1917 2020 103

RHODE ISLAND MEDICAL JOURNAL

FORGING A NEW FRONTIER IN 3D PRINTING DURING COVID-19 PANDEMIC

See Q&A with Dr. Albert S. Woo, page 83

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Preventing, Testing, Managing, and Treating Hepatitis C

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

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

22 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

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

30 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

35 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

41 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

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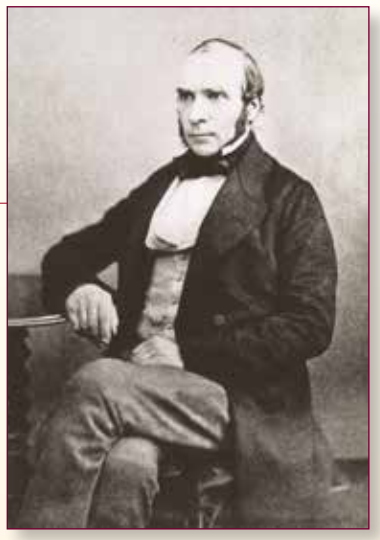


8 COMMENTARY
Keeping Hospitals Safe During the COVID-19 Pandemic
LEONARD A. MERMEL, DO

Miasmas and Other False Beliefs: The Road to Sickness and Death
HERBERT RAKATANSKY, MD

COVID-19: Misinformation Can Kill
GHAZAL AGHAGOLI, BS, MD'23; EMILY J. SIFF, MS; ANASTASIA C. TILLMAN, BA, MD'23; EDWARD R. FELLER, MD, FACP, FACG

16 RIMJ AROUND THE WORLD
London, New York, Rhode Island

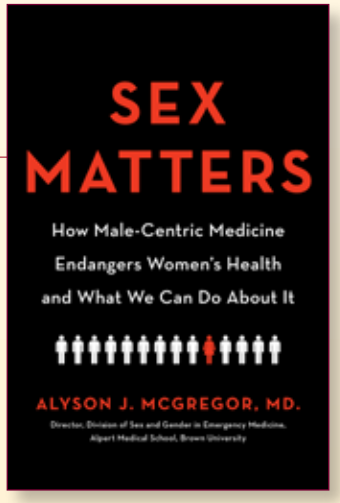
79 RIMS NEWS
Are you reading *RIMS Notes*?
Working for You

83 SPOTLIGHT
Q&A with Albert S. Woo, MD
Forging a New Frontier in 3D Printing during COVID-19 Pandemic
MARY KORR

85 GLOBAL SPOTLIGHT
Q&A with Dean Winslow, MD, on Volunteering in Antarctica
MARY KORR

89 BOOKS
Q&A with Alyson McGregor, MD, author of 'Sex Matters'
MARY KORR

99 HERITAGE
From the Civil War to the Present: A Snapshot of Floating Hospitals
MARY KORR



RHODE ISLAND
MEDICAL JOURNAL

IN THE NEWS

RI HOSPITAL AUTHORS 91
publish study comparing incidence of respiratory virus peak incidence among varying age groups

RI FOUNDATION 91
awards COVID-19 Behavioral Health Fund grants

92 **STUDY FINDS**
only 3% of individuals with autism receive recommended genetic tests

93 **URI**
offers new online Master's program in health care management

PEOPLE/PLACES

ALAN DANIELS, MD 94
named Spine Surgery Division Chief at University Orthopedics

BETTY RAMBUR 94
URI Nursing Professor, appointed to Medicare Payment Advisory Commission

95 **JOHN B. MURPHY, MD**
honored by American Geriatrics Society

95 **DR. ANDREW ZULLO**
receives American Geriatrics Society New Investigator Award

96 **BROWN UNIVERSITY**
COVID-19 Research Seed Fund

97 **OBITUARIES**
Peter B. Baute, MD
Vincent A. DeRobbio, MD
Andrew Edmund Slaby, MD, PhD, MPH

JUNE 2020
VOLUME 103 • NUMBER 5

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CASE REPORTS

45 F18-FDG PET/CT Diagnoses Vasculitis after a Negative Indium-111 Leukocyte Scan
JING WANG, MD; DON C. YOO, MD; ELIZABETH H. DIBBLE, MD

49 Delayed Diagnosis of an Occult Wooden Orbital Foreign Body
YASH J. VAISHNAV, MD; DAVID PORTELLI, MD; MICHAEL E. MIGLIORI, MD, FACS

52 A Rare Case of 4 Ps: Bilateral Pneumothoraces and Pneumomediastinum in Pneumocystis Pneumonia
DANIEL YEE, MD; DANNI FU, MD; CHANNING HUI, DO; NEAL DHARMADHIKARI, MD; GERARDO CARINO, MD, PhD

IMAGES IN MEDICINE

55 Simple Nasotracheal Tube Fixation to Prevent Inadvertent Extubation
TAIF MUKHDOMI, MD; DANIELLE LOVETT-CARTER, MD; MARK C. KENDALL, MD; SCOTT BENZULY, MD

CONTRIBUTIONS

57 COVID-19 and Intimate Partner Violence: A Call to Action
ODETTE ZERO, BA, MD-ScM'22; MEGHAN GEARY, MD

60 Work-Life Balance and Career Experiences of Part-Time Versus Full-Time Faculty at the Warren Alpert Medical School of Brown University
ERICA Y. CHUNG, MD; ALLISON W. BRINDLE, MD; SHUBA KAMATH, MD, MPH; KRISTIN C. LOMBARDI, MD; DELMA-JEAN WATTS, MD; VALERIE RYAN, PhD; OFFICE OF WOMEN IN MEDICINE AND SCIENCE ADVISORY BOARD

65 An Evaluation of Connect for Health: A Social Referral Program in RI
EMILY ZHU, AB'20; JASJIT S. AHLUWALIA, MD, MPH, MS; M. BARTON LAWS, PhD

70 Brown Urology: A Historical Perspective
TIMOTHY K. O'ROURKE, MD; MARK SIGMAN, MD; ANTHONY A. CALDAMONE, MD; ERIC JUNG, MD

73 The Health and Socioeconomic Outcomes of Abortion Denial in Rhode Island: A Health Impact Assessment
NYKIA R. LEACH, MPH; SAMANTHA ROSENTHAL, MPH, PhD

PUBLIC HEALTH

77 Vital Statistics
ROSEANN GIORGIANNI, DEPUTY STATE REGISTRAR

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Keeping Hospitals Safe During the COVID-19 Pandemic
Finding inspiration in a father's credo

LEONARD A. MERMEL, DO

My father survived starvation, sickness, and the death marches of the Holocaust. Growing up, he always told my sisters and I how lucky we were to be Americans. He said that the United States government allowed him to immigrate here and have a good life, so we should be humble, give back, and help the less fortunate.

The last day off I had was January 6, 2020. I am not on the front lines of the fight; instead I am charged with developing strategies to reduce the risk of COVID-19 transmission to our hospital staff and uninfected patients. Over the last nearly 30 years, the focus of my career has been on the prevention of hospital infections. During this time, I was invited to share my views at the Institute of Medicine, National Academy of Sciences regarding reducing risk of infections in healthcare workers during a pandemic due to a respiratory virus. After years of preparation and innumerable drafts of hospital plans, the gravity of the current pandemic remains daunting. Despite thinking about this for so long, writing about it, and collecting views of respected authorities, the responsibility for the health of my colleagues is, at times, frankly overwhelming. Based on past experience, I had thought ahead of time of some shortages, such as reduced availability of products used for staff to clean their hands. However, I had not thought of national shortages in the availability of personal protective equipment worn by staff, shortages in stethoscopes used to examine patients, shortages of filters used on equipment to prevent the virus from circulating in the air, shortages of hospital disinfectants, shortages in swabs used to collect specimens to test patients for COVID-19 infection, shortages in tests used to make the diagnosis, and so much more. Yet, camaraderie among our staff has afforded us the opportunity to work together, innovating every hour of every day of every week, as much as humanly possible, to mitigate risk to those for whom we are honored to serve with and reduce risk to those who enter our hospital system for care. We have been successful in these endeavors. As Nelson Mandela wrote, "It always seems impossible until it is done."

I have been fortunate to have close friends in Europe who are opinion leaders, who have been a few weeks ahead of us in the pandemic, and whom I called upon to help troubleshoot the complexities of safety for our staff in this most challenging time. I have been fortunate to work with administrators, nurses, physicians, supply chain staff, housekeepers, engineers, infection prevention professionals, public health professionals, and many more who have put the well-being of others before themselves. In a time of such need, the likes of which has not been seen since the 1918 flu pandemic, those who have risen to the challenge speaks of the passion and humanity they bring to work each day.

In my father's self-penned obituary a few weeks before his death, he wrote, "The only thing I take with me is my good name. I willfully never hurt anyone and if I did, please forgive me. My credo is be honest, charitable, don't hurt anybody and if it takes just as much effort to be good or nasty, then why not be good?" God knows, over the last several months, I have tried to live up to his credo. ❖

Camaraderie among our staff has afforded us the opportunity to work together, innovating every hour of every day of every week, as much as humanly possible, to mitigate risk to those for whom we are honored to serve with and reduce risk to those who enter our hospital system for care.

Author

Leonard A. Mermel, DO, ScM, Professor of Medicine, Warren Alpert Medical School of Brown University; Medical Director, Department of Epidemiology & Infection Control, Rhode Island Hospital; Adjunct Clinical Professor, University of Rhode Island College of Pharmacy.

Miasmas and Other False Beliefs: The Road to Sickness and Death

HERBERT RAKATANSKY, MD

It is hard to believe that some people in Britain are burning cell towers in the belief that the current pandemic is caused by 5G technology. But we all see the world through our own viewpoint. Most believe the logical explanation of what we observe. But there are many who do not. They deny science, and explain our world in terms of their fixed belief systems. And they ignore inconsistencies when they are pointed out. Think also of "anti-vaccers."

Even within science, however, one's world view can influence how we interpret what we observe. In 1962 the physicist, Thomas Kuhn, published a book (*The Structure of Scientific Revolutions*) describing the evolution of scientific ideas. He described how people interpret observations of nature in the context of our pre-existing theories of how the world works. If there are observed phenomena that cannot be explained by the then current "science," it becomes necessary to discard that "world view" and postulate another that would "explain" the new observations. These "revolutions" in thought are rare but critical.

The viewpoint that the sun revolves around the Earth was first repudiated in modern times by Copernicus in 1543 (Aristarchus had suggested heliocentrism in the 3rd century BC). Copernicus knew that the notion that the Earth was not the center of the universe would be considered heresy and, fearing persecution, waited until he was on his deathbed to publish it (He died within months of the publication). And in 1633, Galileo was convicted of heresy for describing the phases of Venus, and concluding that the Earth rotates around the sun. He was sentenced to house arrest for the balance of his life (10 years). Three hundred and twenty-nine years later Pope John Paul II formally apologized for the outcome of that trial.

Starting in the latter 17th century (1687) Newton's Laws of Gravity could and did explain all physical phenomena. Radioactivity, discovered in 1895, demonstrated clearly that energy emanated spontaneously from uranium. Newton's postulate about the conservation of mass and energy could not explain this new observation. Physics acquired a totally new world view (Einstein, 1905 and later).

The same episodic revolution of ideas has occurred in medicine. Although epidemics and plagues have recurred over the millennia, the idea that these afflictions could be caused by microorganisms such as bacteria and viruses was not easily accepted. In fact, it was denied, even when evidence showed otherwise.

In 1845 Dr. I. Semmelweis in Vienna noted that up to 40% of women who delivered babies in the hospital died rapidly of "Puerperal Fever" (published 1849). (We know now that was streptococcal sepsis.) He also noted that the death rate was about 50% less when the babies were delivered by midwives rather than doctors. Observing the practices in the hospital, he noted that doctors assisted in performing autopsies on their patients. Midwives were not allowed to do so. Additionally, Semmelweis observed the death from the same disease of a male doctor who had nicked his finger during an autopsy. Postulating that there was a transferable cause of disease, he made all doctors wash their hands after doing an autopsy and before delivering babies. The death rate dropped by 50%. Semmelweis's data were clear and definitive. But his observations did not fit the then popular theory that disease was caused by miasmas, invisible vapors in the air. His published findings were ignored and he was dismissed from the hospital. He ultimately died in an asylum.

We are hampered in our approach to this pandemic by the same problem of lack of belief in science that people had about the germ theory.

Dr. Oliver Wendell Holmes Sr. had reported similar conclusions in Boston in 1843 (republished 1855), with the

same outcome. His results also were ignored, again because of belief in miasmas. He abandoned his work in this field but stayed in Boston. Semmelweis and Holmes never knew of each other's work.

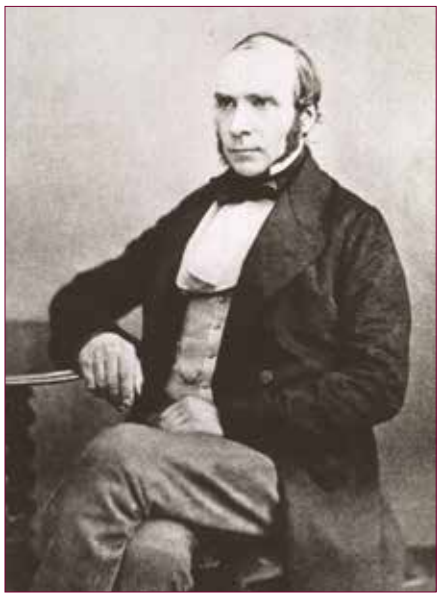
Germ theory

Over the next 20 years (circa 1845–1865) Louis Pasteur, Robert Koch and others demonstrated the presence of microorganisms in the air that could grow in certain nourishing media. They proposed the germ theory of disease but it was not accepted by the medical profession. The belief in miasmas persisted.

A replica of the infamous John Snow pump was reinstalled on Broadwick Street in Soho, London, in 2018. [THE JOHN SNOW SOCIETY AND WESTMINSTER COUNCIL]

A heat wave in London in the summer of 1858 produced the "Great Stink," an intolerable smell from the raw sewage that drained into the Thames River in London. Epidemics of cholera (thought to be induced by miasmas) ravaged London periodically, but not during that summer of 1858, even though the "miasmas" were overpowering. But nobody noted that discordance: why was there no cholera with so many miasmas? The "Great Stink" was the impetus, however, to build the London sewer system which diverted the sewage to the Thames estuary.

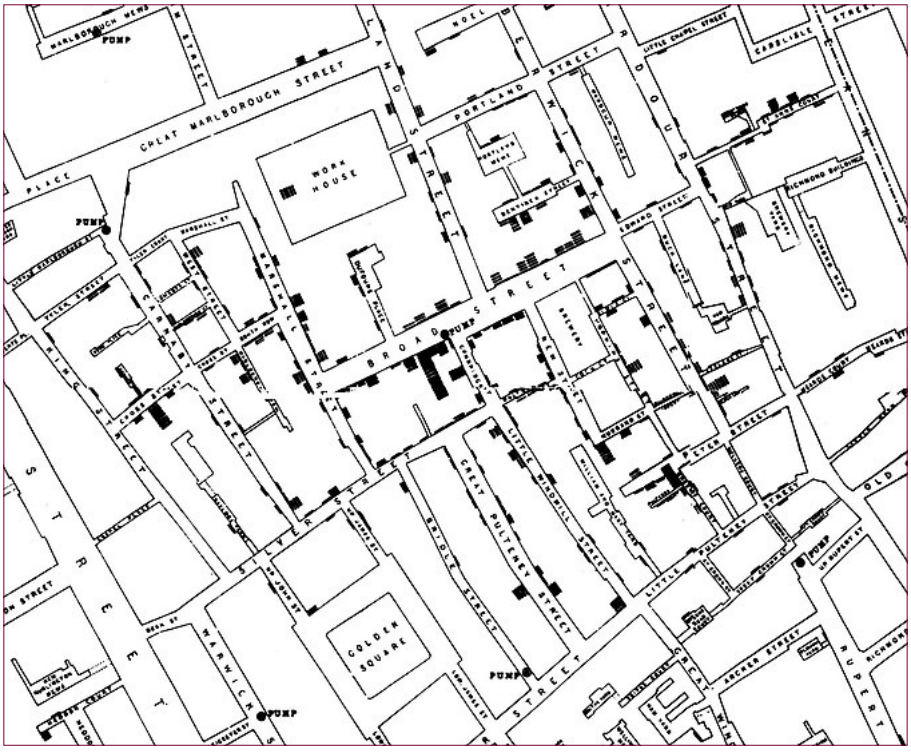
Additionally, Dr. John Snow of London noted that cholera was traceable to the water supply. In 1854 he removed the handle from a municipal water pump and eliminated cholera from that area of London. His findings were noted, but again did not dispel the blind belief in miasmas. A replica of the pump (sans handle) exists today in London at the site of the original pump.



Dr. John Snow (1813–1858) [NATIONAL LIBRARY OF MEDICINE]

Dr. Joseph Lister, a surgeon in Glasgow, was a believer in the germ theory and in the mid-1860s read a newspaper article from Carlisle, Scotland that described the effects of raw sewage leaching into the land adjacent to the sewage which contaminated a local river, and killed cattle grazing there. The local farmers had found that spraying the fields with carbolic acid restored the viability of the fields.

At that time compound fractures were uniformly fatal due to suppuration that Lister believed was due to bacteria rather than miasmas. He connected the pieces and published a paper in 1867 presenting cases of compound fractures treated with carbolic acid, presuming it would kill bacteria in the fracture wounds as it did in the fields of Carlisle. The carbolic acid was almost completely successful in preventing suppuration and death. This was proof of the germ theory. But even this definitive observation took a number of years to be accepted by the medical profession. It was another 14



Original map by Dr. John Snow showing the clusters of cholera cases in the London epidemic of 1854, drawn and lithographed by Charles Cheffins. [WIKIPEDIA, CREATIVE COMMONS]

The Latest Contribution to the Germ Theory
A scientist sits at a table looking at a tiny cupid. To the right a microscope, and several containers of bacteria. The illustration first appeared in 1897, in *Harper's New Monthly Magazine*, v95, p 810. [NATIONAL LIBRARY OF MEDICINE]

years before the first patient to have an abdominal operation using antiseptic technique and not die of infection had a gastrectomy by Dr. Theodor Billroth in Vienna in 1881.

Not so long ago, in 1980, Drs. Barry Marshall and Robin Warren discovered bacteria in the stomachs of persons with ulcers. Despite universal acceptance of the germ theory, these findings initially were debunked since they did not fit the preconceived view that ulcers were caused by acid and stress (replacing miasmas). That discovery of *H pylori* subsequently won the Nobel Prize.

The germ theory is no longer controversial. But there are people in our society who have belief systems that deny and/or ignore the effect of a scientific approach to this pandemic. Some believe that coronavirus dissemination was deliberate. Conspiracy theories, extremist sects and a lack of trust in science are widespread. The contemporary rapid dissemination of "fake news" makes false beliefs even more powerful and influential. Some continue practices that facilitate the transfer of this virus from animals. Some deny that changes in behavior, such as social isolation, will mitigate the pandemic severity. Some advocate for medications with no demonstrated effect.

Many in our society have been targets of discrimination based on color, religion, economic and other invidious bases. They have little reason to trust authority, including the scientific establishment. It is essential that we address this issue.

Erroneous belief systems die long and difficult deaths. This is not the first and will not be the last pandemic. Our very survival demands that, as a society, we address the underlying causes of false beliefs and establish an abiding trust in science. ❖

Author
Herbert Rakatansky, MD, is a Clinical Professor of Medicine, emeritus, Alpert Medical School of Brown University.

COVID-19: Misinformation Can Kill

GHAZAL AGHAGOLI, BS, MD'23; EMILY J. SIFF, MS; ANASTASIA C. TILLMAN, BA, MD'23;
EDWARD R. FELLER, MD, FACP, FACG

INTRODUCTION

False messages about the COVID-19 pandemic may spread faster than the virus itself. From countless fabrications about coronavirus cures to fraudulent COVID-19 testing drive-throughs, misinformation is ceaselessly expanding. For instance, frequently circulating claims that *"COVID-19 is like the common cold"* are false. Scientific evidence indicates that, from its molecular structure to its high fatality rates, COVID-19 is not like the common cold.[1]

Fabricated messages can spread, not only through misinformation (false information that may inadvertently or purposefully mislead), but also through intentionally malicious processes, such as disinformation (false information that is intended to mislead).[2] While disinformation thrives during the COVID-19 pandemic, discerning whether those who spread erroneous messages intend to deceive can be challenging or impossible. Consequently, this commentary primarily refers to false and misleading messages as "misinformation." Intentionally misleading or not, misinformation can have far-reaching and disastrous consequences.

HOW WIDESPREAD IS THE MISINFORMATION PANDEMIC?

Today, anyone with access to the Internet is capable of not only consuming but also actively generating misleading material. While scientific research is more carefully filtered, any of us can post online, regardless of our expertise, accuracy, or ethics.

Should we trust the content we find online? By 2013, 72% of U.S. Internet-users reported searching for their health information online[3] and, by 2019, an estimated 80% of U.S. adults reported going online "at least daily."[4] However, the Internet has no gatekeeper – websites and social media platforms are rarely vetted. Once online, dangerous posts are immediately available to millions – often permanently. Even when refuted or removed, there is nothing to halt our oftentimes accidental propagation of and belief in misinformation.

Scientific findings can be difficult to consume and interpret, much less convey. From the average Internet-user to journalists to researchers, the fast-paced nature of the online world allows any one of us – often unintentionally – to misrepresent, falsify, or overdramatize health-related posts. In short, separating accurate scientific facts from false, biased, or intentionally misleading content is frequently impossible.[5]

From links to and advertisements for empirically untested supplements to fabricated science resources and fallacious anti-viral devices, damaging content is persistently promoted. Whether the content is conveyed by fake experts or just the average social media user, misinformation is often disseminated and propagated to a level where it can obscure or even discredit robust evidence from truly credible resources.[6]

One brazen fraud created an inauthentic drive-in testing site where "volunteers" in deceptive gear swabbed for non-existent COVID tests.

WHY DO WE BELIEVE MISINFORMATION?

We live in a world replete with misleading content, including pseudoscience. Our willingness to believe some messages and discard others is influenced by past experiences, the limitations of our knowledge, and the accuracy of available data. Critically, there are a multitude of malicious methods that can facilitate the spread of and belief in misinformation (**Table 1**).

We all want the world to make sense. To reduce uncertainty and optimize decision-making, we tend to favor simple, unambiguous information over complex, ambiguous but accurate information. However, just because a message is straightforward does not mean that it is more accurate than a complicated picture. For instance, believing the falsehood that there is an easy cure for COVID-19 – like eating garlic – might be more appealing than the complicated, pessimistic reality that there is no current cure for this disease.

Also, we favor content confirming our existing beliefs, and we have difficulty searching for evidence to refute them. Seeking insight from inaccurate explanations can delude us to interpret unclear or misleading data to fit our expectations. We may fail to detect pitfalls of biased, random, or unrepresentative second-hand information, including content from mass media. Passive processing increases the likelihood of erroneously finding order and predictability in what is actually random or contradictory data.

Moreover, during rapidly evolving crises like the COVID-19

Table 1. How Misinformation Spreads: Malicious Methods

MALICIOUS METHODS	DEFINITIONS	MISINFORMATION EXAMPLES	CORRECTIONS
Deception	Inaccurate, false information that is presented as legitimate	**Untrue**: "COVID-19 can be transmitted through mosquito bites."	**True**: COVID-19 cannot be transmitted by mosquitos.
Create False Equivalence	Comparing logical, accurate arguments to illogical, inaccurate arguments	**Untrue**: "Scientists disagree – no COVID-19 consensus exists."	**True**: Scientists commonly disagree; however, there is widespread scientific consensus about COVID-19.
Favor Simplified Messages	Tendency to favor simple messages over complicated content	**Untrue**: "Do not take ibuprofen if you have the virus."	**True**: WHO initially said that those with COVID-19 should avoid ibuprofen, but later retracted this statement.
Amplify Unreliable Messages	Frequently flood Internet with the same malicious content	**Untrue**: "5G spreads COVID-19."	**True**: 5G technology does not spread COVID-19.
Downplay Risks	Underestimate risk, overestimate ability to overcome risk	**Untrue**: "COVID-19 is like the common cold."	**True**: COVID-19 is not like the common cold; much higher fatality rates than a common cold.
Mix Content Accuracy	Combine accurate and inaccurate information	**Untrue**: "COVID-19 can kill older people, but it can't harm young people."	**True**: COVID-19 can infect and be fatal at any age.
Impersonate Reliable Sources	Attribute misinformation to a reliable source or pretend to be a reliable source	**Untrue**: "Dr. Fauci said social distancing doesn't matter."	**True**: Dr. Fauci has been a major proponent of social distancing.
Non-Verifiable Predictions	Predictions about future events that cannot be proven or disproven	**Untrue**: "Schools will re-open in Fall 2020."	**True**: School re-openings depend on diverse, uncertain scenarios.

pandemic, governing health bodies may change their advice in response to the changing circumstances. Although sticking with the initial, unambiguous message may be easier, the evolving message is often more accurate. For example, the World Health Organization (WHO) initially warned against taking ibuprofen when one is diagnosed with COVID-19 – WHO later retracted this warning. This rapid change in messaging resulted in some favoring the initial, unambiguous message of "do not take ibuprofen" over the evolving, accurate message of "WHO initially said not to take ibuprofen, but this warning was retracted."[7]

WHAT ARE THE CONSEQUENCES OF BELIEVING MISINFORMATION?

Misinformation can be confusing and pernicious. Over time, false messages can erode public support and discourage adherence to evidence-based guidelines, foster mistrust in science and waste limited human and material resources.[5] A major consequence of spurious messages is skepticism of truthful accurate content and the legitimization of misleading content. Fictitious information might be presented as one side of an honest debate, creating a false equivalence.

Another striking consequence of misinformation is an increased risk for catastrophic but preventable outcomes during the COVID-19 pandemic. Seemingly harmless, well-meaning misinformation can be fatal. For instance, while optimism is emotionally crucial, overoptimistic messages during health crises like a pandemic can result in detrimental decisions, such as lack of adherence to social distancing.[9]

WHAT CAN WE DO TO AVOID AND DETECT MISLEADING MESSAGES?

A pandemic of misinformation parallels the COVID-19 outbreak. Perpetrators disseminate non-existent virus and vaccine solutions, impairing intelligent responses to this crisis. Each of us must monitor our information consumption and actions and: (1) Seek accurate information from credible sources such as the CDC; (2) Know that reliable sources may change their messages as data evolves and updates; (3) Be wary of widespread misinformation on social media; (4) Don't click on links or attachments from unverified sources; (5) Be skeptical of unsolicited emails offering testing, products or requests for personal information; and (6) Reject online requests to pay by gift card or scammers posing as reps from WHO or CDC to trick users to download malware.

CONCLUSION

Science can be manipulated to promote disinformation. Uncertainty, angst, fear and confusion amidst relentless exposure to enormous amounts of diverse communications increase our vulnerability. Understanding the pervasive scope and strategy of unreliable and malicious information can aid us in confronting misleading content and mitigating its potentially catastrophic consequences.

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Authors

Ghazal Aghagoli, BS, MD'23, Warren Alpert Medical School of Brown University, Providence, RI.

Emily J. Siff, MS'20, Master of Cognitive Science graduate program, Brown University, Providence, RI.

Anastasia C. Tillman, BA, MD'23, Warren Alpert Medical School of Brown University, Providence, RI.

Edward R. Feller, MD, FACP, FACG, Clinical Professor of Medical Sciences, Brown University; Co-Editor-in-Chief, *Rhode Island Medical Journal*, Providence, RI.

Correspondence

Edward Feller, MD, FACP, FACG
Box G M-264, Brown University
222 Richmond Street
Providence, RI
Edward_Feller@brown.edu

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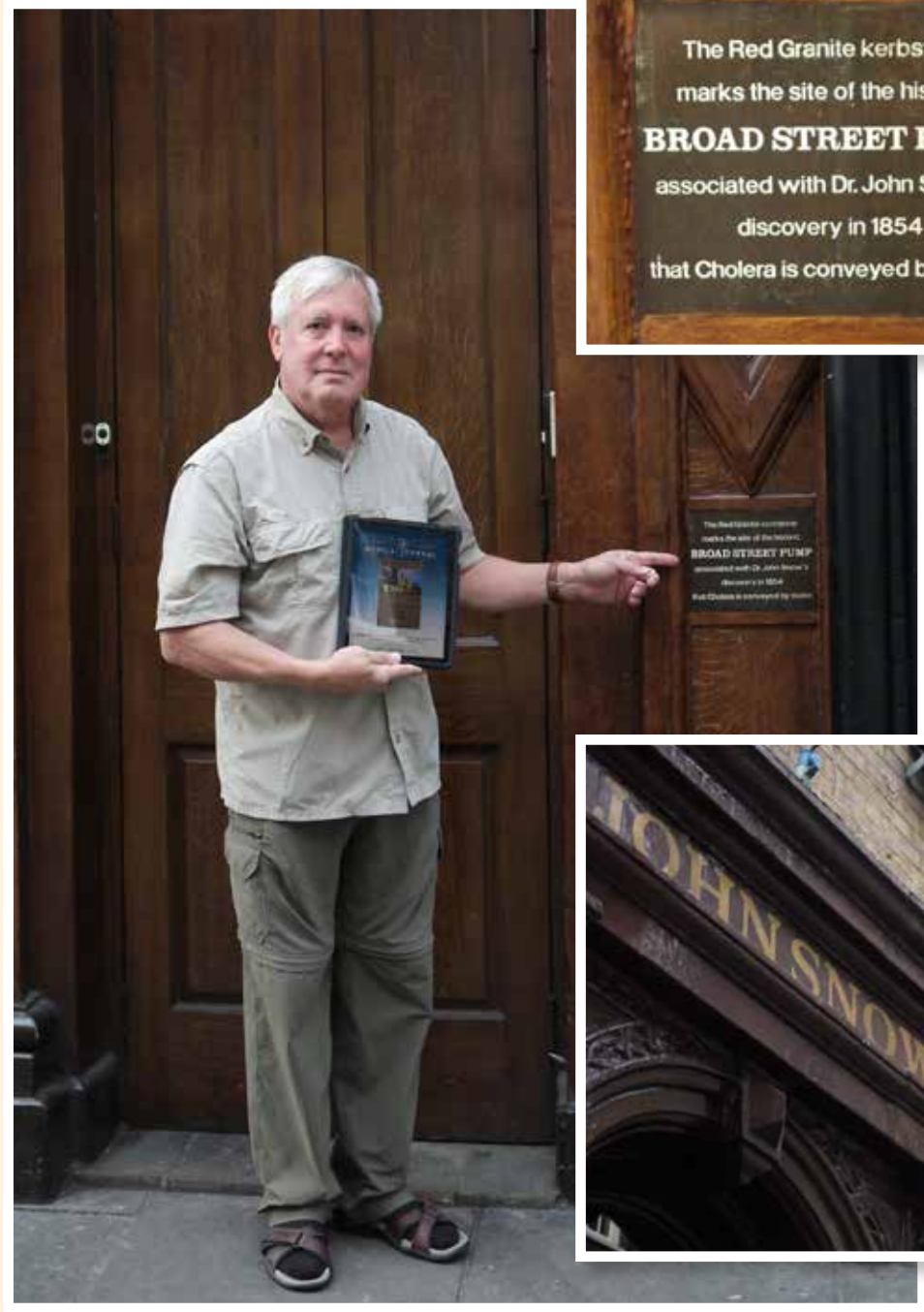
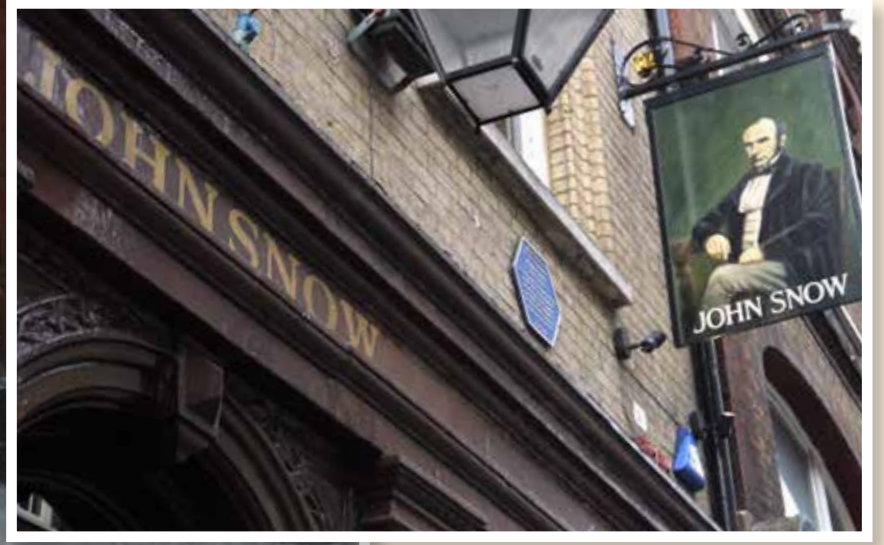


A replica of the infamous John Snow pump was reinstalled on Broadwick Street in Soho, London, in 2018. [THE JOHN SNOW SOCIETY AND WESTMINSTER COUNCIL]

LONDON, ENGLAND

In August 2015, RIMS executive director **Newell Warde, PhD**, opened the journal at the site of John Snow's famous water pump, in front of a pub named for the famous physician, near the corner of Broadwick and Cambridge Streets in the Soho section of Westminster, London. (See Commentary, page 9)



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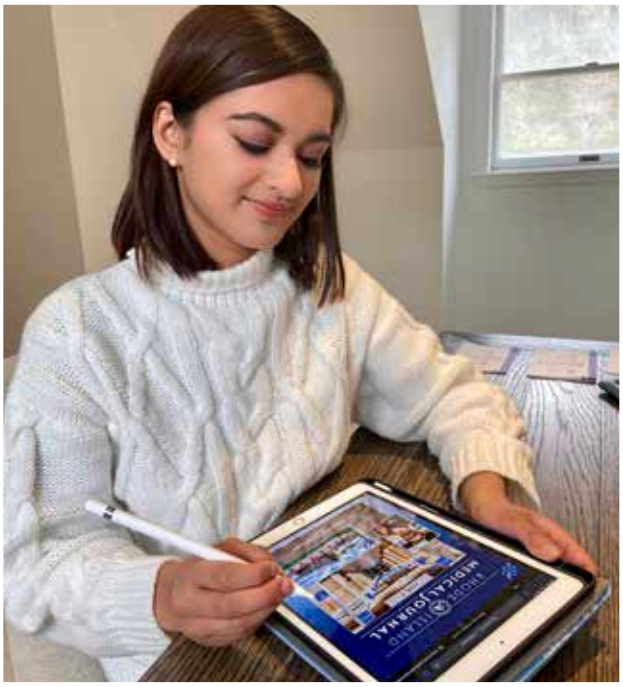

NEW YORK

Soumitri Barua, AB, MD'21, sent RIMJ this photo from her home where she is continuing her studies virtually due to the pandemic. She and co-authors contributed to this month's theme section, in the article, **Intrahepatic Cholangiocarcinoma in a Patient with Hepatitis C: A Cautionary Tale**. (page 30)

RHODE ISLAND

Emily Zhu, AB, who received her degree in Public Health and Public Policy at Brown this year, reads a current issue of RIMJ outside her apartment. She and co-authors offer an overview of a unique program at Hasbro and the Center for Primary Care in this issue, **An Evaluation of Connect for Health: A Social Referral Program in RI**. (page 65)

RHODE ISLAND

Timothy K. O'Rourke, MD, a urology resident/PGY3 at Brown and Rhode Island Hospital, paused in his busy schedule to send us this photo taken at his home. In this month's issue, he and co-authors provide an overview of his subspecialty, in **Brown Urology: A Historical Perspective**. (page 70)

RHODE ISLAND

Barbara Roberts, MD, FACC, who founded and directed the Women's Cardiac Center at The Miriam Hospital from 2002 to 2016, sent us this photo as she reviewed the May issue of RIMJ. To her right on the bookshelf is her most current book published in 2019, The *Doctor Broad: A Mafia Love Story*. Her author talks have now Zoomed into the virtual world, at least for the present.

She is also the author of *How To Keep From Breaking Your Heart: What Every Woman Needs to Know About Cardiovascular Disease*; *Treating and Beating Heart Disease: a consumer's guide to cardiac medicines*; and *The Truth About Statins: Risks and Alternatives to Cholesterol-Lowering Drugs*.

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The Second Biggest Infectious Disease Killer in the U.S.: Hepatitis C Virus Infection and Steps Towards its Elimination in Rhode Island and Beyond

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

It has been six years since our first hepatitis C virus infection (HCV)-themed edition of the *Rhode Island Medical Journal* (RIMJ) and 31 years since the discovery of this small, single-stranded, enveloped RNA virus.[1] An evolving understanding of this pathogen and the shifting HCV epidemic lead to continual changes in the standard of care. The past months mark the convergence of many steps taken to address the global and national problem of HCV.

In April 2020, the U.S. Centers for Disease Control and Prevention (CDC) released revised HCV testing recommendations, advising universal HCV screening for all adults – not just persons born from 1945 to 1969 and those with risk factors.[2] The CDC also recommended HCV screening for all women who are pregnant during each pregnancy. CDC continues to instruct that people with risk factors be tested regularly. This followed the March 2020 U.S. Preventive Services Task Force (USPSTF) updated recommendations advising that clinicians screen all adults aged 18 to 79 for HCV at least once, regardless of their risk level for contracting the disease.[3] The USPSTF also counseled that those outside this age range at high risk of infection be screened.

