobile device, and send us a photo: **mkorr@rimed.org**.

Through Plagues and Pandemics: The Evolution of Medical Face Masks

KELLY PAN, ANUVA GOEL, LILIANA R. AKIN, SUTCHIN R. PATEL, MD, FACS

KEYWORDS: face masks, pandemic, COVID-19

Paul Fürst, engraving, c. 1721, of a plague doctor of Marseilles (introduced as 'Dr. Beaky of Rome'). His nose-case is filled with herbal material to keep off the plague. [CC-PD]

PLAGUES AND PANDEMICS

The first face masks were created to combat the earliest plagues. The Bubonic Plague, otherwise known as the Black Death, spread throughout the Roman Empire in the 6th Century AD.[1] When Gregory I became Pope in 590 AD, an outbreak was reaching Rome. To combat the disease he ordered unending prayer. At the time, sneezing was thought to be an early symptom of the plague, thus stating "God bless you" became a common phrase spoken to help halt the disease.[2]

The plague ravaged Europe and Asia from the 14th to the 17th Centuries and is estimated to have killed 200 million people in the 14th Century alone.[2] Plague doctors wore the iconic bird-beak masks in which the beaks were filled with a mixture of herbs such as garlic and rue to block the odors of the dead and dying that were ever-present.[1,4] This form of protection was thought to neutralize the "miasma" in the air which was thought to be the cause of the illness.[3]

In 1867, the British surgeon **JOSEPH LISTER** (1827–1912) brought about the age of antisepsis, championing the use of carbolic acid to sterilize surgical instruments and clean wounds. At the time, **LOUIS PASTEUR** (1822–1895), the French microbiologist and chemist, had recently described the presence of germs as the microscopic source of infection. Lister suggested eliminating germs through the use of antiseptic substances.[6]

JOHANN MIKULICZ-RADECKI (1850–1905), Chair of the Department of Surgery at the University of Breslau, worked with local bacteriologist, **CARL FLÜGGE** (1847–1923), who showed that ordinary conversation could disseminate respiratory droplets with bacteria. This led Mickulicz-Radecki to create and wear a face mask in 1897, which he described as a "piece of gauze tied by two strings to the cap, and sweeping across the face so as to cover the nose, mouth and beard."[6]

The Manchurian Plague, 1910–1911

The Manchurian Plague of 1910–1911 started along the Russian border of Manchuria, an area of Northeast Asia, and quickly spread south along the railways. The pneumonic form of plague killed every person it infected. Most believed it was spread by rodents so the idea that it was airborne caused fear. The masks during the Manchurian Plague consisted of a 4x6 inch cotton rectangle secured over the mouth by a long piece of gauze. The gauze was folded so that the rectangle was contained within the gauze lengthwise. The ends of the gauze were then cut so that one end had two flaps and the other had an opening for the flaps to tie into behind the head. The flaps and opening were placed around the ears, similar to modern face masks, to secure the mask in place. The ends were then tied together to finish the contraption.[4] The final product was similar in appearance to a modern day cotton face mask, but the covering over the mouth and nose area were thicker than they are now. The mask was made for the entire population; however, the harsh winter conditions may have adversely affected the efficacy of the mask.[4] This plague and the widespread usage of masks had a cultural effect on the Manchurian population. The collective effort by the population to wear masks in order to curb the epidemic led to a shift from the belief in superstitions and the supernatural towards an acceptance of science to help combat the plague.[4]

The Spanish Influenza of 1918–1919

The Spanish Influenza of 1918–1919 brought worldwide hardship and halted the normalcy of everyday life. The Spanish Flu did not originate in Spain, but because Spain was a neutral country in World War I with a free media; the outbreak was covered from the start, with it being first reported in May of 1918. During this time, there was a shortage of healthcare workers because those caring for the sick were themselves ill with the virus. The First World War added to the severity of the pandemic as soldiers' immune systems, already weakened by the stress and ravages of war, allowed the virus to spread throughout the trenches. Increased travel due to the war effort further contributed to the spread of the

virus.[2] Deaths worldwide were estimated to be 50 million, with 675,000 deaths in the United States.[7] During the 1918–1919 influenza pandemic, masks were mandatory for medical workers, police officers, and in certain American cities (citizens in San Francisco were fined $5 if they were caught in public without a mask), but the mandate of face masks was not without protest.[5] By this time, most masks were made of layers of cotton gauze with occasionally another layer of a less porous material surrounded by a metal frame. Furthermore, these masks were reusable and could be sterilized.[5] The 1918–1919 influenza pandemic ended approximately 18 months after its outbreak. The wearing of face masks was thought to have played an important role in helping stop the spread of the disease during its course.[2]

THE DEVELOPMENT AND EVOLUTION OF FACE MASKS

As discussed earlier, one of the first surgical masks, composed of a single layer of gauze, was described by Johann Mikulicz-Radecki in 1897. In 1899, Flugge, who was working with tuberculosis, demonstrated that ordinary conversation could disseminate bacteria-filled droplets from the nose and mouth. The droplet theory of infection substantiated the need for an effective face mask. In 1905, **ALICE HAMILTON** (1869–1970), a Chicago physician, proposed that scarlet fever was transmitted through droplet infection and recommended doctors wear masks at the time of surgery because of heavy droplet transmission from the mouth and nose while talking and teaching. This may have been the first recommendation that surgeons wear masks. While the use of gauze face masks to protect patients against wound infections was widespread in operating rooms by the late 1920s, the following decade saw a burst of innovation in surgical mask design. Some designs were especially creative: one mask proposed in 1930 consisted of a 14-karat gold-filled frame covered with wax paper, and another consisted of a paper napkin, two paper clips or safety pins, and two rubber bands. The introduction of antibiotics in the 1940s briefly decreased interest in surgical masks, but it was soon discovered that antibiotics were not a substitute for good aseptic technique.[8]

The standardization and testing of surgical face masks began in earnest in the 1950s, establishing the basis for our present-day practices. Numerous tests were conducted to assess the effectiveness of masks in preventing the dissemination of germs from the wearer. Some tests involved placing petri dishes or glass slides at varied intervals from an individual to pick up exhaled germs. Other more tech-savvy tests visualized droplets and aerosols using high-speed cameras and strobe lights. Many of the principles established by these tests remain important to keep in mind today. For instance, it was discovered that the closeness of fit of the mask to the face is just as important as the material, that semi-porous filtering masks are more effective than nonporous deflector masks, and that masks quickly lose their filtration capability once wet.[9]

In the modern era, there has been a scarcity of experimental evidence to support the effectiveness of face masks in the prevention of surgical site infections.[6] What literature there is on the subject is dated and has had poorly explained methodology. Furthermore, it is uncertain that the results of these studies can be extrapolated to today given the usage of new antiseptic techniques since their completion. Face masks have also been thought to have utility in that they act as a physical barrier against blood and bodily fluid splashes during surgery. Despite clear evidence that face masks act to protect the staff from macroscopic facial contamination, there are studies that suggest that they fail to protect surgeons from sub-micrometer contaminants. The use of face shields may help mitigate this risk. Given that there has been little evidence that face masks cause harm, proponents err on the side of caution and encourage their continued use, stressing there is no room for complacency when it comes to both patient and surgeon safety.

The Hawk's Nest Tunnel disaster

Respirator-type masks that protect the wearer from inhaling pathogens have become heavily associated with the medical field today during the COVID-19 pandemic. These respirators were originally developed in the mining industry. In 1919, the U.S. Bureau of Mines (USBM) began working to address the high fatality rate of mineworkers by establishing the first respirator certification program.[10] From the beginning, inequalities existed in workers' access to respiratory protection, as exemplified by one of the deadliest disasters in American industrial history, the Hawk's Nest Tunnel disaster of the 1930s. From 1930–1935, three thousand men, the majority of whom were Black migrant workers from the South, worked on the construction of a tunnel near Gauley Bridge, West Virginia. In the construction process, they found the mineral silica and were forced to mine it without any respiratory protection. As a result, an estimated one-third of the workers died from acute silicosis and related conditions. Notably, the dangers of silica dust were well-known to the company, as their engineers wore respirators inside the tunnel.[11] The disaster accelerated the adoption of standards for dust, fume, and mist respirators, but it was not until the passage of the Occupational Safety and Health Act of 1970 that the federal government began requiring employers to provide adequate respiratory protection to all workers.

In 1972, the USBM approved the first single-use N95 respirator, which is the respirator-type mask that many of us are familiar with today. The designation of "N95" is a government efficiency rating that means the mask blocks about 95 percent of particles that are 0.3 microns in size or larger.[12] The material in these respirators is designed to trap small particles using a method called corona electrostatic charging, which allows the fabric to filter particles ten times more efficiently than uncharged fabrics. The importance of the electrostatic charge also means that a wet N95 mask loses its effectiveness. The

adoption of respirator-type masks in the medical field began in the 1990s, when healthcare workers began wearing them to protect themselves from drug-resistant tuberculosis, and their use in healthcare and other industries continues to the present day. Unfortunately, with the scarcity of personal protective equipment during the COVID-19 pandemic, complaints of unequal access to respiratory protection in the workplace have again arisen, with accounts of allied health professionals, interpreters, and room cleaners not receiving the same level of protection as doctors and nurses, despite their equally close contact with COVID-19 patients.[13]

FACE MASKS TODAY

SARS-CoV-2 is a viral respiratory illness, which has grown within six months from an outbreak in Wuhan, China to a pandemic that has claimed over a million lives. To stem the spread of the virus, face masks have been one measure at the center of the debate around health guidance, in addition to social distancing, shut-downs, testing, and quarantining.