These recommendations are consistent with November 2019 modified U.S. society guidelines from the American Association for the Study of Liver Diseases (AASLD) and the Infectious Disease Society of America (IDSA) endorsing one-time, routine, opt-out HCV screening for all individuals 18 years and older.[4] They also advocate periodic testing for persons with an increased risk of HCV exposure, annual HCV testing for people who inject drugs (PWID) and HIV-infected men who have unprotected sex with men, and one-time testing for all persons younger than 18 years at increased risk of HCV. These updated guidelines stipulate that all patients with chronic HCV be treated, except those with short life expectancies that cannot be remediated, with no restrictive prioritization of HCV medications.

Rapidly advancing therapeutic options and complex treatment algorithms hinder treatment scale-up at the population level; AASLD/IDSA also issued simplified treatment approaches for HCV treatment-naïve patients with and without cirrhosis in November 2019.[4] Ninety-nine percent of HCV infections are now curable with pangenotypic direct-acting antiviral (DAA) agents with all-oral medication regimens for 8–12 weeks (longer for advanced liver disease and complex patients). Benefits of cure include reduced transmission, decreased liver-related morbidity and mortality as well as all-cause mortality, diminished need for liver transplantation and improved quality of life.

Additionally, in April 2020, the CDC reported that U.S. HCV incidence tripled from 2009 to 2018, due to the opioid crisis.[5] While Baby Boomers remain the highest prevalence population in the U.S., increases in acute HCV infections are attributable to rising rates of injection drug use among younger persons. Compelling evidence demonstrates that DAAs are effective for PWID, and that high levels of HCV treatment and cure for PWID can reduce HCV incidence and prevalence.[6-11] Consequently, national and international guidelines support prioritization and HCV treatment expansion for this population.[4,12] In the absence of a vaccine, and no effective pre- or post-exposure prophylaxis, it is DAA treatment, opioid agonist therapy plus high-level needle syringe provision that are the necessary trifecta to facilitate prevention and the path to cure.

The World Health Organization (WHO) Global Health Sector Strategy provides a roadmap to HCV elimination.[13] In line with WHO goals, there should be a 30% reduction in new infections and a 10% reduction in hepatitis-related deaths by the end of this year. The U.S., along with 80% of high-income countries, is not on track to meet these targets.[14] Of 45 high-income countries, only nine (Australia, France, Iceland, Italy, Japan, South Korea, Spain, Switzerland and the United Kingdom) are on course towards meeting WHO's 2030 targets of 90% reduction in new infections and a 65% reduction in mortality. Thirty nations including the U.S are off-track by at least 20 years, as they are not projected to achieve HCV elimination before 2050. Our national plan, the U.S. National Academies of Sciences, Engineering, and Medicine report, presents strategies and priorities to eliminate HCV as a serious public health threat.[15] Lack of funding impedes full implementation of these plans. For example, for fiscal year 2019, the enacted budget shows that the CDC's Division of Viral Hepatitis received 39 million dollars, representing 0.5% of CDC's total program budget.[16] Viral hepatitis accounts for less than one percent of the National Institutes of Health research budget.[17]

Rhode Island data

What is the data from Rhode Island (RI)? Chronic HCV prevalence exceeds national averages.[18] Per a March 2020

modeling study (we lack robust national surveillance data), RI, with a prevalence estimate of 1.78% for men, ties with Arizona for the eighth highest prevalence among men behind the District of Columbia, Louisiana, New Mexico, Oklahoma, Oregon, Tennessee and West Virginia. RI has the ninth highest prevalence estimate among females, behind the District of Columbia, Kentucky, Louisiana, New Mexico, Oklahoma, Oregon, Tennessee and West Virginia with a prevalence estimate of 0.67%. Among the U.S. states and District of Columbia, RI has the 10th highest HCV prevalence estimate among the birth cohort, those born between 1945 and 1969.

Manuscripts from the current edition of the Journal exhibit the wide-ranging expertise needed to make a difference in providing life-saving preventive measures and care. These articles highlight the expertise of a diverse group across RI as they address barriers and facilitators of HCV elimination.

Public health leadership and initiatives provide the foundation for combating RI's HCV epidemic. **MATTHEW MURPHY, MD,** et al describe the Rhode Island Department of Health's HCV elimination efforts.

The advent of DAAs ended the interferon era, and ushered in the use of non-invasive approaches for assessing hepatic fibrosis. **ADIB R. KARAM, MD,** and **MICHAEL D. BELAND, MD,** explain the varied techniques of liver ultrasound elastography, elucidating benefits and limitations.

The HCV cascade to cure has not reached PWID in sufficient numbers. Delivering all elements of care at a single site, and streamlining care to reduce time from infection to cure, may be accomplished with co-location of HCV and addiction care. **SOUMITRI BARUA, MD'21,** along with her co-authors, illuminates these lessons and reminds us of an aggressive HCV-associated malignancy, intra-hepatic cholangiocarcinoma. As HCV is typically asymptomatic, older adults may be unknowingly living with HCV for decades; the largest burden of HCV-related complications falls on those age 60 and older. Highlighting the important role of pharmacists in HCV treatment, **ALYSSA K. GREENWOOD FRANCIS, MPH,** and colleagues evaluate DAA efficacy in older versus younger patients.

The U.S. spends more on healthcare than any other country.[19] Interventions to reduce waste in U.S. healthcare spending include cutting inflation in pricing of medications and easing administrative complexity.[19] **PATRICK DURYEA** et al discuss RI's DAA Prior Authorization process, providing opportunity to consider steps to alleviate administrative burdens and inefficiencies.

Due to the COVID-19 pandemic, RI Defeats Hep C cannot hold C is for Cure Waterfire this summer in honor of July 28's World Hepatitis Day (it would have been our 7th annual event, one of the world's largest HCV festivals). We hope this issue of the Journal keeps HCV on your mind as its contributors address key domains of prevention, stigma, screening and diagnostic testing, evaluation of liver disease, treatment, medical complications, healthcare disparities and public health policy. Best of health to all and thank you to RI's extraordinary medical community.

Acknowledgments

Thank you to the many patients living with and cured of HCV, for your courage and endurance.

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Author

Lynn E. Taylor, MD, FACP, FAASLD, Research Professor, University of Rhode Island; Director of HIV and Viral Hepatitis Services, CODAC Behavioral Healthcare; Director, RI Defeats Hep C.

Correspondence

Lynn E. Taylor, MD
URI Providence Campus
80 Washington Street, Room 525
Providence, RI 02903
letaylor@uri.edu
www.ridefeatshepc.com

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

ABSTRACT

Hepatitis C Virus (HCV) continues to be a cause of significant morbidity and mortality around the world surpassing HIV, Tuberculosis and Malaria as the leading cause of death by an infectious disease. In the United States, advances in screening, testing and treatment have put the goal set by the World Health Organization (WHO) to HCV elimination within reach. Rhode Island has taken an innovative public health approach to eliminating HCV by improving disease surveillance activities, supporting disease reduction strategies and removing barriers across the continuum of care, particularly for populations that are disproportionately impacted by the disease. Through the coordination of the Rhode Island Hepatitis C Action Coalition, the Rhode Island Department of Health (RIDOH), the Executive Office of Health and Human Services (EOHHS), community organizations, and clinical leaders, important steps have been taken to reduce transmission of the disease and work toward HCV elimination.

KEYWORDS: hepatitis C virus, elimination, Rhode Island

INTRODUCTION

Globally, viral hepatitis has now become the most common cause of mortality from an infectious source surpassing HIV, Malaria and Tuberculosis for cause of death.[1] In the United States (US), hepatitis C virus (HCV) is the most common blood-borne infection and is an important cause of liver related morbidity and mortality.[2] It is estimated that at least 2.4 million individuals in the US are currently living with HCV and there are approximately 17,000 new cases each year, although given concerns of underreporting, the incidence and prevalence of the disease is likely quite higher.[3,4] HCV is estimated to cost in excess of $10 billion annually in the US alone and is a significant contributor to the increase in morbidity and mortality related to hepatocellular carcinoma, cirrhosis and liver failure.[5,6]

First described in 1989, HCV is a virus that affects the liver and is predominantly transmitted through exposure to infected blood or bodily fluids that contain blood. It has been classified into eight genotypes with a highly varied global distribution and 1a being the most common in the US.[7] Acute infection is often mild or asymptomatic and leads to chronic infection in approximately 75% of exposed individuals.[8] Morbidity and mortality associated with HCV most frequently results from the complications of chronic infection including cirrhosis, liver failure and hepatocellular carcinoma.[9,10] The HCV epidemic in the US disproportionately impacts certain groups including those born between 1945 and 1965, known as the Baby Boomer generation, individuals who received blood transfusions or organ transplants prior to 1992, people who inject drugs (PWID), men who have sex with men (MSM) and in particular those who are infected with HIV.[3] Baby Boomers have a particularly high burden of disease which is thought to be related to the lack of standardized sterilization techniques and injection practices.[11] However, there has been an increasing disease burden among younger individuals due in large part to the growing opioid epidemic in the US.[12,13] Persons who have ever injected drugs are at increased risk for HCV given the possibility of transmission through syringes and injection equipment contaminated with HCV and injection drug use is the most common risk factor for HCV acquisition in the US.[14] It is estimated that between 69 to 77% of persons who inject drugs have been exposed to HCV amounting to approximately 1.5 million individuals in the US.[15] However, despite the growing burden of the disease, it is estimated that at least half of all persons with HCV are not aware of their infection.[16]

Although HCV remains a significant threat to public health, there have been incredibly promising strides in the treatment and cure of the disease. The development of a number of safe, well tolerated and highly effective treatment regimens of Direct-Acting Antiviral (DAAs) agents, several of which are pangenotypic and require relatively brief dosing regimens of as little as 8 weeks, makes elimination of the disease attainable.[17] The WHO has established a goal of eliminating HCV as a public health threat by 2030 aiming to reduce HCV incidence by 90% and HCV related mortality by 65% within the next 10 years.[18] This has catalyzed a significant public health response including the development of a National Viral Hepatitis Plan[19] in the US as well as state-based elimination plans.[20] Action plans to attain the goal of elimination have largely focused on risk reduction for the group with the greatest burden of new infections, namely PWID, as well as reducing barriers along the continuum of HCV care from prevention to testing through sustained virologic response (SVR, equivalent to cure).

RESPONDING TO THE HCV EPIDEMIC IN RHODE ISLAND

Similar to elsewhere in the US and globally, Rhode Island has been increasingly impacted by the HCV virus and its complications. Over the past 10 years, mortality related to the HCV has increased by 272% and far outpaces the mortality related to HIV in the state.[21] However, measuring the true incidence and prevalence of the disease has met with similar challenges faced by other parts of the world. Prior estimates suggest that approximately 2% of Rhode Islanders have been exposed to HCV (16,603 to 22,660 individuals) with approximately 1.5% having developed chronic infection (12,286 to 16,768 individuals).[22] Importantly, the state has also continued to be disproportionately impacted by the national opioid epidemic with higher rates of substances use and overdose deaths compared to the national population, potentially worsening the HCV epidemic as well.[23] As a result, the RIDOH has developed a response with the goal of reducing the risk of transmission among those at highest risk for acquiring the disease as well as expanded testing and treatment services, taking advantage of expanded HCV screening guidelines, facilitating point-of-care HCV testing and supporting community services for risk reduction approaches.[24,25]

RHODE ISLAND HEPATITIS C ACTION COALITION

The Rhode Island Hepatitis C Action Coalition (RIHAC) was formed in 2014 by Rhode Island Public Health Institute (RIPHI). RIHAC is currently led as a partnership between RIDOH and the Executive Office of Health and Human Services (EOHHS). The primary goal of this partnership is to reduce the HCV burden in the state by improving access to HCV risk reduction programming, disease testing and linkage to effective treatment programs that are designed for population groups most at risk for infection. The coalition is comprised of many stakeholders including medical providers, patient advocates, public health officials, community-based organizations and clinical researchers. RIHAC is responsible for coordinating the statewide public health response to addressing the HCV epidemic in Rhode Island including formulation of a statewide elimination plan. RIHAC has also worked on policy issues related to HCV, including reducing restrictions on HCV medications to improve access.

DECREASING HCV INCIDENCE THROUGH RISK-REDUCTION INTERVENTIONS

A key element to the state response has been to coordinate prevention programming with community organizations and public health programs already working with vulnerable populations, particularly among PWID. Risk-reduction activities have focused on encouraging safe injection practices to reduce the transmission of HCV, HIV and other life-threatening complications associated with injection drug use. Efforts in Rhode Island have been led by AIDS Care Ocean State (ACOS), which was the first community-based organization to provide harm reduction and integrated HIV/Viral Hepatitis services in the state. ACOS is the major source of clean syringes and statewide harm reduction services organized through the ENCORE Program (**E**ducation, **N**eedle Exchange, **C**ounseling, **O**utreach, and **RE**ferrals). The ENCORE program was established in Providence since 1995, and currently operates two fixed sites as well as mobile units in five cities including: Providence, Woonsocket, Newport, Pawtucket and Central Falls. The main hub for ENCORE is located at 557 Broad Street in the Southside of Providence, RI. In 2018, ACOS had 1,350 total client encounters, serving approximately 600 unique clients; collected approximately 48,000 used syringes for safe disposal; and distributed 75,000 clean syringes and 40,000 harm reduction kits. In the same year ACOS distributed 222 kits of Naloxone/Narcan and received reports back on 55 of those kits (25% Utilization Rate) saving 55 individuals.

ACOS has also partnered with another key community-based organization, Project Weber/RENEW (PWR), in its risk-reduction programming, including overdose prevention and needle exchanges. PWR provides safe spaces, innovative services, referrals, and advocacy for high-risk people, including individuals who engage in transactional sex. PWR employs a peer-driven model to develop and implement direct services and community advocacy for clients through street outreach, compassionate peer-to-peer counseling and critically important data collection. Project Weber/RENEW has grown in the past three years to operate three drop-in centers (two co-located in Providence, and one in Pawtucket). The organization employs 13 staff, 5 part-time and 8 full-time, who represent a range of identities, ethnicities, races, and ages. The great majority of employees are themselves in recovery from substance use disorder (SUD). The goal is for every client to walk through the doors and see someone who shares their identity and life experiences. PWR's primary goal is to provide compassionate and non-judgmental health and social support services to at-risk men and women in Providence. Through street and venue-based outreach, PWR provides comprehensive HIV and drug-associated harm reduction counseling, and critical life-saving harm reduction tools. PWR facilitates weekly social support groups for high-risk people, which promote self-competencies and supportive social relationships between peers and build HIV knowledge and harm reduction skills. Staff also assist with supported referrals to health care, mental health and addiction support services, legal aid, and shelter. Project Weber/RENEW's commitment to the health and well-being of at-risk men and women in Rhode Island, including overdose, HIV, STI and viral hepatitis prevention, extends beyond its counseling, testing and referral services.

The organization plans and holds trainings, workshops, and community events that increase knowledge and awareness of the obstacles faced by the population.

IMPROVING ACCESS TO HCV TESTING THROUGH COMMUNITY-BASED PROGRAMMING

RIDOH has helped to coordinate the essential work of improving testing and reducing the number of people in Rhode Island who are infected with HCV but are unaware of their diagnosis. Innovative approaches through partnerships with community-based organizations that already work with individuals at greater risk of HCV infection have been well received and garnered significant support. Support from RIDOH has allowed for the provision of point-of-care HCV testing at multiple venues including mobile vans, street-level outreach as well as already existing clinics such as methadone clinics. Increased HCV testing is also being supported through peer-provided services and integration into needle exchange programs, SUD management and community health services. ACOS's ENCORE program for example, in addition to providing a needle exchange program and harm reduction kits, also includes both standing and mobile HCV testing sites and a street outreach program with 11 staff (9 staff with Qualified Professional Test Counselor (QPTC) certifications, four are agency consumers (peers). In 2018, ACOS conducted 890 Rapid HCV tests with a 5.2% positivity rate which is significantly higher than national average. With recent funding from RIDOH, ACOS is providing a Social Network Strategy (SNS) to recruit high-risk clients who do not know their status to HIV testing. This strategy is being expanded to include messages about clean syringes and other harm reduction tools as well as using recruiter to promote the harm reduction program to network associates (ENCORE SNS).

Expanded testing and linkage to HCV care services has also been offered through Project Weber/RENEW (PWR), complementing their risk reduction programming for at-risk men and women in Rhode Island. Each year, PWR provides over 400 HIV and HCV tests, over 1500 Narcan kits, over 125 support groups, over 15,000 condoms, over $50,000 in basic needs assistance, among dozens of other services. Additionally, the organization has partnered with The Miriam Hospital on "Project Break," a program focused on MSM who are struggling with SUD and with Sojourner House on the state's first (and only) human trafficking shelter to link individuals who are at risk or test positive for HCV and HIV to medical treatment and other prevention services.

IMPROVING HCV CARE CONTINUUM OUTCOMES

Accompanying the efforts to expand access to testing in Rhode Island are robust linkage to care programs to ensure individuals that test positive for HCV are quickly and effectively linked to the highly effective treatments. The statewide RIDOH initiative to address the HCV epidemic has led to significant health systems changes allowing for the integration of SUD management and HCV care, particularly for individuals with SUD that have historically encountered significant barriers to accessing health care and HCV treatment. Key elements of this initiative have been piloted at CODAC, the state's largest non-profit provider of methadone care. There, all individuals who are receiving SUD care are screened for HCV and those who are infected are immediately linked to onsite HCV treatment services with the goal of promptly initiating appropriate curative therapy. This integrated approach starting at the very beginning of the HCV care continuum has shown to be a promising model for successful HCV micro-elimination among individuals with a significant SUD history that frequently face a number of barriers to accessing care.[26,27]

RIDOH has also been successful in partnering with the state's Department of Corrections (RIDOC), which is also responsible for the clinical care of a population disproportionately impacted by HCV. Incarceration provides an opportunity for testing and linkage to care but also presents unique challenges to continuity of care, as it may involve a change in health insurance status and risks the interruption of the treatment of disease in the transition from community to incarceration and vice versa. As a result, in addition to supporting increased access to prevention interventions and HCV testing, RIDOH in coordination with RIDOC has helped to increase access to HCV treatment within the RIDOC facilities as well as supporting discharge planning for individuals who would benefit from linkage to treatment services in the community.

The Miriam Hospital Immunology Center has also been a key community partner for expanding access to HCV treatment programming. The Center is the state's only publicly funded sexually transmitted infection (STI) clinic which has significantly increased testing for HCV as part of its standard STI screening procedures. The Center also includes a robust clinical care program for people living with HIV and has significant experience and dedicated programming for people living with HIV who are also co-infected with HCV which started in 2003. In 2019, the Center performed 472 HCV serologic antibody tests, with a positivity rate of 5.51%. All reactive antibody tests were followed up with an HCV RNA test, of which 69% had a detectable viral load.

FUTURE DIRECTION

Prior research estimated that in order for Rhode Island to attain a goal of HCV elimination in line with the goals laid out by the WHO, there would need to be a significant increase in the number of individuals treated for the disease, up to 2,000 annually.[28] This will require continued commitment from multiple stake holders along with buy in from

the highest levels of government and public health administration in the state. While the innovative programming developed and implemented in Rhode Island has helped to expand access to HCV prevention, screening and treatment services, progress still needs to be made if the state is to meet the goal of elimination by 2030. This should include ongoing efforts to reduce barriers along the HCV care continuum including increased testing among all providers in the state as part of standard primary care, particularly in light of the recent changes in the USPSTF recommendations, as well as removing barriers to accessing treatment that include a burdensome and complex prior authorization process to access DAA treatment. Rhode Island has already made great strides in developing a recipe for success to eliminate HCV but efforts will need to be redoubled to ensure continued progress over the next 10 years.

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Authors

Matthew Murphy, MD, MPH, Department of Medicine, Warren Alpert Medical School of Brown University, Providence RI

Katharine Howe, MPH, Rhode Island Department of Health.

Theodore Marak, MPH, Rhode Island Department of Health.

Thomas Bertrand, MPH, Rhode Island Department of Health.

Michaela Maynard, MPH, MSN, NP-C, Department of Medicine, Warren Alpert Medical School of Brown University, Providence RI.

Colleen Daley Ndoye, Project Weber/RENEW, Providence, RI.

Raynald Joseph, AIDS Care Ocean State, Providence, RI.

Jerry Fingerut, MD, Rhode Island Executive Office of Health and Human Services.

Philip A. Chan, MD, MS, Rhode Island Department of Health.

Correspondence

Philip A. Chan, MD

Rhode Island Department of Health

3 Capitol Hill

Providence, Rhode Island 02908

Philip.Chan@health.ri.gov

Liver Ultrasound Elastography: Review of Techniques and Clinical Applications

ADIB R. KARAM, MD; MICHAEL D. BELAND, MD

ABSTRACT

Chronic liver disease remains a substantial worldwide problem. Accurate estimation of liver fibrosis is crucial for determining the stage of the disease, assessing the patient's prognosis and predicting treatment response. Staging hepatic fibrosis has traditionally been done with liver biopsy but clinical practice has been changing, partly because liver biopsy has several disadvantages: it is invasive; it is associated with rare but serious complications; and it is prone to sampling error representing a tiny portion of the total liver volume. An increasing number of non-invasive liver fibrosis assessment have been developed. These include elastographic methods involving ultrasound (US) and magnetic resonance (MR) imaging. In this review article we discuss the different ultrasound-based elastography techniques, their clinical applications and various confounding factors in the assessment of hepatic fibrosis that may affect the accuracy of the measurements.

KEYWORDS: ultrasound, fibrosis, elastography, shear wave, liver, hepatitis

INTRODUCTION

Chronic liver disease remains a substantial worldwide problem. Although the underlying etiologies differ, with viral hepatitis, non-alcoholic fatty liver disease (NA-FLD) and alcohol remain common causes, the end result is similar – increasing deposition of fibrous tissue within the liver, leading to progressive fibrosis and development of hepatic cirrhosis and subsequently to portal hypertension, hepatic insufficiency and carcinogenesis.[1,2]

Hepatic fibrosis is a dynamic process leading to a progression of disease stages from no fibrosis to cirrhosis. Accurate estimation of liver fibrosis is crucial for determining the stage of the disease, assessing the patient's prognosis and predicting treatment response.[3] Although percutaneous liver biopsy is considered the reference standard for the assessment of hepatic fibrosis, it has several inherent limitations, and its use has been declining over recent years.[2] Liver biopsy is an invasive procedure having potential complications including pain and bleeding which can be severe in 1% of the cases,[4,5] and a procedural mortality rate of approximately 0.01%,[6,7] which reduce patient's acceptance and limit its suitability for repeated measurements and disease monitoring. Also, liver biopsy is prone to sampling error representing approximately 1/50,000th of the total liver volume.[8,9] An increasing number of non-invasive liver fibrosis assessment have been developed. These include elastographic methods involving ultrasound (US) and magnetic resonance (MR) imaging.

The aim of this review is to discuss the different ultrasound-based elastography techniques, their clinical applications and various confounding factors in the assessment of hepatic fibrosis that may affect the accuracy of the measurements.

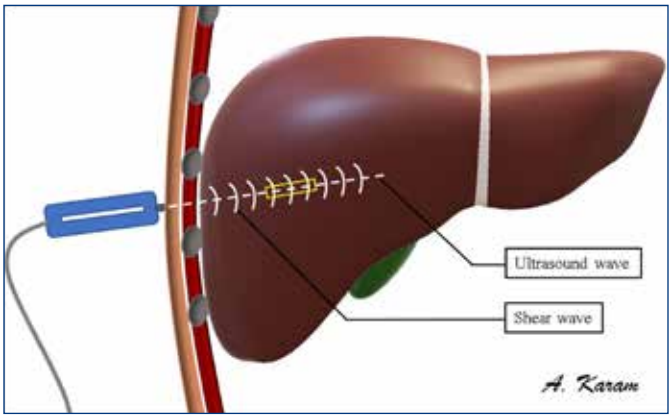
ULTRASOUND-BASED ELASTOGRAPHY

There are three main ultrasound-based elastography methods to evaluate tissue stiffness: transient elastography (TE); point shear wave elastography (pSWE) and two-dimensional shear wave elastography (2D SWE). In each of these techniques, the patient is placed in the supine position with the right side slightly elevated (approximately 30 degrees) and the right arm raised above the head to increase the intercostal acoustic window.

TE technique

The FibroScan® system (Echosens, Paris, France) was the first commercially available TE system, introduced in Europe in 2003 and was approved by the Food and Drug Administration in the United States of America in 2013. TE is an inexpensive system used as a "point of care" tool. Although it is an US-based technique, it does not provide direct imaging guidance – the probe is typically positioned based on anatomic landmarks at the level of the dullest point over the liver, typically in the 9th–11th intercostal along the right axillary line. Different frequency probes are available to allow the evaluation of different size patients including children. TE uses a mechanical piston to generate a resulting shear wave that propagates into the underlying liver. The ultrasound probe provides an image showing the propagation of the shear wave over time (shear wave speed) in the region of interest (ROI) called the elastogram box, placed approximately 6 cm deep (**Figure 1**). The shear wave speed is converted to elasticity utilizing Young's modulus and displayed

Figure 1. Schematic of transient elastography system showing a shear wave, created by a mechanical piston, propagating through the liver. The speed of the shear wave is measured by the ultrasound wave in the elastogram box (yellow rectangle).



in Kilopascals (KPa). The software determines whether the obtained measurement is valid or not; the machine will not report a value if inadequate. The procedure is considered to have failed when no value could be obtained following at least 10 attempts. The examination is deemed valid when: (1) at least 10 valid measurements are obtained; (2) The ratio of valid measurements/ the total number of shots is > 0.6; (3) the interquartile ratio (IQR)/ median value < 0.3 – the IQR is the difference between the 75th and 25th percentiles, essentially the middle 50% of the data.

Since TE has been available since 2003, there have been many studies supporting its use. Thresholds for the differentiation of the degree of fibrosis all the way to cirrhosis have been provided with TE based on many original works using histology as the reference standard.[10] Limitations of this technique are: (1) the lack of grayscale images to guide the placement of the elastogram box and to provide diagnostic images of the liver parenchyma i.e. potential liver lesion(s), biliary tree and hepatic vasculature; (2) the probe needs recalibration every 6–12 months for reliable measurements; (3) inability to use it in patients with ascites and large body habitus.

pSWE technique

At present, most ultrasound manufacturers have developed their own liver stiffness quantification technologies. They all share the capacity to assess tissue deformation and to measure the speed of shear waves travelling perpendicular to the axis of an applied force consisting of ultrasound energy known as acoustic radiation force impulse (ARFI). These technologies are collectively known as shear-wave elastography (SWE) with the two main categories being pSWE (point shear wave elastography) and 2D SWE (two-dimensional shear wave elastography).[2,11] In pSWE the shear wave speed is calculated in a small selected ROI measuring approximately 0.5 to 1cc (**Figure 2**) in meters per second and is converted to elasticity utilizing Young's modulus and displayed in kPa.[2] Advantages of this technique over TE are its ability to acquire real-time grayscale images allowing the operator to avoid placing the ROI over potential masses, blood vessels and bile ducts, and to perform a diagnostic ultrasound examination at the same setting. With both pSWE and 2D SWE

Figure 2. Grayscale ultrasound image from a pSWE study showing the white box representing the ROI where the measurement is obtained. Note the adjacent vessels (white arrows) that were avoided during the placement of the ROI. HV: Hepatic vein. IVC: Inferior vena cava.

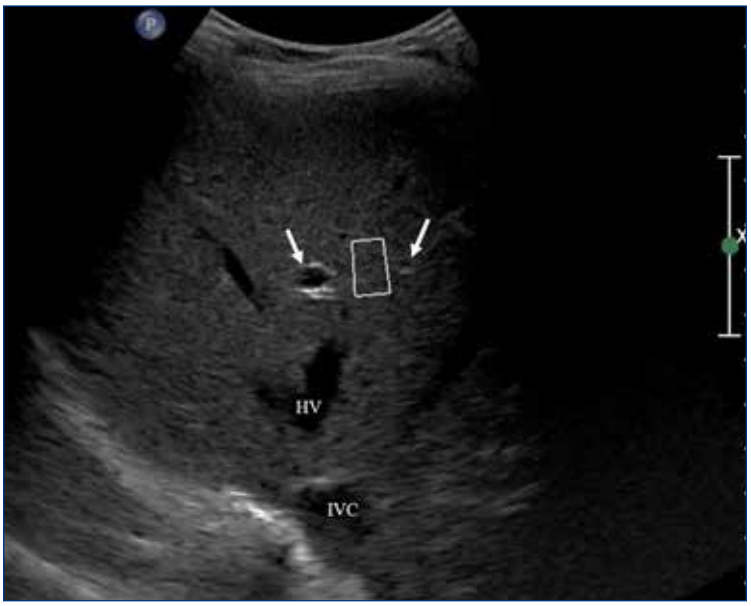
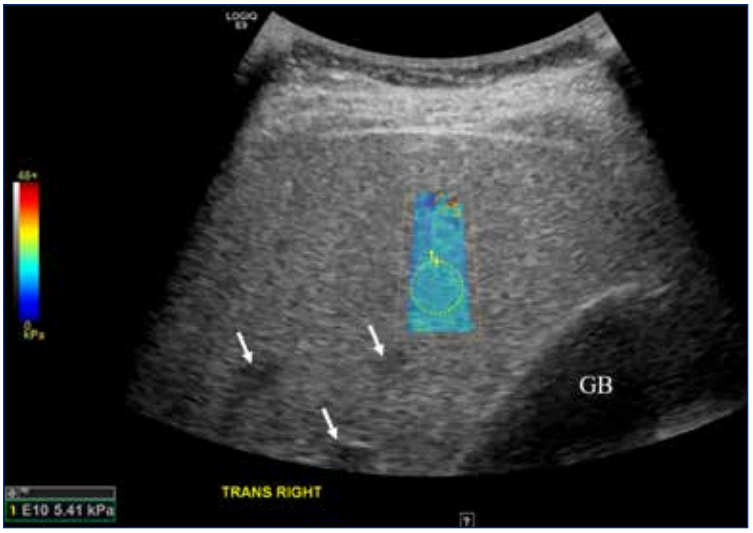


Figure 3. 2D SWE image in a 41-year-old female patient with history of chronic hepatitis C. Note the rectangular box placed in the right lobe of the liver away from major vessels (arrows), which is the field of view where shear waves are measured and color coded. The round circle is the ROI where the measurement is obtained (measurement # 10 is shown). The software provides the median, the IQR and IQR/median (5.4 KPa, 0.55 KPa and 0.10 respectively in this patient). GB: gallbladder.



technologies, the consensus recommendation is to obtain 10 measurements from the right lobe of the liver and confirm the IQR/median value < 0.3 if the reported stiffness value is > 7.1 KPa (1.5 m/sec).

2D SWE

In 2D SWE the shear wave speed is calculated in a relatively large field of view (FOV), of approximately 14 to 20 cc. Within this FOV an ROI is placed to obtain measurements from this location (**Figure 3**). Like with pSWE, the speed of the shear waves is calculated in meters per second and is converted to elasticity utilizing Young's modulus and displayed in KPa. Advantages of 2D SWE are its ability to acquire real-time grayscale images allowing the operator to place the FOV avoiding potential masses, vessels and bile ducts and to perform a diagnostic ultrasound examination like in pSWE. The larger area of measurements compared to pSWE allows for a larger ROI for the averaging of measurements.[2] 2D SWE is proven a highly accurate method in hepatitis B virus (HBV) and hepatitis C virus (HCV) infected populations.[12,16] Although less well studied than pSWE and TE as it is a newer technique, 2D SWE has been found to be equivalent if not better than both technologies,[13,16] and can be used with equivalent diagnostic accuracy.

Clinical applications of liver ultrasound elastography

Current guidelines including the AASLD and EASL recommend the use of ultrasound elastography to assess the degree of hepatic fibrosis.[17,18] Apart from chronic hepatitis B and C, ultrasound elastography has also been used to assess hepatic fibrosis in patients with alcoholic liver disease, nonalcoholic fatty liver disease, primary sclerosing cholangitis and others. One major benefit of noninvasive ultrasound elastography is that the examination can be readily repeated, as a standalone test or during diagnostic liver ultrasound examination.

Early studies proved a positive correlation between hepatic fibrosis and portal hypertension, which in turn is correlated with the development of gastric and esophageal varices.[19] Recent international guidelines recommend a TE elasticity of 20 KPa and a platelet count of 150,000/μL as a threshold to obviate the need for gastroscopic examination in cirrhotic patients.[17,18]

Initial studies suggest that ultrasound elastography can play a role in establishing the prognosis of patients with chronic liver disease; patients with higher hepatic elasticity are at greater risk to develop hepatocellular carcinoma, gastric varices with or without hemorrhage, hepatic decompensation and have a higher mortality.[20]

Confounding factors in the assessment of hepatic fibrosis

While SWE techniques are relatively easy for an experienced sonographer to learn and perform, a good intercoastal window allowing adequate visualization of the right lobe of the liver and the push of a button are not the only considerations. It is crucial to consider different technical and patient related factors that can affect the stiffness values, the main ones are summarized in **Table 1**. Most patient-related confounding factors increase the stiffness values therefore, a normal value of elastography (< 5 KPa) can be accepted as normal, whereas an increased value must be taken in clinical context.[1,2] Several studies comparing different technologies on the same patient cohort have demonstrated inter-system variation for SWE estimation of liver fibrosis. Furthermore, machines from different manufacturers are based on proprietary technologies, resulting in different calibration and stiffness ranges among each other and in comparison to TE.[1,13] A general conclusion we can draw is that normal levels of stiffness firmly indicate the absence of any significant fibrosis, irrespective of the manufacturer and are obtained with high reproducibility. Conversely, thresholds for higher levels of stiffness and therefore higher fibrosis stages are strictly related to each technology and manufacturer.

Table 1. Confounding factors in liver ultrasound elastography.

Confounding factors	Liver stiffness	Comments
Right heart failure	Increased	Evidence of right heart failure and liver congestion can be seen on grayscale and Duplex ultrasound.
Biliary obstruction	Increased	Can be seen on grayscale ultrasound.
Necro-inflammatory activity	Increased	Elevated transaminase levels > 5 times normal values. Increased liver stiffness associated with severe hepatic steatosis is attributed to increased necroinflammatory activity.
Digestion	Increased	Liver stiffness measurements obtained within 0 to 3 hours from a meal may overestimate the degree of liver fibrosis. Examination should be obtained after fasting.
Amyloidosis	Increased	
Alcohol consumption	Increased	In patients with alcoholic hepatitis, it is recommended to ascertain the quantity and recency of alcohol consumption related to the timing of the examination.
Alcohol abstinence	Decreased	In patients with alcoholic hepatitis, it is recommended to ascertain the quantity and recency of alcohol consumption related to the timing of the examination.
Anti-viral therapy	Decreased	
Subcapsular and left lobe measurements	Increased	ROI should be placed 1.5–2 cm deep to the liver capsule to avoid reverberation artifacts and increased subcapsular stiffness within 1 cm from the capsule. Measurements obtained in the left lobe are affected by the cardiac activity.

CONCLUSION

Liver ultrasound elastography has evolved into an accurate method for noninvasive diagnosis and monitoring of liver fibrosis of various etiologies. There are several methods for performing liver elastography, including TE, pSWE, and 2D SWE. While each method may be appropriate, they differ in how the shear wave is generated and in what measurements are taken, with pSWE and 2D SWE having the advantage of real-time ultrasound imaging for accurate measurement placement and performing a diagnostic ultrasound surveying for the sequelae of chronic liver disease. Interpretation of the results should consider potential confounding factors and technical limitations.

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Authors

Adib R. Karam, MD, Department of Diagnostic Imaging, The Warren Alpert Medical School of Brown University, Rhode Island Hospital, Providence, RI.

Michael D. Beland, MD, Department of Diagnostic Imaging, The Warren Alpert Medical School of Brown University, Providence, RI.

Correspondence

Adib R. Karam, MD
Department of Diagnostic Imaging
Rhode Island Hospital
593 Eddy St.
Providence, RI 02903
401-444-5184
Fax 401-444-5017
adib.karam@lifespan.org

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

KEYWORDS: hepatitis C virus, intrahepatic cholangiocarcinoma, direct-acting antiviral, people who inject drugs

INTRODUCTION

Delayed treatment of hepatitis C virus infection (HCV) can lead to cirrhosis and may increase the risk of associated malignancies including hepatocellular carcinoma (HCC) and less commonly, intrahepatic cholangiocarcinoma. Stigma and misunderstanding surrounding alcohol and/or substance use disorders (SUD) can delay or prevent access to life-saving direct-acting antiviral (DAA) therapies, despite the large body of evidence supporting HCV treatment in people with SUD. We present a case of fatal intrahepatic cholangiocarcinoma in an HCV-infected patient who received unrestricted access to treatment for three malignancies and other chronic health conditions but for whom treatment of HCV was delayed due to SUD.