The guidance around mask usage, through the World Health Organization (WHO) and the United States Centers for Disease Control and Prevention (CDC), has shifted over the course of the pandemic. These shifts are attributed to new evidence that has come to light on the asymptomatic transmission of SARS-CoV-2, whereby an infected individual can spread the virus through aerosol, before or without the presence of symptoms.[14] The initial WHO recommendations, in January 2020, recommended medical mask use only for individuals with respiratory symptoms and for healthcare workers.[15] However, by June 2020, the agency's guidance was recommending cloth mask use among the general population, with medical mask use still restricted for vulnerable populations, those with respiratory symptoms, and healthcare workers.[16]

Despite the recent WHO guidance, the implementation of these guidelines has varied geographically. In China, mask usage reflected cultural norms around hygiene and collective health benefits. In contrast, in countries like the United States, which value individualism, mask-wearing had not initially been readily accepted.[17] The lack of compliance conveys an urgency to communicate proper information about mask type and usage to the U.S. population. There are several types of masks that are being commonly used during the pandemic, including medical masks (such as N95 respirators and surgical masks) and cloth masks, often made out of common household materials, such as bandanas or T-shirts. The varying characteristics of mask materials affect their effectiveness, particularly in the context of source control, restricting an infected person's viral shedding to protect others in close proximity.[14,16]

N95 respirators, reserved primarily for healthcare workers, are made of multiple fibers of polymer, and have the added benefit of protecting the wearer with a nearly one hundred percent filtration efficiency.[18] With the shortage in the supply of personal protective equipment (PPE), even healthcare workers were finding a need to reuse these masks. However, a recent study found that autoclave sterilization procedures reduced the filtration efficiency of N95 respirators, particularly for small- to medium-sized particles, indicating that multiple uses of these masks come with disadvantages to personal safety.[19] The N95 mask with a valve is a variation that is also being commonly used. However, this mask has a one-way filtration system, such that, contrary to the source control method, it only protects the wearer by filtering inhaled air, without conferring protection to people nearby.[14] Thus, for public health purposes of mitigating COVID-19 spread, this type of mask should be avoided. Surgical masks are made of multiple layers of propylene, and demonstrate a filtration capability not by physically blocking the particle through Van der Waals interactions with the fibers, but rather by creating an electrostatic charge difference between the fiber and particle.[18] However, exposure to moisture, perhaps from long-term use, sterilization procedures, or other means, could reduce the electrostatic nature of the mask, reducing its effectiveness.[19]

Cloth masks, recommended for use for the general public, are less effective at protecting the wearer, but can substantially reduce spread of the virus. A recent study visualized the spread of aerosol particles ejected from respiratory jets by utilizing mask-wearing mannequins and found that each cloth mask reduced propulsion by at least half the distance of an uncovered individual.[20] Although bandanas had the highest thread count per inch, they only reduced propulsion to 4 feet, while a folded handkerchief limited propulsion to just over one foot, and a stitched mask made of quilting cotton limited propulsion to just 2.5 inches. Thus, aside from thread count, a greater number of layers of material in the mask also contributes to limiting propulsion, while increasing filtration efficiency as well, although an increase in layers can reduce mask breathability.[18,20] Even though cloth masks do not match the efficacy of N-95 respirators and surgical masks, expansive use of these masks can drastically reduce spread.[14] Mask fit and placement play an important role in preventing droplet escape. The most common sites of droplet escape include the top of a mask (which can be seen as fogging of glasses or eye protection) when there is not a tight fit at the nose as well as from the sides of the mask by the cheeks.[20] Curtailing the spread of the virus requires wearing a mask when there is limited social distancing, and keeping the mask covering the mouth and nose while speaking, to limit droplet propulsion. Our understanding of how to best utilize face masks and their effectiveness continues to evolve. We thus recommend checking up to date information on the websites for the CDC (https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html) and WHO (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks).

Mask wearing is not a new phenomenon when it comes to protecting ourselves from pandemics. People have used masks for hundreds of years in an early, but not completely understood, attempt to halt the spread of disease. Progressively we have begun to better understand the science behind protective equipment since the last pandemic at the beginning of the 20th century. From the Black Death to the Manchurian Plague to the 1918–1919 Influenza Pandemic to the COVID-19 Pandemic today, the use of facial coverings has been a simple but powerful tool to help combat infectious disease. ❖

References

1. Archaeological Medica XLVI. How our Forefathers Fought the Plague. Br Med J. 1898;2:903-908.
2. Patrick BK, Thompson JM. An Uncommon History of Common Things. National Geographic. 2009; p.74.
3. Snowden F. Plague I-III. Hist 234: Epidemics in Western Society since 1600s. Lecture conducted from Yale University, New Haven, CT. 2010. (https://oyc.yale.edu/history/hist-234#overview Accessed July 20, 2020)
4. Lynteris C. Plague Masks: The Visual Emergence of Anti-Epidemic Personal protection Equipment. Med Anthropol, Aug/Sep2018;37(6):442-457.
5. Schlich T, Strasser BJ. A History of the Medical Mask and the Rise of Throwaway Culture. The Lancet. 2020; 396(10243):19-20.
6. Da Zhou C, Sivathondan P, Handa A. Unmasking the Surgeons: The Evidence Base Behind the Use of Face masks in Surgery. Journal of the Royal Society of Medicine; 2015, Vol. 108(6):223–228.
7. CDC. 1918 Pandemic (H1N1). March 20, 2019. https://www.cdc.gov/flu/pandemic-resources/1918-pandemic-h1n1.html
8. Spooner JL. History of Surgical Face Masks: The myths, the masks, and the men and women behind them. AORN Journal. 1967;5(1):76-80.
9. Rockwood CA, O'Donoghue DH. The Surgical Mask: Its Development, Usage, and Efficiency: A Review of the Literature, and New Experimental Studies. AMA Arch Surg. 1960;80(6):963-971.
10. 100 Years of Respiratory Protection History. NPPTL, NIOSH, CDC. Published June 3, 2020. (https://www.cdc.gov/niosh/npptl/Respiratory-Protection-history.html Accessed July 16, 2020)
11. Crandall RE. Revisiting the Hawks Nest Tunnel Incident: Lessons Learned from an American Tragedy. Journal of Appalachian Studies. 2002;8(2):261-283.
12. N95 Respirators and Surgical Masks. Blogs, CDC.(https://blogs.cdc.gov/niosh-science-blog/2009/10/14/n95/ Accessed July 19, 2020)
13. 'They don't let us use masks. They say we don't need them.' Center for Public Integrity. (https://publicintegrity.org/health/coronavirus-and-inequality/low-profile-hospital-workers-bemoan-their-COVID-19-risk/ Accessed July 19, 2020)
14. Gawande A. Amid the Coronavirus Crisis, a Regimen for Reentry. *The New Yorker*. May 13, 2020.
15. World Health Organization. Advice on the use of masks in the community, during home care and in healthcare settings in the context of the novel coronavirus (2019-nCoV) outbreak. June, 5 2020. (https://www.who.int/publications/i/item/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak. Accessed July 21, 2020)
16. World Health Organization. Advice on the use of masks in the context of COVID-19. April 6, 2020. (https://apps.who.int/iris/handle/10665/331693. Accessed July 21, 2020)
17. Katz J, Sanger-Katz M, Quealy K. A Detailed Map of Who Is Wearing Masks in the U.S. *The New York Times*. July 17, 2020.
18. Zangmeister CD, Radney JG, Vicenzi EP, Weaver JL. Filtration Efficiencies of Nanoscale Aerosol by Cloth Mask Materials Used to Slow the Spread of SARS-CoV-2 [published online ahead of print, 2020 Jul 7]. *ACS Nano*. 2020.
19. Grinshpun SA, Yermakov M, Khodoun M. Autoclave Sterilization and Ethanol Treatment of Re-used Surgical Masks and N95 Respirators during COVID-19: Impact on their Performance and Integrity [published online ahead of print, 2020 Jun 26]. J Hosp Infect. 2020;105(4):608-614.
20. Verma S, Dhanak M, Frankenfield J. Visualizing the effectiveness of face masks in obstructing respiratory jets. Phys Fluids 2020;32(6):061708.

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Planning a post-war, mid-century hospital in Kent County

Kent District Medical Society takes lead in planning memorial hospital

MARY KORR
RIMJ MANAGING EDITOR

World War ll had just ended and the suburban explosion and burgeoning "Baby Boom" generation was in its nascent stages. In Kent County, plans for a hospital were taking shape. The January 1946 issue of the *Rhode Island Medical Journal* (RIMJ), published by the Rhode Island Medical Society (RIMS), supported the concept in an editorial, which stated:

> *"With the City of Warwick and surrounding towns planning memorials for returning veterans, it would appear that no finer tribute could be planned than for each community to contribute a unit to a Memorial Kent County Hospital for the improvement of health service to every citizen."*

Editorials in subsequent RIMJ issues cited the demographics of the County and the need for expanded medical care:

> *"The excellent state highways that have enabled the city worker to move his residence outside of the Greater Providence area …The area to be serviced has grown in stature in recent years. An estimated 60,000 persons reside within the county, with a projected growth of 100,000 in five years. It is encouraging that the city of Warwick and surrounding towns have accepted the responsibility for providing a hospital local to Kent County."*

Kent County was located between hospitals in Providence and the 62-bed South County Hospital in Wakefield, and RIMJ editorials called for this "vital extension of medical care in the state's second most populous county." In addition, the development of voluntary hospitalization insurance and the "35,000 subscribers to Blue Cross in Kent County" was a positive factor.

At the same time, the Kent County Medical Society was experiencing growth in membership. Its 34 physicians provided "a fine nucleus for the staffing of the hospital," one RIMJ editorial pointed out.

Kent County Medical Society

In 1946, members of the Kent County Medical Society voted on forming a committee, which included local citizens from its constituent towns of Warwick, West Warwick, Coventry, East Greenwich and West Greenwich to investigate "the possibility of elevating a Memorial Hospital in Kent County to be named Kent County Memorial Hospital."

Kent County Medical Society executive officers **WHITMAN MERRILL, MD**, president; **PETER ERINAKES, MD**, vice president; **JEANNETTE E. VIDAL, MD**, secretary, and **JOHN M. MACK, MD**, treasurer, led the effort, which culminated in legislation passed by the Rhode Island General Assembly in April 1946 to incorporate Kent County Memorial Hospital.

Kent County physicians, citizens, civic and organization leaders, as well as veterans' groups, participated in an active

Jeannette E. Vidal, MD: A Warwick Leader in Healthcare

Seventy-three years ago this month, at the December 7, 1947 meeting of the Kent County Medical Society held at the Greenwich Club, East Greenwich, the slate of officers for the 1948 year was elected; **Jeannette E. Vidal, MD**, (1918–2003) of West Warwick was named president.

The *Rhode Island Medical Journal* took note of the appointment in a column titled "Women Physicians." It stated:

> *"For the second time within three years a district medical society has honored a woman physician with its presidency. In 1945, it was Washington County that named Dr. Frances A. Kenyon as its leader.*
>
> *The honor to Dr. Vidal is particularly significant in view of the fact that the Kent County Society has taken leadership in the campaign for a hospital in that area, and with the fundraising phase of the program being launched this month the president of the district medical society is certain to draw added important duties."*

The article noted her qualifications as a member of the Rhode Island Medical Society's public laws and medical economics committee. She was also a member of the American Medical Association, the American Medical Women's Association, and the World Medical Association.

Dr. Vidal was the daughter of Judge George N. Vidal and Elmina Vidal. Census records of 1940 show she was 22 years old, and lived with her parents and brother George at 416 St. John Street in West Warwick.

She was a graduate of Rivier College, in Nashua, NH, in 1937, and received an MD cum laude from the University of Montreal in 1943. She was on the staff of Rhode Island Hospital serving as assistant physician in the Department of Medicine and later Kent County Memorial Hospital.

She also took an active role in the Mid-Century White House Conference on Youth and Children and served on the Rhode Island Dept. of Health Rheumatic Fever Programs, and at Kent County Memorial Hospital, serving as medical director of its research program.

She was awarded an honorary doctorate in science from Rivier College in 1964 for her contributions to social, scientific and philanthropic leadership.

Her entire professional career was spent tending to the healthcare needs of the citizens of West Warwick, where she and her medical assistant saw patients for more than half a century. ❖

The land for Kent County Memorial Hospital was donated by **Col. Patrick H. Quinn**, a native of Phenix, town of Warwick, and a prominent Rhode Island attorney and probate judge in Warwick.
[CARROLL, CHARLES. *RHODE ISLAND: THREE CENTURIES OF DEMOCRACY*, VOL 3, NEW YORK: LEWIS HISTORICAL PUB. CO.,1932.]

campaign to raise $800,000 for the proposed hospital to be located on Toll Gate Road, midway between Westcott and Apponaug, on a site donated by Warwick native and prominent attorney, **COL. PATRICK H. QUINN**. The Kent Medical Society was instrumental in developing proposed bylaws, and rules and regulations for the hospital and its staff. Representative citizens were solicited to form a Board of Trustees; **ARTHUR H. RUGGLES, MD**, Superintendent of Butler Hospital in Providence, was selected chairman.

Donations to the hospital

At the November 1949 meeting of the Kent Medical Society, held at the office of **DR. PETER ERINAKES**, it was reported that the Veterans of Foreign Wars of East Greenwich "are offering an iron lung for the new hospital and one could be obtained from the National Foundation." However, **DR. ARTHUR HARDY** suggested that someone be appointed to speak at the next meeting of the VFW and propose an alternative gift, such as a blood bank. **DR. GEORGE YOUNG** was appointed to the task, and the idea was met with enthusiasm when he and **DR. ORLAND SMITH** visited the Post. It was also noted that the Warwick Kiwanis Club was interested in donating an incubator.

The December 1949 annual meeting of the Society reported on the start of the construction of the hospital, which ultimately opened its doors in 1951. A year later, at the monthly meeting of the Kent Medical Society in February 1952, it was voted that a plaque be installed on the outside of the hospital stating that the Kent County Memorial Hospital was so named in memory of all the residents who served in World War ll.

If a hospital can be described as a "Baby Boomer," Kent is surely one, nearing its 70th birthday in 2021. ❖

Arthur H. Ruggles, MD

KENT COUNTY MEMORIAL HOSPITAL

Architects—Howe, Prout, & Ekman of Providence
Consultants—Neergaard & Craig of New York

GROUND FLOOR—Main Unit: Kitchen, dining rooms, storage, locker rooms, etc. Wing Unit: Out-patient clinics (eye, ear, nose and throat, dental, etc.), X-ray department, laboratories, physiotherapy department.

FIRST FLOOR—Main Unit: Patient rooms (private, semi-private, 4-bed). Wing Unit: 3 operating rooms, 2 delivery rooms, all surgical and obstetrical facilities.

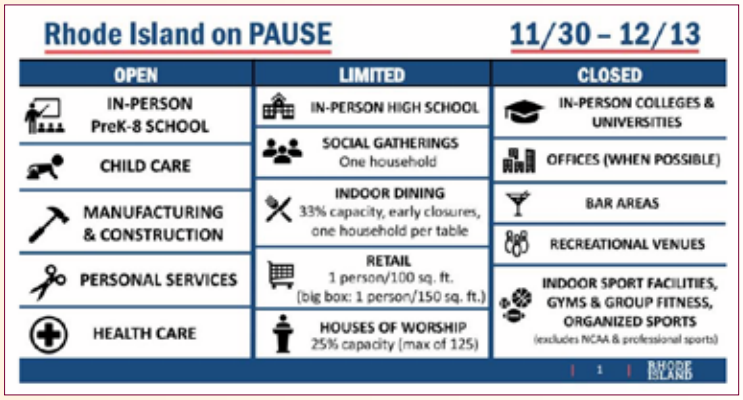
SECOND FLOOR—Patient rooms.

THIRD FLOOR—Maternity; patient rooms and nurseries.

Minimum capacity of 75 beds. Fund-raising campaign for $800,000 now under way. Hospital to serve the 60,000 residents of Kent County, which includes Warwick, West Warwick, Coventry, East Greenwich, West Greenwich. Hospital to be built on Tollgate Road, between Apponaug and Westcott, on property donated by Colonel Patrick H. Quinn.

This sketch of the future Kent Hospital appeared in the April 1948 issue of RIMJ. Chartered by the State of Rhode Island in 1946, Kent opened with 90 beds in 1951.

As COVID cases surge, RI 'paused' and poised to open two field hospitals



At Governor Gina M. Raimondo's press conferences on November 19th and 25th, she announced a statewide two-week "pause" which started November 30th. During that two-week period, restrictions shown in this graphic will take effect. The goal is to reduce the strain on hospitals, given that new hospitalization rates have tripled over the past five weeks and at this rate, it is unsustainable and hospitals won't have the capacity or staff.

Governor Gina M. Raimondo's said at her press conference on November 25th that COVID-19 cases are threatening to strain or overwhelm hospitals, and that plans are underway to potentially open two field hospitals at the discretion of hospital officials. The state is prepared to open the 353-bed Cranston site (shown above and below), which is operated by Care New England (CNE), at the former Citizen's Bank facility at Sockanosset Cross Road in Cranston, and the field hospital at the Rhode Island Convention Center, operated by Lifespan (bottom right).

Cranston site will open for lower acuity COVID patients

Last Wednesday, on Nov. 25th, **JAMES E. FANALE, MD**, President and CEO, Care New England, said CNE will open its site this week. "As healthcare systems across the nation are taxed, due to the COVID-19 pandemic, surge site locations nationally are being activated to handle the additional number of patients who need care. Currently, Care New England's Kent Hospital, is close to capacity, therefore in the best interest of our patients, CNE will open its field hospital early next week. This will insure that our patients receive the attention and care they need, in a safe environment," he said.

"At the Cranston field hospital location, Care New England medical experts and operations professionals have been testing and running drills to ensure that we can provide the medical care they deserve without compromising quality or safety. Initially, lower acuity patients with COVID-19 will be transferred to the Field Hospital from Kent Hospital to continue their hospitalization and recovery. We feel that this will allow us to care for all the patients who are seeking medical attention at Kent Hospital," said **PAARI GOPALAKRISHNAN, MD**, Chief Medical Officer, Kent Hospital. Dr. Gopalakrishnan will be running operations at the Cranston field hospital. ❖

(Right) Inside the field hospital at the Rhode Island Convention Center, with a capacity of approximately 600 beds to care for lower acuity patients or patients transitioning out of hospital. The convention center's main display space has been transformed into four wards comprised of 28 pods, each with 24 beds; walls and a curtain separate each individual "unit."

(Left) **Dr. Selim Suner,** on the staff at Rhode Island Hospital, and the Director of Disaster Medicine and Emergency Preparedness in the Department of Emergency Medicine, spearheaded the convention center transformation.

RI among 4 states picked by Pfizer for pilot program to study vaccine delivery, deployment

NEW YORK – On November 16, Pfizer announced the U.S. COVID-19 Immunization Pilot Program with four states, to help refine the plan for the delivery and deployment of the company's COVID-19 vaccine candidate that is being co-developed with BioNTech.

The four states – Rhode Island, Texas, New Mexico, and Tennessee – were selected for the program because of their differences in overall size, diversity of populations, and immunization infrastructure, as well as the states' need to reach individuals in varied urban and rural settings. The four states included in this pilot program will not receive vaccine doses earlier than other states by virtue of this pilot, nor will they receive any differential consideration.

To build on its coordination with the relevant U.S. agencies, Pfizer launched this pilot program to help better support the states' planning, deployment, and administration of the COVID-19 vaccine candidate. Learnings from this program will be adapted for usage across other states to help them create effective immunization programs for this vaccine.