CASE REPORT

A 62-year-old African American male presented in October 2017 to the co-located HCV clinic at his methadone maintenance program for a second opinion regarding treatment of chronic HCV. Past medical history was notable for transitional papillary cell bladder carcinoma with transurethral resection of bladder in 2006, prostate cancer with transurethral resection of prostate and radiation in 2007, diffuse large b-cell lymphoma (DLBCL) stage III status post six cycles of R-CHOP (rituximab, cyclophosphamide, hydroxydaunorubicin, vincristine sulfate [Oncovin®], prednisone) through which he missed no doses or scheduled treatments, diabetes mellitus type two, hypertension, alcohol dependence, opioid use disorder and injection drug use (IDU) on methadone maintenance since January 2008. In February 2002 he was diagnosed with HCV. He was first referred to hepatology for HCV evaluation and treatment in February 2011. In March 2011 liver biopsy was performed, with one cylindrical core fragment measuring 1.8 cm by 0.1 cm demonstrating fibrosis stage 1 of 4. Right upper quadrant ultrasound revealed cirrhosis in February 2013.

The patient attended eight hepatology appointments from 2011 to 2018 and underwent repeated liver imaging as ordered. From the interferon into the DAA era, HCV treatment was deferred by his hepatologists due to ongoing alcohol and illicit opioid use. For example, in September 2015, his physician documented, "patient understands that sobriety from IDU as well as alcohol are a requirement for treatment of HCV, given that after investing in treatment we want to help him protect his liver from any further damage as much as possible." Similarly, between 2016 and 2017, the patient saw his primary care physician (PCP) eight times, at all of which the patient was informed that he could not access HCV treatment due to alcohol misuse.

The patient reported that he tried to discontinue alcohol but developed alcohol withdrawal seizures. He had been given lists of local resources to help him 'detox,' by a social worker at the request of his PCP. The patient declined outpatient pharmacologic treatment for alcohol use disorder. Regarding his tobacco dependence, he was counseled by his PCP on the benefits of nicotine replacement therapy, began using the nicotine patch in January 2017, and decreased to 4–5 cigarettes per day from one pack per day by July 2017.

During these years, the patient continued to receive primary and subspecialty care and be followed for his other malignancies. Urology monitored for recurrence of his bladder and prostate cancers. The patient's oncologist saw him two to three times annually to monitor for DLBCL recurrence. There was no deferral or denial of cancer treatment due to SUD.

At initial HCV evaluation at the HCV program embedded within his methadone program on October 10, 2017, physical examination was significant for a firm liver edge palpable 3 cm below the right costal margin, lack of palpable spleen, and trace ankle edema. Laboratory studies were notable for albumin 4.0 mg/dl, total bilirubin 0.6 mg/dL, AST 56 units/L, ALT 39 units/L, platelets 169,000/ L, INR 1.1, Cr 0.79, HCV viral load 857, 032 IU/mL and HCV genotype 1a. Testing for HIV was negative, hepatitis B virus (HBV) serologies showed isolated core antibody reactivity, and hepatitis A total antibody was reactive. The infectious disease-trained physician reviewed medical records at the patient's request. Diagnosis of cirrhosis was discussed with him, including the impression per the last hepatic ultrasound in April 2017 indicating hepatomegaly (likely from alcohol and diabetes-related steatosis) and cirrhosis. Benefits of DAA therapy

leading to sustained virologic response (SVR) were reviewed, including lowering risk for decompensated cirrhosis and other HCV-associated conditions and extrahepatic manifestations. It was explained that men with alcohol use disorder and chronic HCV were at highest risk for HCC, and that SVR reduced the risk of developing HCC; SVR is associated with a greater than 70% reduction in the risk of HCC, and a 90% reduction in the risk of liver-related mortality and liver transplantation.[1-2] The patient and physician discussed the deleterious effects of alcohol on the liver and overall, and the risks of HCV reinfection and transmission with continued IDU. They developed a plan for risk reduction to be reviewed on an ongoing basis. The patient was eager to initiate DAAs.

The HCV physician contacted the patient's hepatologist, PCP and oncologist, recommending prompt HCV treatment. All agreed that this physician could treat the patient's HCV. The HCV physician remained in close contact with the patient's PCP, hepatologist and oncologist from this point onward. On October 20, 2017, ten days after initial HCV assessment, the patient began DAA treatment with sofosbuvir/velpatasvir (Epclusa), for 12 weeks. He achieved SVR in April 2018.

Five weeks following SVR, in May 2018, the patient had a computed tomography (CT) scan of the abdomen in the setting of "abdominal pain and alcohol intoxication" in the emergency department. CT demonstrated a nodular liver contour, compatible with cirrhosis, with a 2 cm indistinct hypoattenuating segment II lesion, plus a 6 mm right lower lobe ground glass pulmonary nodule. The recommendation was for liver protocol magnetic resonance imaging (MRI) or CT for further evaluation and, "continued attention to patient's annual lung cancer screening CT." Prior CT for lung cancer screening in 2016 did not show this nodule.

August 2018 MRI of the abdomen demonstrated a poorly defined lesion within segment II of the liver which displayed intrinsic T1 hypointensity and mild T2 hyperintensity. The arterial phase was not acquired due to patient intolerance. There was evidence of extensive washout on delayed phase imaging with multiple satellite nodules. The region of washout measured 3.0 x 1.6 x 2.0 cm. Findings were considered highly suspicious for malignancy in the left hepatic lobe; further characterization required the arterial phase, not performed as the patient could not tolerate that portion of imaging. Three-phase CT liver examination was recommended given shorter length of acquisition time.

In September 2018, CT scan of the abdomen revealed re-demonstration of a 1.7 x 2.1 cm peripherally enhancing ill-defined lesion in hepatic segment II without definitive evidence of washout on delayed phase imaging, corresponding to the left hepatic lobe indeterminate lesion on August MRI. Further evaluation with histologic correlation was recommended. Ultrasound-guided diagnostic biopsy of the left hepatic lobe lesion sized 0.5 x 2.1 x 0.1 cm revealed adenocarcinoma compatible with pancreaticobiliary primary.

The patient's findings were deliberated at his hospital's Oncology multidisciplinary tumor board in October 2018, and consensus opinion favored surgical resection of the mass with lymph node dissection for presumed intrahepatic cholangiocarcinoma. The patient underwent staging laparoscopy where he was found to have carcinomatosis with disease near the superior mesenteric artery. Two omental biopsies were positive for adenocarcinoma consistent with the original biopsy. Celiac lymph node biopsy showed metastatic poorly differentiated adenocarcinoma with extensive extranodal involvement.

The patient was deemed to have stage IV disease and was started on combination gemcitabine and cisplatin. He was followed by palliative care during his treatment and continued with methadone maintenance. In February 2019, scans showed disease progression and he was switched to modified FOLFOX (leucovorin, fluorouracil, and oxaliplatin). Unfortunately, the patient clinically deteriorated. He opted to stop active treatment and enroll in hospice. He died in May 2019.

DISCUSSION

Hepatocellular carcinoma (HCC) and cholangiocarcinoma are the most common primary liver cancers. HCV is a causal agent of HCC, with risk of HCC developing once cirrhosis develops. HCC is the fasting-rising cause of cancer-related death in the U.S.[3-4] There are three types of cholangiocarcinomas: extrahepatic, intrahepatic and combined. Intrahepatic cholangiocarcinoma is less common than HCC.[5] The incidence ratio of HCC to intrahepatic cholangiocarcinoma is 13.7 to 1 infected with either HBV or HCV.[6] The association of HCV with intrahepatic cholangiocarcinoma may be under-appreciated compared to the association with HCC.[7] Although the mechanism of intrahepatic cholangiocarcinoma development is unclear, one theory is that HCV in bile duct epithelium leads to chronic inflammation and tumorigenic processes. HCV RNA has been detected in intrahepatic cholangiocarcinoma biopsy specimens. A meta-analysis of patients with HCV and intrahepatic cholangiocarcinoma demonstrates a statistically significant positive association with HCV and incidence of intrahepatic cholangiocarcinoma; the pooled odds ratio (OR) of intrahepatic cholangiocarcinoma was 3.38 (95% CI, 2.72 to 4.21), while the pooled OR of extrahepatic cholangiocarcinoma was 1.75 (95% CI, 1.00 to 3.05).[7] HCV carries a poor prognostic prediction for intrahepatic cholangiocarcinoma.[8] Surgical resection is the preferred treatment but is contraindicated in patients with bilateral, multifocal disease and distant metastases, as in this patient.[9]

Beyond hepatic malignancies, there are extra-hepatic oncologic manifestations of HCV. HCV is a lymphocytic virus associated with several lymphoproliferative disorders, including DLBCL, the most common type of B cell

non-Hodgkin lymphoma.[10] Continued stimulation of lymphocyte receptors by HCV antigens, viral replication in B cells, and damage of B cells are potential mechanisms of pathogenesis of DLBCL in HCV-infected patients.[11] Our patient continued to receive consistent follow-up care for DLBCL recurrence after completing chemotherapy in 2014. While the pathogenesis of this malignancy continues to be investigated, one cannot say for certain that ongoing HCV infection, first detected in 2002, did not impact development of DLBCL in this patient. In the setting of both HCV and NHL, it is imperative to retard progression of liver disease by treating with DAAs.[12] For some types of NHL, achieving SVR leads to better 10-year survival rates compared with those not treated with antivirals or controls.[13] For patients with NHL, treating concurrent HCV with DAAs may induce NHL remission in up to 75% of cases.[13-15] Some oncology programs around the U.S. are now routinely including HCV treatment within their protocols.

Treating the infection has become the easy part of HCV care, as DAAs can safely cure most patients in 8 to 12 weeks. Staging fibrosis and treating cirrhosis over time can be more challenging. The patient's 2011 liver biopsy was 1.8 x 0.1 cm in size. While non-invasive measures to stage fibrosis have become standard of care in HCV, liver biopsies were routinely performed in the interferon-era. A specimen of at least 2.5 cm in length is required to stage hepatic fibrosis in HCV, or else disease severity may be under-staged, as may have occurred with this patient.[16] Note, he was diagnosed with cirrhosis in 2013, two years after initial staging biopsy.

IDU, opioid use disorder, alcohol misuse and HCV often coexist.[17] People who use drugs are disproportionately affected by HCV. The burden of HCV-related disease in this group continues to grow at alarming rates and represents a major cost to the healthcare system. People who inject drugs (PWID) carry the highest burden of HCV, with almost half of PWID worldwide living with HCV.[17-21] IDU is the main route of transmission in middle- and high-income regions.[17-21] High levels of HCV treatment and cure for PWID can reduce HCV incidence and prevalence.[22-27] Therefore, expanding preventive efforts, testing, diagnosis, treatment and cure among this population is critical. As early as 2014, for example, the Veterans Administration, the largest provider of HCV care in the U.S., abolished HCV treatment candidacy based on substance use: "There are no published data supporting a minimum length of abstinence as an inclusion criterion for HCV antiviral treatment."[28]

Rather than excluding PWID, national and international guidelines including those of the American Association for the Study of Liver Diseases (AASLD)/Infectious Disease Society of America and World Health Organization, endorse prioritizing PWID for HCV treatment to improve individual and public health.[29-30] Benefits of treating HCV early include thwarting development of cirrhosis, end-stage liver disease and HCC, and stemming disease spread.[28, 31-32] Decreasing the infectivity of the transmitting population is essential to achieve HCV elimination.[29-30] While historic concerns about treating HCV in PWID include risk of reinfection and sub-optimal adherence, a robust body of evidence demonstrates DAA efficacy among PWID both on opioid agonist therapy and not, as well as HCV treatment as prevention benefits among PWID to eliminate HCV.[22,33-35] Reported rates of reinfection after SVR among PWID are low – 3.8-6.2/100 person-years, and may be exacerbated by slow scale-up of HCV treatment for this population.[36] Concerns about reinfection rates in other subpopulations, such as surgeons and HIV-infected men who have sex with men, have not impeded HCV treatment. Additionally, HCV treatment of PWID is cost-effective, particularly when the prevention benefits are considered.[22]

AASLD and the World Health Organization do not require treatment of alcohol use disorders before HCV treatment, nor HCV treatment restrictions for persons with alcohol use disorders. HCV and alcohol act synergistically in causing more severe liver injury than seen with either disease alone. Persons with coexisting alcohol disorders are at a higher risk for HCV-related complications.[17,37] Curing HCV is easier than 'curing' alcohol disorders; pharmacotherapy for alcohol misuse is limited, and behavioral interventions are not always successful. SVR rates are similar in drinkers and nondrinkers.[38]

While physicians caring for patients with tobacco dependence recommend tobacco cessation and treat tobacco dependence, potential life-saving therapies for the treatment of lung cancer or asthma are not withheld from smokers. Diabetes medications are not withheld from those who are overweight and do not adhere to dietary recommendations. Substance use criteria are not used to restrict access to antiretroviral therapy for HIV/AIDS. The 2020 standard of care requires that PWID and people with alcohol use disorders not experience delays in accessing potentially life-saving DAA medications due to provider-level misperceptions not supported by evidence. Addiction is a chronic relapsing and treatable brain disease to be treated with respect and compassion.

The HCV epidemic exposes racial and socioeconomic health care disparities. More than half of HCV-infected people in U.S. have incomes lower than twice the poverty level and less than a high school education. Native Americans and Alaskan Natives have the highest incidence. People who are African American account for 25% of those with chronic HCV but 11% of the population.[39-40] Multiple studies identify a racial/ethnic disparity with respect to HCV diagnosis, referral and treatment initiation. Implementing universal screening and treatment will help overcome these inequities.[41]

CONCLUSION

Intrahepatic cholangiocarcinoma is an aggressive HCV-associated malignancy. Further research as to the impact of SVR on intrahepatic cholangiocarcinoma incidence and incidence of other HCV-associated malignancies is needed. Early DAA treatment is now universally recommended except for those with short life expectancy that cannot be remediated by HCV therapy or liver transplantation. Interferon-era concerns about treating HCV in drug-involved patients should not be perpetuated. Evidence-based national and international guidelines supporting prioritization and HCV treatment scale-up for this population.[31-32]

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Authors

Soumitri Barua, AB, MD '21, The Warren Alpert Medical School of Brown University, Providence, RI.

Sophie Sprecht-Walsh, LPN, CODAC Behavioral Health, Providence, RI.

Zoe Weiss, MD, Division of Infectious Diseases, Brigham and Women's Hospital and Massachusetts General Hospital.

James N. Butera, MD, Department of Medicine, The Warren Alpert Medical School of Brown University, Division of Hematology-Oncology, Rhode Island Hospital, Providence, RI.

Khaldoun Almhanna, MD, MPH, Division of Hematology/Oncology, The Warren Alpert Medical School of Brown University; Lifespan Cancer Institute, Rhode Island Hospital, Providence, RI.

Susan Hart, MD, CODAC Behavioral Health, Eleanor Slater Hospital, Cranston, RI.

Jael Rodriguez, MD, Department of Internal Medicine, Warren Alpert Medical School of Brown University; Division of General Internal Medicine, Rhode Island Hospital/The Miriam Hospital.

Lynn E. Taylor, MD, CODAC Behavioral Health and University of Rhode Island, Providence, RI.

Correspondence

Lynn E. Taylor, MD
letaylor@uri.edu

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

ABSTRACT

OBJECTIVE: To compare sustained virologic response 12 weeks post-treatment completion (SVR12) and patient characteristics for older versus younger patients with chronic hepatitis C virus infection (HCV) receiving direct-acting antiviral (DAA) agent therapy.

METHODS: This retrospective cohort study included patients with chronic HCV who received DAA therapy, between 2015 and 2018, in the largest health system in Rhode Island (N=154). Patient characteristics, comorbid diagnoses, and SVR12 status were compared between older (aged ≥60 years) and younger (<60 years) adults using chi-squared tests.

RESULTS: Overall, 94.1% (95% CI: 90.4–97.8) achieved SVR12; response rates were 91.8% (95% CI: 84.9–98.6) for older adults and 95.6% (95% CI: 91.5-99.8) for younger adults (p=0.51).

CONCLUSIONS: Our findings refute the historical notion that older adults were a "difficult-to-treat" subpopulation for whom clinicians should expect less treatment success. This is no longer the case with DAA therapy.

KEYWORDS: hepatitis C, chronic, direct-acting antiviral agents, older adults, sustained virologic response

INTRODUCTION

Hepatitis C virus (HCV) currently affects 71 million people globally and 4.1 million people in the United States (U.S.).[1,2] Between 75 and 85% of all acute HCV infections develop into chronic HCV infections, which have an estimated domestic prevalence of 1.0%.[2] Chronic HCV can take decades to develop, as it is a slow, progressive scarring of liver tissue, often culminating intrahepatic and extrahepatic disease due to long-term systemic inflammation.[3] Since the progression from acute to chronic HCV is typically asymptomatic, adults aged 60 years and older may have been unknowingly infected with HCV for decades, and as a result, are at a higher risk for HCV-associated complications compared to younger adults.[3] In fact, natural history models predict that the largest burden of complications from HCV infections will fall on those aged 60 years and older.[4]

The advent of novel interferon-free, direct-acting antiviral (DAA) agent regimens have decreased the rate of adverse events and improved the rate of achieving cure for older adults receiving HCV therapy.[3,5,6] Current American Association for the Study of Liver Diseases (AASLD) and Infectious Diseases Society of America (IDSA) guidelines recommend all patients with chronic HCV receive DAA-based therapy, regardless of age, unless treatment is unlikely to improve life expectancy.[7] However, clinical studies reporting the efficacy and tolerability of DAA therapy enrolled a limited proportion of patients aged ≥ 60 years.[3] Since clinicians rely on clinical trial data to make real-world decisions in treating patients, this less robust clinical trial data for older adults can affect a provider's willingness to treat patients with HCV in this population.

While older adults experience less drug-drug interactions (DDIs) and adverse events on DAA regimens compared to interferon-based regimens, these events may still occur and discourage clinicians from pursuing guideline-concordant treatment.[6,8] Older adults are at a particular risk for experiencing DDIs with DAA therapy compared to younger adults as older adults are more susceptible to polypharmacy, corresponding to having more comorbidities.[8–10] Some clinicians may therefore perceive older patients with chronic HCV as a "difficult-to-treat" subpopulation, for whom less treatment success should be expected.[11,12]

Pharmacists may help overcome these challenges. Pharmacists are positioned to address many drug-related problems that older adults may be at a higher risk for, such as DDIs, side effects, and medication nonadherence that are typically of concern with patients starting DAA therapy. Given the critical role pharmacists may play in HCV treatment, our study examined patients receiving DAA therapy at clinics that include clinical pharmacists in the management of HCV.

We examined SVR12 rates and the burden of 19 comorbid medical, psychiatric, and substance use conditions for older versus younger adults in a cohort of patients with chronic HCV receiving DAA therapy at pharmacist-involved clinics. We hypothesized that older adults would be less likely to achieve SVR12 compared to younger adults due to clinicians' historical perception that older adults are a "difficult-to-treat" subpopulation and a subsequent reluctance to pursue guideline-concordant HCV management.

METHODS

Study Design and Data Source

This was a retrospective cohort study using existing data on adult patients (age ≥18 years) diagnosed with chronic HCV who initiated treatment at one of two pharmacist-involved clinics within a single health system in Providence, Rhode Island, between January 1, 2015 and June 30, 2018. In both clinics, pharmacists educated patients with chronic HCV and monitored their care throughout DAA treatment. Additional details have been previously published.[13]

All data were collected from the patient's electronic health record (EHR) by two researchers working together to identify patients, extract information, and confirm eligibility. Data were recorded using a standardized abstraction instrument. Patients were included in the analysis if it was their first treatment at the clinic and they were receiving DAA-based therapy with or without ribavirin. For patients who were prescribed a course of treatment more than once at the same clinic, only their first treatment regimen was included. Patients co-infected with human immunodeficiency virus (HIV) were treated at a separate immunology clinic and were not included in this study. There were no additional exclusion criteria applied to maximize generalizability. The Lifespan Institutional Review Board (IRB) determined this study to be exempt from IRB review.

Age and Covariates

Age was dichotomized using a cutoff of 60 years. Younger adults were those aged <60 years of age and older adults were those aged ≥60 at the time of clinic enrollment. The age threshold of ≥60 for defining older adults was selected to concord with related research.[4,11,14]

Additional variables determined from the literature to be related to achieving HCV cure were extracted from the EHR for each patient. These covariates were gender, race, income level, insurance type, HCV genotype, presence of cirrhosis, presence of decompensation, prior history of HCV treatment, type of DAA medication, use of ribavirin, length of treatment course (<24 weeks and ≥24 weeks), and risk factors for HCV infection, including patient-reported history of injection drug use, snorting drugs, tobacco use, male-to-male sexual encounters, blood transfusions prior to 1992, and incarceration.[3,6,13] Insurance type was dichotomized to private insurance and public insurance, with public insurance including patients who had Medicaid, Medicare or a combination of both Medicaid and Medicare listed as their primary insurance provider.

Covariates for comorbid medical diagnoses determined from the literature to be prevalent comorbidities in patients with HCV included chronic pain, hepatitis B virus, hypertension, coronary artery disease, chronic heart failure, chronic kidney disease, chronic pulmonary disease, and diabetes.[3,6,14,15] Comorbid psychological diagnoses included depression, anxiety, bipolar disorder, post-traumatic stress disorder, and schizophrenia.[3,14,15] Current or past history of substance use disorders included alcohol, amphetamine, benzodiazepine, cannabis, cocaine, and opioid use disorders.[14–16] A dichotomous variable was created to investigate the burden of comorbid diagnoses in the cohort. The two levels were "patient was diagnosed with at least one comorbid condition" and "patient was not diagnosed with any comorbid condition."

Sustained Virologic Response (SVR12)

SVR12 for HCV therapy was defined as sustained virologic response, or a non-detectable HCV RNA viral load, 12 weeks following completion of treatment. Patients achieving SVR12 are deemed to be cured of HCV.[7] Both intention-to-treat (ITT) and modified intention-to-treat (mITT) SVR12 rates were reported for the cohort. Only patients who completed their full prescribed course of DAA therapy and had a reported SVR12 status were included in the analysis of patient characteristics.

Statistical Analysis

Results were reported first for the entire cohort and then stratified by younger versus older adults. Chi-squared tests were used to compare older and younger adults, and report p-values and 95% confidence intervals (CIs). Data analyses were conducted using R version 3.4.1 (R Core Team; Vienna, Austria).[17]

RESULTS

Study Cohort

There were 162 patients with chronic HCV who initiated treatment at a pharmacist-involved clinic between January 1, 2015 and June 30, 2018. Of those, 154 patients initiated and completed treatment at those clinics within the same time frame. Considering only the 154 patients with chronic HCV who initiated and completed treatment, the mean age of the cohort was 55. The cohort was predominantly male (53.2%), white (63.6%), had a prior or current history of smoking (79.2%) and had public insurance (82.4%). **Table 1** describes demographics overall and stratified by age.

The overall ITT SVR12 rate was 90.7% (95% CI: 86.3-95.2). For those who completed treatment, the mITT SVR12 rate was 94.2% (95% CI: 90.4-97.8) (**Table 2**). Prior to beginning treatment, over half of the cohort was diagnosed with liver cirrhosis (51.9%) and 12.9% showed signs of decompensated cirrhosis. Most patients completed a DAA treatment course that was less than 24 weeks (80.5%), using ledipasvir/sofosbuvir (75.3%) without ribavirin (77.2%).

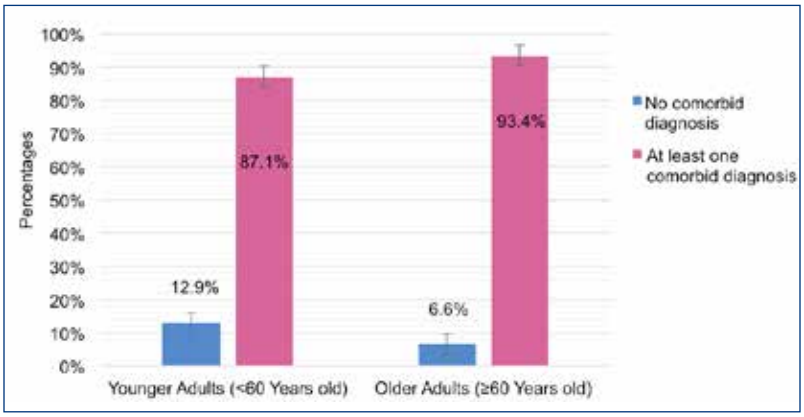
Looking at the distribution of comorbid conditions, 35.7% of the cohort was diagnosed with chronic pain, 55.8% had hypertension, 20.1% had chronic pulmonary disease, 29.8% had diabetes, 48.0% had depression, and 31.1% had anxiety. Close to a quarter of patients had a current or past history of alcohol use disorder (24.0%) and slightly less had a current or past history of opioid use disorder (16.8%).

Table 1. Characteristics of hepatitis C virus patients stratified by age group (N=154)

	Overall (N=154)	Younger Adults <60 years (n=93)	Older Adults ≥60 years (n=61)	P value
Demographics				
Age, mean (SD)	55 (9.6)	50 (7.6)	64 (5.0)	--
Female, n (%)	72 (46.7)	42 (45.1)	30 (49.1)	0.74
Race, n (%)				0.48
White	98 (63.7)	62 (66.7)	36 (59.1)	
Black	32 (20.7)	29 (20.4)	13 (21.3)	
Other/Unspecified	24 (15.6)	12 (12.9)	12 (19.6)	
Hispanic, n (%)	29 (18.8)	19 (20.4)	10 (16.3)	0.67
Annual household income, n (%)				0.41
Tertile 1 ($30,711–40,455)	57 (37.1)	37 (39.8)	20 (32.8)	
Tertile 2 ($40,456–55,632)	44 (28.5)	23 (24.8)	21 (34.4)	
Tertile 3 ($55,632–117,408)	53 (34.4)	33 (35.4)	20 (32.8)	
Public insurance, n (%)	127 (82.4)	79 (84.9)	48 (78.6)	0.43
Ever smoker, n (%)	122 (79.2)	72 (77.4)	50 (81.9)	0.63
Factors related to HCV exposure, n (%)				
History of intravenous illicit drug use	77 (50.0)	51 (54.8)	26 (42.6)	0.18
History of snorting drugs	67 (43.5)	42 (45.1)	25 (40.9)	0.72
History of high-risk sexual activity	26 (16.8)	15 (16.1)	11 (18.0)	0.92
Blood transfusion prior to 1992	39 (25.3)	20 (21.5)	19 (31.1)	0.24
Incarceration	47 (30.5)	33 (35.4)	14 (22.9)	0.14

a. Chi-squared tests used to determine the relationship between categorical variables.
b. P values are comparing younger adults to older adults.

Figure 1. Bar plot displaying the burden of comorbid conditions among patients with hepatitis C virus infection (HCV) stratified by age group (N=154)



Comorbid conditions include chronic pain, hepatitis B virus, hypertension, coronary artery disease, chronic heart failure, chronic kidney disease, chronic pulmonary disease, diabetes, depression, anxiety, bipolar disorder, post-traumatic stress disorder, schizophrenia, alcohol use disorder, amphetamine use disorder, benzodiazepine use disorder, cannabis use disorder, cocaine use disorder, and opioid use disorder.

Comparing Older and Younger Adults

Of the 162 patients with chronic HCV who initiated treatment, 99 patients were <60 years old and 63 patients were ≥60 years old. Considering only the 154 patients who initiated and completed treatment, 93 patients were <60 years old and 61 patients were ≥60 years old. Neither demographic characteristics nor factors related to HCV exposure were distributed differently between age groups.

The ITT SVR12 rate for older adults was 90.5% (95% CI: 83.2-97.7) and the mITT SVR12 rate was 91.8% (95% CI: 84.9-98.6), compared to ITT SVR12 rate for younger adults of 90.9% (95% CI: 85.2-96.5) and mITT SVR12 rate of 95.6% (95% CI: 91.5-99.8). The SVR12 rates did not differ significantly between age groups (p=0.51) (**Table 2**). Characteristics related to the patients' HCV diagnosis and DAA treatment regimen did not vary significantly between older and younger adults in this cohort.

Figure 1 displays the burden of comorbid diagnoses stratified by age group. Older adults had a greater burden of comorbid diagnoses, with 93.4% (95% CI: 87.2-99.6) of older patients diagnosed with at least one comorbid illness, compared to 87.1% (95% CI: 80.2-93.9) of younger adult patients who were diagnosed with at least one comorbid illness (p=0.32). Only hypertension was markedly different between older and younger adults (**Table 2**). More older adults were diagnosed with hypertension (72.1%, 95% CI: 60.8-83.3) compared to younger adults (45.1%, 95% CI: 35.0-55.2) (p=0.001).

DISCUSSION

Among patients treated at pharmacist-involved HCV clinics, SVR12 rates did not significantly differ between age groups, suggesting that patients with chronic HCV, regardless of age or comorbid conditions, can attain SVR12 with DAA therapy. Overall, 94.2% achieved SVR12 and were cured of HCV. Although older adults in this cohort did have a slightly lower SVR12 rate compared to younger adults, the difference between the two age groups was not statistically significant.

The SVR12 rates observed are consistent with those found in the literature for similar patient populations receiving DAA therapy. Su et al. grouped patients with HCV into six age categories and reported SVR12 rates greater than 90% for patients in the age categories of 60–64,

Table 2. Characteristics of the treatment regimen received, hepatitis C virus, and comorbid diagnoses among study participants stratified by age group (N=154)

	Overall (N=154)	Younger Adults <60 years (n=93)	Older Adults ≥60 years (n=61)	P-value[a,b,c]
Hepatitis C Virus				
Genotype 1, n (%)	123 (79.8)	73 (78.4)	50 (81.9)	0.74
Presence of liver cirrhosis, n (%)	80 (51.9)	48 (51.6)	32 (52.4)	1
Presence of decompensated cirrhosis, n (%)	20 (12.9)	12 (12.9)	8 (13.1)	1
Prior history of treatment, n (%)	46 (29.8)	27 (29.0)	19 (31.1)	0.91
Treatment Regimen for Hepatitis C Virus				
Length of treatment, n (%)				0.87
< 24 weeks	124 (80.5)	74 (79.6)	50 (82.0)	
24 weeks	30 (19.5)	19 (20.4)	11 (18.0)	
Type of DAA medication, n (%)				0.55
Ledipasvir/sofosbuvir	116 (75.3)	68 (73.1)	48 (78.7)	
Other	38 (24.7)	25 (26.9)	13 (21.3)	
Use of ribavirin, n (%)	35 (22.7)	17 (18.2)	18 (29.5)	0.15
SVR12 achieved[d], n (%)	145 (94.1)	89 (95.6)	56 (91.8)	0.51
Comorbid Diagnoses				
Comorbid Medical Diagnoses, n (%)				
Chronic pain	55 (35.7)	32 (34.4)	23 (37.7)	0.80
Hepatitis B virus	6 (3.8)	5 (5.3)	1 (1.6)	0.4
Hypertension	86 (55.8)	42 (45.1)	44 (72.1)	0.001**
Coronary artery disease	8 (5.1)	5 (5.3)	3 (4.9)	1
Chronic heart failure	5 (3.2)	3 (3.2)	2 (3.2)	1
Chronic kidney disease	11 (7.1)	5 (5.3)	6 (9.8)	0.46
Chronic pulmonary disease	31 (20.1)	21 (22.5)	10 (16.3)	0.46
Diabetes	46 (29.8)	26 (27.9)	20 (32.7)	0.64
Comorbid Psychiatric Diagnoses, n (%)				
Depression	74 (48.0)	51 (54.8)	23 (37.7)	0.05
Anxiety	48 (31.1)	34 (36.5)	14 (22.9)	0.10
Bipolar disorder	12 (7.7)	9 (9.6)	3 (4.9)	0.44
Post-traumatic stress disorder	10 (6.4)	8 (8.6)	2 (3.2)	0.32
Schizophrenia	8 (5.1)	6 (6.4)	2 (3.2)	0.61
History of Comorbid Substance Use Disorder, n (%)				
Alcohol use disorder	37 (24.0)	24 (25.8)	13 (21.3)	0.65
Amphetamine use disorder	1 (0.6)	1 (1.0)	0 (0.0)	1
Benzodiazepine use disorder	3 (1.9)	1 (1.0)	2 (3.2)	0.71
Cannabis use disorder	2 (1.2)	1 (1.0)	1 (1.6)	1
Cocaine use disorder	13 (8.4)	8 (8.6)	5 (8.1)	1
Opioid use disorder	26 (16.8)	19 (20.4)	7 (11.4)	0.21

a. Chi-squared tests used to determine the relationship between categorical variables.
b. P values are comparing younger adults to older adults.
c. **P value <0.01
d. Modified intention-to-treat SVR12, includes only patients who completed treatment and had a SVR12 reported

65–69, 70–74, and 75 years and older.[14] Vermehren et al. and Jhaveri et al. compared patients with HCV <65 years old to those ≥65 years old and found SVR12 rates between 91 to 99% for younger adults and SVR12 rates between 97 to 100% for older adults.[5,8] Most recently, Pan et al. found no significant difference in achieving HCV cure between patients with HCV <65 years old and those ≥65 years old.[18] Combined with our study, these findings suggest that age alone does not adversely impact achieving SVR12 through DAA therapy.

Since older adults are more likely to experience DDIs with DAA therapy as a result of having a greater burden of comorbidities and medications to treat them, it is important to include comorbid conditions and medication use in evaluations of DAA therapy.[8–10] Prior literature examining SVR12 for DAA therapies included only a few comorbid conditions. Of those, to our knowledge, no study examined more than six diagnoses.[6,14,16,18] Our study included 19 diagnoses for comorbid conditions (eight medical, five psychiatric, and six substance use disorders), which were specifically selected for their prevalence as comorbidities in patients with HCV.[14,16] Older adults in this cohort shared a greater burden of having at least one comorbid diagnosis compared to younger adults, although this difference between age groups was not statistically significant. Only one comorbid condition, hypertension, was distributed differently between the younger and older adult age groups, with more older adults having with hypertension. This finding is consistent with older adults in both the general and HCV population, as the prevalence of hypertension increases with age.[18,19] Older adults shared a greater burden of having at least one comorbid diagnosis, but both age groups achieved SVR12 at a similar rate. This indicates that the comorbid conditions evaluated in this study are not expected to significantly affect the ability of an older patient with chronic HCV to be cured of HCV.

Although not considered a comorbid condition in analysis, nearly 80% of our cohort reported a past or current history

of smoking. The rate of tobacco use among patients with HCV is estimated to be three times higher than the rate of tobacco use among patients without HCV.[20] This is likely linked to the fact that cardiovascular diseases are more prevalent among patients infected with HCV compared with the general public. Additionally, patients with HCV are more likely to die from cardiovascular and respiratory causes than liver-related causes, which further supports the importance of tobacco cessation counseling of patients being treated for HCV.[20]

Interestingly, the percent of patients with cirrhosis in our cohort was higher than expected, with over half diagnosed with cirrhosis at the start of the study. The World Health Organization estimates that between 15 and 30% of patients with HCV develop cirrhosis.[1] This discrepancy is likely due to the fact that at the time that this study was conducted, many insurers in Rhode Island, both private and public, reserved coverage of DAA therapies to patients with stage three or stage four fibrosis. Since then, restrictions based on fibrosis score have largely been removed and patients with less severe fibrosis are able to access HCV treatment.

In our cohort, the distribution of patients with liver cirrhosis and decompensated cirrhosis were similar across both age groups. However, due to a longer duration of infection, older adults more often present with advanced stages of fibrosis compared to younger adults.[3,18] Current HCV guidelines recommend treatment for all patients with HCV, unless they have a short life expectancy (less than 12 months) and are unlikely to receive benefit from therapy.[7] Although older adults often present at a later stage of liver fibrosis, this does not correlate with their ability to respond to HCV treatment. The efficacy and tolerability of DAA therapy indicates older adults with HCV no longer need to be viewed as a "difficult-to-treat" population. However, there is some urgency regarding when to start therapy for an older patient with chronic HCV, as older adults do have a greater risk for HCV-related intrahepatic and extrahepatic disease.[3] Given the similar distributions of HCV-related liver complications and the greater than 90% SVR12 rate in this cohort, it does not appear that older adults, who are who are at the highest-risk for HCV-related liver morbidity and mortality, should be denied treatment based on stage of liver disease.

Our finding that patients with chronic HCV are not limited by age or comorbid conditions in achieving HCV cure must be interpreted in light of some limitations. Given the retrospective chart review nature of this study, some comorbid diagnoses may be missing or misclassified. However, it is unlikely that missingness or misclassification would be differential by age. Additionally, this study employed data from a single health system, so results may not generalize to other institutions with markedly different patient populations.

CONCLUSIONS

Our findings suggest that HCV cure is possible for both younger and older patients with chronic HCV and is not limited by a patient's age or the comorbid illnesses evaluated in this study. Although there were some differences between age groups, none of these differences are expected to influence the ability of a patient with chronic HCV to respond to HCV treatment and be cured of HCV. Given the longer duration of infection in older patients with HCV and the efficacy and tolerability of DAA therapy, it is imperative to treat older patients, who are at the highest-risk for HCV-related liver morbidity and mortality.

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Authors

Alyssa K. Greenwood Francis, MPH, School of Public Health, Brown University, Providence, RI.

Francesca L. Beaudoin, MD, PhD, Associate Professor of Emergency Medicine and Health Services, Policy, and Practice, The Alpert Medical School of Brown University, Providence, RI.

Safiya S. Naidjate, PharmD, Clinical Pharmacist Specialist, Ambulatory Care, Lifespan Corporation, Rhode Island Hospital, Providence, RI.

Christine Berard-Collins, MBA, BSPharm, Director, Department of Pharmacy, Rhode Island Hospital; Clinical Pharmacist Specialist, Ambulatory Care, Lifespan Corporation, Rhode Island Hospital, Providence, RI.