Pfizer has been working with U.S. officials in Operation Warp Speed (OWS) and the U.S. Centers for Disease Control and Prevention (CDC) to help ensure that after potential authorization or approval, the Pfizer-BioNTech COVID-19 vaccine can reach those in most need as quickly and equitably as possible. The company believes this ongoing coordination is critical to help ensure an efficient vaccine distribution as soon as possible after the vaccine receives regulatory authorization or approval, if received.

"This pilot program and our collaboration with U.S. and state officials will help us prepare for broader vaccine deployment in the near future, subject to authorization or approval, as we work to address this urgent public health need," said **ANGELA HWANG**, Group President, Pfizer Bio Group President, Pfizer Biopharmaceuticals Group. "We are hopeful that results from this vaccine delivery pilot will serve as the model for other U.S. states and international governments, as they prepare to implement effective COVID-19 vaccine programs."

In July, Pfizer and BioNTech announced the execution of an agreement with the U.S. Department of Health and Human Services and the Department of Defense to meet the U.S. government's OWS program goal to begin delivering 300 million doses of a vaccine for COVID-19 in 2021. Under the agreement, the U.S. government will first receive 100 million doses of the Pfizer-BioNTech COVID-19 vaccine after Pfizer successfully manufactures and obtains approval or emergency use authorization from the U.S. Food and Drug Administration (FDA). The U.S. government will pay $1.95 billion for those first 100 million doses, with the option to acquire up to an additional 500 million doses.

Pfizer's COVID-19 vaccine development and manufacturing costs have been entirely self-funded, with billions of dollars already invested at risk. The company will continue bearing all the costs of development and manufacturing in an effort to help find a solution to this pandemic as fast as possible. ❖

AMA strengthens policy to combat spike in national drug shortages

CHICAGO – In response to an uptick in national drug shortages that threaten patient care and safety, physicians at the American Medical Association's (AMA) Special Meeting of its House of Delegates (HOD) adopted policy underscoring drug shortages as an urgent public health crisis. The move reinforces and builds upon existing AMA policy that outlines a comprehensive framework to address ongoing drug shortages, which have been exacerbated during the COVID-19 pandemic.

The newly enhanced policy updates the AMA's approach to mitigating drug shortages, specifically related to manufacturing innovations, global supply chain transparency, and drug maker incentives.

It includes a number of recommended steps, ranging from supporting continued analysis of the root causes of drug shortages to urging drug makers to accelerate adoption of advanced manufacturing technologies. The policy also reiterates AMA's call on the federal government to continue to examine and consider drug shortages as a matter of national security.

"As the COVID-19 pandemic has illustrated, shortages of critical drugs can have a major impact on patient health. That's why it's essential for physicians to have access to the right drugs in order to provide high-quality care for our patients," said AMA Immediate-Past Board Chair **JESSE M. EHRENFELD, MD, MPH**. "While this pandemic has exposed vulnerabilities in the global medicine supply chain, the AMA remains committed to working with stakeholders to act quickly on solutions that alleviate supply shortages now and in the future."

While hospitals have experienced various drug shortages for decades, an unprecedented influx of critically ill patients due to COVID-19 has driven up the number of medications in short supply. Many of the drugs currently facing shortages are common injectable medications required for routine hospital patient care and necessary for ventilator support – such as analgesics, sedatives, and paralytics.

The AMA has partnered with multiple stakeholders to increase drug supplies and ease regulations amid the COVID-19 pandemic, including successfully urgingBx the U.S. Drug Enforcement Administration (DEA) to increase limits for some injectable controlled substances to meet increasing COVID-19 demands and joining other leading health organizations in calling for responsible ordering, prescribing,

and dispensing of potential COVID-19 medications.

The top five classes of drugs in short supply are central nervous system medications, antimicrobials, cardiovascular medications, ophthalmic and chemotherapy agents. In 2018, 55% of the medications with shortages were injectable, though this has decreased to 39% in 2019. While the reasons behind drug shortages can vary, a recent U.S. Food and Drug Administration (FDA) report estimates that more than 60% of shortages from 2014 to 2017 were due to manufacturer quality issues. The report cites a lack of incentives for manufacturers to produce lower-profit drugs and invest in quality management programs as factors.

The AMA's new policy underscores the need to address increasing rates of new drug shortages and ongoing supply challenges for essential medications. Recognizing that prescription drug shortages have a widespread impact on patient care and treatment, the AMA remains committed to working collaboratively with other stakeholders to further evaluate and implement recommendations that contribute to solutions for this critical public health issue. ❖

New AMA policy recognizes racism as a public health threat

CHICAGO – New policy adopted by physicians at the American Medical Association's (AMA) Special Meeting of its House of Delegates (HOD) in November recognizes racism as a public health threat and commits to actively work on dismantling racist policies and practices across all of health care.

The new policy approved by the AMA, representing physicians and medical students from every state and medical specialty, opposes all forms of racism as a threat to public health and calls on AMA to take prescribed steps to combat racism, including: (1) acknowledging the harm caused by racism and unconscious bias within medical research and health care; (2) identifying tactics to counter racism and mitigate its health effects; (3) encouraging medical education curricula to promote a greater understanding of the topic; (4) supporting external policy development and funding for researching racism's health risks and damages; and (5) working to prevent influences of racism and bias in health technology innovation.

Though previous AMA policies and principles have emphasized the need to eliminate health disparities and called on physicians to prevent violence of all kinds, the new policy explicitly acknowledges racism's role in perpetuating health inequities and inciting harm against historically marginalized communities and society as a whole.

Specifically, the new policy recognizes racism in its systemic, cultural, interpersonal, and other forms as a serious threat to public health, to the advancement of health equity, and a barrier to appropriate medical care. It makes clear that a proactive approach to prevent, or identify and eliminate, racism is crucial – particularly con-sidering that studies show historically marginalized populations in the U.S. have shorter lifespans, greater physical and mental illness burden, earlier onset and aggressive progression of disease, higher maternal and infant mortality, and less access to health care.

The policy describes the various forms of racism as follows:

- Systemic racism: structural and legalized system that results in differential access to goods and services, including health care services.
- Cultural racism: negative and harmful racial stereotypes portrayed in culturally shared media and experiences.
- Interpersonal racism: implicit and explicit racial prejudice, including explicitly expressed racist beliefs and implicitly held racist attitudes and actions based upon or resulting from these prejudices.

In addition, the new policy requests AMA to identify a set of best practices for health care institutions, physician practices, and academic medical centers to address and mitigate the effects of racism on patients, providers, international medical graduates, and populations. It also guides the AMA's position on developing and implementing medical education programs that generate a deeper understanding of the causes, influences and effects of all forms of racism – and how to prevent and improve the health effects of racism.

Further, the policy asks that AMA support the creation of external policy to combat racism and its effects and encourage federal agencies and other organizations to expand research funding into the epidemiology of risks and damages related to racism. Additionally, the policy asserts that the AMA will work to prevent, and protect against the influences of racism and bias in innovative health technologies.

The AMA has been leading an aggressive effort to embed equity in thoughts, actions, and processes so as not to perpetuate inequities and instead help people live healthier lives. In 2018, the AMA adopted policy to define health equity and outline a strategic framework toward achieving optimal health for all. To help navigate these challenges, in 2019 the AMA hired its first chief health equity officer to establish the AMA's Center for Health Equity to elevate and sustain efforts to address systemic level changes that can improve health.

Fully understanding that there is tremendous work still to be done to ensure that everyone has the opportunity, conditions, resources, and power to achieve optimal health, the AMA is committed to collaborating with stakeholders to confront the issue of racism within our society. The AMA continues to urge other leading health organizations to also take up the mantle of intolerance for racism as it pushes upstream to dismantle racism across all of health care – driving the future of medicine toward anti-racism. ❖

AMA announces policies adopted on final day of special meeting

CHICAGO – On November 18th, the American Medical Association (AMA) announced new policies adopted by physician and medical student leaders from all corners of medicine at the Special Meeting of the AMA House of Delegates. Policies adopted help the AMA drive the future of medicine, remove obstacles that interfere with patient care, and improve the health of the nation.

The AMA's House of Delegates is the policy-making body at the center of American medicine, bringing together an inclusive group of physicians, medical students and residents representing every state and medical field. Delegates work in a democratic process to create a national physician consensus on emerging issues in public health, science, ethics, business and government to continually provide safer, higher quality and more efficient care for patients and communities.

The policies adopted by the House of Delegates this week include:

Improving access to substance use disorder treatment amid evolving overdose epidemic

Despite some signs of progress in prescription opioid-related overdoses, the U.S. is still facing an evolving overdose epidemic that is increasingly fueled by illicit fentanyl and stimulant drugs – and becoming more deadly. In response, the nation's physicians adopted new AMA policy today advocating for expanded federal funding for states to improve access to evidence-based addiction treatment – a major barrier for the more than 2 million Americans with an untreated substance use disorder. The policy is especially aimed at bolstering long-term funding and creating a comprehensive framework to treat all substance use disorders, including treatment for patients who suffer from both substance use and mental disorders at the same time.

"The changing landscape of this epidemic poses challenges for our health system, which must prioritize access to evidence-based care for patients with substance use disorder," said AMA Trustee **THOMAS J. MADEJSKI, MD**. "We cannot lose sight of the fact that our nation's drug overdose epidemic is killing more than 70,000 Americans each year, which is why the AMA will continue to call on stakeholders to help eliminate barriers to evidence-based treatment."

Protecting residents and fellows affected by unexpected hospital closures

Building on the American Medical Association's (AMA) efforts to financially and professionally protect residents and fellows displaced by unexpected teaching hospital closures, physicians, residents and medical students at the Special Meeting of the AMA House of Delegates (HOD) today adopted policy aimed at better preparing for future events similar to the closing of Hahnemann University Hospital in 2019. The sudden shutdown left more than 570 residents and fellows without the required malpractice insurance coverage – and without a spot in a medical training program.

Under the new policy, the AMA will continue to help monitor related issues that arise at programs and hospitals owned by corporate entities. Specifically, the policy calls for revising federal regulations to specify that residency slots are not hospital assets and for developing an application process that would allow displaced residents to match with other institutions. It also asks for the creation of rules requiring teaching institutions to maintain a professional liability fund for these situations, and urging requirements so that residents are provided with an institution's financial health details, such as credit ratings or merger/acquisition information. Additionally, it directs the AMA to assist in minimizing confusion and misinformation in the event of a sudden closure by coordinating with appropriate stakeholders on communications efforts.

"The AMA remains committed to ensuring that residents and fellows are safeguarded professionally and financially in the event of an unforeseen teaching hospital closure. It is our obligation to help mitigate any related hardships that displaced residents may face in these unfortunate situations," said AMA Trustee **GRAYSON ARMSTRONG, MD, MPH**. "By creating a policy playbook to plan ahead and prepare for potential shutdown circumstances, we can better assist these physicians-in-training in moving forward as seamlessly as possible, allowing them to focus on completing their training and caring for patients."

The AMA engaged legal counsel to represent the displaced Hahnemann residents and fellows in bankruptcy proceedings, which settled in March 2020. In addition, the AMA and AMA Foundation helped fund grants to offset relocation expenses for the affected physicians. ❖

AMA adopts policy calling for continued telehealth services

At the five-day policy-making virtual meeting of the American Medical Association in November, Delegates adopted a telehealth policy directing the AMA to continue it advocacy work with legislators and regulators who have an important opportunity to codify coverage, access and payment policies that support telehealth advancements throughout the COVID-19 pandemic and beyond.

The new AMA policy states:

RESOLVED, That our AMA continue to advocate for the widespread adoption of telehealth services in the practice of medicine for physicians and physician-led teams post SARS-COV-2; and be it further

RESOLVED, That our AMA advocate that the Federal government, including the Centers for Medicare & Medicaid Services (CMS) and other agencies, state governments and state agencies, and the health insurance industry, adopt clear and uniform laws, rules, regulations, and policies relating to telehealth services that:1. Provide equitable coverage that allows patients to access telehealth services wherever they are located;

2. Provide for the use of accessible devices and technologies, with appropriate privacy and security protections, for connecting physicians and patients (New HOD Policy); and be it further;

RESOLVED, That our AMA advocate for equitable access to telehealth services, especially for at-risk and under-resourced patient populations and communities, including but not limited to supporting increased funding and planning for telehealth infrastructure such as broadband and internet-connected devices for both physician practices and patients.

RESOLVED, that our AMA support the use of telehealth to reduce health disparities and promote access to health care.

The adoption of the AMA's new telehealth policy coincides with the appearance of a new physician survey on telehealth issued by the COVID-19 Healthcare Coalition. The survey's topline findings show strong support for telehealth:

- 60% reported that telehealth has improved the health of their patients.
- 68% report they're motivated to increase telehealth use in their practices.
- 11% said they were using remote patient monitoring technologies with patients in their homes. Commonly used tools included smartphones, blood pressure cuffs, body weight scales, and pulse oximeters.
- 55% indicated that telehealth has improved the satisfaction of their work.
- More than 80% of respondents indicated that telehealth improved the timeliness of care for their patients. A similar percentage said that their patients have reacted favorably to using telehealth for care.

The survey also found barriers and challenges still exist and/or are anticipated beyond the pandemic.

- 73.3% indicated that no or low reimbursement will be a major challenge post-COVID.
- More than 64% said technology challenges for patients were a barrier to the sustainable use of telehealth.
- 58% are not able to currently access their telehealth technology directly from their electronic health records

CharterCARE Care@Home to provide physician home care visits

PROVIDENCE – CharterCARE Health Partners and its affiliate IPA physician organization have created Care@Home to provide at-risk patients who suffer from chronic medical disease issues with physician and other provider care in their home.

Care@Home is an in-home medical care program that provides 30–60-minute in home physician visits to at-risk patients of CharterCARE Provider Group of Rhode Island, the 550-member physician IPA. Under the program, a doctor and other care team members provide integrated coordination with at risk, chronically ill patients, family members, the family physician and specialists physicians to manage the chronic condition(s), manage medication therapies and reduce the need for emergency room visits and hospitalizations.

"Knowing that I can extend my reach into my patients' home with our Care@Home team makes a big difference in their quality of life and helps me with overall care coordination", said **DR. JAMES CARDI**, a Cranston-based Internal Medicine specialist, and member of CharterCARE Provider Group.

CharterCARE CEO **JEFF LIEBMAN** stated, "Care@Home will significantly enhance our ability to manage care and provide critical services to patients who live at home with chronic disease by providing physician home visits within the framework of an integrated care plan. It will also help us to level if not decrease the costs of care provided to the chronically ill."

"The program is phenomenal, especially for my parents who have difficulty getting out," added Suzette Santos, who cares for both her parents, Analia and Cesar Pereira. ❖

Pod e-cigarettes less harmful than regular cigarettes, new study finds

In the first-ever clinical trial of fourth-generation electronic cigarettes, researchers found that adults who switched to e-cigarettes had lower levels of a major carcinogen compared to smokers who continued using combustible cigarettes.

PROVIDENCE [BROWN UNIVERSITY] – Cigarette smoking causes more than 480,000 deaths each year in the United States, according to federal government data – and some smokers find it nearly impossible to quit. Many of these smokers use regular, or combustible, cigarettes.

Physicians and scientists have for many years explored the health benefits and drawbacks of nicotine-based alternatives to cigarettes, and new research offers significant evidence that "pod" e-cigarettes are less damaging to health than traditional cigarettes.

"Nicotine is one of the most addictive substances on earth, both in animal models as well as to humans," said **DR. JASJIT S. AHLUWALIA**, a professor of behavioral and social sciences and medicine at Brown University. "So how can we help these people who can't quit smoking combustible cigarettes? They need other options, and e-cigarettes may be one such option. Our research shows that in the short-term, e-cigarettes are considerably safer than combustible cigarettes."

Ahluwalia is senior author of a new JAMA Network Open study, published on November 18th, on the world's first randomized clinical trial of fourth-generation pod e-cigarettes.

The trial included 186 African American and Latinx smokers, as racial and ethnic minority groups tend to experience higher rates of tobacco-related morbidity and mortality even when they smoke at the same rates as other groups. Two-thirds of the participants were provided e-cigarettes for six weeks, while the remaining participants were instructed to continue smoking combustible cigarettes as usual.

By the end of the study, participants who switched to e-cigarettes exhibited significantly lower levels of the potent pulmonary carcinogen NNAL compared to those who continued to smoke combustible cigarettes exclusively. The e-cigarette users also had significantly reduced carbon monoxide (CO) levels and reported fewer respiratory symptoms. These benefits – reduced NNAL, reduced CO and respiratory symptom improvements – were especially pronounced among participants who switched completely to e-cigarettes.

The researchers also measured participants' levels of cotinine, a breakdown product of nicotine, and determined that there were no significant differences between groups, an indication that e-cigarettes provided adequate replacement of nicotine.

"Anyone under 21 should not take up cigarettes, e-cigarettes or any nicotine product – hands down, the best thing to do is to never start – but if people use tobacco products, they should quit," Ahluwalia cautioned. "But if they cannot quit smoking combustible cigarettes, they should consider using novel nicotine products to either quit smoking altogether or to reduce their harm by transitioning fully to these products."

Going forward, work needs to be done to better understand the non-cancer risks associated with e-cigarettes, such as respiratory and cardiovascular disease. The researchers also plan to carry out year-long studies to further explore the harm-reduction potential of e-cigarettes.

"Most smokers who switched exclusively from combustible cigarettes to e-cigarettes during the study maintained this behavior at six months, but we need longer-term follow-up," said **KIM PULVERS**, a professor of psychology at California State University San Marcos who was the principal investigator of the study. "We also need continued study of dual users to determine whether they maintain harm reduction over time."

Ahluwalia said that because many individuals who use both e-cigarettes and combustible cigarettes will switch back to exclusively combustible cigarettes over time, there is a critical need for interventions that support those who try to switch to e-cigarettes but fail. He also emphasized the importance of alternatives to quitting outright, given the challenge that quitting poses for so many cigarette smokers.

"It's possible that nicotine e-cigarettes and other harm-reduction products will be game-changers for our field," Ahluwalia added. "I hope this study stimulates more people to do this research and to have an open mind about this. I also hope it inspires them to let science inform policy rather than emotion."

In addition to Ahluwalia and Pulvers, additional contributors include **CHRISTOPHER H. SCHMID** and **KEXIN QU** from Brown; **NICOLE L. NOLLEN** from the University of Kansas School of Medicine; **DR. NEAL BENOWITZ** from the University of California, San Francisco; and **MYRA RICE** from California State University San Marcos.

Schmid served as a consultant for legal firms representing Eli Lilly, Boehringer-Ingelheim and Gilead outside the study. Benowitz received personal fees from Pfizer and Achieve Life Sciences and served as a consultant to pharmaceutical companies that market smoking cessation medications and as an expert witness in litigation against tobacco companies outside the study. Dr. Ahluwalia received personal fees from Lucy Goods outside the study. These points were fully disclosed in the study. ❖

The study was funded by the National Institutes of Health (5SC3GM122628) and was also supported by the NIH-funded Center of Biomedical Research Excellence (P20GM130414) and the National Institute of General Medical Sciences of the NIH (U54GM115677).

Lung cancer report finds RI ranks as a Top 10 State for early diagnosis, 5-year survival, surgery, screenings and access to treatment

PROVIDENCE – Lung cancer is the nation's leading cause of cancer deaths, and it's estimated that 920 Rhode Island residents will be diagnosed with this disease in 2020 alone. The recently released 2020 "State of Lung Cancer" report from the American Lung Association examines the toll of lung cancer throughout the nation and outlines steps every state can take to better protect its residents from lung cancer. The report finds that while Rhode Island was ranked as a top 10 state in 5 out of 6 categories, the rate of new lung cancer cases in the state was higher than average (69.8 per every 100,000), highlighting the work that must still be done.