Andrew R. Zullo, PharmD, PhD, Assistant Professor of Health Services, Policy, and Practice and Epidemiology, School of Public Health, Brown University; Research Fellow, Center of Innovation in Long-Term Services and Supports, Providence Veterans Affairs Medical Center; Clinical Pharmacist Specialist, Department of Pharmacy, Rhode Island Hospital, Providence, RI.

Correspondence

Alyssa K. Greenwood Francis, MPH
Department of Health Services, Policy and Practice
Brown University School of Public Health
121 South Main Street
Providence, RI 02912
alyssa_francis@alumni.brown.edu

A Modifiable Barrier to Hepatitis C Virus Elimination in Rhode Island: The Prior Authorization Process for Direct-Acting Antiviral Agents

PATRICK DURYEA, BA; JACKIE HABCHI, PharmD; SOPHIE SPRECHT-WALSH, LPN; AURIELLE THOMAS, MSc; JEFFREY BRATBERG, PharmD

ABSTRACT

Hepatitis C virus (HCV) is disproportionately prevalent among different groups of marginalized populations in Rhode Island (RI). Although direct-acting antiviral (DAA) agents are safe and cure HCV, RI payers limit access to these life-saving medications using prior authorizations (PAs). We assessed RI DAA-specific PA criteria. The authors reviewed payers' websites and/or called payers to obtain, describe, and analyze DAA PA forms, and approval and appeal processes. While some information was consistently required, we observed substantial differences among payers' requirements. All PA forms require at least one piece of data that is clinically superfluous for DAA prescription. These include post-treatment laboratory results, prescriber requirements, documentation of co-treatment of substance use disorders, and repeat diagnostic tests. Post-approval barriers also exist; DAA PAs are time-limited, and DAAs can only be obtained from preferred pharmacies. The PA process requires many steps, differing across RI payers, taking 45–120 minutes per patient. To achieve HCV elimination, DAA PA forms and processes should be standardized, streamlined, and ultimately removed.

KEYWORDS: hepatitis C virus (HCV), prior authorization (PA), direct-acting antiviral (DAA), people who inject drugs (PWID)

INTRODUCTION

Hepatitis C virus (HCV) is the most common bloodborne infection in the U.S.[1] HCV incidence is rising dramatically, driven by percutaneous transmission among younger people who inject drugs (PWID).[2] These data along with the benefits of treatment contributed to Centers for Disease Control and Prevention and U.S. Preventive Services Task Force recommendations for universal testing of all adults.[3-4]

Oral direct-acting antivirals (DAAs) are safe and effective curative therapies for HCV. Contemporary short-term formulations are typically pan-genotypic and taken once daily. Although prices of DAAs have decreased, and treatment leading to cure is cost-saving and cost-effective, many DAAs remain in a tier of higher-priced medications with access regulated by private and public payers through specialty pharmacies-only access and prior authorization (PA) processes.[5-6] Acquiring DAAs for a patient requires clinical and administrative teams (e.g. physicians, nurses, pharmacists) and then patients to navigate complex PA processes that differ for every payer in Rhode Island (RI).

DAA PAs are paper or electronic forms that require patient-specific demographic, medical and non-medical information, plus supporting laboratory results. Typically, a physician evaluates a patient and chooses to prescribe the best DAAs for that specific patient. A payer-specific PA request form must be submitted, reviewed, and approved before the patient can obtain DAAs. There are myriad reasons for PA denials, ranging from a request for a regimen that is not on the payer-specific preferred drug formulary, to missing a non-essential piece of information (see Case Examples). PA re-submissions require providing data rebutting the denial, and often patient-specific provider letters. If the payer still denies the PA, the prescriber must contact the payer to conduct a peer-to-peer appeal, which can involve weeks of correspondence via phone voicemail. Once approved, the payer will only approve the treatment until a specific date. If a refill is needed or treatment is initiated after the PA expires, the PA must be redone, even if treatment has already started.

For patients to physically receive their medication, each payer requires that DAAs be obtained exclusively via a payer-specific preferred specialty pharmacy. Specialty pharmacies are either local, with a walk-in location, or central, which deliver medications by mail. Most payers will not notify the pharmacy of the prescription approval, so prescribers often must call in prescriptions. Patients are provided with a 1-month supply of medications and must call the pharmacy for refills for a 2-, 3- or 6-month regimen. Patients that are new to the specialty pharmacy must create a profile over the phone and receive counseling by the payer's preferred pharmacist, about their DAA regimen. A significant burden of HCV lies with PWID and people who are homeless-experienced.[7] The challenges of limited access to consistent housing, transportation, and phones, underscore the difficulties of the PA process for certain sub-populations and their prescribers. Our objective was to describe the RI DAA PA process.

METHODS

We evaluated RI payer PA criteria for DAA approval. We identified 12 different RI DAA PAs: six Medicaid, four Medicare, and two Commercial. We selected a representative sample of six payers: three public (Medicaid: UnitedHealthcare of RI (UHC), Tufts Health Plan of RI, Neighborhood Health Plan of RI), two private (Blue Cross Blue Shield of RI (BCBS), Aetna of RI), and the AIDS Drug Assistance Program (ADAP) of RI for Human Immunodeficiency Virus (HIV)/HCV co-infected patients. We focused on three Medicaid payers because their covered patients possess a higher prevalence of HCV than payers that cover non-Medicaid recipients.[8] We examined two private insurers and one drug assistance program to broaden the scope of this investigation and better understand PAs across different types of RI payers. We searched the payers' websites between January 10 and March 11, 2020 to find PA request forms that must be submitted for consideration of DAA approval.

One author contacted payers by email, to verify that the information on the online PA request forms used for the PA request process were up to date. When payers did not respond to emails, authors called the payer's public patient and provider phone number. Of the six payers, four responded to the verification request. No edits to the PA process were obtained. Two authors extracted data from payer-specific PA request forms into a standardized spreadsheet. One co-author verified the data. Outcome variables consisted of clinical and non-clinical features of each payer's PAs. Data used for outcome variables was publicly available. The verified processes from each payer were assessed for discrepancies between requirements of the PA request forms and the current evidence-based society guidelines (HCVguidelines.org).[9]

RESULTS

(**Table 1**) All payers require the following information be submitted: HCV genotype, HCV ribonucleic acid (RNA) viral load (VL), estimate of liver fibrosis stage, the test used to estimate fibrosis stage, and cirrhosis status. Four payers require an HCV RNA VL result within 90 days of the PA request (even for patients with years of documented HCV viremia). Three payers required a prescriber to agree to submit patients' 12-week post-treatment HCV RNA VL sustained virologic response (SVR) result (signifying whether the patient achieved cure) back to the payer. One payer requires an HCV genotype within 90 days of the PA request (even for patients with years of the same documented genotype without risk for reinfection with a new genotype). Five payers require the prescriber's medical specialist status or preferred provider status. ADAP requires that patients with substance use disorders (SUDs) sign an agreement and participate in a clinician-monitored treatment program or be abstinent for six months prior to HCV treatment initiation (documented by attestation). Three payers require information about transplant history, two require HIV status, two require ethnicity,

Table 1. Summary of Prior Authorizations for Direct-Acting Antivirals in Rhode Island

	Rhode Island Public Payers				RI Private Payers	
	UHC*	THP*	NHP*	ADAP*	BCBS*	Aetna*
Plan	Community	RITogether	Medicaid			
Preferred pharmacy	BriovaRx	CVS Caremark[1]	Walgreens[2]	RIH Pharmacy[3]	Prime Therapeutics	None
Preferred pharmacy type	Central	Central	Local	Local	Central	None
Prescriber information	√	√	√	√	√	√
Prescriber specialist status	√	√	√		√	√
Preferred Provider status	√	√ [4]	√ [5]	√ [5]		
Agreement to submit post-treatment VL[6]	√	√		√		√
Treatment start date			√	√		√
Fibrosis stage (0-4) & test used to estimate	√	√	√	√	√	√
Cirrhosis & compensation status	√	√	√	√	√	√
APRI[7] & Fibrosure					√ [8]	
HCV Genotype	√ [9]	√	√	√	√	√
HCV VL within 90 days of PA request	√	√	√	√		
Date of HCV VL	√	√	√	√		√
HCV VL "most recent"					√	
HCV VL within 6 months of PA request						√
Patient address	√		√		√	√
Patient ethnicity		√			√	
Patient weight					√	√
Patient contract				√ [10]		
Patient substance use treatment				√ [11]		

* United Healthcare of RI (UHC), Tufts Health Plan of RI (THP), Neighborhood Health Plan of RI (NHP), Blue Cross Blue Shield of RI (BCBS), Aetna of RI, AIDS Drug Assistance Program of RI (ADAP)

[1] CVS Caremark Central is their preferred pharmacy. Also, CVS Local Specialty can help in answering questions.

[2] 335 Prairie Ave, Providence RI (Local Specialty)

[3] 593 Eddy Street, Providence RI or medication transferred to The Miriam Hospital (164 Summit Ave., Providence RI).

[4] If a patient's hepatic fibrosis stage is F3 or F4, the submitting prescriber "must be on the Rhode Island Medicaid Hepatitis C Preferred Provider List" or in co-managing the patient with a Preferred Provider.

[5] Prescriber is required to be enrolled as a Preferred Provider.

[6] Viral load

[7] Aspartate Aminotransferase to Platelet Ratio Index

[8] Both APRI and Fibrosure are required.

[9] HCV Genotype within 90 days of PA request

[10] The patient must sign a contract before starting treatment. ADAP's sample contract states that nonadherence will result in nonrenewal of medications, among other things. The suggested contract is meant to be stored in patient's medical record, and not used for eligibility.

[11] Patients with alcohol or drug misuse must be participating in a clinician-monitored treatment program or substance-free for six months. Treatment and monitoring may be documented by attestation.

and two require weight. None had PA processes that were the same or followed standardized formatting. The complete DAA PA process from prescription to DAA acquisition took 45-120 minutes per patient, longer with a protracted denial and appeals process.

Payers' preferred pharmacy is the only option for patients to obtain DAAs. BriovaRx, UHC's preferred pharmacy, requires the medication be shipped to a patient's address. BriovaRx staff will not call the prescriber if a patient cannot be reached via telephone. If BriovaRx requires additional documentation or if a PA must be redone, the pharmacy will only use fax, and will not reach out to the prescriber. This may take several hours to multiple days.

Case Example 1

A patient presented with HCV genotype 2 and compensated cirrhosis in 2015. He was evaluated and prescribed a 16-week therapy with sofosbuvir and daclatasvir in accordance with society guidelines at the time (HCVguidelines.org).[9] Medicaid denied the PA multiple times. The patient was eventually granted approval for a shorter therapy of 12 weeks despite his physician's explanation that the data supported a 16-week course. This patient did not achieve SVR despite reporting perfect adherence. His physician then prescribed a second regimen, this time requiring 24 weeks of DAAs. While he achieved SVR with this second regimen, his SVR was delayed, with an inflated cost for cure with two DAA regimens over 36 weeks. Following SVR, the patient was diagnosed with hepatocellular carcinoma (HCC). Chronic HCV infection is the leading cause of HCC in the U.S., while SVR reduces the risk for developing HCC.

Case Example 2

A patient presenting with HCV in 2018 was approved for an 8-week regimen. Due to complex life challenges, the patient did not retrieve DAAs from the pharmacy nor initiate treatment. In 2020, this patient requested treatment with the same physician, who completed a new PA. The PA was denied, stating that documentation of prior HCV treatment must be provided, even though the PA indicated no prior treatment. This denial was appealed on three separate occasions but no response from the payer has been received.

DISCUSSION

We evaluated the DAA PA process for six RI payers. The process entails several time-consuming administrative steps, including phone calls, faxes, and peer-to-peer clinical discourse. For PAs in general, beyond HCV antiviral therapy, U.S. physicians report spending an average of 14.9 hours per week, and 91% of physicians report delays to necessary care because of the time to complete PAs.[10] Thirty-six percent of physicians have staff exclusively working on PAs.[10] In one HCV-specific study, although one-quarter of patients were denied initial DAA approval, most prescriptions eventually were approved. Initial denials are often not medically justified and may serve as a deterrent.[11]

Several DAA PA requirements across multiple payers are gratuitous. These include an HCV RNA VL result within 90 days of the PA request, specialty or preferred provider status, submission of post-treatment VL results, and treatment and monitoring of SUDs. Four payers require an HCV RNA VL or genotype result within 90 days of the PA request. Patients with years of documented viremia and recent genotyping, prescribed pan-genotypic regimens, are still forced to undergo inconvenient, costly, and redundant laboratory tests. Current evidence-based guidelines call for one HCV RNA VL any time before treatment initiation (HCVguidelines.org).[9]

No policy restricts non-specialists or non-preferred providers from prescribing DAAs in RI, yet all payers require prescribers to state their specialty and/or status as a preferred provider. No differences in efficacy were found for non-specialist providers administering HCV treatment compared to specialist providers.[12] Non-specialist or non-preferred providers may be confused by this inconsistency, potentially dissuading them from prescribing DAAs, discouraging the patient from seeking treatment, or leading to a referral to yet another physician who is considered a specialist or preferred provider. Each of these outcomes increases the potential for delayed treatment and cure. This may prolong the time of infectivity, contribute to patients dropping out of HCV care or being lost to follow-up, and impact morbidity and mortality.

Four payers also require DAA prescribers to agree to submit a post-treatment HCV RNA VL (SVR result), back to the payer. Physicians are not obligated to provide treatment outcomes to payers for other diseases; this is particular to HCV. For example, prescribers do not have to provide back to payers non-detectable HIV VL data for antiretroviral prescriptions, nor hemoglobin A1C data for diabetes medications. Sharing patient's SVR data with payers is unwarranted.

Other PA requirements impede HCV cure. ADAP requests that patients with SUDs sign a contract, as well as participate in a clinician-monitored treatment program or demonstrate six months of pre-treatment abstinence. A large body of evidence demonstrates that DAA treatment in people with SUDs leads to SVR rates comparable to those without SUDs and that there is not justification for pre-treatment sobriety.[9,13-14] Also, a patient's weight and ethnicity are unnecessary for DAA prescription.

Non-invasive assessments of liver fibrosis estimate the presence of advanced fibrosis. Non-invasive markers do not precisely differentiate Meta-Analysis of Histologic Data in Viral Hepatitis (METAVIR) fibrosis stage (F) F0-F3. What is necessary for selecting a DAA regimen is knowledge of whether the patient has cirrhosis or not, and whether cirrhotic patients are decompensated or not. This is highly dependent on clinical presentation and clinical diagnosis. BCBS of RI requires both aspartate aminotransferase to platelet ratio index (APRI) and

a high-priced Fibrosure test for DAA approval (even for young patients with incident infection without fibrosis). Additionally, the PA forms may encourage prescribers to order elastography when it is not medically indicated or to assume that elastography is a requirement for prescribing antiviral therapy.

Even after PA approval, care teams and patients face access and communication hurdles. UHC's preferred pharmacy, BriovaRx, requires a patient's address to ship approved medications, and does not follow up with patients when delivery concerns arise. These requirements hinder treatment for homeless adults, of whom approximately 44% are HCV-infected.[15] BriovaRx's limited contact options and poor communication further diverts staff time away from navigating patients to cure.

States should collaborate on system-level strategies to reduce barriers to care, such as PAs, to advance U.S. HCV elimination goals.[16] Some states, such as Washington, have successfully removed PAs for DAAs for most eligible patients prescribed glecaprevir/pibrentasvir.[17]

CONCLUSION

In RI, HCV elimination has been impeded in part due to the time-intensive, multi-step DAA PA process, differing across payers. Delaying HCV elimination, especially in the transmitting population, increases risks to the community, and increases costs to detect, treat, and monitor more people. Action from legislators and healthcare officials is indicated. PAs for DAAs should be standardized, streamlined or removed to increase access to safe, efficacious, and cost-effective medications.

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Authors

Patrick Duryea, BA, University of Rhode Island, Providence, RI.

Jackie Habchi, PharmD, CODAC Behavioral Healthcare, Providence, RI.

Sophie Sprecht-Walsh, LPN, CODAC Behavioral Healthcare, Providence, RI.

Aurielle M. Thomas, MSc, University of Rhode Island, Providence, RI.

Jeffrey Bratberg, PharmD, University of Rhode Island, Providence, RI.

Correspondence

Patrick Duryea, BA, Research Assistant
University of Rhode Island
80 Washington Street, Room 528, Providence, RI 02903
401-277-5004
pduryea@uri.edu

F18-FDG PET/CT Diagnoses Vasculitis after a Negative Indium-111 Leukocyte Scan

JING WANG, MD; DON C. YOO, MD; ELIZABETH H. DIBBLE, MD

ABSTRACT

We present a case of a 38-year-old man with a prior episode of fever of unknown origin (FUO) four years ago who presented with acute severe dull nonradiating abdominal pain centered in the epigastric region associated with nausea and vomiting. Bloodwork showed a normal leukocyte count but elevated erythrocyte sedimentation rate of 26 and elevated C-reactive protein of 40; syphilis titers and anti-neutrophil cytoplasmic antibodies (pANCA and cANCA) were negative. CT angiogram (CTA) of the abdomen and pelvis showed diffuse medium vessel vascular inflammation. Indium-111 labeled leukocyte scan did not show evidence of infection and, specifically, no evidence of infectious vasculitis. Subsequent F18-FDG PET/CT scan showed diffuse uptake in the mesenteric vasculature in the area of abnormality seen on prior contrast-enhanced CT and confirmed the diagnosis of vasculitis, subsequently deemed by rheumatology to be most consistent with segmental arterial mediolysis.

INTRODUCTION

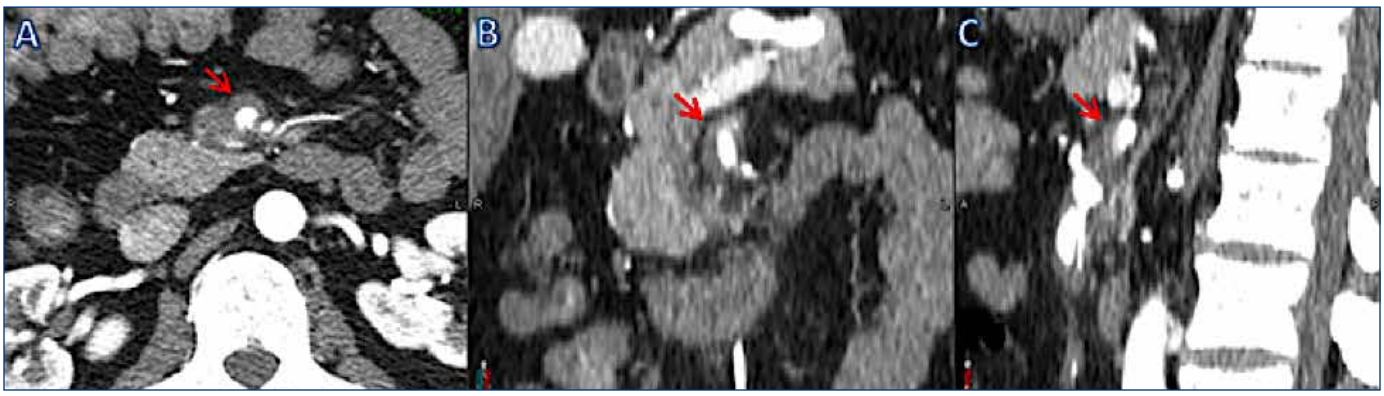
F18-FDG PET/CT is primarily used for oncologic imaging; however, mechanisms of F18-FDG uptake by tumor cells that leads to their visualization on F18-FDG PET/CT – increased expression of facultative GLUT transporters and increased expression of glycolytic enzymes[1-3] – also occur in inflammatory and granulation tissues.[4] Because of this, F18-FDG PET/CT is being used increasingly to evaluate infectious and inflammatory conditions. We present a case that illustrates the use of F18-FDG PET/CT in the workup of infection and inflammation, specifically, in a young man with vasculitis.

CASE REPORT

A 38-year-old man with a prior episode of fever of unknown origin (FUO) four years ago presented to the emergency department with 10/10 abdominal pain associated with nausea and vomiting. The abdominal pain started 1 day ago, was centered in the epigastric region and was nonradiating, better lying down, and worse sitting up. Bloodwork showed a normal leukocyte count but elevated erythrocyte sedimentation rate of 26 and elevated C-reactive protein of 40; syphilis titers and anti-neutrophil cytoplasmic antibodies (pANCA and cANCA) were negative.

CT angiogram (CTA) of the abdomen and pelvis showed diffuse inflammation and thickening of the superior mesenteric artery (SMA) wall and its branches (medium-sized vessels) (**Figure 1**) highly suspicious for vasculitis. In addition, the patient had pseudoaneurysms of the SMA and an acute SMA dissection. The differential diagnosis included segmental arterial mediolysis, connective tissue disease, and infectious and inflammatory vasculitides. The patient had no family history or other signs of connective tissue disease.

Figure 1. Axial (A), coronal (B), and sagittal (C) images from abdomen/pelvis CTA show diffuse inflammation and thickening of the superior mesenteric artery (SMA) wall (red arrows) and its branches highly suspicious for vasculitis.



The patient had recently completed a course of steroids for poison ivy and thus was mildly immune compromised; in addition, the apparent distribution of involvement together with pseudoaneurysms and dissection are unusual for inflammatory vasculitides. 111-Indium labeled leukocyte study was performed to evaluate for infectious vasculitis. The study was normal (**Figures 2 and 3**).

Subsequent CTA of neck and chest (not shown) was performed to assess for evidence of a larger vessel vasculitis and was negative.

Because of the negative neck and chest CTA and negative labeled leukocyte scan, F18-FDG PET/CT was performed to assist in diagnosis, evaluate extent of involvement, and help decide whether to initiate immunosuppressive agents. PET/CT images showed diffuse increased uptake in the mesenteric vasculature, and more focal intense uptake in the SMA in the area of abnormality seen on prior contrast-enhanced CT (**Figure 4**). The patient was diagnosed with diffuse inflammatory vasculitis, not otherwise specified, and started on corticosteroids. His abdominal pain improved, and he was discharged with outpatient rheumatology follow-up. Upon further genetic testing and clinical evaluation, rheumatology deemed the diagnosis most likely segmental arterial mediolysis.

Figure 2. Anterior (left image) and posterior (right image) whole body planar images from 111-Indium labeled leukocyte scan were normal.

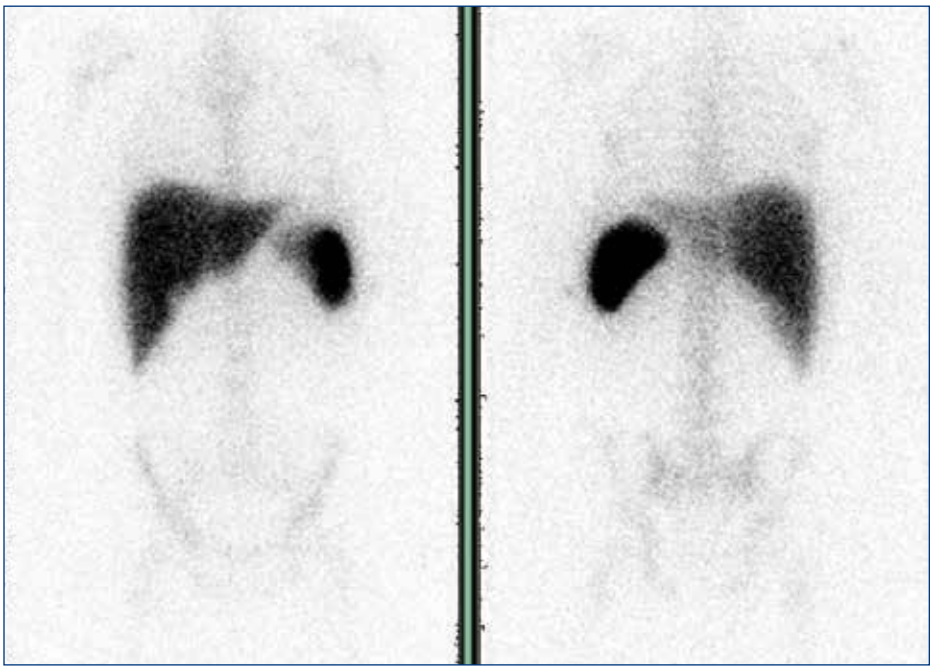


Figure 3. Maximum intensity projection Indium-111 labeled leukocyte scan image (A) and axial, coronal, and sagittal Indium-111 labeled leukocyte SPECT, (B-D, respectively) and fused SPECT/CT images (E-G, respectively) show no increased uptake in the region of the SMA (red arrows) in the area of abnormality seen on prior contrast-enhanced CT.

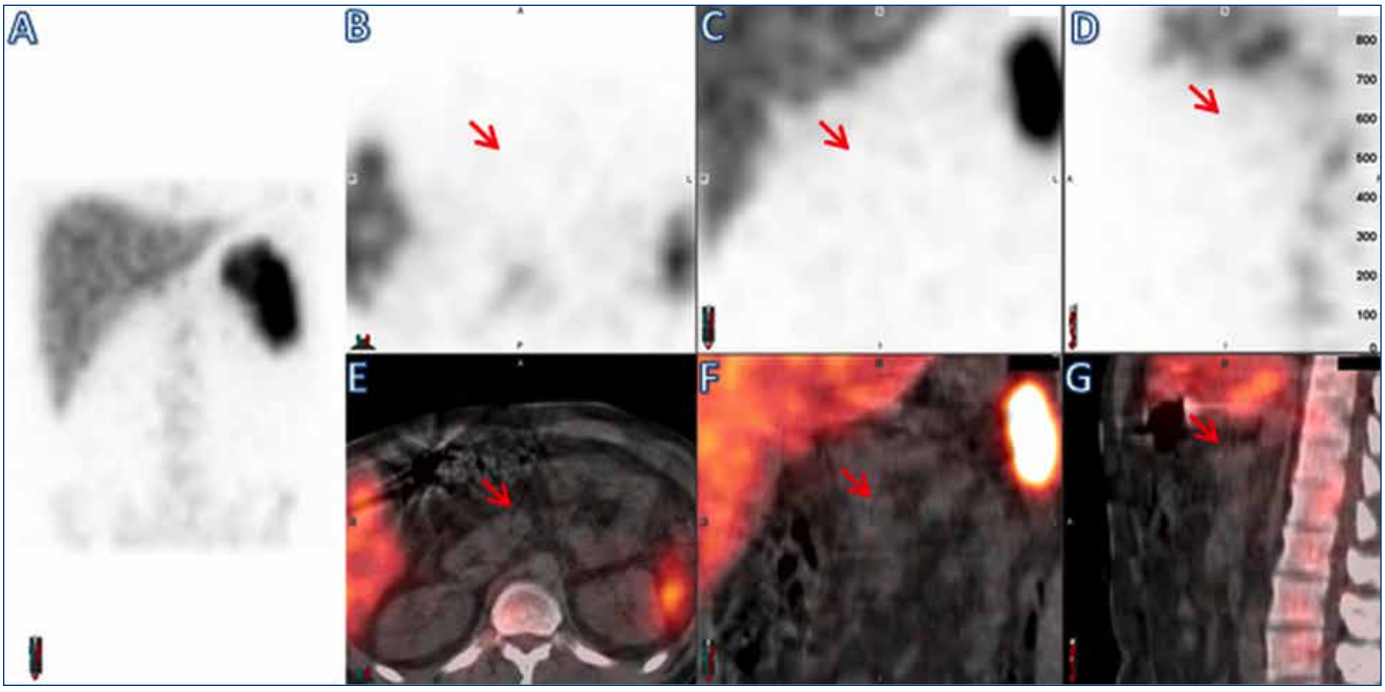
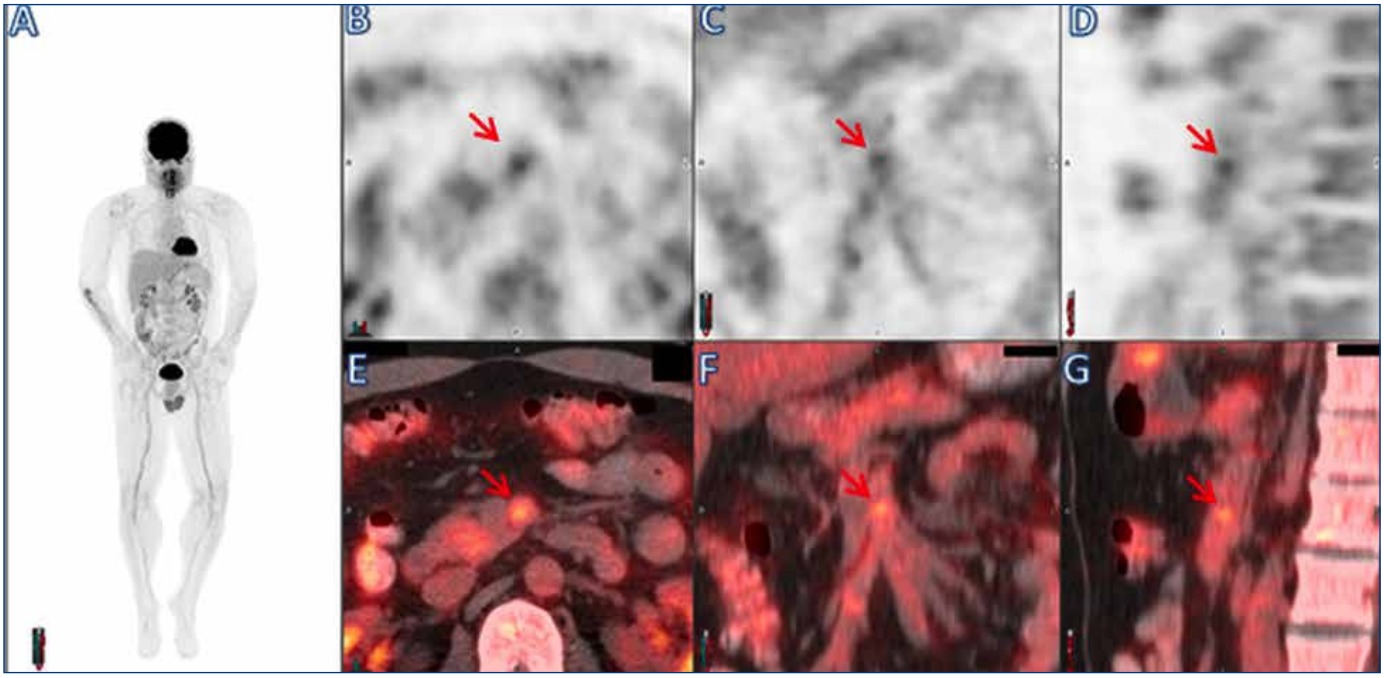


Figure 4. Because of the negative CTA and labeled leukocyte scan, F18-FDG PET/CT was performed to assist in diagnosis, evaluate extent of involvement, and help decide whether to initiate immunosuppressive agents. Whole body MIP F18-FDG PET (A) and axial, coronal, and sagittal PET (B-D, respectively) and fused PET/CT (E-G, respectively) images demonstrate diffuse increased uptake in the mesenteric vasculature, and more focal intense uptake in the SMA (red arrows) in the area of abnormality seen on prior contrast-enhanced CT.



DISCUSSION

F18-FDG PET/CT has a sensitivity for vasculitis ranging from 77%–92%[4,5] versus Indium-111 tagged leukocyte scintigraphy's sensitivity of 25%.[6] In addition, F18-FDG uptake correlates with elevated levels of inflammatory markers[7,8] and can detect metabolic abnormalities in vessels prior to morphologic changes visible on conventional anatomic imaging.[9,10] In a study evaluating FUO, F18-FDG PET/CT had a sensitivity of 86% while Indium-111 leukocyte scintigraphy had a sensitivity of 20%.[11] F18-FDG PET/CT performed at the time of this patient's prior episode of FUO may have prevented a hospital admission. In addition to assisting with diagnosis, F18-FDG PET/CT can evaluate progression and treatment response in vasculitis.[12]

F18-FDG PET/CT can also yield cost benefits relative to labeled leukocyte scintigraphy. While labeled leukocyte scintigraphy and F18-FDG PET/CT can both detect infection and inflammation, the radiopharmaceutical cost for a single dose of radiolabeled leukocytes is approximately seven times more expensive than the cost of a single dose of F18-FDG.[13]

Segmental arterial mediolysis (SAM) is a rare cause of vasculitis that is not considered a true inflammatory vasculitis; rather, inflammatory cells are inconsistently present and considered secondary to the disease itself.[14] SAM is defined by disruption of the arterial medial layer. SAM typically is not as diffuse as was this patient's vasculitis; however, aneurysms and dissections are common, as is medium sized artery involvement. The uptake on F18-FDG PET/CT is likely due to the secondary inflammation caused by disruption of the arterial medial layer.

CONCLUSION

F18-FDG PET/CT is useful in the workup of infectious and inflammatory conditions and, specifically, can be helpful in diagnosing vasculitides including the rare vasculitis segmental arterial mediolysis.

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Authors

Jing Wang, MD, The Warren Alpert Medical School of Brown University, Providence, RI.

Don C. Yoo, MD, Department of Diagnostic Imaging, The Warren Alpert Medical School of Brown University/Rhode Island Hospital, Providence, RI.

Elizabeth H. Dibble, MD, Department of Diagnostic Imaging, The Warren Alpert Medical School of Brown University/Rhode Island Hospital, Providence, RI.

Correspondence

Elizabeth H. Dibble, MD
Department of Diagnostic Imaging
Rhode Island Hospital
593 Eddy Street
Providence, RI 02903
401-444-5184, x297
Fax 401-444-5017
edibble@lifespan.org

Delayed Diagnosis of an Occult Wooden Orbital Foreign Body

YASH J. VAISHNAV, MD; DAVID PORTELLI, MD; MICHAEL E. MIGLIORI, MD, FACS

ABSTRACT

An orbital foreign body should be suspected in cases of penetrating orbital injury, but they are not typically seen with low-velocity trauma and no obvious penetrating injury. Wooden foreign bodies are difficult to distinguish from orbital fat on computed tomography (CT), and without a high degree of suspicion for a foreign body, techniques to distinguish wood in the orbit may not be utilized. The authors present here a case of an initially unrecognized wooden orbital foreign body in the setting of orbital trauma where the patient denied any possibility of a foreign body and no evidence of a penetrating injury. The diagnosis was eventually made with an interdisciplinary review of the imaging between the orbital service and radiology, and the foreign body was subsequently removed via orbitotomy. Surgeons should maintain a high index of suspicion when there is a question of a foreign body on imaging, and a low threshold to involve radiology colleagues in the diagnostic evaluation.

KEYWORDS: orbital foreign body, orbital trauma, wooden foreign body, occult foreign body, interdisciplinary collaboration

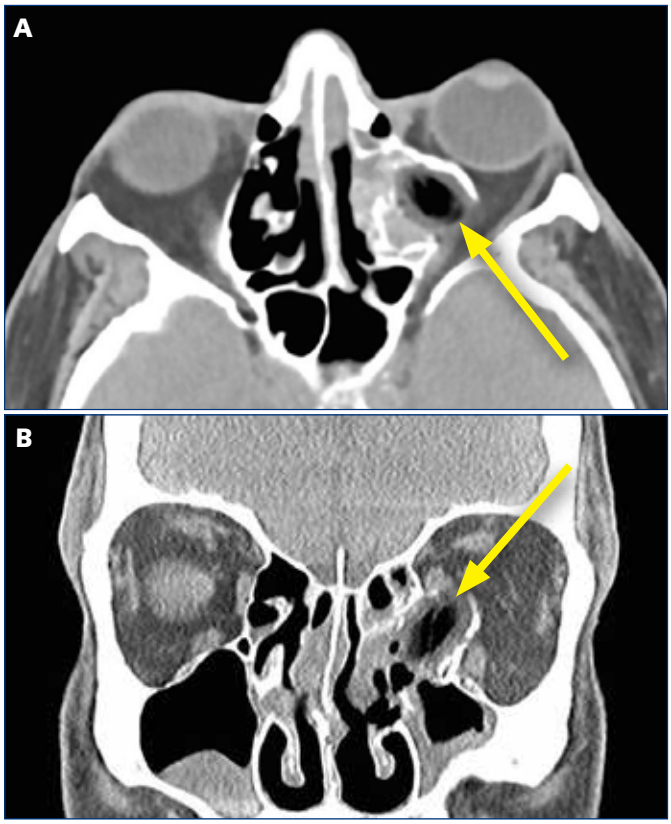
CASE REPORT

A 66-year-old male presented to the hospital emergency department four days after trauma to the left side of his head. He stated that while bending down to pick something up off the floor he suffered an unwitnessed syncopal episode and fell. He was unsure if he had hit his head. He reported that at the time of injury there was a total "black out" of vision in the left eye and difficulty moving the eye. Two days after the injury his vision began to improve and he noted binocular diplopia. He reported some mild epistaxis and blew his nose several times. On presentation to the ED his visual acuity was 20/30 right eye and count fingers at 1 foot in the left eye with an ipsilateral relative afferent pupillary defect. He had marked left proptosis without periorbital swelling or ecchymosis and near-total ophthalmoplegia of the left eye (**Figure 1**). Intraocular pressure of the left eye was 8 mm Hg. The patient denied any possibility of foreign body and, on exam, no intranasal foreign body or periocular lacerations were appreciated. Emergency department clinicians were concerned for retrobulbar hematoma and/or fracture with muscle entrapment and a CT scan was obtained.