For the first time, this year's report explores the lung cancer burden among racial and ethnic groups at the national and state levels. The report finds that while more Americans are surviving the disease, nationally people of color are facing poorer health outcomes than white residents. Although this report did not indicate that Rhode Island had substantial lung cancer health disparities, every state can do more to ensure no one faces lung cancer alone.

The 3rd annual "State of Lung Cancer" report highlights the positive trend of increased lung cancer survival, as the nationwide five-year lung cancer survival rate of 22.6% reflects a 13% improvement over the past five years. In Rhode Island the survival rate is 25.9%, showing a 5 year improvement of 16% and earing it a third place ranking out of 47 states reporting survival data. The report also found that the state earned top 10 rankings for early diagnosis (25.7%), surgery as part of the first course of treatment (28.2), high risk people receiving screenings (10.5%), and for the number of people receiving no treatment (11%).

"While we celebrate that more Americans are surviving lung cancer, too many people are being left behind, and the disease still remains the leading cause of cancer deaths," said **DANIEL FITZGERALD**, Senior Manager of Advocacy for the American Lung Association in Rhode Island. "One local takeaway from the report is that much more can and must be done in Rhode Island to prevent the disease, as we are seeing a greater number of new cases here in Rhode Island than elsewhere."

"It's great to see the progress that Rhode Island has made for lung cancer patients, but we still have work to do," said **DR. SAURABH AGARWAL**, a cardiothoracic radiologist at Rhode Island Medical Imaging. "Our incidence rate is far too high, and we must continue to get our high risk population into early diagnosis screenings if we want to save lives."

Part of the reason that lung cancer is so deadly is because most cases are diagnosed at a later stage, after the disease has spread. Lung cancer screening is the key to catching lung cancer early when the disease is most curable, but only 22.9% of lung cancer cases nationally are diagnosed at an early stage. This simple screening test has been available since 2015, and while Rhode Island ranked 6th out of 49 states in this category, only 10.5% of those eligible in Rhode Island have been screened.

"Lung cancer screening is a powerful tool to save lives," said Dr. Agarwal. "Unfortunately, we're only seeing a fraction of those who qualify actually getting screened. We're pushing for greater awareness of this test to save more lives here in Rhode Island."

More treatment options are available for lung cancer than ever before, yet not everyone is receiving treatment following diagnosis. Rhode Island ranked as the 7th best state in this category, but still 11% of those diagnosed did not receive any form of treatment.

"We want to ensure that everyone has access to treatment options and quality and affordable healthcare. No one who wants care should have to forgo treatment due to lack of access or cost," Fitzgerald said. ❖

JAMA Network Open article focuses on women's access to healthcare

PROVIDENCE – On November 9, 2020, JAMA Network Open published an article which focuses on women's access to healthcare. **BENJAMIN P. BROWN, MD, MS**; **LUCIANA E. HEBERT, PhD**; **MELISSA GILLIAM, MD, MPH**; **ROBERT KAESTNER, PhD**, conducted a study assessing data from 18 states around the country from the years 2000 to 2014. In those states and years, their study found that a highly-restrictive climate around abortion regulations was associated with a significantly lower abortion rate, compared to a less-restrictive climate.

The study found that a highly-restrictive legislative climate was associated with a lower abortion rate (0.48 fewer abortions per 1,000 women [95% CI –0.92 to –0.04], or approximately a 17% decline from the median abortion rate). A highly-restrictive legislative climate was still associated with a lower abortion rate after adjustment for distance to a provider (0.44 fewer abortions per 1,000 women [95% CI –0.85 to –0.03]).

Legislative climate was not significantly associated with distance to a provider, suggesting that a restrictive climate itself may act as a barrier to abortion care

"We have robust data from around the globe that suggests individuals continue to need abortions, regardless of the legal status of that care. When we see a drop in the abortion rate associated with a highly-restrictive legislative climate, it raises the concern that people who need abortions are being prevented from accessing this basic health care," said Dr. Brown, an Assistant Professor of Obstetrics and Gynecology, Clinician Educator, Division of General Obstetrics and Gynecology, Women & Infants Hospital. ❖

Fatal overdoses in Rhode Island continue to rise

Community-level factors, COVID-19, and counterfeit pills all considered contributors

New data from the Rhode Island De-partment of Health (RIDOH)'s Office of the State Medical Examiners (OSME) indicate a sharp increase in accidental drug overdose deaths during the first seven months of 2020. (It can take up to 90 days for the OSME to confirm a decedent's cause and manner of death.)

There have been 233 accidental drug overdose deaths between January and July 2020, compared to 185 during the same period last year. Between these two periods, all drug fatal overdoses increased by 26% and opioid-involved fatal overdoses increased by 33%. During July, more Rhode Islanders died of drug overdoses than any month since the State started tracking fatal overdose data. Similar trends are being seen nationally.

The stressors and isolation of the COVID-19 pandemic are believed to be factors in this increase, resulting in what researchers call a *syndemic*, which is the amplified result of two or more diseases that exist simultaneously in a community. However, Rhode Island's increase in overdose deaths started before the state's first COVID-19 case. Other factors that are likely contributing to the increase are polysubstance use (the use of more than one drug at the same time), counterfeit pills, and the presence of illegally made fentanyl in drugs like cocaine, counterfeit pills, methamphetamine, and other substances.

Counterfeit pills, which often look like prescription medications, are in greater supply throughout the United States, particularly oxycodone (an opioid) and benzodiazepines (a sedating drug). These pills vary in purity and potency and can contain unknown amounts of fentanyl. It is impossible for an end user to know what drugs might be present in counterfeit pills. These counterfeit pills are even more lethal when crushed and snorted. One pill can cause a fatal overdose.

"What underlies the diseases of substance use disorder and COVID-19 are factors in our communities that affect people's abilities to be healthy and safe, such as housing, employment, education, and discrimination," said Director of Health **NICOLE ALEXANDER-SCOTT, MD, MPH**. "While getting prevention and treatment resources into the community to prevent overdoses immediately, we need to continue working to address these larger structural issues. Every single overdose is preventable. There is help and there is hope for everyone who is living with the disease of substance use disorder."

"The increased potency of drugs combined with the challenges of COVID-19 have stressed an already fragile system," said **KATHRYN POWER, MEd**, Director of the Rhode Island Department of Behavioral Healthcare, Developmental Disabilities & Hospitals (BHDDH)."These challenges might have led people who were in recovery to relapse. In other cases, people who use drugs occasionally, like cocaine, might have succumbed to an overdose by not knowing fentanyl was present."

Director Power and Dr. Alexander-Scott are the co-chairs of Governor Gina M. Raimondo's Overdose Prevention and Intervention Task Force.

"The collision between the COVID-19 and opioid epidemic has really highlighted how crucial social determinants of health- safe housing, good employment, access to mental health support- are to sustaining long-term recovery," said **DR. JON SOSKE** of Rhode Island Communities for Addiction Recovery (RICARES). "So many people have relapsed after evictions, layoffs, and traumatic losses- and these have hit racialized communities hardest. Addressing these issues at a systemic level is crucial going forward."

Additional data points

- Accidental drug overdose deaths decreased by 8.3% between 2016 and 2019, dropping from 336 to 308.

- Rhode Island is on track to exceed 2016's total by at least 25%.
- During the first seven months of 2020, non-fatal overdoses fluctuated by month. During April and May, the numbers of non-fatal overdoses that EMS responded to in Rhode Island were lower.
- All Rhode Island cities and towns are being affected. Particular overdose hotspots include Providence, Pawtucket, Warwick, and Woonsocket. Fatal overdoses doubled among Warwick and Providence residents during the first six months of 2020. In North Kingstown and Scituate, the total number of fatal overdoses during the first six months of 2020 exceeded the towns' total numbers for all of 2019.
- While the rate of fatal overdoses among White Rhode Islanders declined between 2016 and 2019, that rate increased in the first seven months of 2020. Overdose rates generally increased among African American and Hispanic Rhode Islanders from 2016 to 2019 and continued to increase during the first seven months of 2020.
- Overdose death data by month and year are available online.

Current action steps

In response to these trends, RIDOH and BHDDH hosted an emergency, online Community Overdose Engagement (CODE) meeting in July with more than 150 state and community stakeholders. Actions steps coming out of that meeting that are either in the implementation or planning phase are:

- Increased street outreach activities in overdose hotspots across the state. Certified peer recovery support specialists from community-based organizations like AIDS Care Ocean State, Community Care Alliance, East Bay Recovery Center, Parent Support Network, and Project Weber/RENEW distribute naloxone, sterile syringes, and fentanyl test strips and provide wrap-around services and basic needs to individuals who use drugs.
- Increased housing support for vulnerable populations in Woonsocket and Providence. Through the West Elmwood 02907 CODE project, Amos House maintains additional beds within its temporary housing assistance program. Project Weber/RENEW in Providence offers recovery housing grants for clients, and Sojourner House in Woonsocket will provide a drop-in housing clinic for emergency services.
- Strategic placement of Substance Abuse and Misuse Teams (SMART) at Rhode Island Hospital's and Landmark Hospital's emergency departments. Trained staff are ready to connect patients who have recently experienced an overdose to local treatment and recovery support services.
- Collaboration with a community-led work group and expert advisors across state agencies to explore the development of an overdose prevention center. Health services such as STI testing, addiction treatment, housing supports, and basic services (i.e., showers, food, and clothing) would be available at such a center. This would also be a place where people could use pre-obtained substances while being peer or medically supervised. Sterile equipment and immediate overdose response resources would be available to reduce overdose and infectious disease risk. ❖

Lifespan Cancer Institute expands radiation therapy program to East Greenwich

EAST GREENWICH – Lifespan Cancer Institute is now offering radiation treatment at its location in East Greenwich, adding to the range of sophisticated oncology options available on-site and marking the second radiotherapy setting in the Lifespan system. Lifespan Cancer Institute also offers radiation treatment at Rhode Island Hospital.