The initial CT interpretation described a comminuted fracture of the left medial orbital wall with an area of

Figure 1. Ocular motility on presentation: (center) primary gaze, clockwise from top up gaze, left gaze, down gaze, right gaze.

Figure 2. CT scan showing radiolucency in the left orbit, (**A**) axial scan and (**B**) coronal scan.



radiolucency initially read as intraorbital air or possibly a foreign body (**Figure 2**). Ophthalmology was consulted. Fundus exam showed venous tortuosity, peripapillary subretinal hemorrhage and retinal ischemia (**Figure 3**). Since the patient denied being struck with any object, was injured in a fall from a low height in his home, and with an equivocal CT scan, it was felt that the patient sustained a medial wall fracture and developed orbital emphysema from blowing his nose, with the displaced bone fragments responsible for his ophthalmoplegia and proptosis. Since his visual loss was several days old, the patient was discharged on prednisone and amoxicillin/clavulanic acid to be followed up in the outpatient clinic within the next 2 days.

The attending radiologist reviewed the patient's chart the following day and contacted the ophthalmology service to tell them there was a foreign body in the left orbit. He described a tubular structure with a calcific density suspicious for foreign body. The structure extended through the left nasal cavity, through the left ethmoid sinus and into the left orbit where the density of it appeared to be encapsulated gas. The exact nature of the foreign body was uncertain. The radiologist reformatted the CT in an oblique plane in order to demonstrate the entire length of the foreign body (**Figure 4**).

The patient returned to the outpatient ophthalmology clinic. He reported subjective improvement in vision but was bothered by diplopia. Visual acuity on the left was counting fingers at 2 feet. The reminder of the exam was unchanged.

Figure 3. Fundus photograph showing venous tortuosity, peripapillary subretinal hemorrhage and retinal ischemia.

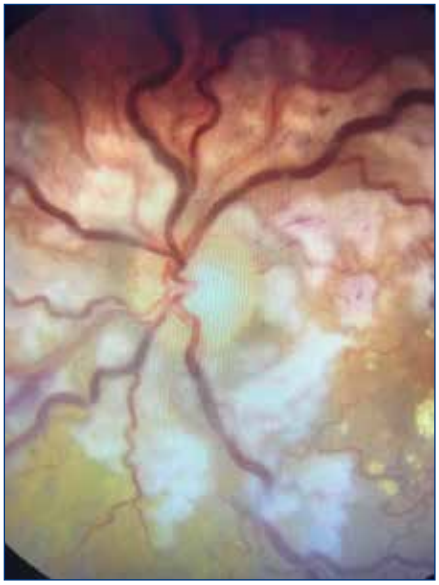


Figure 4. Obliquely reformatted CT showing entire foreign body.

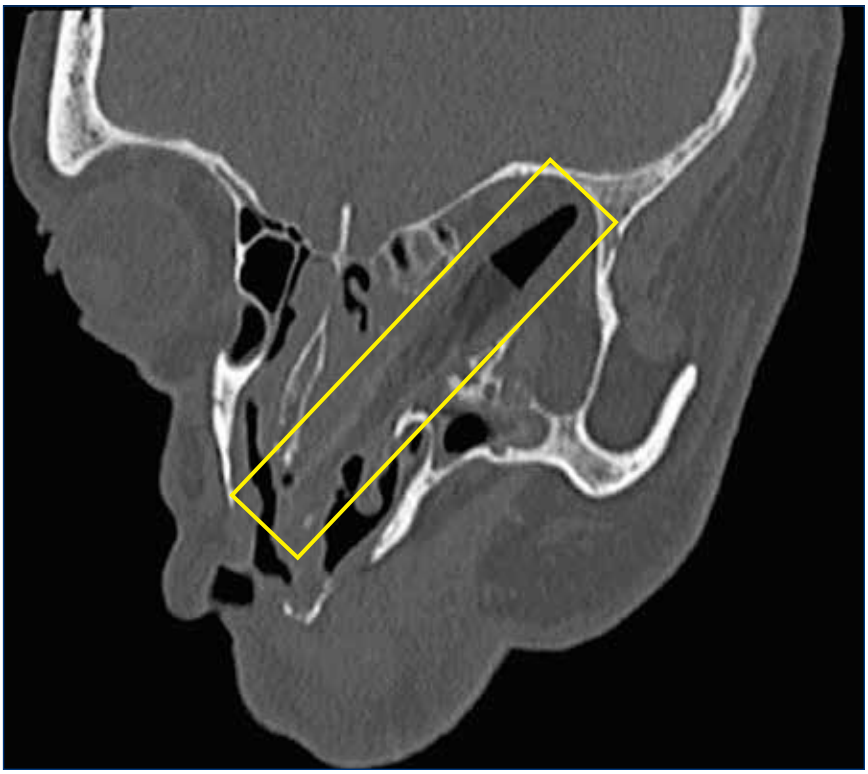


Figure 5. Foreign body removed from the left orbit

The patient was taken to the operating room for orbital exploration. Intranasal inspection revealed a perforated nasal septum but no visible foreign body. An anterior orbitotomy was performed via an inferomedial transconjunctival approach. Upon entering the medial orbit, a wooden foreign body was discovered just below the medial rectus muscle. The foreign body was backed out from within the orbit through the nares and the perforated nasal septum (**Figure 5**). After it was removed, the orbit was copiously irrigated with polymyxin solution.

When the patient was shown the foreign body in the post-operative care unit, he identified it as the tip of a small wooden flagpole. He recalled that there was a vase with several miniature flags on top of the hope chest at home. He evidently fell on the flagpole after fainting, and the pole entered his right nostril, perforating the septum, and passed into the left orbit, breaking off in his nose.

One month postoperatively, the patient's vision had returned to 20/30 in both eyes with resolution of his afferent pupillary defect, proptosis, and return of full motility.

DISCUSSION

Recognition of orbital foreign bodies in the trauma setting can be a challenging clinical task. Patients may not recognize that their injury involved an object entering the orbit and initial history and mechanism of injury can be misleading. Foreign bodies of the orbit may also go unrecognized despite high-resolution diagnostic imaging in the trauma setting, further complicating the diagnosis. Complications of delayed diagnosis of an orbital foreign body include exophthalmos, infection, and damage to intraorbital structures.[1]

The incidence of intraorbital foreign body in orbital trauma cases has been reported as 2.9%.[2] Early detection of wooden foreign bodies can be particularly difficult given their radiolucency, making them almost impossible to detect on plain film.[3] Shelsta, et al.[4] reported 23 cases of wooden foreign bodies, 22 of which were imaged with CT. A definite wooden foreign body was only identified in 61% of these cases and in 35% of cases the radiologist was unable to diagnose the foreign body at the time of presentation.

Our patient was unable to remember the exact mechanism of his injury but was confident that he was not struck by a foreign body. This denial of foreign body and absence of intranasal findings on initial exam overpowered the concern for foreign body raised on the initial CT report. It required review of the imaging by an attending radiologist and oculoplastic surgeon to overcome this bias and agree on the presence of a foreign body.

This case demonstrates the importance of reconciling the patient's history, physical findings and imaging results to make the most accurate diagnosis. It also demonstrates the importance of interdisciplinary collaboration between emergency physicians, radiologists, and ophthalmologists in orbital trauma cases with conflicting history and imaging findings.

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Authors

Yash J. Vaishnav, MD, is a Resident Physician in Ophthalmology at The Warren Alpert Medical School of Brown University, Providence, RI.

David Portelli, MD, is a Clinical Professor of Emergency Medicine at The Warren Alpert Medical School of Brown University and the Director of Emergency Medicine at Rhode Island Hospital, Providence, RI.

Michael E. Migliori, MD, FACS, is a Professor of Surgery, Clinician Educator at The Warren Alpert Medical School of Brown University and Ophthalmologist-in-Chief at Rhode Island Hospital and The Miriam Hospital, Providence, RI.

Correspondence

Michael Migliori, MD, FACS

One Hoppin Street, Suite 202, Providence, Rhode Island, 02903

401-444-3757, Fax 401-444-1645

mmigliori@lifespan.org

A Rare Case of 4 Ps: Bilateral Pneumothoraces and Pneumomediastinum in Pneumocystis Pneumonia

DANIEL YEE, MD; DANNI FU, MD; CHANNING HUI, DO; NEAL DHARMADHIKARI, MD; GERARDO CARINO, MD, PhD

ABSTRACT

We report a case of Pneumocystis jirovecii pneumonia (PCP) complicated by bilateral pneumothoraces and pneumomediastinum in a non-human immunodeficiency virus (HIV)- infected patient. This unusual presentation exemplifies the differences in clinical course and presentation in non-HIV versus HIV-infected individuals, and the poor prognosis associated with PCP complicated by pneumothorax or pneumomediastinum. Providers should be aware of the high mortality in patients who develop one, and especially both complications.

KEYWORDS: pneumocystis jirovecii pneumonia, pneumothorax, pneumomediastinum

INTRODUCTION

Pneumocystis jirovecii (carinii) is a yeast-like fungus that classically causes respiratory infections in immunocompromised individuals.[1] The resulting opportunistic infection, Pneumocystis pneumonia (PCP), is associated with significant morbidity and mortality, and is considered one of the AIDS defining illnesses in HIV infections.[2] Spontaneous pneumothorax is uncommon in non-HIV infected individuals with incidence estimated between 0.4–4%, and bilateral pneumothoraces in PCP regardless of HIV status is a rare phenomenon.[3] Pneumomediastinum is another rarely reported complication associated with PCP.[4] Here, we describe a case of PCP in a non-HIV infected individual complicated by bilateral pneumothoraces and pneumomediastinum.

CASE REPORT

A 31-year-old male with a history of Ewing's sarcoma and acute myeloid leukemia in remission, renal cell carcinoma on lenvatinib and everolimus presented with worsening nonproductive cough, dyspnea, and malaise for several days. His cancer course was complicated by optic neuritis from immunotherapy, treated with a several month-long course of prednisone without prophylactic trimethoprim-sulfamethoxazole (TMP/SMX). On admission, the patient was afebrile and tachycardic to the 170's; he was hypoxic on room air, requiring 5 liters/min of oxygen on nasal cannula. Exam revealed bilateral coarse breath sounds and cool extremities. Initial laboratory workup was notable for lactate dehydrogenase of 414 U/L and negative respiratory viral pathogen panel. Chest X-ray (CXR) showed bullous lung disease, ground glass opacities bilaterally, and hypo-density in the superior mediastinum, suggestive of pneumomediastinum. CT angiogram of the chest was negative for pulmonary embolism but confirmed pneumomediastinum. (**Figures 1–3**) He was admitted to the intensive care unit and started on piperacillin-tazobactam, linezolid, azithromycin, TMP/SMX, and methylprednisolone for concern for PCP. At this point, the patient required a high-flow nasal cannula (HFNC) between 20–40 L/min alternating with noninvasive positive pressure ventilation. Bronchoscopy with bronchoalveolar lavage was done and was positive for PCP by direct fluorescent antibody and negative for Legionella, acid-fast bacilli, or malignant cytology. All antibiotics were subsequently stopped except TMP/SMX. Methylprednisolone was switched to prednisone 40 mg daily with a planned taper by 10 mg every five days. On hospital day 7, the patient developed worsening dyspnea. CXR showed new left-sided pneumothorax and small

Figure 1. Chest X-ray HD1 showing bullous lung disease and ground glass opacities in bilateral lung fields

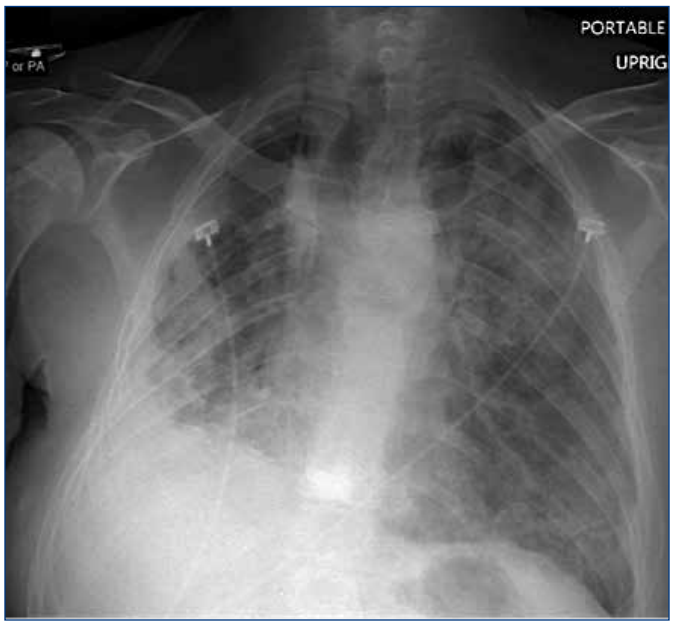


Figure 2. Chest CT on HD 1 showing pneumomediastinum (shown by white arrows)

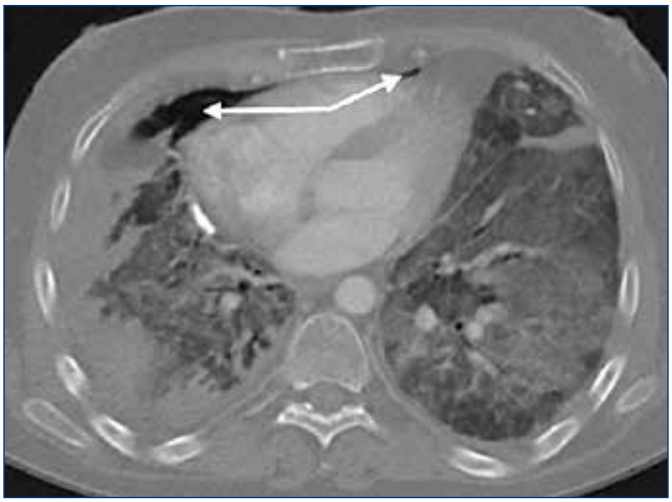
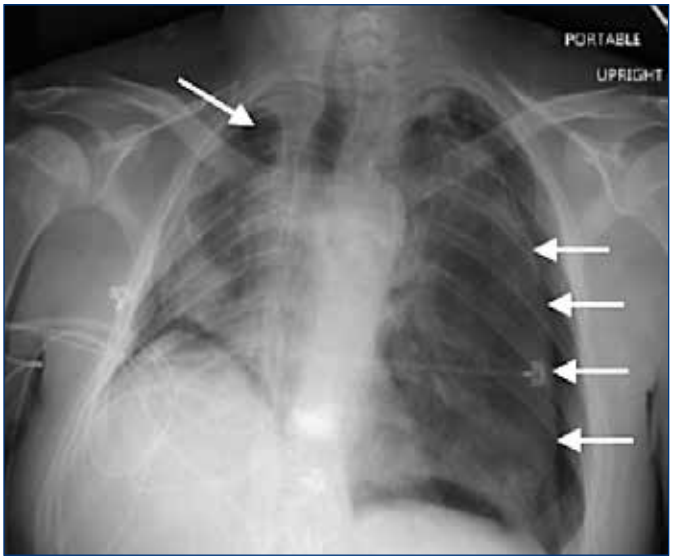


Figure 3. Chest X-ray HD7 showing bilateral pneumothoraces (border of pneumothoraces marked by white arrows)



right-sided pneumothorax. Trimethoprim-sulfamethoxazole and steroid taper were continued. Serial CXRs were done to assess for resolution of pneumothorax.

On day 11, CXR showed worsening left-sided pneumothorax. Chest tubes were placed bilaterally. Despite continuous suction, he failed multiple water seal trials with persistent pneumothoraces on CXR. On day 20, the patient was transferred to another hospital for a second opinion. There he was started on a trial of micafungin for PCP salvage therapy given his overall lack of improvement. He continued to be progressively hypoxemic despite salvage therapy. After discussion with the patient and his family, he was transitioned to comfort measures only. He died on day 4 at the outside hospital.

DISCUSSION

PCP is a potentially devastating illness, especially when complicated by spontaneous pneumothorax or pneumomediastinum. Although classically associated with HIV infections, incidence in non-HIV infected patients has been increasing with increasing prevalence of organ transplantation and widespread use of anti-tumor necrosis factor alpha immunosuppressant medications.[5] The total number of cases of PCP in non-HIV infected patients remains low; however, as PCP prophylaxis appears to be more effective in this population than in HIV cohorts, with an estimated risk reduction of approximately 90%.[6] Chronic steroid use, as in our patient, is an important risk factor, with most studies showing that daily usage of prednisone at 15 mg/day or more for at least one month confers enough risk to warrant PCP prophylaxis.[7] Other risk factors for development of PCP in non-HIV infected individuals include hematologic malignancies, inflammatory disorders, organ transplantations, and solid organ malignancies.[8]

Mortality in non-HIV infected patients with PCP tends to be greater than in the HIV population, with a large meta-analysis reporting a mortality rate of 30.6%.[9] This is also seen in patients admitted to the intensive care unit with one retrospective study reporting mortality rates of 48% versus 17% in non-HIV infected patients and HIV-infected patients, respectively.[10] It has been suggested that mortality tends to be higher in the non-HIV infected population because of ability to mount a greater inflammatory response, including neutrophilic lung inflammation, which may indirectly cause pneumothorax through parenchymal cyst formation.[11] The disease course in HIV patients tends to take a more insidious, subacute clinical course, with symptoms present on average about one month prior to diagnosis.[12] Conversely, the disease course in non-HIV individuals tends to be more rapidly progressive, with symptoms usually present only for days to weeks prior to diagnosis, as demonstrated in our patient.

In addition to inflammation leading to parenchymal pneumatocele formation and rupture, there are a few other theories for spontaneous pneumothorax in PCP. One theory involves subpleural necrosis leading to cavitations, which then form bronchopleural fistulas. Another involves severe inflammation and fibrosis from PCP leading to lung contractures, with slow leakage of air from visceral pleura to the pleural space.[13] Pneumomediastinum in PCP is likely related to cyst rupture, and occurs from free air leak from ruptured alveoli tracking along the pulmonary vessels and the interstitium to the hilum.[14] The incidence of spontaneous pneumothorax and pneumomediastinum is estimated to be between 0.4–4% in non-HIV individuals; co-occurrence is rare in the same individual.[3] Pneumothorax is associated with worse outcomes, with one study citing an increase in mortality up to 50%.[15] We suspect that our patient's ability to mount a greater inflammatory response contributed

to his propensity to develop bullous lung disease, followed by subsequent pneumothorax and pneumomediastinum. Notably, our patient developed both conditions while on chemotherapy with everolimus and levatinib, both medications suppress adaptive immunity, whereas the neutrophilic and macrophage response to pathogens are associated with innate immunity.[16,17]

CONCLUSION

We report an unusual presentation of PCP with bilateral pneumothoraces and pneumomediastinum in a non-HIV infected individual. Both are rare occurrences in non-HIV infected patients, linked to increased mortality compared to HIV positive individuals, likely related to an increased inflammatory response. Clinicians should be aware of the high mortality in patients who have one condition, and especially in patients with both. The importance of prophylaxis with TMP/SMX is crucial for qualified HIV patients as well as non-HIV patients on chronic prednisone greater than 15 mg/day.

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Authors

Daniel Yee, MD, Lifespan/Brown University Internal Medicine Resident.

Danni Fu, MD, Lifespan/Brown University Internal Medicine Resident.

Channing Hui, DO, Brown University Critical Care Fellow at The Miriam Hospital.

Neal Dharmadhikari, MD, Lifespan/Brown University Internal Medicine Resident.

Gerardo Carino, MD, PhD, Director of Intensive Care Unit at The Miriam Hospital.

Correspondence

Daniel Yee, MD
dyee@lifespan.org

Simple Nasotracheal Tube Fixation to Prevent Inadvertent Extubation

TAIF MUKHDOMI, MD; DANIELLE LOVETT-CARTER, MD; MARK C. KENDALL, MD; SCOTT BENZULY, MD

In pediatric surgeries, the ability of securing the naso-endotracheal tube without interfering with surgical access or encountering tube dislodgement is challenging to practitioners. Various methods of endotracheal tube (ETT) fixation have been described, including stitching the ETT, placing a transparent dressing over the face to secure the ETT, and intranasal threading of an infant feeding tube to tie over the ETT.[1,2] However, recent literature describes the prevalence of accidental extubation in pediatric surgery to be 2.5%.[3] We describe a simple technique using a pillow case to safely secure the nasotracheal tube in its proper fixed position which may also protect the patient from facial burns and skin reactions to adhesive tape.

Following successful placement of the nasotracheal tube, position the opening of the pillow case beneath the patient's head covering the forehead and eyes until the bridge of the nose (**Figure 1A**). With the pillowcase extended, begin folding 3–4 inch square towards the patient's head and position it snug to the contour of the head extending distally to the bridge of the nose (**Figure 1B**). The pillowcase is secured with cloth tape in the occipital and temporal regions and across the nasotracheal tube, thus securing the apparatus while limiting patient exposure to adhesive tape (**Figure 1C).**

In more than 300 patients, we have not encountered tube dislodgement or interference with the surgical field, especially during pediatric cardiac procedures. We implore practitioners to utilize this technique in specialized situations requiring nasotracheal intubation; in this case, oral fractures, ENT surgery, burn patients, cardiac patients or even adult critical care patients.[4]

Figure 1A. [Top Left] Post nasotracheal intubation
Figure 1B. [Top Right] Wrapping pillow case along patient's head contour
Figure 1C. [Bottom] Final secured apparatus

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Disclosures

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants/legal guardians included in the study.

Authors

Taif Mukhdomi, MD, Department of Anesthesiology, Rhode Island Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Danielle Lovett-Carter, MD, Department of Anesthesiology, Rhode Island Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Mark C. Kendall, MD, Department of Anesthesiology, Rhode Island Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Scott Benzuly, MD, Department of Anesthesiology, Rhode Island Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Correspondence

Taif Mukhdomi, MD
Chief Anesthesiology Resident
Department of Anesthesiology
593 Eddy Street
Providence, RI 02903
414-444-5172
Fax 414-444-5090
tmukhdomi@lifespan.org

COVID-19 and Intimate Partner Violence: A Call to Action

ODETTE ZERO, BA, MD-ScM'22; MEGHAN GEARY, MD

ABSTRACT

The COVID-19 pandemic has escalated the risks and dangers for victims of Intimate Partner Violence (IPV). This article aims to describe the current state of IPV in Rhode Island as well as best practices for IPV screening and intervention using telehealth. We highlight the particular plight of undocumented immigrant victims of IPV and how healthcare providers can be responsive to their unique vulnerabilities and needs.

KEYWORDS: Intimate Partner Violence, undocumented immigrants, COVID-19, domestic violence, telehealth

INTRODUCTION

Government lockdowns and stay-at-home orders have led to a "horrifying global surge" in Intimate Partner Violence (IPV) according to the Secretary-General of the United Nations.[1] Physical and social isolation, economic and social instability, and long-term confinement have placed many people in greater danger of violence at home.[2,3] Thus, IPV has become an "opportunistic" infection of COVID-19.[4] Worldwide, one in three women experience physical, sexual, or psychological harm from an intimate partner or ex-partner.[5,6] In the past, many victims could stay with friends or family or go to the police, a shelter, or the hospital to escape abuse. Now, victims cannot escape abusers and thus may be at higher risk of IPV-related health issues such as an increase in chronic diseases, obstetrical and gynecological morbidity and mortality, mental health conditions, trauma-related injuries, and stress-related symptoms and sequelae.[7] Non-COVID-related healthcare and social service utilization is plummeting due to mobility constraints and fears of contracting the virus, leading to fewer victims seeking both medical care and safety from abuse.[8] The healthcare system must respond with innovative telehealth interventions to address these problems. This article aims to describe the current state of IPV in Rhode Island as well as best practices for IPV screening and intervention using telehealth. We highlight the particular plight of undocumented immigrant victims of IPV and how healthcare providers can be responsive to their unique vulnerabilities and needs.

IPV IN THE TIME OF COVID-19

The RI Coalition Against Domestic Violence has seen both an increase and a decrease in utilization of various IPV resources. Advocates surmise that the decrease may be because victims are unable to seek help while quarantined with their abuser.[9] Yet, Sojourner House, an advocacy agency for survivors of IPV in Providence, RI, received a surge in phone calls to their hotline. Sojourner's executive director, Vanessa Volz, describes the situation as a "frightening paradox," where shelter beds and apartments are available, yet victims are unable or afraid to access them.[10] Victims remain in unsafe relationships and homes for a variety of reasons. Abusers control victims' finances, food, and daily activities, physically and socially isolate them from support and resources, and threaten violence if not obeyed. Victims and their children are often in the greatest danger of physical violence when leaving their abusers. Quarantine may increase the power and control abusers hold over victims and ignite and exacerbate violence in relationships. During the COVID-19 pandemic, victims are quarantined by the state and confined by their abusers.[11]

The risks and vulnerabilities of victims of IPV during COVID-19 are multiplied for undocumented immigrants. According to estimates from the Institution on Taxation and Economy Policy, 30,000 undocumented immigrants lived in RI in 2014, making up 2.9% of the state population.[12] Undocumented immigrant women are profoundly vulnerable to IPV due to physical and social isolation, fear of law enforcement, lack of information on available resources, language barriers, and legal status. Many undocumented immigrants do not discuss IPV with healthcare providers because they cannot be sure what the providers' responses will be, and they fear deportation and separation from their children.[13] Anti-immigrant rhetoric from political leaders and the media has deepened this fear in recent years, leaving many victims feeling profoundly isolated from resources and support.

HEALTH CARE SCREENING AND RESPONSE

Clinics and hospitals are important sites for IPV prevention and intervention.[7] The US Preventive Services Task Force recommends routine IPV screening for all women of

reproductive age (Grade B recommendation).[14] Healthcare providers, however, do not consistently screen for IPV due to limited time and resources, reluctance to possibly offend the patient, insufficient training and reimbursement, and perceived lack of institutional support.[15,16] This leads to missed opportunities for victims to access information, resources, and support.[16] The COVID-19 pandemic has escalated the risks and vulnerabilities of victims of IPV, thus it is increasingly essential that healthcare professionals address safety and violence at home.[5,6]

The healthcare system is adapting to the spread of COVID-19. With telehealth as the new normal, healthcare providers should consider the benefits as well as concerns related to confidentiality and privacy. For example, what medical conditions are amenable to intervention at this moment? While physical exams and routine procedures cannot be performed, telehealth provides a novel opportunity for longer conversations related to IPV screening and resource provision, contraceptive counseling, and mental health. Rather than reminding reproductive-aged girls and women that they will be due for a pap smear "later this year," perhaps providers can instead initiate a conversation about stress, social isolation, and the risk for verbal, physical and emotional abuse at home. Providers should discuss coping strategies and local resources with all patients, encouraging them to share this information with friends and family.

As an example of this kind of adaptation, the Kaiser Permanente's Family Violence Prevention Program has increased their telehealth services for victims of IPV during COVID-19. According to the regional medical director, "Every virtual visit is a valuable opportunity to connect with patients, learn about their mental health, and ask directly about abuse to get them the help they need."[17] However, it must be acknowledged that patients may not be able to speak for fear of being heard by their abuser. Providers should incorporate "yes/no" questions and be hypervigilant to patient evasiveness or discomfort.[11] Furthermore, telehealth can offer a space to build meaningful relationships with patients, investing in a form of "social capital" that can strengthen primary care provider-patient relationships throughout the pandemic and beyond. The scope of clinical care can effectively shift to include questions like: "How have you been coping with COVID-19? How is your mood? How is your home life? What activities have you been doing to stay busy and active?" Stronger relationships can lead to improved IPV screening efficacy as well as increased healthcare utilization and better outcomes.

SUPPORTING UNDOCUMENTED IMMIGRANT VICTIMS OF IPV

For undocumented victims, relationship-building is essential to proper IPV screening. Ethnographic research has shown that Latina patients appreciate when healthcare encounters begin with questions like, "How are you?" (Cómo está?) and "How are your kids?" (Cómo están sus hijos?).[18] Jumping into a conversation about their purpose for scheduling the medical appointment can seem impersonal to Latina patients. A small investment in relationship-building prior to the medical appointment can result in increased trust and rapport with patients, particularly those who live marginalized identities related to gender, socioeconomic status, skin color, and legal status. Despite the inconvenience of adding a language-line to telehealth calls, the importance of certified non-family member interpreters cannot be understated.

Clínica Esperanza, a free clinic serving immigrant and undocumented patients in RI, began COVID-19 screening in May 2020. Medical students, including the author O.Z., screen patients on the morning of their test date for symptoms, food insecurity, and IPV. Based on experiences working with undocumented victims of IPV in RI, the author advocated to change the IPV screening question from "Do you feel safe at home?" to "We know this is a difficult time for many people. How are you feeling with everything that is going on? We know this situation can cause a lot of stress at home. Because of this, we are asking all patients if they feel safe with the people they live with." Some researchers believe that current IPV screening tools are not effective for undocumented Latina women, and a more individualized and culturally responsive approach is necessary.[17] Prior to screening for IPV, healthcare providers should state that they will not inform US Immigration and Customs Enforcement about the legal status of their patients. Furthermore, providers who serve immigrant communities should be aware of the legal rights of their undocumented patients and inform patients of these rights. For example, undocumented immigrant victims of IPV can qualify for legal status under the Violence Against Women Act. Health professionals should refer interested patients to legal support from organizations such as Sojourner House.

The COVID-19 pandemic affects all of us in both universal and uniquely personal ways. We are united in crisis – never more connected and yet never more alone. Paradoxically, people "sheltering" at home are in greater danger of IPV and face significant barriers to safety and healthcare. This article is a call to action for healthcare providers to strengthen and sustain IPV prevention and intervention services, generally, and for undocumented victims specifically. IPV has increased with COVID-19, and it will not end after quarantine orders have been lifted. Actions taken during this pandemic will have long-term reverberations on society as a whole, and especially for those most vulnerable to IPV.

LOCAL RESOURCES

RI Helpline 1-800-494-8100
National Domestic Violence Helpline 1-800-799-7233
RIDOH factsheet "Resources for Survivors of Violence During COVID-19" https://health.ri.gov/publications/factsheets/COVID-19-Violence-Prevention-Resources.pdf
RI Coalition Against Domestic Violence COVID Response Center http://www.ricadv.org/en/covid-19-response
Economic Progress Institute, the Immigrant Coalition of Rhode Island, and The Latino Policy Institute Webinar factsheet "COVID-19: Resources for Undocumented Immigrants" http://www.economicprogressri.org/index.php/2020/04/29/webinar-supporting-immigrants-during-the-covid-19-crisis/
Sojourner House Immigration Advocacy http://www.sojournerri.org/immigration

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Disclaimer

The views expressed herein are those of the authors.

Authors

Odette Zero, BA, MD-ScM'22 Candidate, Primary Care-Population Medicine Program, Alpert Medical School of Brown University.

Meghan Geary, MD, Assistant Professor of Medicine, Alpert Medical School of Brown University.

Correspondence

Odette Zero, MD-ScM Candidate
Primary Care-Population Medicine Program
Alpert Medical School of Brown University
Brown University, Box G-9478, Providence, RI 02912
odette_zero@brown.edu

Work-Life Balance and Career Experiences of Part-Time Versus Full-Time Faculty at the Warren Alpert Medical School of Brown University

ERICA Y. CHUNG, MD; ALLISON W. BRINDLE, MD; SHUBA KAMATH, MD, MPH; KRISTIN C. LOMBARDI, MD; DELMA-JEAN WATTS, MD; VALERIE RYAN, PhD; OFFICE OF WOMEN IN MEDICINE AND SCIENCE ADVISORY BOARD

ABSTRACT

INTRODUCTION: Part-time faculty are an important part of the academic medical workforce, comprising 11–21% of faculty in some institutions.

OBJECTIVE: To describe the part-time faculty experience at a single institution across four domains: work-life balance, work environment, leadership and advancement, and mentorship.

METHODS: Faculty from the Division of Biology and Medicine at Brown University were invited to participate in an electronic survey. The authors compared responses between full-time and part-time faculty across the four domains.

RESULTS: Survey response rate was 43% (437/1025). Of the 363 who answered the question about employment status, 333 (92%) were full-time and 30 (8%) were part-time. Part-time faculty were *less likely* to report forgoing personal activities for professional responsibilities, that work conflicted with personal life, that their division director took interest in their careers, and having a leadership position was important to them.

CONCLUSION: Part-time and full-time faculty reported significant differences in perception of work impact on personal life, division director support, and desire for leadership positions.

INTRODUCTION

Part-time faculty, those working less than a full-time equivalent, comprise a significant segment of the workforce in academic medicine, ranging from approximately 11–21% of faculty across departments and institutions in some studies.[1,2,3] In a 2011 survey of 126 U.S. medical schools, approximately 21,200 clinical faculty and 1,950 basic science faculty were part-time.[3]

The increasing prevalence of part-time faculty in academic medicine may be attributed partly to the shifting demographics of the physician workforce and greater desire for work-life balance. Between 1975 and 2001, the number of women entering medical school doubled from 24% to 48% of the class, and women now comprise half of U.S. medical students.[4] In a 2012 survey of graduating medical students, over 75% reported that work-life balance influenced their specialty choice and 10% stated that they intended to work part-time upon completion of training.[5] The primary reasons faculty cited for choosing part-time appointments were to enhance work-life balance and to care for their dependent children.[6]

Some medical schools have steadily increased their flexibility and support for part-time faculty through appointment and tenure policies. In addition, a majority of U.S. medical schools – including the Warren Alpert Medical School of Brown University – have tenure-clock-stopping policies that may be used by faculty caring for children or sick family members. Approximately one-third of medical schools have policies that allow tenured faculty to work less than full-time.[7]

Despite increasing support for part-time academic options in medicine, these policies are underutilized by faculty and controversy still exists.[11,8,9] Studies of part-time faculty satisfaction with work environment, academic support, mentorship, promotion opportunities, and compensation show mixed results.[10,11,12] This study examined the part-time faculty experience in a single institution across four domains of academic medical careers: 1) work-life balance 2) work environment, 3) leadership, advancement and promotion, and 4) mentorship.

METHODS

We analyzed survey data collected from faculty in the Division of Biology and Medicine at Brown University in May 2013. All academic faculty from the Division were invited to participate, including faculty from the 13 clinical departments (from The Warren Alpert Medical School), 5 basic science departments, 1 hybrid department (i.e., clinical and basic science), and 4 public health departments. Faculty in the research, (research), teaching, clinician educator, and undeclared academic tracks were invited to participate; the survey did not include volunteer clinical faculty.

The survey content was developed by the Office of Women in Medicine and Science advisory board. Survey administration was co-sponsored by the Office of the Dean of Biology and Medicine, the Office of Diversity and Multicultural Affairs, and the Office of BioMed Faculty Affairs. A total

of 74 investigator-generated items focused on 5 areas: work climate, leadership and advancement, mentorship, gender and diversity, and work-life balance. The present study did not examine the domain of gender and diversity. Response types included Likert scales, yes/no answers, and free text response sections. The survey was anonymous and eight optional demographic questions related to gender, race/ethnicity, and age were included at the end of the survey.

The survey was distributed electronically using the Illume platform (DatStat, Seattle WA). The original survey was exempted by the Brown University Institutional Review Board and the present analyses were exempted by the Rhode Island Hospital Institutional Review Board.

SAS software 9.4 (SAS Inc., Cary, NC) was used for analyses. Respondents who answered "no" to the question "Are you considered a full-time employee?" were considered part-time. Differences between part-time and full-time faculty responses on Likert-type questions concerning work-life balance, work climate, leadership, advancement, mentorship and gender were examined using generalized modeling, assuming a binomial distribution (0–3 or 0–2, depending on the range of the response scale). For binary survey questions (e.g., "Do you provide health insurance for your family?"), the same modeling procedure was used, assuming a binary distribution. The interaction between faculty status (part-time vs. full-time) and gender (male vs. female) was also modeled using the above methods. PROC GLIMMIX was used for all modeling, with interval estimates calculated at 95% confidence and alpha at the 0.05 level.

RESULTS

Sample

Of 1025 eligible faculty, 437 (43%) completed the survey. Of the 363 who answered the question regarding work status, 30 (8%) did not identify as a full-time employee and were therefore considered part-time. The remaining 333 (92%) indicated that they worked full-time.

Demographic Characteristics

Gender and age distributions were similar between the part-time and full-time groups. Assistant professor was the most common current rank for both groups. A large percentage of full-time faculty (56%) reported an average work week of 41–60 hours and 42% reported 61–80 hours. Among part-time faculty, although the majority (16 of 30) reported a 41–60 hour work week, 8 reported working <40 hours per week and 5 reported working 61–80 hours per week (**Table 1**).