"Lifespan Cancer Institute has undergone extraordinary growth in recent years and continues to extend its world-class cancer care across Rhode Island. In addition to sites at Rhode Island Hospital, The Miriam Hospital and Newport Hospital, the Cancer Institute is located at satellite locations in Lincoln – which opened during the past year – and East Greenwich," said **DAVID WAZER, MD**, director of the institute and a leading radiation oncologist. "Since the East Greenwich location already offers infusion serves for chemotherapy as well as physician visits, the addition of radiation treatment further reduces the need for patients in the West Bay to have to travel to multiple sites for appointments.

"We have been actively recruiting some of the nation's foremost clinicians and researchers and greatly expanding the number and diversity of clinical trials we can offer our patients, including promising and newly emerging immunotherapies," said Dr. Wazer. "The continuing expansion of our suburban clinics means patients in the region no longer need to go to the hassle or expense of driving great distances or going to big cities to get the most advanced cancer care." ❖

Appointments

Methodius G. Tuuli, MD, named Executive Chief of Obstetrics and Gynecology at W&I, department chair at Brown

Care New England Health System has announced the appointment of **METHODIUS G. TUULI, MD, MPH, MBA**, as Executive Chief of Obstetrics and Gynecology for Women & Infants Hospital, and chair of the Department of Obstetrics and Gynecology at The Warren Alpert Medical School. He will also hold the Chace-Joukowsky Professorship in Obstetrics and Gynecology at Brown University.

Currently, Dr. Tuuli is employed at the Indiana University School of Medicine, where he is the William H. and Sallie E. Coleman Professor of Obstetrics & Gynecology and vice chair for Obstetrics. He is also currently the director of Perinatal Research in the Department of Obstetrics and Gynecology.

After earning his medical degree from the University of Ghana Medical School, Dr. Tuuli completed a Master's degree in Public Health at the University of California, Berkeley, and a residency in obstetrics and gynecology at Emory University. Dr. Tuuli completed a subspecialty fellowship in maternal fetal medicine at Washington University in St. Louis. He remained at Washington University for ten years and served as medical director of Labor & Delivery and director of the Division of Clinical Research. He is a Fellow of the American College of Obstetrics and Gynecology.

"After conducting a national search, Care New England Health System decided that Dr. Tuuli had the medical expertise, experience in women's healthcare, and the passionate desire to lead women's healthcare forward, that Women & Infants Hospital needs, moving toward the future. Women's healthcare is our utmost priority at CNE, and as a recognized leader in the field, with world renowned doctors on staff at Women & Infants Hospital, CNE is ecstatic to welcome Dr. Tuuli aboard," said **JAMES E. FANALE, MD**, President and CEO, Care New England Health System.

"We are thrilled to welcome a physician, teacher, and researcher of Dr. Tuuli's caliber to our community," says **JACK A. ELIAS, MD**, senior vice president for health affairs and dean of medicine and biological sciences at The Warren Alpert Medical School of Brown University. "His expertise will help advance research and train the next generation of leaders in obstetrics and gynecology." ❖

Recognition

Robert Legare, MD, receives healthcare professional award

WESTERLY – **ROBERT LEGARE, MD**, associate clinical professor of Medicine (Medical Oncology) and medical director of the Smilow Cancer Hospital care centers in Westerly and Waterford, is the recipient of the 2020 Dr. Joseph DiMase Memorial Healthcare Professional Award presented during the Partnership to Reduce Cancer in Rhode Island's Cancer Summit.

The award honors the dedication of Dr. Joseph DiMase, founder of the Screening Colonoscopies for Uninsured Persons (SCUP) program in Rhode Island, which served hundreds of uninsured Rhode Islanders, ultimately saving lives and continuing to screen those at risk for colorectal cancer.

Dr. Legare will be recognized for his lifelong dedication to and champion for cancer prevention, improving detection, increasing access to health and social services and striving for an overall reduction in the burden of cancer on patients. ❖

RWMC, Fatima receive national quality awards

Roger Williams Medical Center and Our Lady of Fatima Hospital have received several national quality awards from Healthgrades, the company that collects and assesses information about physicians, hospitals, and health care providers across the country.

Roger Williams earned 3 awards, as follows:

- 5-Star Recipient for Total Knee Replacement for 2 years in a row (2019–2020)
- 5-Star Recipient for Treatment of Chronic Obstructive Pulmonary Disease for 4 years in a row (2017–2020)
- 5-Star recipient for treatment of respiratory failure for 3 years in a row (2018–2020)

Fatima Hospital was the recipient of the following:

- 5-Star award for treatments of heart attack for 3 years in a row (2018–2020)

Healthgrades measures hospital quality solely on risk adjusted mortality and in-hospital complications. Its analysis is based on approximately 40 million Medicare discharges for the most recent three-year period available.

CharterCARE CEO **JEFF LIEBMAN** stated, "These national quality recognitions are most impressive in that they reflect sustained performance over a period of several years. At CharterCARE, we have invested thousands of hours to develop clinical quality and patient safety protocols and systems. These awards are a credit to the hard work and relentless commitment of our doctors, nurses and support staff." ❖

Recognition

Kent Hospital receives Level 3 Geriatric Emergency Department Accreditation (GEDA)

WARWICK – Kent Hospital's Emergency Department has achieved the bronze standard – Level 3 GEDA accreditation, from the American College of Emergency Physicians (ACEP), with support from The Gary and Mary West Health Institute and John A. Hartford Foundation, which launched the Geriatric Emergency Department Accreditation (GEDA) program to recognize those emergency departments that provide excellent care for older adults.

"We at Kent Hospital take great pride in all the work we do, especially how we care for our aging population. Nationwide, there are approximately 20 million seniors who visit their local emergency departments, annually. Any senior who visits Kent Hospital's emergency department can be assured that they will have access to the medical expertise, and equipment necessary to provide optimal care," said **ROBERT HAFFEY**, President and COO, Kent Hospital.

Led by a remarkable team of inter-disciplinary leaders, including **LAURA FORMAN, MD**, Chief -Emergency Medicine, and **SANDRA STOCKS**, Nursing Director, Emergency Department, Kent Hospital's accreditation demonstrates its focus on the highest standards of care for Rhode Island's older adults.

"At Kent Hospital, we see many older adults, some with multiple chronic conditions. Some, while dealing with medical issues, also struggle with social and physical challenges, making things increasingly more difficult for them," said Laura Forman, MD, Chief of Emergency Medicine, Kent Hospital.

"I want to make sure that when an older adult comes to see us at Kent, no matter how major or minor their issue, they feel safe and welcome, knowing we are going to take care of their needs in an inclusive environment. This accreditation means a lot to us, because it recognizes our commitment to older adults in our community," she added.

The GEDA program is the culmination of years of progress in emergency care of older adults. In 2014, ACEP along with Society for Academic Emergency Medicine, Emergency Nurses Association, and American Geriatrics Society, developed and released geriatric ED guidelines, recommending measures ranging from adding geriatric-friendly equipment to specialized staff to more routine screening for delirium, dementia, and fall risk, among other vulnerabilities.

The voluntary GEDA program, which includes three levels similar to trauma center designations, provides specific criteria and goals for emergency clinicians and administrators to target. The accreditation process provides more than two dozen best practices for geriatric care and the level of GEDA accreditation achieved depends upon how many of these best practices an emergency department is able to meet. A Level 3 emergency department must incorporate many of these best practices, along with providing inter-disciplinary geriatric education, and having geriatric appropriate equipment and supplies available. ❖

Obituaries

MARTIN P. FELDMAN, MD, 90, passed away on November 18, 2020 at St. Mary's Hospital. Dr. Feldman was a general surgeon for over 40 years, practicing in Providence and noted for his later interest in parathyroid surgery. He graduated summa cum laude from the University of Rochester, where he was a member of Delta Upsilon and Phi Beta Kappa and where, after three years, had early acceptance to Harvard Medical School, where he obtained his MD degree. Following his surgical residency at Beth Israel Hospital in Boston and the Veterans Administration Hospital in Coral Gables, FL, he entered the US Air Force as a Captain and became Chief Surgery at Offutt Air Force Base (Strategic Air Command) Hospital in Nebraska. Following discharge from the Air Force with commendation, he entered practice in Providence.

Dr. Feldman was on the staff of Roger Williams Medical Center, The Miriam Hospital, Saint Joseph's and Our Lady of Fatima Hospitals and Women & Infants Hospital of RI. His main focus was at Roger Williams Hospital where he formed and served as president of the Physician Hospital Organization and served on many committees including the Executive Ethics chairman and as president of the medical staff.

Throughout his career, he served as an instructor in surgery at the Warren Alpert Medical School of Brown University. He was also on the teaching staff of Boston University School of Medicine and Tufts University School of Medicine and served for a year as a teaching fellow in surgery at Harvard Medical School.

Following his retirement, Martin maintained his art, music, stamp and coin collections and enjoyed landscaping.

He was the beloved husband of Natalie (Young) Feldman of 51 years, and the devoted father of Ilene Feldman, Wendy Feldman, Julie Andoscia (Terry), Amy Pressman (Robert), Andrew J. Feldman (Kristen) and Nancy Wallent, and dear brother of the late Stephen Feldman. He was the loving grandfather of Marisa, Madison, Ava and Lily Born in New York City, a son of the late Morris and Mildred (Preville) Feldman, he had lived in Cranston for 5 years, previously living in Barrington.