Work and Personal Life Balance

Although both part-time and full-time faculty found that work conflicted with personal life, part-time faculty were significantly less likely to experience the conflict. In addition, part-time faculty were less likely to report forgoing personal activities because of professional responsibilities. There was no significant difference between part-time and full-time faculty in their perceptions that they forgo professional activities because of personal responsibilities. (**Table 2**)

Overall, there was no significant difference between part-time and full-time faculty reporting that department leadership was supportive of faculty who wanted balance in their personal and professional lives (on average, both groups "somewhat agreed" with this question). (**Table 2**)

Both part-time and full-time faculty disagreed with the statement that female faculty who have children are considered by department members to be less committed to their careers than faculty without children; there was no significant difference between the two groups. Although

Table 1. Demographic Characteristics of Survey Respondents

	Part-time, N (%)	Full-time, N (%)
Sex		
Male	10 (43%)	123 (45%)
Female	13 (57%)	148 (55%)
Age		
25–35	1 (4%)	22 (8%)
36–46	9 (39%)	120 (45%)
47–57	8 (35%)	77 (29%)
58 +	5 (22%)	49 (18%)
Avg. hours of work per week		
< 20	1 (3%)	1 (<1%)
20–40	7 (24%)	5 (2%)
41–60	16 (55%)	185 (56%)
61–80	5 (17%)	141 (42%)
% of professional time†		
Research	22.6 (32.45)	35.18 (31.53)
Teaching	16.77 (16.12)	15.32 (11.61)
Clinical	41.83 (29.40)	27.83 (28.23)
Service	4.50 (4.75)	7.48 (6.92)
Administration	7.07 (16.84)	12.24 (16.26)
Other	7.23 (20.39)	1.95 (4.87)
Current Rank		
Instructor	0 (0%)	1 (<1%)
Assistant professor	13 (43%)	144 (44%)
Associate professor	9 (30%)	80 (24%)
Full professor	7 (23%)	94 (29%)
Other	1 (3%)	8 (2%)

† Represented by mean (standard deviation) and "total" as range. In the survey, participants entered a numerical estimate of the percentage of professional time spent on various tasks.

Table 2. Faculty Responses to Likert-type Survey Questions

Survey Questions	Part-time, mean	Part-time, SD	Full-time, mean	Full-time, SD	p-value
Conflict Between Professional and Personal Responsibilities Response scale: 0 = never, 1 = rarely, 2 = sometimes, and 3 = frequently					
Work conflict with personal life	2.1	0.74	2.4	0.70	0.02*
Forgo personal activities for professional responsibilities	1.9	0.73	2.3	0.74	0.001*
Forgo professional activities for personal responsibilities	1.8	0.87	1.7	0.83	0.37
Departmental Support and Career Progression Response scale: 0 = strongly disagree, 1 = somewhat disagree, 2 = somewhat agree, 3 = strongly agree					
Department leadership supports faculty who want work-life balance	2.0	0.71	2.0	0.86	0.87
Department meetings frequently occur outside of work day	1.5	0.99	0.9	1.07	0.002*
Department supportive of half- or three-quarter time positions	2.3	0.78	1.7	1.06	0.006*
Career Commitments of Parents Based on Gender Response scale: 0 = strongly disagree, 1 = somewhat disagree, 2 = somewhat agree, 3 = strongly agree					
Female faculty who have children are considered by department members to be less committed to their careers	1.0	0.91	0.8	0.97	0.38
Male faculty who have children are considered by department members to be less committed to their careers	0.7	0.80	0.4	0.66	0.04*
Work Climate – Respect Response scale: 0 = none of the time, 1 = some of the time, 2 = most of the time, and 3 = all of the time					
How often are you treated with respect by your peers?	2.37	0.56	2.40	0.62	0.78
Work Climate - Support Response scale: 0 = not at all, 1 = a little bit, 2 = somewhat, and 3 = very much					
How much does your department chair take an interest in your career?	1.76	1.12	2.02	1.03	0.20
How much does your division director take an interest in your career?	1.25	1.16	2.02	1.09	0.004*
How satisfied are you with opportunities to collaborate with faculty in your department? [b]	1.90	0.96	2.18	0.86	0.09
Leadership, Advancement and Promotion Response Scale 0 = strongly disagree, 1 = somewhat disagree, 2 = somewhat agree, and 3 = strongly agree.					
Having a departmental, university, or administrative leadership position is important to me.	1.52	1.06	2.02	0.88	0.009*
I am aware of the requirements for promotion.	2.48	0.57	2.42	0.69	0.61
The criteria for promotion and/or tenure are clearly communicated and documented in advance of the decision-making process.	2.03	0.78	2.04	0.84	0.97
Hiring, promotion, and/or tenure decisions are based on objective criteria such as a candidate's experience, skills, and abilities in relationship to faculty requirements.	2.07	0.59	2.06	0.82	0.95
I receive the support I need for professional advancement at the university	1.55	1.02	1.70	0.92	0.45
I have been overlooked for a promotion that I believe I deserved.	0.41	0.75	0.61	0.94	0.24

* sig. at the p < 0.01 level

respondents also disagreed with the statement that male faculty with children were less committed to their careers, full-time faculty more strongly disagreed with this statement compared to part-time faculty (**Table 2**).

Work Climate

Part-time faculty were significantly less likely to feel their division director took interest in their career as compared to full time faculty. However, there was no statistically significant difference between part-time and full-time faculty in their response to "how often are you treated with respect by your peers" and "how much does your department chair take an interest in your career" (**Table 2**).

Leadership, Advancement and Promotion

Part-time faculty were significantly less likely to feel that "having a department, university or administrative leadership position is important" to them, as compared to full-time faculty. Furthermore, there was no statistically significant differences between part-time and full-time faculty in how much supervisors have encouraged or discouraged leadership roles (**Table 2**).

Table 3. Faculty Responses to Binary Survey Questions

Survey Questions	Part-time, % yes	Full-time, % yes	p-value
Mentorship			
Do you have at least one person locally whom you consider a mentor?	55	59	0.33
Do you have at least one person elsewhere whom you consider a mentor?	50	56	0.22
I have mentored another faculty member	52	56	0.63

Responses on binary scale (yes/no)

Mentorship

No significant differences were found for questions addressing mentorship between part-time and full-time faculty (**Table 3**).

Discussion

In our study, part-time and full-time faculty generally reported similar experiences in work-life balance, work environment, leadership and advancement, and mentorship. However, the two groups reported significant differences in their perception of the impact of work on personal life, support from division directors, and desire for leadership positions.

Our study supports the concept that part-time faculty may have better preservation of their personal life than full-time faculty. Although there was no difference between part-time and full-time faculty in their report of care-giving roles or in their perception of departmental support of work-life balance, part-time faculty found they could better protect their personal activities from professional obligations. Our findings support a previous study by Pollart et al. where the most frequently identified reasons for working part-time were to enhance work-life balance and care for dependent children.[14]

In our sample, when compared to part-time faculty respondents, full-time faculty more strongly disagreed with the statement that male faculty with children were less committed to their careers. Previous studies examining gender differences in perceived organizational commitment have shown a wide range of results, including gender differences in attributing greater professional commitment to women or to men. Scandura and Lankau found that women reported greater commitment to work if their employers offered flexible work hours, but this finding was not observed in men.[13] More recent data by Budig suggest that, in general, women's careers are negatively impacted if they have children, whereas men's careers are positively impacted; this difference diminished in higher-paying careers.[14]

In the work environment, part-time faculty felt as supported by department chairs as their full-time counterparts. This finding is consistent with the study by Socolar and Kelman, which found that most department chairs were very satisfied with having part-time faculty and cited various advantages for employing them, including the opportunity to keep talented faculty in the workforce, to leverage financial resources, and to retain specific skills of their part-time faculty.[15]

In our study, although both full-time and part-time faculty reported career interest by their division director, part-time faculty were significantly less likely to feel that their division director took interest in their career than full-time faculty. This difference may in part be due to the managerial role of the division director compared to that of the department chair. The disadvantages of employing part-time faculty cited by Socolar and Kelman, including scheduling problems and less commitment by faculty, are perhaps felt more by those directly supervising part-time faculty, such as the division directors.

In our sample, part-time faculty were significantly more likely than full-time faculty to state their department was supportive of half-time or three-quarter time positions. Full-time faculty may be less aware that such positions are supported by their departments. Given the benefits of working part-time identified in our study and in others,[16] including better work-life balance and less physician burn-out, departments may consider more widespread acknowledgment and support of part-time positions as viable career options.

With respect to leadership and advancement, part-time faculty were less likely to identify leadership positions as a priority. Whether this is a view carried consistently through one's career or a reflection of feelings at the time of the survey is unknown. For example, 23% of part-time faculty were full professors who may have held leadership positions in the past. Junior faculty working part-time to balance demands of career and family life may aspire to leadership positions after their children are grown. In addition, although part-time faculty found promotion criteria to be objective and clearly communicated and did not feel they had been overlooked for a promotion that they deserved, they were nonetheless less likely to expect promotion at the time of the survey. These findings do not necessarily reflect lack of interest or commitment by part-time faculty to be productive members of their departments.

This study has several limitations. First, the small sample size of part-time faculty (n=30) may not be representative or may be underpowered for some analyses. The survey did not provide a clear definition for part-time work. Not initially designed to compare part-time and full-time faculty, the survey queried the respondents "Are you considered a full-time employee?" Those who responded "no" were considered part-time in this analysis. Some respondents might have been mis-categorized if, for example, they worked half-time at 2 different institutions. Second, the similarity in gender distribution and number of hours worked between the part-time and full-time groups raises the question if indeed the two groups are distinct. The gender distribution

of the part-time group mirrored that of the full-time group, and the majority of all respondents, part-time and full-time, reported working 41–60 hours per week. Third, the response rate of 43% may reflect self-selective sampling of respondents that favored certain groups. Finally, as a single institution study, the finding may not be generalizable to medical schools across the U.S.

CONCLUSION

Part-time and full-time faculty reported significant differences in their perception of professional impact on personal life, division director support, and desire for leadership positions. Further research is needed to understand how part-time positions in academic medicine may be structured to align values and goals of faculty and institutions and to identify avenues for academic advancement that reflect priorities of part-time faculty.

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Disclaimers

The views expressed herein are those of the authors and do not necessarily reflect The Alpert Medical School Office of the Dean of Biology and Medicine, the Office of Diversity and Multicultural Affairs, or the Office of BioMed Faculty Affairs.

Authors

Erica Y. Chung, MD, Associate Professor, Clinician Educator, Department of Pediatrics, Rhode Island Hospital/Hasbro Children's Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Allison W. Brindle, MD, Assistant Professor, Clinician Educator, Department of Pediatrics, Rhode Island Hospital/Hasbro Children's Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Shuba Kamath, MD, MPH, Assistant Professor, Clinician Educator, Department of Pediatrics, Rhode Island Hospital/Hasbro Children's Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Kristin C. Lombardi, MD, Assistant Professor, Clinician Educator, Department of Pediatrics, Rhode Island Hospital/Hasbro Children's Hospital, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

Delma-Jean Watts, MD, Assistant Professor, Clinician Educator, Department of Pediatrics, Rhode Island Hospital/Hasbro Children's Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Valerie Ryan, PhD, Former extern in the Lifespan Biostatistics Core, Rhode Island Hospital, Providence, RI.

Office of Women in Medicine and Science Advisory Board, The Warren Alpert Medical School of Brown University, Providence, RI.

Correspondence

Erica Chung, MD
Rhode Island Hospital, 593 Eddy Street
Multiphasic Building 223
Providence, RI 20903
401-444-7396
Erica_Chung@brown.edu

An Evaluation of Connect for Health: A Social Referral Program in RI

EMILY ZHU, AB'20; JASJIT S. AHLUWALIA, MD, MPH, MS; M. BARTON LAWS, PhD

ABSTRACT

BACKGROUND: Connect for Health is a social referral program based at Hasbro Children's Hospital and the Center for Primary Care in Providence, RI, that aims to address basic needs in order to improve the health and well-being of patients.

METHODS: A qualitative program evaluation was conducted by interviewing providers and patients, assessing perceptions of effectiveness and barriers to success.

RESULTS: Providers felt their workload was alleviated and believed the program was addressing the social determinants of health. Patients similarly felt that their needs were met but acknowledged some barriers to accessing resources such as transportation, business hours, and language barriers. Ultimately, patients and providers viewed the program as effective but both groups perceived structural barriers such as housing and limited resources.

DISCUSSION: A structured program of referral for social services and benefits can alleviate some patient needs and provider workloads, but fundamental socio-economic disparities and inadequate resources limit effectiveness.

KEYWORDS: social referral, social determinants of health, , social services Connect for Health

BACKGROUND

Connect for Health (formerly called Health Leads) is a nonprofit, community-based program working to reduce the burden of social determinants of health in Providence, RI. The program operates out of Lifespan's Community Health Institute and is currently based at Hasbro Children's Hospital and at Rhode Island Hospital's Center for Primary Care (CPC). Connect for Health's mission is to optimize health by addressing the basic social needs of patients such as food, housing, transportation and employment. Physicians and other healthcare workers refer patients to Connect for Health for unmet social needs that are contributing to poor health outcomes. When individuals arrive at the desk, they are enrolled into the online database by a volunteer advocate (usually a Brown University student), who then conducts an initial interview using a standard screening tool to understand which resources the individual needs help locating. Every week Connect for Health advocates follow up with enrollees by phone to track progress and determine whether all identified needs were met and inquire about other emerging needs. Currently, with the ongoing COVID-19 pandemic, advocates are still performing weekly follow-up virtually. Although many local resources that are typically referred to are closed for the time being, COVID-19 specific resources have been compiled by community organizations like AMOR Rhode Island and have been shared with Connect for Health for use.

Social referral agencies like Connect for Health may play an important role in reducing health inequalities. However, there has been no formal evaluation of Connect for Health. This project developed an understanding of the participants' experience of the program, including perceived barriers to care individuals face, and their own evaluation of Connect for Health's role in alleviating this burden. Interviews of providers developed an understanding of the process by which patients are referred to the program and how Connect for Health interacts with medical care.

METHODS

The data for this study consisted of semi-structured interviews with providers and patients. We developed the interview guides in consultation with staff of the Lifespan Community Health Institute. (**See Table 1**.) Patient interviews were conducted both in person or over the phone (half from CPC and half from Hasbro). Additional interviews were conducted with hospital staff who often refer patients to Connect for Health.

Interviews were transcribed and analyzed using thematic coding in Nvivo (©QSR International) by the first author, with the other authors providing consultation and feedback on the results. The target number of participants for the entire study was 20–30, intended to achieve diversity in background and experience. The interviews covered questions regarding perception of Connect for Health's role in patients' health outcomes alongside barriers to care they have witnessed and proposed solutions to overcoming these barriers that may contribute to poor health outcomes.

Table 1.

Provider Questions
1. How long have you referred patients to Connect for Health/been involved with the program?
2. How well do you think Connect for Health is coordinated with the [medical] care you are providing to patients? What is working well, or not so well?
3. How well do you feel that Connect for Health is helping your patients manage their health better?
4. How do you feel Connect for Health is affecting your workload [as a provider]?
5. Is there anything you would like to see Connect for Health do differently or any areas of improvement you see for the program?
6. Do you think there are patient groups that Connect for Health doesn't currently work with that you think would benefit from our services?
7. Would you recommend Connect for Health to another patient or provider?
Patient Questions
1. How helpful do you feel that Connect for Health has been for you? Why do you feel that way?
2. What concerns did you come to Connect for Health for?
3. What are some of the issues in your life such as housing, food, or education that affect your health? How do these affect you?
4. Do you think Connect for Health helps you be healthier? How so?
5. Do you have trouble getting some of the resources and help you need, such as food stamps (SNAP), food pantries, Medicaid, or other help? **a.** What are some of the biggest problems getting what you need? [If need to probe] – transportation, forms to fill out, getting documents, others? **b.** Can you think of a specific time when you had a need that you did not seek help from Connect for Health for? What prevented you from seeking help from the program then?
6. Are there problems that prevented you from using the Connect for Health resources provided? **a.** Were there any other needs that you did not seek help for?
7. After being enrolled in Connect for Health, do you feel more prepared to get the help and resources you need on your own?
8. In your opinion how can Connect for Health improve the program to better meet your needs?
9. How well do you feel that Connect for Health was coordinated with your medical care?
10. Can you think of other people in your community or social network that could benefit from Connect for Health's services? Would you recommend Connect for Health to them?

RESULTS

Provider Characteristics

The first author interviewed 11 providers for this study: three were based at Hasbro Children's Hospital and eight worked at the Center for Primary Care. The reason for this imbalance may have been the result of a vacant Hasbro Connect for Health coordinator position at the time of the study in the fall of 2019, and it may have been a contributing factor in a limited response from healthcare and social service providers. Since then, the coordinator position has been filled. However, four doctors were interviewed, three social workers, one nurse practitioner, one pharmacist, one nurse, and one program coordinator.

Provider Themes

Provider responses can be organized into four overarching topics: the impact of Connect for Health on providers, areas for possible improvement, structural barriers, and the social determinants of health. Overall, attitudes towards Connect for Health were positive, with many providers stating they were extremely grateful for the work the program does for their patients.

"I've been in multiple academic centers and this is the only place that I've worked where [Connect for Health] has been available and so it is incredibly helpful when someone is there and when families make a connection in that moment that we're saying to them: 'We're asking you this, you've trusted us to tell us that you don't have enough food, that you're having trouble with a bill, you're worried about lead.' You've trusted us with that information and when we can say, 'I hear you' and you hear someone say, 'I hear you,' I think that is really empowering to families who feel at times that they're in a hopeless situation." — Provider 1, Pediatrician at Hasbro

Impact of Connect for Health on Providers

The sub-codes for this overarching theme included provider workload and the Connect for Health referral process. Many providers did believe that Connect for Health helped with their workload, directly or indirectly. A few providers remarked that Connect for Health provided knowledge and resources in areas that they could not help with and some providers mentioned that Connect for Health may be able to address issues that would have been left otherwise unaddressed and ultimately allowed providers to spend more time on other aspects of the patient's medical care.

"I wouldn't say [Connect for Health] makes [our workload] lighter and I wouldn't say it makes it heavier. I think what does happen which really is apparent is issues get addressed that wouldn't have gotten addressed, that's for sure." — Provider 3, Pediatrician and Medical Director, Hasbro

Areas of Improvement

When asked about coordination of Connect for Health with the medical care patients received at the respective

locations, answers were mixed. Overall, it appears that coordination can be improved and that communication between providers and Connect for Health could increase. One barrier that was repeated was the use of separate Electronic Medical Records (EMRs) that prevented providers from accessing their patient's enrollment in Connect for Health.

"I think it would be nice if the Connect for Health volunteers could actually have access to the medical records if they were allowed to be given the training in HIPAA. I think it would be really great if they could delve in and see what some of the barriers and needs might be that we might not have even touched on." — Provider 3, Pediatrician and Medical Director, Hasbro

HIPAA, the Health Insurance Portability and Accountability Act of 1996, requires that providers protect the confidentiality of patients' private health information (PHI) and train all staff who have access to PHI. Giving Connect for Health advocates HIPAA training could be a pathway to improving coordination between providers and health advocates. Currently, efforts are being made to integrate Connect for Health into the Lifespan EHR with the creation of LifeChart, the new Lifespan EHR that allows information to be shared throughout the healthcare system, from hospitals and clinics to community partners. In addition, a social needs screening and referral tool called Healthy Planet will be implemented in order to allow approved LifeChart users to ask patients standardized screening questions and generate a list of referrals from a resource database. Connect for Health will subsequently share its resource directory and become the backbone of the resource directory being built in LifeChart. Following implementation of LifeChart, Connect for Health advocates will be trained to use LifeChart in order to work with patient care teams to identify, respond to, and document the steps taken to ameliorate health-related social needs.

Structural Barriers

Another major problem mentioned in many interviews was the current state of housing in Rhode Island. Especially at the Center for Primary Care, many patients enroll in Connect for Health for housing needs. However, because of the shortage of affordable housing, there is little Connect for Health can provide for these individuals.

"So many people come in and need housing and I see it a lot where people say, 'I'm a priority because I'm disabled and I have children and all these things,' and I say, 'You are, but you're one of so many people in this situation.' "
— Provider 6, Clinical Social Worker, CPC

Social Determinants of Health

Many providers commented how Connect for Health could impact social determinants of health and listed that as a benefit of having Connect for Health as a complement to the medical services provided.

"I think that we all know that there are lots of social determinants of health that can impact the care we provide to our families. And the families our clinic often serves have housing and food insecurity, and sometimes they are not aware of the resources that they need, so it's very helpful when families here in the clinic are able to access some of those resources."
— Provider 1, Pediatrician, Hasbro

Patient Demographics

The first author also interviewed 19 patients for this study; one interview was lost in processing. Nine patients originated from Hasbro Children's Hospital and the other nine received care from the Center for Primary Care. Most of the patients interviewed were female, with ages ranging from the mid 20s to late 60s. (**See Figures 1–5**.) Most interviewees identified as Latino/a/Hispanic, and a majority completed their high school education.

Figure 1. Gender

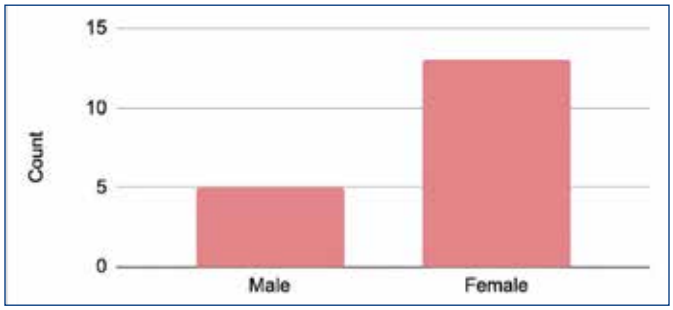


Figure 2. Age Breakdown

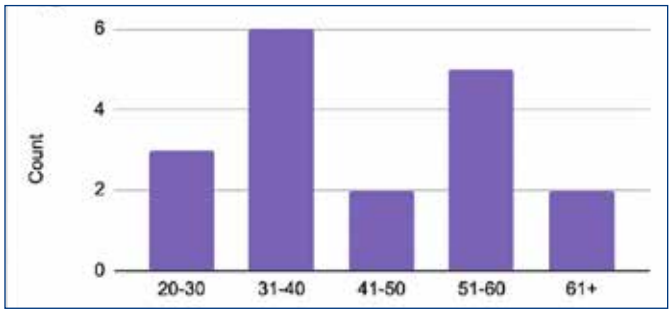


Figure 3. Race or Ethnic Group

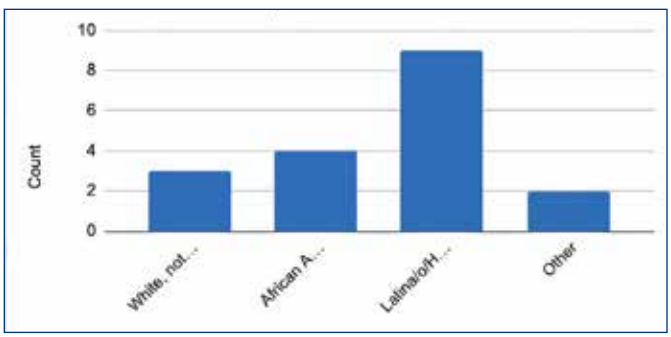


Figure 4. Country of Birth

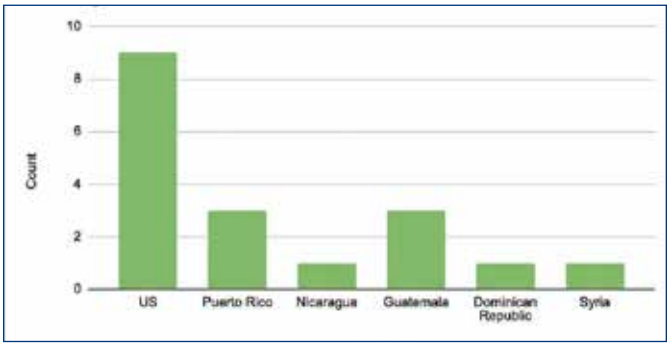
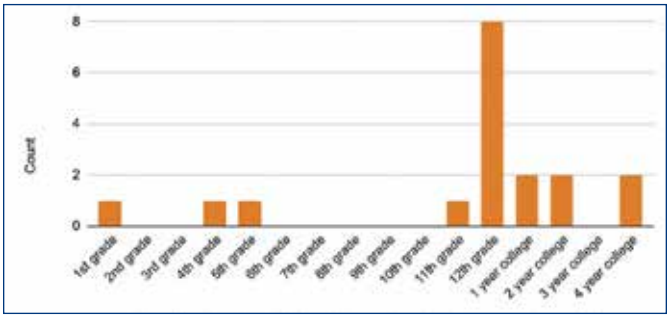


Figure 5. Highest Grade or School Year Completed or Enrolled In



Patient Themes

The overarching themes throughout all the patient interviews can be categorized into four interrelated topics: needs, social determinants of health, barriers, and program insights. Overall, attitudes toward Connect for Health were mainly positive and many patients were extremely grateful for the program.

"I want to thank [Connect for Health] for their help; they were very caring and kept asking about any kind of assistance they could provide and asked about my family, so I am very thankful for you and for them." — P12, Hasbro

Needs

When asked about needs that currently affect them or have previously affected them, many patients brought up food, housing, and commodities such as clothing or furniture. Consistent with the provider interviews, many patients recognized the shortage of affordable housing in Rhode Island. This was particularly noticeable at the Center for Primary Care where the patient population tends to be older and suffering from severe financial constraints. Many patients interviewed came to the program for housing help. Alongside housing, accessing food resources such as food pantries, getting enrolled in SNAP, and commodity resources like clothing banks and furniture gift cards, were frequently mentioned throughout the interviews.

Social Determinants of Health

Fewer than half of the patients interviewed mentioned any connection between being in the program and their own health outcomes, although one of the long-term goals of Connect for Health is ultimately reducing utilization of healthcare services for non-medical needs and transforming Lifespan to a health system that promotes health and well-being. Individuals may not directly connect the program to their own health unless the resource they are looking for is directly related to a health condition or a health behavior. For instance, food resources were most often identified as connected to health followed by housing and access to medication. When asked why they enrolled in the program, P14 remarked, "I wanted to have good health. I noticed that my health was declining, and I wanted help figuring out how to eat the right food and those kinds of things. So I wanted to improve my health, you know?"

Barriers

When asked what the major issues were preventing individuals from accessing resources that Connect for Health provided, respondents gave numerous answers including transportation and barriers, such as language, to filling out forms. One patient mentioned that a lot of the food pantries were not accessible by bus and another said before they got their driver's license it was difficult to drive to different organizations. Another patient remarked how often the resources provided did not have business hours that she could attend. In addition, a few patients mentioned filling out the forms could be complex, especially if there was a language barrier. P14 was deaf and said, *"Most of the paperwork and everything is in full sentences and in English, and my English is not so good, so it might be helpful to have illustrations of some kind."* Although Connect for Health provides many resource sheets in Spanish and utilizes Language Line Solutions to call patients who are not fluent in English, language barriers still exist in various social service applications and varying literacy levels may prevent individuals from accessing local resources.

Besides barriers to accessing resources, another major obstacle individuals mentioned was simply not knowing what resources exist and how to navigate the landscape of social services. Many patients were grateful to be enrolled in Connect for Health for this reason, as the program offered information about where to look for help and what programs they may be eligible for. When asked whether they thought one of the main issues was that people don't know what resources are available, one patient responded, "Yes, absolutely."

All in all, many patients felt supported by Connect for Health and mentioned that the strengths of the program itself lay in communication and the proximity of the program to their medical appointments.

"I think [Connect for Health] is very helpful because it's like you already know where you're going to and you're comfortable with the place." — P13, Hasbro (Female, age 28)

"It's good that it's all centralized in this one place. What I like about it is when I go to my visits I like going right to the Connect for Health desk and then it's all together."
— P1, Center for Primary Care (Female, age 60)

CONCLUSION

Connect for Health in Rhode Island is an effective program in providing resources to patients while simultaneously alleviating providers' workloads. In particular, resources in the form of food and commodities like clothing and furniture were especially helpful for patients. Providers also saw Connect for Health as helping with the social determinants of health, something they all agreed was critical in primary care. However, limitations of the program do exist, and many patients and providers brought up housing as the primary challenge. Patients also mentioned language barriers, transportation, and confusing forms as barriers to accessing resources and social services. The main area of improvement for the program lies in coordination between providers and Connect for Health, which could be facilitated through monthly meetings with providers or with the implementation of the same electronic health record system. While patients did not necessarily see the link between Connect for Health and their own personal health, the positive feedback from both patients and providers demonstrates that Connect for Health is working effectively in providing social resources to those in need.

Acknowledgments

The authors acknowledge and appreciate the contributions of Lifespan Community Health Institute and Connect for Health in their efforts to create and maintain the program. As well, the authors would like to extend their deepest gratitude to providers and patients from Hasbro Children's Hospital and the Center for Primary Care for their willingness to participate in the evaluation.

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Authors

Emily Zhu, Brown University, Providence, RI.

Jasjit S. Ahluwalia, MD, MPH, MS, Department of Behavioral and Social Sciences, Brown University School of Public Health; Department of Medicine, Alpert Medical School of Brown University, Providence RI.

M. Barton Laws, PhD, Department of Health Services, Policy, and Practice, Brown University School of Public Health, Providence, RI.

Correspondence

Emily_zhu@brown.edu

Brown Urology: A Historical Perspective

TIMOTHY K. O'ROURKE, MD; MARK SIGMAN, MD; ANTHONY A. CALDAMONE, MD; ERIC JUNG, MD

ABSTRACT

The first Urology Residency Program in the United States was founded at the Johns Hopkins Hospital in the wake of the first structured surgery residency as established by Dr. William Halsted in the early 20th Century.[1] Dr. Hugh Hampton Young was selected to lead the Genitourinary Division and the foundation for the first urology residency training program was established.[2] The Brown University Medical School, initially opened in 1811, effectively closed circa 1827, and re-established in the 1970s, has a long tradition in training surgeons.[3,4] The Rhode Island Hospital Urology Residency Training Program was organized in the early 1950s and will be explored in this article. Brown University affiliated with the residency program in the mid-1980s to establish the first and only academic urology residency program in Rhode Island. Today, this program provides state-of-the-art urologic care for thousands of patients in the state.

KEYWORDS: urology, Warren Alpert Medical School, Brown University, Rhode Island Hospital, residency, history

INTRODUCTION

Formal surgical training in the state of Rhode Island dates back to 1811 when "The Medical Department of Brown University" was established as the third medical school in New England.[3] Pioneering surgeons providing education through the medical school at this time included Dr. Solomon Drowne, Dr. William Ingalls, and Dr. Usher Parsons. Unfortunately, the medical school was disbanded in 1827, reasons unclear, but may have been related to grave robbing to secure anatomic specimens and concerns surrounding student discipline. One apparent sentinel event involved a partially prepared skeleton inside of a barrel that was kicked by students down College Street, eventually spilling its contents onto the road. President Francis Wayland, having recently taken over as Brown University's fourth president, devised a new policy to improve student conduct that required all students and faculty to reside on campus. This was not acceptable to the medical instructors – and very likely contributed to the closure of the medical school. In an attempt to improve healthcare availability to those residing in Rhode Island, Dr. Parsons was instrumental in the founding of Rhode Island Hospital (RIH) in 1863, largely funded by a significant donation from Thomas Poynton Ives. A 2-year surgical internship was initially established in 1893. This would continue to evolve as structured surgical residency programs emulating that which was conceived by Halsted gained traction throughout the United States in the early 20th Century.[4]

Following World War II, training programs in surgical subspecialties such as plastic and reconstructive surgery and urology were introduced to Rhode Island Hospital.[4] The Urology Residency program was approved by RIH in 1954 as a two-year hospital-based training program without academic affiliation. The residency program as established was (and remains) the only residency program training urological surgeons in the state of Rhode Island. The medical school was formally re-established in the early 1970s, graduating its first class of medical doctors (MDs) in 1975. Soon thereafter the urology residency program affiliated with Brown.[4] This article will explore the leaders, milestones, contributions, and accomplishments of the Brown University/Rhode Island Hospital Urology Residency Training Program. Historical references and information were obtained through review of available literature and discussions with those who directly influenced program/practice development from conception to the present day.

DEPARTMENTAL LEADERSHIP

Dr. Howard K. Turner served as the first Chief of Urology in the early 1950s, just as the residency program was formally established. Dr. Ernest K. Landsteiner took over as Chief in 1955, shortly after the start of the residency program. At this time the residency program was expanded to three years of formal urological instruction. Of note and clinical interest, Dr. Landesteiner's father, Dr. Karl Landsteiner, was awarded The Nobel Prize in Physiology or Medicine in 1930 "for his discovery of human blood groups." Dr. E. Landsteiner published an article in the *Rhode Island Medical Journal* in October 1960 entitled "Urological Causes of Back Pain."[5]

Dr. John B. Lawlor was appointed Chair of the Department in 1976. Following the re-establishment of the Brown University School of Medicine (then called Program in Medicine) and thus the commencement of a strong academic affiliation, the residency program expanded to cover

additional hospitals including the Providence VA Medical Center, which had been established following World War II in 1948, and Roger Williams Hospital.[6] The clinical affiliation with the Providence VA remains today; however, urological residents no longer train at Roger Williams. Dr. John F. Maynard was appointed acting Chief of Urology, approximately 1983–1985.

Dr. Barry Stein was recruited from Temple University Medical School and appointed Chief of Urology on April 1, 1985. He was responsible for, among many notable accomplishments, the recruitment of an invigorating and impactful faculty including Drs. Anthony Caldamone, August Zabbo, and Mark Sigman. Dr. Stein is widely published and made scholarly contributions including collaboration on the initial United States multicenter randomized control trial for a novel surgical approach for benign prostatic hyperplasia, visual laser ablation of the prostate (VLAP).[7] Dr. Caldamone was recruited to Brown and would soon be appointed Chief of Pediatric Urology following completion of his urology residency at Strong Memorial Hospital in Rochester, New York, Pediatric Urology Fellowship at Children's Hospital of Philadelphia, and experience as consultant at The Hospital for Sick Children (now Great Ormond Street Hospital) in London. He would serve as the residency Program Director for 26 years, from 1990–2016. Dr. Caldamone was a member of the charter class of the Brown University School of Medicine, graduating in 1975. Dr. Mark Sigman, having completed his urology residency at University Hospital of Virginia and Male Reproductive Medicine and Surgery Fellowship at Baylor College of Medicine, succeeded Dr. Stein as Chief of Urology in 2009. Dr. Sigman coordinated the founding of the Men's Health Center at The Miriam Hospital and is currently the Co-Director. Dr. Simone Thavaseelan, who completed her urology residency and Endourology Fellowship at Brown, was named Residency Program Director in 2017.

MILESTONES AND ACCOMPLISHMENTS

The urologists of Brown Urology have made many notable contributions to the field of Urology at large, but more specifically, to urological care for patients of Rhode Island and southern New England. Over the years the Brown faculty were among the first to introduce some of the most novel surgical techniques to the region. Drs. Barry Stein and August Zabbo introduced extracorporeal shock wave lithotripsy (ESWL) for management of nephrolithiasis to Rhode Island Hospital in 1987. One of the first retroperitoneal laparoscopic surgeries performed in the United States, a nephrectomy, was completed by Dr. Stein and Dr. David Hoenig, a urological resident at the time, in the early 1990s. Dr. Zabbo has been credited with performing the first percutaneous nephrolithotomy in Rhode Island, a procedure where renal calculi are accessed and removed through direct percutaneous kidney access, also in the early 1990s. This surgical technique, conceived, implemented, and further developed the mid-1970s by Drs. Fernström and Johansson of Stockholm, Sweden, and Dr. Wickham at St. Paul's Hospital in London, has become a standard procedure in the armamentarium of endourologists throughout the world.[8,9] In 2006 Dr. Gyan Pareek performed one of the first robot-assisted surgeries in the New England region with the novel da Vinci Surgical System. This approach has since become the standard of care for such operations as radical prostatectomy. Dr. Liza Aguiar, Pediatric Urology, is credited with performing the first pediatric robot-assisted surgery in Rhode Island in 2015. The first robot-assisted radical cystectomy in southern New England was performed by Dr. Dragan Golijanin, Urologic Oncology, in 2016.

The Rhode Island Hospital General Urology Clinic was established as a resident-driven clinical experience that provides urologists-in-training significant opportunity to coordinate outpatient care for urological patients under the direct supervision of an attending urologist. The Urology Clinic is crucial to resident professional development and provides a strong foundation for future practice as well as access to evidence-based urological care to thousands of patients from Rhode Island and surrounding regions, who otherwise would have difficulty obtaining urologic care. A particular emphasis is placed on follow-up after major urological trauma, as the clinic is located at Rhode Island Hospital, the only Level I Trauma Center in Rhode Island. Historically, multiple faculty members rotated through this position. Dr. Alan Podis took over as the first full-time Clinic Director in 1997, guiding residents through patient management and decision-making in the pre-operative, intra-operative, and post-operative phases of care. Dr. Kennon Miller, a subspecialist in Reconstructive Urology, has served in this capacity since 2015.

The Professorship and Chair of Urology was endowed in 2003 as a direct result of a generous donation from the Krishnamurthi Family. Notable milestones within the practice and program include the establishment of, in 2008, the Men's Health Center at The Miriam Hospital — one of the first multi-disciplinary men's sexual health centers in the USA. The integrated Kidney Stone Center was established in 2013, providing multidisciplinary patient-centered care through collaboration of specialists within Urology, Nephrology, and Nutrition all in one patient encounter. The Genitourinary Multidisciplinary Clinic provides for a comprehensive and multifaceted cancer management strategy – patients are guided through their management plan in coordination with specialists from multiple disciplines including Urologic Oncology, Medical Oncology, and Radiation Oncology. These subspecialists meet weekly to review complex genitourinary oncology cases in-depth and in coordination with the Departments of Pathology and Radiology. The Minimally Invasive Urology Institute, established in

2014, provides for collaboration amongst healthcare providers in various roles in an effort to optimize urologic disease management through minimally invasive and robotic approaches.

CONCLUSIONS

The residency training programs affiliated with Brown University are an integral aspect of medical care throughout the state of Rhode Island. The Urology Residency Training Program, initially a non-University-affiliated institution associated with Rhode Island Hospital, has evolved over the years to become a nationally recognized academic residency program having affiliated with The Warren Alpert Medical School. Robust exclusive hospital affiliations presently include Rhode Island Hospital, The Miriam Hospital, Hasbro Children's Hospital, the Providence Veterans Affairs Medical Center, and Women & Infants Hospital. The Miriam Hospital, just recognized as the #1 ranked hospital in Rhode Island, was also recognized among the top 2% for urologic care in the USA (27 of 1495 hospitals) by US News Health.[10] Brown Urology is the largest urologic practice in Rhode Island and supports the state's only Urology Residency Training Program, providing urologic care for thousands of patients. Its storied history and continued evolution position the residency program and practice well to continue to provide state-of-the-art care for patients and exceptional training for budding urologists.

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Disclaimer

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Authors

Timothy K. O'Rourke, MD, Division of Urology, Brown University/Rhode Island Hospital, Providence, RI.

Mark Sigman, MD, Division of Urology, Brown University/Rhode Island Hospital, Providence, RI.

Anthony A. Caldamone, MD, Division of Urology, Brown University/Rhode Island Hospital, Providence, RI.

Eric Jung, MD, Division of Urology, Brown University/Rhode Island Hospital, Providence, RI; Division of Urology, Cedars-Sinai Medical Center, Los Angeles, CA.

Correspondence

Timothy K. O'Rourke, MD
Brown University/Rhode Island Hospital
2 Dudley Street
Providence, RI 02903
timothy_orourke_jr@brown.edu

The Health and Socioeconomic Outcomes of Abortion Denial in Rhode Island: A Health Impact Assessment

NYKIA R. LEACH, MPH; SAMANTHA ROSENTHAL, MPH, PhD

ABSTRACT

OBJECTIVES: To determine the health and socioeconomic consequences of comprehensive abortion denial in Rhode Island.

METHODS: Using Turnaway Study findings and RI abortion data from 2013-2016, we project the burden of negative outcomes for women and their families under 100% abortion denial conditions.

RESULTS: Findings suggest negative impacts on the health and socioeconomic well-being of RI women and their families. 982 and 910 women, who would have otherwise received an abortion, will report anxiety and depression, respectively, at one-week post abortion denial, and 1,499 will report receiving Temporary Assistance for Needy Families funding at six months post denial.

CONCLUSIONS: If women who would seek a safe and legal abortion in RI are denied one, clear and undue burden will exist for those who carry to term and raise the child, as well as affecting existing children.

KEYWORDS: abortion denial, Rhode Island, outcomes, women, health

INTRODUCTION

Abortion denial is a critical public health issue.[1] In 1965, 17% of all childbirth mortalities were subsequent to illegal abortions (IA). Today, less than 0.03% of women who undergo legal abortions (LA) sustain serious injury or complications resulting in hospitalization.[2] Death is even less common, with only six mortalities from LA in 2014.[3] Further, the American Gynecological & Obstetrics Association underscores the epidemiological reality that childbirth poses a 14 times higher risk of death for women than LA.[4]

The Supreme Court of the United States' (SCOTUS) 1973 landmark ruling to legalize abortion nationally improved the public's health by making this service both more accessible and through clinical regulation, safe.[5] Repercussions of Roe v. Wade have been far-reaching and influential to "the full emancipation of women," as Justice Harry Blackmun proclaimed.[2] With the right to decide whether to terminate a pregnancy – to have a child and raise a family – women have participated in educational and employment opportunities that, during the ban, were scarcely obtainable.[2]

Today's women, however, are facing the most direct threats to their reproductive freedom since before 1973. With new conservative Justices recently appointed, SCOTUS' balance has shifted to the right, once again, actually in favor of limiting and outlawing abortions. In attempts to preserve the right currently afforded to women by Roe, state-level protections have emerged in General Assemblies across the country. With Roe in jeopardy of overturn, Rhode Island (RI), which depends upon the federal decree to ensure abortion access, is now engaging in efforts to safeguard the right to abortion by passing consistent local legislation.

To our knowledge, there is no robust, existing literature that has studied abortion and the consequences of its inaccessibility in Rhode Island. Towards the goal of better understanding proposed health policy, we conduct a Health Impact Assessment (HIA) using rudimentary projection modeling to examine the health and socioeconomic burden of abortion denial among RI women.

METHODS

Turnaway Study Data Collection

Secondary data were compiled from the Turnaway Study (TS) (see Table 1).[6-11] From 2008 to 2010, the TS recruited 955 participants from 30 abortion facilities registered with the National Abortion Federation across 21 states. Gestational limits of these facilities ranged from 10 weeks through second trimester. Eligible women included those 15 years or older who spoke English or Spanish, had no known fetal complications indicating a potential maternal health need for an abortion, and reported to one of the study facilities seeking an abortion.[6]

The TS aimed to describe the mental and physical health, as well as socioeconomic consequences of receiving a desired abortion compared to those who were "turned away" at the clinical facility, carrying an unintended pregnancy to term.[12] A prospective cohort design, the TS collected data during a five-year period (2010-2015) by conducting ~8,000 telephone interviews. Women were first interviewed 8 days after seeking an abortion, receiving or being denied the procedure, and were followed-up at six-month intervals.[12]

For comparison, all participants were classified into one of three study groups based on gestational age at the time an

abortion was sought. Women who sought an abortion up to three weeks over the gestational limit and were turned away without receiving an abortion were included in the Turnaway Birth Group (TBg). Women assigned to the Near-limit Group (NLg), sought their abortions up to two weeks prior to the facility's gestational limit and received an abortion. Lastly, women in the First Trimester Group (FTg) received an abortion during the first 12 weeks of their pregnancy.[12]

Extrapolation Process

RI abortion prevalence trends (2013-2016) obtained from the RI Department of Health's Health Center for Data and Analysis were averaged to 2,372 annually. For extrapolation purposes, in a policy environment where abortion is illegal, we define the 2,372 annual abortions as 100% denials and equate them in the projections to the TBg category from the TS.

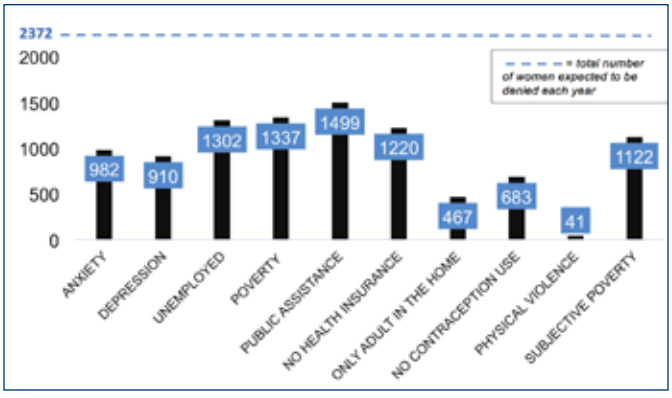
The CDC reports, among RI women receiving abortions, 92% are received at ≤ 13 weeks gestation and 8% at > 13 weeks.[3] These proportions were applied to dichotomize the abortion group consistent with the TS's groupings. For mean extrapolation, TS means by group were multiplied by each RI group to determine the expected number of additional days per year that women will experience the outcome (see **Figure 1**).

Adjusted odds ratios (aOR) from the TS were inverted so the TBg was compared to both NLg (ref) and FTg (ref) separately. Estimated probabilities were calculated from aOR reciprocals and multiplied by the number of RI women proportioned to each expected annual abortion prevalence subgroup (see **Figure 1**). For physical violence specifically, in order to extrapolate to the RI population of women receiving abortions per year, we applied the proportion of women in the TS sample who reported experiencing physical violence by the male involved in pregnancy during the 6 months prior to baseline (5%) to the RI average (2,372 women) abortion prevalence.[9]

For each construct, the number of women projected to experience the specific outcome was calculated by totaling the subgroups using an adjusted strength formula (see **Figure 1**). The number of first trimester RI women was multiplied by 2/3 in an effort to account for inherent differences between the comparison groups. Two-thirds strength was chosen because demographic data from the TS showed financial differences between FTg and those of NLg and TBg (monthly income is 1.5 times higher and household monthly income is 1.4 times higher in the FTg versus the NLg and TBg).[7] NLg and TBg were found to be demographically consistent.

For subjective poverty, comparison groups include: mothers with an existing child who received a desired abortion (ExCAg) versus those with an existing child who were turned away and gave birth (ExCTBg). According to the CDC, 55% of women who receive abortions in RI have existing children in the household.[3] This proportion was applied to determine the number of children living in a home where the mother, who would have otherwise sought an abortion, has reported subjective poverty post-denial.

Figure 1.



RESULTS

Based on an average of 2,372 abortions received per year and drawing upon the TS national sample's findings collected from 2010-2015, extrapolations for comprehensive abortion denial in RI show an increase in the number of women (and children) experiencing adverse health and socioeconomic outcomes.

In RI, the average induced termination prevalence per year is 2,372 with a rate of ~11.32 abortions being performed for every 1,000 women aged 15-44 years. The total number of days per year that physical limitation would be experienced post-partum by women, who would have otherwise sought and received an abortion, was found to be 23,957 days. This is a threefold increase with 16,424 additional days of limitation attributed to abortion denial.

If abortions were outlawed in RI, an estimated 982 (41.4%) and 910 (38.4%) of the 2,372 (100%) women turned away will report experiencing anxiety or depression, respectively, at one-week post abortion denial. 1,220 (51.4%) women who would have otherwise received either a FTg or NLg abortion, will report not having private or public health insurance at six months post denial. Over the five years following denial, 683 (28.8%) of these women are not expected to be using a modern contraception method. Regarding socioeconomic outcomes, 1,302 (54.9%), 1,337 (56.4%), and 1,499 (63.2%) women will report being unemployed, at or below the Federal Poverty Level, and receiving Temporary Assistance for Needy Families (TANF) funding, respectively, as of six months post denial. Four hundred sixty-seven (19.7%) women at six months following denial will reside without adult family or a male partner. With comprehensive denials, an additional 41 (1.7%) women will report being victims of physical violence (e.g. pushed, hit, slapped, kicked, chocked, or physically hurt by the man involved in the pregnancy during the 2.5 years following their sought abortion.

Lastly, projections suggest that 1,122 (47.29%) children

(<5 years old at one week post denial) born previous to abortion denial will live in a home where their mother reports, during six months to four years after the denial, insufficient money to pay for food, housing, and transportation.

Combining projections for the ten health and socioeconomic constructs examined in our HIA, we project that a total of 9,663 (excluding physical health) new cases of negative outcomes will be experienced within 5 years post denial compared to if abortion was legal.

DISCUSSION

These findings show that comprehensive abortion denial has negative impacts on the health and socioeconomic well-being of RI women (see **Table 1** and **Figure 2**). If all 2,372 women expected to receive an abortion in RI each year were no longer able to access this health service, approximately 20%–63% of them would experience *at least* one of the negative outcomes examined in this HIA. When women who would otherwise seek a safe and LA are denied one, clear and undue burden emerges.

While this study did not assess the relationship between abortion denial and unregulated abortion mortality, acute health outcomes are important to consider. Regression to a pre-Roe level of access would not prevent all abortions from occurring, but instead, increases the frequency of unsafe abortions.[5] Examining national abortion data between 1972 and 1974, the CDC found that IA mortality fell from 39 deaths of women to only 5 deaths.[13] This is likely an underestimate of the burden due to the procedure's illegal nature and under-reporting.[14] Injury and mortality from IAs would increase in RI if there is widespread abortion denial.

Existing literature provides insight, consistent with these projections, into the expansive range of impact abortion denial has on women and their families. Although no research has been conducted on abortion denial in RI, national analyses suggest that compared to abortion recipients, those denied are more likely to experience serious complication from the end of pregnancy (including eclampsia and death), stay tethered to abusive partners, and are less likely to have aspirational life plans for the coming year.[11,9,14]

Table 1. Turnaway Study Adjusted Odds ratios and Estimated Probabilities by Construct

Construct	Turnaway Study (national sample)		Present Study (RI extrapolation)
[ref (1) = TBg]	aOR	Estimated Probability (95% CI)	Women with Outcome N (%)
Anxiety			982 (41.41%)
NLg	0.89	0.47 (0.44, 0.50)	89
FTg	1.59	0.61 (0.58, 0.64)	893*
Depression			910 (38.37%)
NLg	0.87	0.47 (0.43, 0.50)	88
FTg	1.30	0.57 (0.53, 0.60)	822*
Employment Status			1,302 (54.90%)
NLg	3.06	0.75 (0.72, 0.78)	143
FTg	3.92	0.80 (0.77, 0.82)	1159*
Poverty Status			1,337 (56.37%)
NLg	3.77	0.79 (0.76, 0.82)	150
FTg	4.44	0.82 (0.79, 0.84)	1187*
Public Assistance			1,499 (63.20%)
NLg	6.26	0.86 (0.84, 0.89)	164
FTg	11.18	0.92 (0.90, 0.94)	1335*
Health Insurance			1,220 (51.43%)
NLg	2.54	0.72 (0.69, 0.75)	136
FTg	2.92	0.75 (0.71, 0.77)	1084*
Household Structure			467 (19.71%)
NLg	0.55	0.36 (0.32, 0.39)	67
FTg	0.38	0.28 (0.24, 0.31)	400*
Contraceptive Use			683 (28.78%)
NLg	0.57	0.36 (0.33, 0.39)	69
FTg	0.73	0.42 (0.39, 0.45)	614*
Physical Violence			41 (1.72%)
NLg	0.98	0.50 (0.46, 0.53)	5
FTg	0.98	0.50 (0.46, 0.53)	36*
Subjective Poverty			
ExCTBg	6.13	0.86 (0.82, 0.90)	1,122 (47.29%)

LIMITATIONS

Risk factors for negative outcomes, such as prior mental health diagnoses or history of child abuse, neglect, sexual violence, and intimate partner violence, were not known. Therefore, we do not know if RI women are comparable to those sampled by the TS. We calculated confidence intervals rather than prediction intervals because we do not have access to the standard error of residuals in each of the regression models performed in the TS. As such, more uncertainty exists around our estimates than the confidence intervals show.

Data on percentage of women in RI who report physical violence during the six months prior to abortion were not known. Instead, the percentage found in the TS was applied to the extrapolation. Further, the extrapolation for subjective poverty is likely an underestimate because data regarding subsequent children is not known for women receiving abortions in RI. These projections assume causality from the 5-year longitudinal TS. All constructs are mutually exclusive in the projections, so experience of more than one negative outcome could not be determined. Despite the rudimentary methodological approach, this is the first study attempting to project the health and socioeconomic impacts of abortion denial in RI.

PUBLIC HEALTH IMPLICATIONS

Access to LA must be maintained and protected in RI. In June of 2019, the RI General Assembly passed The Reproductive Privacy Act, a state statute consistent with Roe, protecting safe and legal abortion at the local level. A Health in All Policies approach to sexual and reproductive health should be employed to address this public health issue by incorporating health considerations into decisions made across policy areas.[15] This interdisciplinary strategy has the potential to prevent unnecessary harm to women and cost to the community.

Although there are limitations in our study, these projections offer RI health professionals and policymakers evidence of abortion denial's consequences for their patients and constituents. These results also set precedent for a Department of Health plan of action, such as a harm reduction model, in preparation for potential abortion right abolishment.

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Authors

Nykia R. Leach, MPH, Brown University, School of Public Health, Providence, RI.

Samantha Rosenthal, MPH, PhD, Department of Health Science, Johnson & Wales University; Department of Epidemiology, Brown University, School of Public Health, Providence, RI.

Correspondence

nykia_leach@alumni.brown.edu

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

VITAL EVENTS	REPORTING PERIOD		
	DECEMBER 2019	12 MONTHS ENDING WITH DECEMBER 2019	
	Number	Number	Rates
Live Births	889	11,102	10.5*
Deaths	952	10,613	10.0*
Infant Deaths	8	64	5.6#
Neonatal Deaths	8	50	4.2#
Marriages	371	6,512	6.2*
Divorces	—	2,444	2.8*

* Rates per 1,000 estimated population

Rates per 1,000 live births

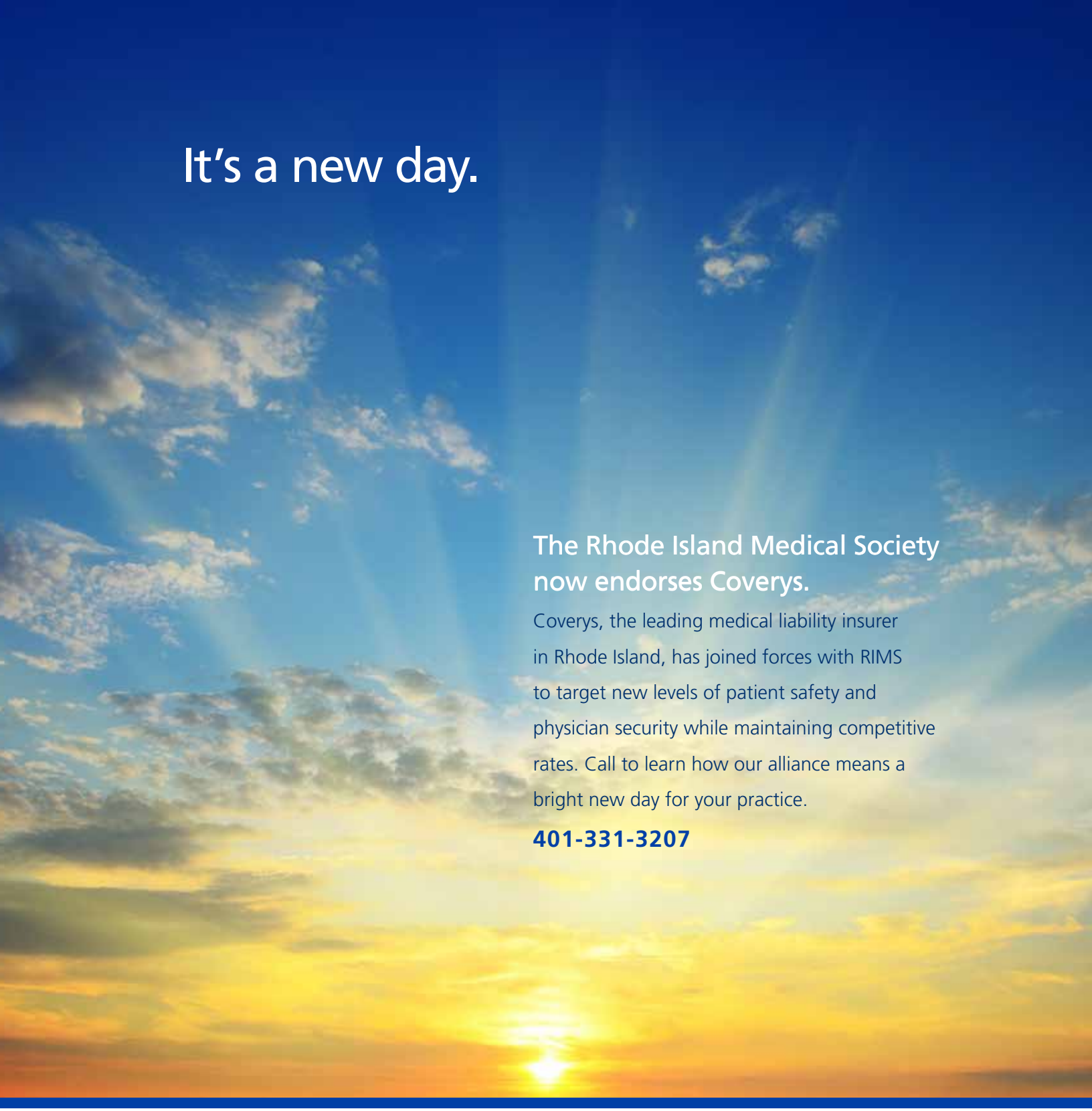
Underlying Cause of Death Category	REPORTING PERIOD			
	JUNE 2019	12 MONTHS ENDING WITH JUNE 2019		
	Number (a)	Number (a)	Rates (b)	YPLL (c)
Diseases of the Heart	186	2,482	234.3	3,057.0
Malignant Neoplasms	189	2,280	215.2	5,152.0
Cerebrovascular Disease	29	448	42.3	347.5
Injuries (Accident/Suicide/Homicide)	76	916	88.5	12,664.0
COPD	45	491	46.3	465.0

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

(b) Rates per 100,000 estimated population of 1,056,298 (www.census.gov)

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

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



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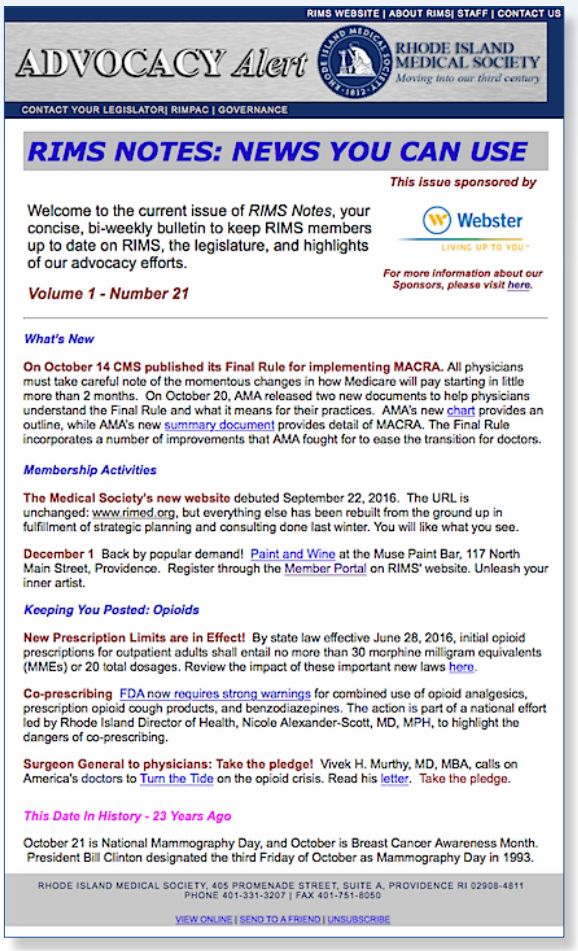

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RIMS NOTES: NEWS YOU CAN USE

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Welcome to the current issue of *RIMS Notes*, your concise, bi-weekly bulletin to keep RIMS members up to date on RIMS, the legislature, and highlights of our advocacy efforts.

For more information about our Sponsors, please visit here.

Volume 1 - Number 21

What's New

On October 14 CMS published its Final Rule for implementing MACRA. All physicians must take careful note of the momentous changes in how Medicare will pay starting in little more than 2 months. On October 20, AMA released two new documents to help physicians understand the Final Rule and what it means for their practices. AMA's new chart provides an outline, while AMA's new summary document provides detail of MACRA. The Final Rule incorporates a number of improvements that AMA fought for to ease the transition for doctors.

Membership Activities

The Medical Society's new website debuted September 22, 2016. The URL is unchanged: www.rimed.org, but everything else has been rebuilt from the ground up in fulfillment of strategic planning and consulting done last winter. You will like what you see.

December 1 Back by popular demand! Paint and Wine at the Muse Paint Bar, 117 North Main Street, Providence. Register through the Member Portal on RIMS' website. Unleash your inner artist.

Keeping You Posted: Opioids

New Prescription Limits are in Effect! By state law effective June 28, 2016, initial opioid prescriptions for outpatient adults shall entail no more than 30 morphine milligram equivalents (MMEs) or 20 total dosages. Review the impact of these important new laws here.

Co-prescribing FDA now requires strong warnings for combined use of opioid analgesics, prescription opioid cough products, and benzodiazepines. The action is part of a national effort led by Rhode Island Director of Health, Nicole Alexander-Scott, MD, MPH, to highlight the dangers of co-prescribing.

Surgeon General to physicians: Take the pledge! Vivek H. Murthy, MD, MBA, calls on America's doctors to Turn the Tide on the opioid crisis. Read his letter. Take the pledge.

This Date In History - 23 Years Ago

October 21 is National Mammography Day, and October is Breast Cancer Awareness Month. President Bill Clinton designated the third Friday of October as Mammography Day in 1993.

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Contact Sarah if you've missed an issue, sstevens@rimed.org.

Working for You: RIMS advocacy activities

May 1, Friday

World Diabetes Day (November 14, 2020) Group Planning Committee

May 4, Monday

RIMS Board of Directors Meeting – Peter A. Hollmann, MD, Chair of the Board; Christine Brousseau, MD, MPH, President (via teleconference)

May 5, Tuesday

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

RIMS Board of Directors conference call with Congressman James Langevin

May 6, Wednesday

Workers Compensation Advisory Council, RI Dept. of Labor & Training

May 8, Friday

World Diabetes Day Group Planning Committee

Health Professional Loan Repayment Program, RI Dept. of Health

May 12, Tuesday

Governor's Overdose Prevention and Intervention Task Force, Harm Reduction Work Group

May 13, Wednesday

Board of Medical Licensure and Discipline, RI Dept. of Health

Governor's Overdose Prevention and Intervention Task Force – Sarah Fessler, MD

MMJUARI (Joint Underwriting Association) Finance Committee – Newell Warde, PhD

May 14, Thursday

Conference call with state medical societies on COVID-19 epidemic

May 18, Monday

Health Insurance Advisory Committee, Office of the Health Insurance Commissioner (OHIC)

May 20, Wednesday

Primary Care Physician Advisory Committee, RI Dept. of Health

RIMS Nominating Committee – Christine Brousseau, MD, MPH, President (via teleconference)

May 21, Thursday

MMJUARI Board of Directors, Annual Meeting – Newell Warde, PhD, Director

May 26, Tuesday

Alpert Medical School, Primary Care-Population Medicine Program panel, Sarah Fessler, MD and RIMS staff

Meeting with RI Health Center Association, Thundermist Health Centers and RI Physical Therapy Association regarding telemedicine legislation

May 27, Wednesday

Health Professional Loan Repayment Program, RI Dept. of Health

May 29, Friday

Meeting with RI Health Center Association, Thundermist Health Centers and RI Physical Therapy Association, RI Dental Association, American Nurses Association – RI, regarding telemedicine legislation

Kathleen Boyd, MSW, LICSW, elected to Board of Federation of State Physician Health Programs

KATHLEEN BOYD, MSW, LICSW, Director of the Rhode Island Medical Society's Physician Health Program, has been elected to the Board of Directors of the Federation of State Physician Health Programs (fsphp.org) to serve a two-year term, from April 2020 to April 2022. She will serve as Northeast Region Director during her tenure.

Since January of 2013, she has been the director of the Rhode Island Medical Society's Physician Health Program. She is responsible for the daily management and operation of the program, including conducting initial interventions and providing ongoing case management for all referrals to the program, which serves physicians, physician assistants, dentists and podiatrists.

In addition, Boyd serves as advisor to Brown University's Medical Student Health Council, and serves as a consultant to multiple boards of licensure, health care professionals and healthcare facilities. She holds academic appointments at Brown University, Department of Medicine, and Johnson & Wales University's Center for Physician Assistant Studies.

Boyd participates on three FSPHP committees: Northeastern Region Nominating Committee member, the Medical Student & Residents Committee, and the Performance Enhancement & Effectiveness Review Committee (PEER-C).

She is a 1985 graduate of Smith College School for Social Work and holds an undergraduate degree in Human Development.

In her spare time, she enjoys sailing, yoga, playing the piano and guitar, and writing music when inspired. ❖

For more information on the Physician Health Committee visit:
https://www.rimedicalsociety.org/physician-health-program.html or email kboyd@rimed.org

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

Neighborhood Health Plan OF RHODE ISLAND™

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.

RHODE ISLAND PHYSICIANS CORPORATION PRIMARY CARE

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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Q&A with Albert S. Woo, MD

Forging a New Frontier in 3D Printing during COVID-19 Pandemic

MARY KORR
RIMJ MANAGING EDITOR

The August 2019 issue of RIMJ featured an article about Dr. Woo's 3D Printing Lab. http://www.rimed.org/rimedicaljournal/2019/08/2019-08-15-cont-boyajian.pdf.

ALBERT S. WOO, MD, Director of the Lifespan 3D Printing Lab at Rhode Island Hospital, leveraged resources at Lifespan and university and private organizations to address the shortage of personal protective equipment (PPE), a project that is ongoing, particularly when it comes to N-95 masks.

Dr. Woo, who is also the Director of the Craniofacial Program and Chief of Pediatric Plastic Surgery at Hasbro Children's Hospital, responded to questions from RIMJ on this vital turn in 3D print medical manufacturing no one could have foreseen prior to the pandemic.

RIMJ: What gave you the idea of making Personal Protective Equipment (PPE) in the Lifespan 3D Printing Lab?

DR. WOO: To be honest, I had no idea of the degree of interest in the use of 3D printing technology for personal protective equipment. As a plastic surgeon, most of the work that we have done with 3D printing has been focused on the creation of anatomic models for use in planning and performing surgical reconstructions. However, with the onset of the COVID pandemic, reports started arising around the world of certain individuals utilizing 3D printing technology to assist with certain critically needed parts that might not have been commercially available due to supply shortages. After forwarding an article about the use of 3D printing to the hospital administration in mid-March, I was shocked by the outpouring of interest by the hospital asking how I might be able to help with predicted supply shortages. This was the first step into a whirlwind journey into 3D printing for production of PPE.

RIMJ: What is the current timeframe/progress for the Lifespan 3D Printing Lab on making other PPEs, such as respirator shields, N-95 masks?

DR. WOO: Based on the interest in 3D printing, we started exploring how to use this technology to help with critical supply shortages. We initially explored the idea of using 3D printing to help with face shields for health care providers. There are a number of plans available, including those by Prusaprinters.org and Budmen.com. Such shields are widely being made by people with 3D printers across the country. After discussions with the hospital, it became clear that they had much greater needs, as Rhode Island Hospital was already able to find local manufacturers to create the shields for hospital workers. We therefore began exploring other options and also began recruiting collaborators.

Pediatric Ophthalmologist **Melissa Simon, MD**, wearing a clip-on shield created by Dr. Woo's 3D Printing Lab, designed to give full-face protection and fit over a binocular indirect ophthalmoscope.

Need for protection for anesthesia, critical care and emergency room staff

An interesting project that became very urgent was the need for protection for anesthesia, critical care and emergency room staff when intubating or otherwise performing very high-risk procedures on COVID-positive patients. When doing so, they use powered air-purifying respirators (PAPRs) and the specific model that the hospital provided included disposable masks. Due to the COVID pandemic, this mask supply became dangerously low. To help with this, we established a collaboration with Professor **CHRISTOPHER BULL**, a Brown University engineering professor who heads the Brown Design Workshop. With the assistance of the hospital, we were able to obtain the necessary supplies to manufacture these critical disposable shields ourselves using traditional engineering practices.

N-95 shortages

The project that has taken the greatest amount of time, however, has been the development of a mask to combat the N-95 shortage that has been plaguing health care providers around the world. After weeks of design and iteration, we have designed a mask that we feel fulfills this need. The collaborations have been extensive, including other physicians, **DR. THOMAS N. CARRUTHERS** (a vascular surgeon), the Brown Design Workshop, **MEGAN BILLINGS** (an engineer at Kineteks) and multiple partners who have printed models for us. These are currently being manufactured by volunteer Brown undergraduate and medical students and are currently made available to Rhode Island Hospital staff. Unfortunately, as the design is currently under patent filing, I cannot disclose the details of the device.

We have also developed strong collaborations with Professor **BRENNAN PHILLIPS** at URI, who has been spearheading efforts to produce ventilator filters and splitters, another possible need for the state.

Ophthalmology

While in the midst of this, I was approached by **DR. MICHAEL MIGLIORI**, Ophthalmologist-in-Chief at Rhode Island Hospital, to help with a critical need to protect our ophthalmology colleagues as they examine potential COVID patients. You might remember that the physician who was labeled a whistleblower in China and eventually passed away from COVID was an ophthalmologist as well. This case highlights the increased risk that these physicians face when caring for some of these patients. Based on our experience above, it was an easy process for us to borrow from some of our other efforts to create several specialized shields for our doctors when they are using some of their equipment. It is a pleasure to have played a small part in helping colleagues whom I have such strong respect for.

RIMJ: What other organizations are you partnering with?

DR. WOO: We have multiple collaborators: Brown University, particularly the Brown Design Workshop and Brown Bioengineering (multiple individuals), Dr. Carruthers (Brown Physicians, Inc), **DR. AUDOEN MADDOCK** from Women & Infants, Megan Billings (Kineteks), Brennan Phillips (URI), Lifespan [with the support of **DR. LATHA SIVAPRASAD** (CMO), and **DR. JOHN MURPHY** (Interim President of RIH). Our efforts would also not have been successful without the express support of President **CHRISTINA PAXSON**, Provost **RICHARD LOCKE**, and Dean **JACK ELIAS** of Brown, who provided special permission for our student volunteers to assist in this process.

RIMJ: Do you have the necessary supplies to create PPE?

DR. WOO: Yes, Lifespan has been generous with providing the necessary supplies to manufacture our masks by hand. Our greatest challenge has been trying to mass manufacture these devices. We hope to find additional support from local manufacturers to help with this process.

The potential is incredible as this technology continues to expand beyond simple printing of plastics into metals and even bioprinting. This technology is truly the wave of the future.

RIMJ: Who is designing and executing the work in the Lifespan 3D Lab?

DR. WOO: Myself and **JOSEPH CROZIER**, who coordinates the activities of the 3D Printing Lab. **KATHERINE WESTROM** has been instrumental in the training and dispensing of masks to hospital personnel.

RIMJ: How did you personally first become interested in 3D printing?

DR. WOO: This is a long story. As a craniofacial surgeon, I have always been interested in 3-dimensional imaging and happened to head the Craniofacial Imaging Lab at Washington University in St. Louis. It was an easy transition from there to actually printing our imaging and I found myself one of the founding co-directors of the 3D Printing Lab at Washington University. With my relocation to Rhode Island Hospital, I continued my pursuits of 3D printing and we were one of the first centers in the country to obtain a Stratasys J-750 printer.

RIMJ: Beyond its present capabilities, what applications/potential do you foresee in using 3D printing in the future?

DR. WOO: As you know, we have done our best to try to make the medical community in Rhode Island aware of the use of medical 3D printing technology and published a paper in the August 2019 issue of the RIMJ. I think that the field of medical 3D printing is very much in its infancy as few physicians have looked into exploring the possibilities of this technology in their own practices. In short, the potential is incredible as this technology continues to expand beyond simple printing of plastics into metals and even bioprinting. This technology is truly the wave of the future. ❖

Q&A with Dean Winslow, MD, on Volunteering in Antarctica

Currently the only continent without confirmed cases of COVID-19 during COVID-19 Pandemic

MARY KORR
RIMJ MANAGING EDITOR

DEAN WINSLOW, MD, Professor of Medicine at the Stanford University Medical Center, served as lead physician for the U.S. Antarctic Program (USAP) at McMurdo Station from August 2019 until February 2020. His wife, **JULIE PARSONNET, MD**, Professor of Medicine and Health Research and Policy at Stanford, volunteered as well. Since their return, the COVID-19 pandemic has spread to every continent on Earth – except for Antarctica, where there are currently no known or identified cases, as of this writing, according to The National Science Foundation (NSF), which conducts the USAP.

In the following Q&A, Dr. Winslow shared his experiences with RIMJ about what it was like to work at McMurdo, a scientific research base on the edge of the Ross Ice Shelf, in one of the most desolate places on Earth, and, one could argue, perhaps the safest, now that winter has descended.

RIMJ: What drew you to work in Antarctica?
DR. WINSLOW: I had the privilege of serving as the USAF flight surgeon deployed to McMurdo Station to support Operation Deep Freeze for 6 weeks during the Austral summer of 2009. I was struck by many things then: The amazing beauty of the continent, its remoteness, the excellent science being conducted in Antarctica by the NSF, the amazing people (scientists and support staff), the important mission, and the fact that in the entire history of the planet, only a few thousand humans have ever set foot on the continent. I decided that if I ever had the chance (after our children were grown) to return to Antarctica as a civilian doctor for the entire season, I would love to do it. It was an added bonus that my wife, Julie, was willing to deploy with me. We applied to the UTMB Polar Medicine Program, were selected, and Stanford granted us an unpaid leave of absence for 6 months.

Julie Parsonnet, MD, and **Dean Winslow, MD**, on a promontory above McMurdo Station, where they served at McMurdo General Hospital (below). [PHOTOS COURTESY OF DEAN WINSLOW, MD, AND UTMB POLAR OPERATIONS]

A greeter on the former Pegasus landing field at McMurdo. The Adélie penguin is one of eight penguin species found on the continent.

RIMJ: What are the population demographics there that could potentially need medical services and what is the capacity for inpatient/outpatient care?

DR. WINSLOW: When we arrived in Antarctica in late August, the population of the "winter-over" personnel at McMurdo was about 175; however, when we departed for home in February, the population was about 1,300, including crews from the vessels arriving to replenish fuel and supplies and several dozen construction/contractor personnel.

Our patients ranged in age from about 20 to almost 80 years old. All individuals deploying to Antarctica must pass a physical exam, lab tests, EKG, and are expected to be compliant with adult immunizations and cancer screening. The screening criteria are somewhat more stringent for individuals "wintering over," since it is very difficult to Medevac patients off the continent during the dark winter months. Our UTMB boss, **DR. JIM McKEITH** (UTMB Polar Medicine medical director) and his staff did a very thorough job reviewing these packets and following up on additional necessary studies/waivers. While individuals were carefully screened, with this large age range we certainly cared for a population of patients with the potential for developing medical emergencies typical of this age range in the US population. The Medical Facility (Bldg. 142) was a quaint older structure built by the US Navy in the early 1960s. While it was not optimally laid out by modern standards for patient care, we found it to be very functional. The main trauma bay had two beds with room for a third in the event of a MASCAL. We had modern monitoring equipment, a very nice ultrasound, and all of the infusion sets, crystalloid IV fluids, and surgical instrument sets that you would expect to find in a busy ED in the US.