Contributions in his memory may be made to Make-A-Wish Foundation, 20 Hemmingway Dr., Riverside, RI 02915 or the charity of your choice. ❖

DR. GERD EMMA-STINA (HALLQVIST) GRENANDER, 95, passed away peacefully in her home on November 14, 2020 after a decade-long struggle with Alzheimer's disease.

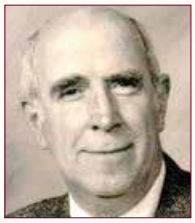
Dr. Grenander was born in Perstorp, Sweden in 1925. She earned her medical degree from the Karolinska Institute in Stockholm and practiced medicine in her native Sweden for many years until she moved to Providence with her husband, Professor Ulf Grenander, a mathematician at Brown University. Over the next several decades, she raised her family on the East Side of Providence while working as a physician in the Student Health department at Brown University and as a gynecologist at Planned Parenthood. Every summer, she, her husband, and their three children returned to Sweden where she continued her medical practice.

Dr. Grenander, known affectionately as Paj, will be remembered by her family and friends as a strong and spunky woman who was incredibly dedicated to her work, to her children and grandchildren, to her innumerable dogs, and most of all, to her husband. With exuberant energy, she was an active member of the Brown community, and she touched so many lives with her vibrant intellect and witty sense of humor. She welcomed animals of all kinds into her warm home and cherished the close connection with nature that she enjoyed every summer in Västervik, Sweden. When she was not tending to her flowers, playing yet another competitive game of bridge with her friends, or creating a masterpiece in the kitchen, she could be found taking walks on the East Side or crocheting next to her adoring husband. Her ethical and non-materialistic approach to life helped shape the lives of her grandchildren who will carry her values with them forever.

She is predeceased by her loving husband of 69 years, their dog Kettu, and caregiver Antonia Shanley. She is survived by her son Sven and daughter-in-law Nancy, her daughter Angela Grenander and Nooredin Raufi and their four children Alexander, Ariana, Nikolas, and Tatiana, and her daughter Charlotte and son-in-law Jeffrey Guterman and their children Annika and Anders.

Services will be private, held in Sweden. In lieu of flowers, donations may be made to the Alzheimer's Association. ❖

ALEXANDER ADAMS McBURNEY, MD, 87, of Kingston, Rhode Island, died October 26, 2020. He is survived by his beloved wife, Donna Lindemann McBurney, five children (Blaine McBurney, Robin McBurney, Christian McBurney, Shaun McBurney and Jon Jeffrey Tyzbir), four daughters-in-law and significant others (Stephanie Finch McBurney, Margaret McBurney, Patricia Miller McBurney and Lee Cavanaugh), eleven grandchildren, and two great-grandchildren.



He was raised in Slater, Missouri, where he had an idyllic childhood, including playing football and basketball for the Slater High School teams. After graduating from Slater High School in 1951, he graduated from the University of Kansas in 1955 and from the University of Kansas Medical School in 1958. He spent three years as a lieutenant in the U.S. Naval Medical Corps, including interning at Bremerton, Washington.

Alex married Linda Murrell, of Marshall, Missouri, in 1958.

He served his residency at Mary Hitchcock Hospital, Dartmouth College, in Hanover, New Hampshire. Searching for a place in New England to begin his practice, he drove to Newport, Rhode Island, and never looked back. He began his practice as a urologist at Newport Hospital in 1965 and at South County Hospital in 1968. He founded Urology Associates, Inc., which continues to grow and still has offices in Wakefield and Newport. He was highly respected in his field and adored by his patients who appreciated his understanding manner.

He moved to Kingston, Rhode Island, in August 1968, where he purchased the historic Elisha R. Potter House (circa 1809) and owned it for 50 years. Linda Murrell McBurney passed away in 1977.

Dr. McBurney married Donna Lindemann on February 16, 1980. Together they enjoyed collecting early American antique furniture and art, visiting Saline County, Missouri (especially Slater), and visiting and restoring the historic John Locke Hardeman House at Hardeman, Missouri, near Arrow Rock. They also served as Revolutionary War reenactors. And, most of all, they enjoyed being with family. He was a member of the Dunes Club in Narragansett since 1978, the Newport Reading Room since 1990, and the Springdale Hall Club of Camden, South Carolina.

He retired in 2000, after 35 years in practice. In 2004, he headed a dedicated group of volunteers who operated the coffee shop at South County Hospital. He was proud that the coffee shop served doctors, nurses and families of patients, and also raised tens of thousands of dollars each year that was donated to the hospital. After logging more than 3,000 hours, he was named South County Health's 2016 Volunteer of the Year.

Alex, along with his brother Frederick, supported for many years Slater's Public Library, the McBurney Scholarship Fund for deserving Slater High School students, and the Akeman-McBurney Medical Clinic at Slater.

Due to the COVID pandemic, funeral services will be private with family members only. A memorial service will be held sometime in the future when the pandemic is over.

In lieu of flowers, donations may be made to The McBurney Scholarship Fund at Exchange Bank of Missouri, 201 W. Maple St., Slater, MO 65349. For guestbook and condolences, please visit averystortifuneralhome.com.

He was a true gentleman who will be missed terribly by his family and friends. ❖

ALBERTO S. RUBIO, MD, 95, passed away peacefully on Nov. 12, 2020. He was the husband of the late Jeannette (Garceau) Rubio. Born in Peru, Dr. Rubio graduated from the University San Marcos, Lima, Peru in 1957. He worked at the San Marco's University Medical Faculty and had a private practice for two years prior to moving to the U.S. He interned in pathology at Mckennan Hospital, South Dakota, followed by pathology residencies in Albany Medical Center, NY; Rhode Island Hospital; Springfield Hospital, MA (fellowship); and Montreal Queen Elizabeth, Canada.

In 1968, he returned to Rhode Island and continued a successful career at in Rhode Island as a senior pathology physician for 16 years. He was proud to serve in the 455th US Army General Hospital as an internist, general surgeon, and lab specialist until his retirement in 1993 as a Lieutenant Colonel in the Army Reserves.

He was predeceased by his wife, Jeannette Garceau, and is survived by his daughters; Jeannette (Rubio) Jutras, Nancy (Rubio) Toevs, and Dorothy (Rubio) Chobanian and grandchildren Edward Rubio, Rene Jutras, Elizabeth (Wudtke) Hannon, Michael Wudtke, Nicole Jutras, and Madison Wudtke. ❖

JACK H. RUDDELL, MD'21. It is with immeasurable sadness and grief that we communicate the passing of Jack Howard Ruddell, a beloved son, baby brother, dear friend, and member of his treasured Ruddell and Cade extended families. Jack took his life on November 1, 2020 at the age of 25. He brightened the lives of those who knew him with characteristic compassion, honesty, intellect, and wit.

Jack was born on December 13, 1994 in Seattle, to John and Jennifer Ruddell, joining older brothers Michael and Alexander. To his immediate and extended family, he was "Happy Jack," a nickname that befit the fluffy-haired boy who amused and endeared with his ever-present sense of wonder and affection. At five years old, Jack relocated with his family to Los Angeles, where he joined the kindergarten class at St. Paul the Apostle School in Westwood. Los Angeles quickly became home for Jack, and his childhood there was highlighted by friendships that grew in the years that followed. With openness and zeal, he pursued new interests in sports and his life-long passion for music. Jack sang with the Paulist Choristers and would continue to sing beautifully throughout his life, including with the Brown University Bear Necessities a capella group.

Like his brothers, Jack attended Loyola High School in Los Angeles, graduating in 2013. He set extraordinary standards for himself in school and in activities like club soccer and the Marina Aquatic Center rowing team, where he expanded his friendships and self-discipline. Through extraordinary determination, Jack achieved remarkable academic success while quietly managing the learning challenges associated with Tourette's Syndrome. He had a brilliant mind and made the most of his unique talents.

Jack attended college at Brown University in Providence, Rhode Island and graduated magna cum laude in 2017 from the Program in Liberal Medical Education with a concentration in Economics. Having previously decided on a career in medicine, Jack continued at the Alpert Medical School at Brown, where he was a gifted student and accomplished researcher.

Throughout his time at Brown, Jack found opportunities to explore and learn in various fields of medicine. These also extended to summer-time research and projects at Alpert Medical School; the Program in Geriatric Medicine at University of Rostock, Germany; a fellowship at the UCLA Neurology research lab; and others. Jack was a co- or lead author of more than twenty medical papers. His research spanned a variety of topics, many of which Jack saw as particularly important to society, such as the public health impact of opioid dosages post-surgery. At the time of his death, Jack had completed his two United States Medical Licensing Examinations required for graduation and looked forward to a well-deserved break, including visits with his brothers and parents, before deciding on his medical specialty. His accomplishments and experiences belied his young age of 25. In recognition of having met the requirements for graduation from Alpert Medical School, Jack will be posthumously awarded his Doctorate of Medicine degree with his graduating class in the coming year.

Jack lived a full and rich life. He loved spending time with family, filled his life with music, and was diligent and sensitive in all he did. He was at his best in the company of others. Jack cared deeply about the people in his life as well as his medical patients. His genuine kindness, empathy, and care are his greatest legacy. These wonderful traits touched his family, friends, and colleagues and undoubtedly would have impacted so many lives in years to come. May God bless and hold in His arms our Happy Jack.

Funeral services and a celebration of Jack's life are being planned in Los Angeles and will be shared soon.

In lieu of flowers, donations can be made in Jack's memory to the The Warren Alpert Medical School Humanities and Ethics fund at "https://www.brown.edu/go/JackRuddell". A primary focus of this fund is the support of the Scholarly Concentration in Medical Humanities and Ethics, which recognizes that medicine is perhaps the most humane art and science – its tasks of caring and healing focus first on the body but its goals of individual and collective well-being affect all aspects of physical, mental, and social life. Jack's passion for medicine was heavily focused on this humane element of patient wellness, in addition to the scientific. ❖