RIMJ: What is the spectrum of medical conditions, illnesses and injuries seen at the medical facility there? Any unique incidents relative to the Antarctic habitat that you treated, such as seal bites?

DR. WINSLOW: We did see a few cases of minor frostbite in scientists and support personnel and several cases of HAPE (high altitude pulmonary edema) in personnel at the South Pole Station. (South Pole elevation is about 11,000′ Mean Sea Level (MSL) but with low atmospheric pressure the "pressure altitude" is often closer to 13,000′.) No seal or penguin bites, since generally NSF researchers and staff are required to stay at least 25m from all wildlife unless directly involved with tagging or other pre-approved observations. However, we did see a few serious injuries related to the Antarctic environment, including extremity fractures from falls on the ice, compression fractures of the spine from riding in tactical vehicles, and lacerations from slipping on ice or gravel on steep trails. One of the researchers slipped on the ice while working on the Ross Ice Shelf, struck her face on a sled and sustained a through and through laceration of the lip, extending all the way up to the nostril, which required a careful multi-layer repair. Toward the end of the season one of the crewmen on the cargo vessel sustained a severe crush injury of his hand when a 1,000 lb. hatch cover slammed shut on his hand.

RIMJ: What are the diagnostic imaging capabilities at the hospital and what is the capability to respond to emergencies such as appendectomy or acute MI?

DR. WINSLOW: We had a very nice ultrasound machine, tabletop and portable modern digital X-ray machines,

The medical team at McMurdo General Hospital.

The skier statue overlooking downtown McMurdo which is located on Ross Island on the shore of McMurdo Sound. McMurdo, the main U.S. station in Antarctica, is about 2,400 miles south of Christchurch, New Zealand, and 850 miles north of the South Pole.

point-of-care diagnostics, and a microscope. We were well-stocked with crystalloid IV fluids, infusion equipment, oral and injectable medications, but we did not stock blood or blood products. We did exercise our "walking blood bank" since all personnel have been typed, so we could call in appropriate donors, confirm their blood type and that of the recipient and transfuse type specific or O+/– whole blood if necessary. We did not have the capability to cross match, however. We had one scientist with a perforated appendix whom we managed medically with IV antibiotics for about 36 hours until we could Medevac the patient to New Zealand. We also cared for another patient with a posterior circulation stroke, but he was out of the window for tPA and we did not have CT to exclude a CNS bleed. Unlike my previous experience in Antarctica in 2009 where we cared for three patients with ACS, we did not have a patient with ACS this past season. We had one very tragic death of a young USAF NCO who was brought into Medical one morning by our paramedics with CPR in progress and was in PEA arrest. Cardiac ultrasound I performed during resuscitation revealed paradoxical motion of his septum and likely clot in the RV and autopsy conducted in NZ confirmed massive bilateral pulmonary embolism.

RIMJ: How far are you from full-service back-up and what is the protocol to Medevac a patient? And how challenging is that, especially in winter?

DR. WINSLOW: Amundsen-Scott Station (South Pole) is about a 3.5 hour flight by

University of Texas Medical Branch coordinates with National Science Foundation in Polar Medical Operations program

The University of Texas Medical Branch (UTMB Health) and the Center for Polar Medical Operations (CPMO) serve the National Science Foundation's US Antarctic Program (USAP), enabling vital scientific research from the most remote places on earth.

The CPMO is responsible for the medical screening of all USAP participants who travel to Antarctica each year, as well as providing the healthcare providers (physicians, mid-levels and various other clinical roles), resupplying the stations with medical supplies and medications, and real-time medical support via telemedicine and other assets.

UTMB Health has medical opportunities available at the South Pole, McMurdo and Palmer Stations in Antarctica, as well as summer field camps. These positions are seasonal and UTMB maintains a running list of interested candidates for future opportunities.

Due to the Pandemic, the organizations are monitoring and evolving isolation and testing protocols for the scientists, researchers, and volunteers who have historically traveled there seasonally and in summer field camps.

For more information on the program and future volunteer opportunities, visit: https://www.utmb.edu/polar and https://www.usap.gov

LC-130 to McMurdo Station. McMurdo Station is 6 hours by C-17 and 10 hours by LC-130 to Christchurch, NZ (our closest tertiary care center). The weather is generally flyable from McMurdo to Christchurch most days from September until end of February, but one can experience several days of blowing snow and bad visibility which make safe flight impossible. Similarly, the weather can be much worse at outlying field camps or the South Pole, so even in summer it was occasionally necessary to care for patients for a few days before we could get them to NZ for definitive care. During the winter it is dark most of the time and weather can be very bad, so there are normally no flights to or within Antarctica from early June until late August. An emergency Medevac in Antarctica during the winter is truly a heroic event associated with great risk to aircraft and crew and costs millions of dollars. One initiative I took during my time as lead physician was to develop (with the approval of the UTMB Medical Director) a rigorous SOP and checklists/briefing guides for all Medevac and Casevac missions to bring these operations in line with the disciplined procedures we used successfully in Afghanistan and Iraq during my military deployments in those combat operations.

RIMJ: When did you do in your off time?

DR. WINSLOW: McMurdo Station is a very tight knit, yet eclectic community. Julie and I both greatly enjoyed sitting down with random personnel at mealtimes, learned about their life journeys, interests, and their work. Since there is no wireless Internet, people do not carry a cell phone, so we sit and talk to each other a lot. There were also two bars and a coffee shop on base and we often had live music from classical to folk to rock & roll of all types in the evenings. There were also fantastic science lectures on Wednesday and Sunday nights every week given by NSF-funded scientists on topics as diverse as particle physics, penguin or seal biology, geology, oceanography, glaciology, and climate change.

RIMJ: What was the highlight of your tenure there?

DR. WINSLOW: I would say experiencing the natural beauty of this isolated continent, appreciating the beauty of the sunlight on the glaciers and the Ice Shelf and how it changed each day, watching the ice start to break up, seeing Weddell seals sleeping on the ice and giving birth, watching the magnificent penguins as they waddled across the ice (or through town) and seeing their grace as they entered the water. Julie (who had been a history major at Harvard) became a real expert on the heroic era of polar exploration (including Scott and Shackleton) and became certified as a docent to give tours to personnel at Scott's Discovery Hut (which is exactly the same – frozen in time – as it was in 1902–1904). It was also interesting to be a small part of the history of the continent and to support the science that has taken place in Antarctica since those first explorers arrived. We also made many lasting friendships with the people we met. ❖

Dean Winslow, MD, and **Julie Parsonnet, MD**, high above the Ice Shelf. The mean annual temperature is 0°F; temperatures may reach 46°F in summer and –58°F in winter.

Q&A with Alyson McGregor, MD, author of 'Sex Matters'

MARY KORR
RIMJ MANAGING EDITOR

ALYSON McGREGOR, MD, MA, FACEP, an emergency room physician affiliated with Rhode Island Hospital and The Miriam Hospital, has just published the book, "Sex Matters, How Male-Centric Medicine Endangers Women's Health and What We Can Do About It."

The positive reviews of the book, available in multiple formats, make it seem like a logical choice for a summer reading (or Pandemic) list:

"Artfully relayed through storytelling, Dr. McGregor brings several familiar stories from the emergency department to your living room, showcasing the many ways men and women are different and why each requires tailored medical care. Her personal experiences of a tortuous path of advocacy are the foundation of action steps to help readers to take charge of their own health and change the future of medicine."

— Basmah Safdar, Associate Professor, Yale University, Sex and Gender Medicine Expert

"Alyson McGregor is a persuasive and intelligent advocate for the unique health care needs of women. The two sexes are significantly different in all the tissues of the body – even to the way the same genes are expressed. An expert in emergency medical care, her deep and informed knowledge of the way disease presents itself in women ensures their prompt and accurate diagnosis and treatment. She is a powerful force in gender-specific health care."

— Marianne J. Legato, MD, PhD (hon. c.), FACP, Emerita Professor of Clinical Medicine, Columbia University

And while in-person author events are on hold, virtual ones are a click and conversation away. In the following Q&A, RIMJ reached out to Dr. McGregor to share some of her background and early professional experiences with our readers, as well as her reflections on working in an emergency department during the COVID-19 Pandemic.

RIMJ: Can you tell us a little bit about your formative years growing up in Rhode Island?
DR. McGREGOR: I grew up in Coventry. I had a wonderful beginning at Fr. John V. Doyle School and La Salle Academy and made lifelong friends at both.

RIMJ: What led you to pursue the field of medicine, and emergency medicine in particular?
DR. McGREGOR: My father was a RI state police officer. I looked up to him as he worked long hard hours serving the public. I loved science and medicine and thought I would put the desire to help others (and work long hours!) in that way. My mother encouraged me to believe I could accomplish anything with passion and dedication. Becoming an emergency physician was such a natural fit for me. It was that place where you can help people in the critical moments of their lives.

RIMJ: In regards to the role of mentors, who has been the most significant influence on you in your professional life? And in your position at Brown, how is mentorship fostered for students, residents and fellows?
DR. McGREGOR: Mentorship comes in many forms and I have been so grateful to so many along my path. The person who has been the most influential in my career development and national outreach would be Dr. Marjorie Jenkins. She is the current Dean of the University of South Carolina School of Medicine Greenville. We met when I was a junior faculty member at Brown University and she provided sponsorship for pivotal roles in sex and gender education nationally. I was then able to establish novel educational and mentorship programs for medical students, residents and fellows here at Brown University.

PHOTO: ANGELA C. BROWN

BRIEF BIO

Alyson J. McGregor, MD, MA, FACEP

Associate Professor of Emergency Medicine at the Alpert Medical School of Brown University

Co-Founder and Director for the Division of Sex and Gender in Emergency Medicine (SGEM); Director of a SGEM two-year fellowship program and SGEM educational electives for residents and medical students

Co-founder, executive board member, of the national organization Sex and Gender Women's Health Collaborative (SGWHC)

Lead editor for the textbook, "Sex and Gender in Acute Care Medicine" (Cambridge University Press, 2016).

Her TED talk, "Why Medicine Often Has Dangerous Side Effects For Women," currently has over 1.5 million views. (www.ted.com/talks/alyson_mcgregor_why_medicine_often_has_dangerous_side_effects_for_women)

Boston University School of Medicine, MD'03, MA'98

RIMJ: Your book "Sex Matters" has just been published, during the COVID-19 Pandemic. Will you be doing any virtual book or TED talks until in-person events are deemed safe?

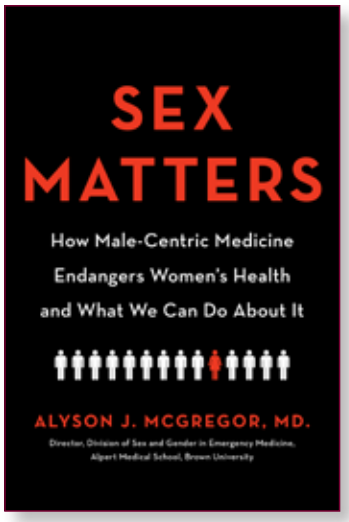
DR. McGREGOR: I had a whole schedule of in-person talks, conferences, interviews both in the US and UK for my book launch. Once the pandemic hit, everything was canceled. It was challenging at first but now that the world has adjusted to this new reality that includes distance, I have been enjoying meeting people across the world via Zoom, Facetime and Skype conducting podcasts and webinars. Links to them can be found on my website (https://www.alysonmcgregormd.com) and twitter@mcgregormd.

RIMJ: As an ED physician practicing during the COVID-19 Pandemic, do you foresee any future research opportunities regarding gender and COVID-19 in its presentation across demographics, incidence, etc.?

DR. McGREGOR: As a practicing ED physician during this pandemic, it has clearly been a challenging time. The ED is a place that runs as a community. It takes a lot of people to care for a lot of patients. Now we are all geared up in PPE and it makes connecting with each other and the patients challenging. It has also highlighted some fault lines in medicine and further demonstrates that biological sex can be a critical component to health and disease severity. Many of us are working very hard to fast track important medications and vaccines, but it is crucial to include both men and women in the studies and to analyze the data in a way that can determine if sex differences exist.

RIMJ: When you leave work behind, how do you relax and regenerate?

DR. McGREGOR: I have a lovely home that is so comforting to me. It's filled with two Portuguese Water Dogs, my husband, lots of gardens and windows… oh, and a wine cellar ☺



COURTESY OF HACHETTE BOOKS, PUBLISHER

Excerpt from 'Sex Matters'

As an undergraduate in the University of New Hampshire's premed program, I took only one elective that wasn't directly related to my major (or, at least, I thought at the time that it wasn't related). That course was women's studies. I loved circling up with other women to talk about the history of women in society and the gender-related issues we faced both individually and collectively. It was illuminating and truly inspiring. When the class ended, and our spirited discussions were replaced in my schedule by yet another biology lab, I felt like a bit of the spark had gone out of my collegiate life.

I didn't know it at the time, but that course—and the questions about sex, gender, and the female experience it sparked in me—would have a profound influence on the trajectory of my career.

When I finished medical school at the Boston University School of Medicine, I applied for a residency at Brown University in my hometown of Providence, Rhode Island. When my residency ended, I wanted to stay on and work there. Because Brown is an academic institution, I needed to choose a research focus in order to apply for a long-term position. When I sat down and thought about it, the only path I wanted to take was one that would improve the lives and health of women. I wanted to know about women's bodies and how those bodies affected (and were affected by) modern medicine—in particular, emergency medicine.

At the time, sex and gender research didn't even exist. My choice to pursue a specialty in women's health felt like a nod to my feminist beliefs and personal philosophy, a way to keep feeding my passion for women's issues.

I had no idea just how deep an ocean I was diving into or how many challenges I would face in bringing women's unique health concerns into the medical mainstream.

When I mentioned to my advisors that I'd like to explore fields related to women's health, the immediate reaction was, "Oh. You want to do OB/GYN."

"No," I'd reply. "I want to study women's health holistically. As in, the overall health of women."

No one seemed to know what I meant. That was my first clue about what was really happening in our medical establishment.

As I discovered, and as I'll share in this book, there is far more to "women's health" than pelvic exams and mammography. Women are different from men in every way, from their DNA on up. The medical practice of differentiating women from men according to their reproductive organs alone is both reductionist and, as it turns out, hugely problematic—but the male-centric model of medicine is so pervasive in our healthcare systems, procedures, and philosophy that many don't even realize it exists. Most people simply assume that women's differences are already being taken into account—yet nothing could be further from the truth.

My research on and passion for this issue has placed me at the forefront of a medical revolution. As a researcher, educator, speaker, and physician, I—and my colleagues in this cutting-edge field—are tasked with integrating emerging information about women's health into the mainstream medical culture. We are advocates for women and their unique bodies in a system that has largely ignored them, marginalized them, and minimized them. We are women (and a few good men) taking a stand for women in a way that has never been done before. ❖

RIH authors publish study comparing incidence of respiratory virus peak incidence among varying age groups

PROVIDENCE – *JAMA Network* recently published a study co-authored by Rhode Island Hospital Medical Director of Epidemiology and Infection Control and Brown University Professor of Medicine **LEONARD A. MERMEL, DO, ScM**, along with **YOUNG JUNE CHOE, MD, PhD**, **MICHAEL A. SMIT, MD, MSPH**, both affiliated with Rhode Island Hospital and The Warren Alpert Medical School of Brown University at the time of the study, now with Hallym University College of Medicine (South Korea) and Children's Hospital Los Angeles and Keck School of Medicine, University of Southern California, respectively.

The study assessed the impact of age on the epidemiology of human respiratory viruses in Rhode Island over a 5-year period 2012 through 2016, examining 6,733 respiratory virus cases. The authors confirmed seasonality of human respiratory viral infections as well as important findings in the order of age groups affected. Namely, they found that most human respiratory viruses first occurred each season in the 0-4-year age group before they occurred in older age groups. This included human coronaviruses. The one exception was influenza which was first detected the 18–64-year age group.

"This publication may have implications regarding the current COVID-19 pandemic. We found that most human respiratory viruses, including human coronaviruses, start in the youngest age groups and then go on to affect older individuals. Thus, as SARS-CoV-2, the cause of COVID-19, continues to circulate and evolve as a human respiratory virus, it too may eventually sequentially affect youngest age groups followed by older people," Dr. Mermel said. "Better understanding this relationship will be important in planning for future community mitigation strategies and the impact of day care and school closures on transmission risk." ❖

RI Foundation awards COVID-19 Behavioral Health Fund grants

The Rhode Island Foundation recently announced $3.7 million in grants to help Rhode Islanders cope with the behavioral health challenges of the COVID-19 crisis. These grants are the first from the COVID-19 Behavioral Health Fund at the Foundation.

More than three dozen organizations, including the Samaritans of Rhode Island, Bradley Hospital and Newport Mental Health, will receive funding from the Foundation's new COVID-19 Behavioral Health Fund. (The full list of awardees and a brief description of what each grant will support is posted here.)

"The health and economic impacts of the COVID-19 pandemic have created significant behavioral health challenges for too many in our community," said **NEIL D. STEINBERG**, president and CEO of the Foundation. "We hope that these grants can help provide support to address the increases in depression, isolation, suicide and substance abuse that we are seeing during these critical times."

The Samaritans of Rhode Island will use its grant to maintain its suicide prevention services, to provide COVID-19 related supportive services, to prepare for returning volunteers and to recruit new volunteers.

"Many funders are delaying grants, government budgets are decimated and fundraising events had to be postponed. At the same time, we expect a surge in daily supported callers as people who already struggle with overwhelming fear cope with the pressures of the COVID-19 experience," said **DENISE PANICHAS**, executive director. "And then, in the months and years ahead, we anticipate a wave of new callers driven to call our listening line by the hopelessness associated with the financial, health and social ramifications of the pandemic. This grant ensures we have the resources to continue responding to all calls for help."

Bradley Hospital will expand the services of its Kids' Link RI behavioral health triage and referral network. This award will help Kids' Link RI provide support for children who are impacted by the coronavirus (COVID-19) pandemic and in emotional crisis. Bradley Hospital will also use the funding to provide suicide prevention training to school personnel statewide and install tablet-based work stations at Bradley and the emergency department at Hasbro Children's Hospital to provide psychiatric telemedicine.

"We are in unchartered territory as a nation, state, health care system, and even as hospitals," said Bradley Hospital President and Chief Medical Officer **HENRY T. SACHS III, MD**. "We are very fortunate to have an excellent communication process at Lifespan and with our state government that has allowed us to navigate these dynamic times as effectively as possible, including rapid expansion of our Kids' Link RI™ program to serve as a clearinghouse for almost all child, adolescent, and family behavioral health concerns across the state during this time of significant stress."

The Foundation created the COVID-19 Behavioral Health Fund in partnership with the state Office of the Health Insurance Commissioner with more than $5 million in funding from Blue Cross & Blue Shield of Rhode Island, Neighborhood Health Plan of Rhode Island, Tufts Health Plan and UnitedHealthCare.

"The mental health and substance use disorder treatment community is absolutely critical through this pandemic and beyond. These grants serve as a means for health insurers to collectively provide some of the essential health care supports we need to persevere and recover," said **MARIE GANIM**, state insurance commissioner.

The COVID-19 behavioral health fund awarded grants to organizations that:

- Support evidence-informed programs that meet a specific local need related to the COVID-19 pandemic; and
- Support operating expenses necessary to continue delivery of behavioral health services.
- Serve communities that are disproportionately impacted by behavioral health issues and are underserved by behavioral health supports.

The Foundation expects to announce a second round of grants from the fund later this summer. ❖

Study finds only 3% of individuals with autism receive recommended genetic tests

Tests can identify or rule out abnormalities that could impact clinical care, but a study from the R.I. Consortium for Autism Research and Treatment finds that most people with autism spectrum disorder don't receive them.

PROVIDENCE, BROWN UNIVERSITY – A study analyzing data from the Rhode Island Consortium for Autism Research and Treatment (RI-CART) found that only 3% of individuals diagnosed with autism spectrum disorder reported having fully received clinical genetic tests recommended by medical professional societies.

The results bring to light a dissonance between professional recommendations and clinical practice, the researchers behind the study say.

Autism spectrum disorder is one of the most strongly genetic neuropsychiatric conditions. Medical professional societies – such as the American Academy of Pediatrics, the American College of Medical Genetics, and the American Academy of Child and Adolescent Psychiatry – recommend offering chromosomal microarray testing and Fragile X testing for patients diagnosed with autism. The tests can identify or rule out genetic abnormalities that could have implications in a patient's diagnosis and clinical care.

The study, published in *JAMA Psychiatry* on May 13, analyzed 1,280 participants with autism spectrum disorder based on medical records and self-reported data from the time period of April 2013 to April 2019. The participants are enrolled with RI-CART, a public-private-academic collaborative focused on advancing research and building community among individuals with autism spectrum disorder in Rhode Island and their families. The study's goal was to determine the current state of clinical genetic testing for autism in this cohort, said authors **DR. DANIEL MORENO DE LUCA** and **DR. ERIC MORROW**.

Of the 1,280 participants, 16.5% reported having received some genetic testing, with 13.2% stating they received Fragile X testing, and 4.5% reporting that they received chromosomal microarray testing. However, only 3% of participants reported having received both recommended tests.

"I had the impression that the frequency of recommended genetic testing was not going to be very high based on the patients I encounter clinically, but 3% is actually lower than I thought it would be," said Moreno De Luca, an assistant professor of psychiatry and human behavior at Brown University, who is affiliated with the Carney Institute for Brain Science, and a psychiatrist at Bradley Hospital. "A higher proportion has had either test individually, and the proportion of people with chromosomal microarray is higher in recent calendar years, which is a hopeful glimpse for people who are being diagnosed recently and who may be younger. However, this underscores that there is still significant work to be done, especially for adults on the autism spectrum."

In the study, researchers examine possible reasons for the gap between clinical practice and the recommendations from medical professional societies. Age was among the most prominent, as people with autism in older age groups are less likely to be tested. According to the study, adults with autism were generally unlikely to have undergone the clinical genetic tests.

The researchers also found that patients diagnosed by subspecialist pediatricians were more likely to report genetic testing as compared to those diagnosed by psychiatrists and psychologists.

"This paper is really about how you implement clinical genetic tests in the clinical diagnostic setting," said Dr. Eric Morrow, an associate professor of biology at Brown and director of the Developmental Disorders Genetics Research Program at Bradley Hospital. "There is rapid progress from research, and then there's the doctor and health systems that need to translate that to clinical practice. The clinics need to set up more support to educate clinicians and families about genetics and autism. Generally, this is done by genetic counselors who may be rare in autism clinics."

Furthermore, the researchers found that nearly 10% of participants who received an autism spectrum disorder diagnosis between 2010 and 2014 reported receiving chromosomal microarray testing, one of the more modern genetic tests. Compared to those in the study who received a diagnosis in years before 2010, this showed an increase in self-reported testing.

"There is a more hopeful message that conveys that the success in implementing clinical genetic testing is increasing," said Morrow, who is affiliated with the Carney Institute, co-leads the Autism Initiative at the Hassenfeld Child Health Innovation Institute at Brown and directs the University's Center for Translational Neuroscience.

Based at Bradley Hospital in East Providence, the team behind RI-CART represents a partnership between researchers at Brown, Bradley Hospital and Women and Infants that also involves nearly every site of service for people on the autism spectrum and their families in Rhode Island. ❖

URI offers new online Master's program in health care management

KINGSTON, APRIL 28, 2020 – One of the keys to learning is the sharing of ideas and experiences, listening to a classmate's point of view and brainstorming solutions.

That couldn't be truer than in the University of Rhode Island's new online graduate program in health care management. And in a program geared toward health care professionals, those experiences now regularly include dealing with the COVID-19 pandemic in one form or another.

"The whole program is about managing real-life issues and these students are health care leaders or aspiring leaders," says **KATHRYN JERVIS**, director of the graduate program and a professor of accounting. "These are extremely important discussions to share information about current health care events."

The Master of Science in Healthcare Management, offered through the College of Business, opened in January and starts its first summer course May 5. The program is geared toward current and future health care professionals, preparing them to integrate leadership and knowledge of health care systems to enhance the management of patient care and quality of health organizations. The graduate program is part of the University's new degree and certificate initiative, URI Online.

"In a focus group and through surveys, we found that health care practitioners desire knowledge about business concepts, skills and tools to deliver high-quality care efficiently and effectively," says Jervis. "Providing health care is an extremely complex process to manage. Whether a clinician or a health care administrator, professionals often require leadership skills, ability to manage finances, data management, quality and process improvement, and a basic understanding of laws, ethics and public relations."

When the graduate program started in January, the coronavirus was just becoming identified in China. In the program's first class on leadership in health care, students already were sharing experiences about the crisis during online discussions, and that has continued in Jervis' class on financial management of health care.

"Every single person on the planet has been impacted by COVID-19 in some way – whether that be financial, loss of an experience, increased work hours, disruption of daily routine," says **KARLI COLLINS**, an assistant athletic trainer at URI and a student in the program. "While this course is financial management, we are able to still bring discussions about our experiences in our various professions."

Those discussions have included the impact of health care reforms and how the crisis has affected classmates who come from varied professional backgrounds.

"Our class discussions and readings have been enjoyably diverse with the range of perspectives we all have from various careers in health care," says Collins, of West Kingston. "Experiences shared have been from those working in a pharmacy, a hospital, urgent care, insurance administration, patient care and business administration."

Collins' experiences include serving as assistant athletic trainer for softball and football at URI and three years at the University of Louisiana in Lafayette. Since mid-March, she has been working remotely, conducting telemedicine visits with athletes and communicating with coaches, support staff and strength coaches. She also works as an emergency medical technician. During the crisis, she has volunteered with the Rhode Island Medical Reserve Corps, assisting with inventory, stocking and preparing supplies. Collins, who has a master's degree in sports and exercise science, is pursuing the master's in health care management with the goal of moving into the administrative side of athletics.

The experiences **MARTIN LAFFERTY** have shared come from a long career in the military, a background in civil engineering and now chief of facilities at the Veterans Affairs Medical Center in Providence. Lafferty, who was commissioned an Army officer at URI in 1981, retired from the Army in 2015 as a colonel.

"The older – or as Professor Jervis says, the nontraditional – students tend to have a deeper pocket from which to pull personal experiences," says Lafferty, of Saunderstown. "These personal vignettes augment the textbook material and add a greater texture to the discussion. It illustrates contextually how the classroom presentation plays out in the real world."

At the VA Medical Center, Lafferty has seen COVID-19 become the primary focus. The hospital has increased its surge capacity, improved its internal protection measures and pared the staff to only essential workers to reduce exposure – while also increasing telehealth outreach and providing non-virus care, says Lafferty, who is acting associate director of operations and incident coordinator for the medical center's pandemic response.

While the financial management course material doesn't directly address the crisis, it does touch on such issues as the general wellness of the population and health care industry and legislative efforts to improve quality and value of care. "The net result could be healthier citizens who are better prepared for pandemic threats," he says.

Lafferty says he's found the course and program challenging, especially as his days can stretch to 12 to 14 hours at the hospital. "This program provides those of us in health care with the ability to expand our knowledge base and the opportunity and flexibility to participate," he says. "I could not have gotten this experience any other way."

The online Master in Science Healthcare Management degree is a 30-credit graduate program that includes two stackable certificates – Health Leadership and Administration, and Quality Improvement, Process Measurement, and Information Systems Management – that can also be earned separately. To earn the master's degree, students must complete the certificates, and an elective course and a final practicum. The structure of the seven-week, online courses allows students to move at their own pace, meeting deadlines for assignments. But students have the opportunity to finish the degree in two years with courses offered during the fall, spring and summer semesters. Students may enter the program during any semester. The summer semester started May 5. ❖

Appointments

Alan Daniels, MD, named Spine Surgery Division Chief at University Orthopedics

EAST PROVIDENCE – University Orthopedics recently announced that **ALAN DANIELS, MD**, has been appointed to Chief of the Division of Spine Surgery.

Dr. Daniels has been a member of the University Orthopedics family for years – completing both his residency training and his Trauma and Spine Fellowships here. He has been serving as Interim Chief since August of 2019 – helping to guide the Department of Orthopaedics through a very difficult time after the untimely passing of his predecessor, Dr. Mark Palumbo.

"In his time as Interim Chief, Dr. Daniels has worked diligently with the Spine Service physicians and we could not be any more thrilled that he has agreed to take on this role permanently," said **DR. EDWARD AKELMAN**, President of University Orthopedics. "In addition to the wealth of knowledge and insight he brings to his specialty, Dr. Daniels is committed to a higher level of patient care – a mission that is at the very heart of our practice. "

Dr. Daniels is a board-certified spine surgeon who specializes in complex spinal disorders. He serves as the Chief of the Adult Spinal Deformity Service at Rhode Island Hospital and The Miriam Hospital. He is also the Director of Spine Surgery Research, an Associate Professor of Orthopaedic Surgery at The Warren Alpert Medical School of Brown University, and Co-Director of the Brown Spine Surgery Fellowship. ❖

URI Nursing Professor Betty Rambur appointed to Medicare Payment Advisory Commission

KINGSTON, URI, MAY 27, 2020 – University of Rhode Island College of Nursing Professor **BETTY RAMBUR** has been appointed a commissioner on the Medicare Payment Advisory Commission, which holds a powerful role in advising Congress on Medicare policy.

Rambur, the College's Routhier Endowed Chair for Practice and Professor of Nursing, joins Harvard Medical School Professor of Health Care Policy Michael Chernew, and President and Professor of Internal Medicine and Health Policy and Management at the State University of New York Wayne Riley on the commission, announced Gene Dodaro, Comptroller General of the United States and head of the U.S. Government Accountability Office.

Congress established MedPAC in 1997 to analyze access to care, cost and quality of care, and other key issues affecting Medicare. MedPAC advises Congress on payments to providers in Medicare's traditional fee-for-service programs and to health plans participating in the Medicare Advantage program. The Comptroller General is responsible for naming new commission members.

Rambur has been a national leader in health policy and health reform for 25 years. She is a recognized leader in the area of workforce redesign within alternative payment models and a Fellow in the American Academy of Nursing. She served as the only nurse on Vermont's Green Mountain Care Board, which regulates health care in Vermont and provides oversight of the transition from fee-for-service to value-based care. Her particular focus is population health, reducing disparities and overtreatment, cost containment and reconceptualized models of care, including primary care nursing and e-connected/virtual care.

"I am thrilled to be appointed to the Medicare Payment Advisory Commission," Rambur said. "It is truly an honor to join this distinguished Commission and staff as we grapple with the complex challenges of Medicare payment and policy. I am eager to lend my experience and expertise as we collectively advise Congress in its critical efforts to analyze and implement Medicare policy in the best interests of the nation."

Previously, Rambur led North Dakota's statewide health reform efforts that resulted in omnibus health reform legislation. Her 2015 book, Health Care Finance, Economics, and Policy for Nurses, provides a user-friendly guide to support nurses' effectiveness and contributions to organizations in rapid transition in response to evolving financial and reimbursement incentives. A second edition is slated for 2021. ❖

Recognition

Dr. Andrew Zullo receives AGS New Investigator Award

ANDREW ZULLO, PharmD, ScM, PhD is among the four recipients of the American Geriatric Society (AGS) Health in Aging Foundation New Investigator Awards, which honors individuals whose original research reflects new insights in geriatrics and a commitment to the discipline's role in academia.

Dr. Zullo is an assistant professor of health services, policy, and practice specializing in geriatric pharmacoepidemiology, comparative effectiveness and safety research, and health services research at the Brown University School of Public Health. His research focuses on improving medication use for older adults, especially those receiving post-acute care or residing in long-term care settings. Additionally, he practices as a geriatric pharmacist and leads the non-experimental research activities for the Department of Pharmacy at Lifespan.

Dr. Zullo has published over 65 peer-reviewed manuscripts in geriatrics and other journals, and his research is supported by the National Institute on Aging. ❖

American Geriatrics Society (AGS) honors John B. Murphy, MD

NEW YORK, MAY 8, 2020 – The American Geriatrics Society (AGS) recently announced that **JOHN B. MURPHY, MD**, has been selected as the recipient of the 2020 Dennis W. Jahnigen Award celebrating work to train health professionals in the care we all need as we age.

Dr. Murphy, President of Rhode Island Hospital/Hasbro Children's Hospital, executive vice president of physician affairs at Lifespan and a professor of medicine and family medicine at the Warren Alpert Medical School, has dedicated nearly four decades to advancing geriatrics and gerontology, helping lead innovation vital to New England and beyond.

"We know the cornerstones of better care for us all as we age: Improved clinical practice, and better education to make that care possible," notes **SUNNY LINNEBUR**, PharmD, FCCP, FASCP, BCPS, BCGP, AGS board chair. "Dr. Murphy is a force to be reckoned with on both fronts: Improving care quality for older adults while also using those improvements to model the way for a geriatrics workforce whose expertise is needed now more than ever."

Dr. Murphy not only helped launch Lifespan's innovating Palliative Care Consultation Program, which seeks to connect those with advanced or serious chronic illnesses to services that can address discomfort as well as physical, emotional, and spiritual needs, but also facilitated the launch of a novel program for helping geriatrics experts and orthopedic surgeons co-manage care for older people hospitalized with hip fractures. The latter program reduced mortality, re-hospitalization, and the risk for complications, and also served as a model for the launch of AGS Co-Care: Ortho™ – a new AGS offering that has expanded the scope of co-management opportunities to health systems across the U.S.

In his current roles at Lifespan and Brown, Dr. Murphy directs everything from leading Rhode Island Hospital/Hasbro Children's Hospital (a 719-person tertiary care hospital and the principal teaching hospital of Alpert Medical School) to overseeing graduate medical education, quality, and safety across multiple system-wide clinical service lines (including those for cancer, cardiovascular concerns, and diagnostic imaging). He also is responsible for system-wide pharmacy, laboratory, and supply chain purchasing, as well as Lifespan research, all with an operating budget of $2.2 billion and a research portfolio valued at $95 million. From 2004 to 2008, Dr. Murphy served as the director of graduate medical education and designated institutional official for Lifespan, which serves 650 residents and fellows.

Dr. Murphy honed much of the expertise he brings to this work over a 40-year career as an educator at Brown, where he began work as a family medicine resident in 1980. Dr. Murphy went on to serve Brown in a variety of roles, including the director of the division of geriatrics from 1986 to 2003 and director of education from 2000 to 2003. His efforts included initiatives to enhance geriatric education for primary care providers in China (Shanghai and Beijing) and Jordan.

An AGS member since 1984, Dr. Murphy served on the AGS Board of Directors from 2003 to 2010, including stints as AGS president from 2008 to 2009 and board chair from 2009 to 2010. He served as an author or on the editorial board of the AGS's Geriatrics Review Syllabus from its second to sixth edition. He earned his medical degree from SUNY Downstate Health Sciences University in 1980, later pursuing board certification in family medicine and geriatrics. ❖

Brown establishes COVID-19 Research Seed Fund; 15 awardees named

Fifteen teams of Brown faculty researchers have received a total of $350,000 from the University's new COVID-19 Research Seed Fund. Brown established the fund to fast track innovative research proposals that directly address the urgent needs of the COVID-19 pandemic. The awards will support research with the potential for significant and rapid impact on human health and research that could create products of immediate need for the healthcare system in Rhode Island and the nation.

Awards

Co-PIs: Rosa Baier, Center for Long-Term Care Quality & Innovation, School of Public Health; **Elizabeth White**, Center for Gerontology & Healthcare Research, School of Public Health; **Terrie Fox Wetle**, Center for Gerontology & Health Care Research

An electronic survey will be administered to frontline staff working in nursing homes and other long-term care settings across the country to capture and rapidly disseminate best practices.

PI: Lalit Beura, Molecular Microbiology and Immunology

With males apparently at higher risk for infection and death from COVID-19, this project will test, in a mouse model, the role of testosterone in disease severity.

PI: Ugur Cetintemel, Computer Science
Co-PIs: Harrison Bai, Diagnostic Imaging, **Ritambhara Singh**, Computer Science

This research will develop an AI platform to differentiate COVID-19 from other viral pneumonia on chest CT, and use the information to identify early-stage patients who are likely to transition to severe disease.

PI: Elizabeth Chen, Brown Center for Biomedical Informatics
Co-PIs: Philip Chan, Medicine; **A. Rani Elwy**, Psychiatry and Human Behavior; **Fizza Gillani**, Medicine; **Joseph W. Hogan**, Biostatistics; **Sorin Istrail**, Computer Science; **Indra Neil Sarkar**, Brown Center for Biomedical Informatics and Rhode Island Quality Institute.

This project will establish an inter-institutional informatics infrastructure to support COVID-19 research in Rhode Island through electronic health data, digital health technology, and data science techniques.

PI: Wafik El-Deiry, Pathology and Laboratory Medicine

This research aims to reduce the virus' capacity to cause death, through immune modulation and discovery of drugs that block it.

PI: William Fairbrother, Molecular Biology, Cell Biology and Biochemistry

This project aims to develop a sample unit for a potential home testing kit for COVID-19.

PIs: Daniel Harris, **Jacob Rosenstein**, **Roberto Zenit**, School of Engineering

Ventilators are among the most critical aspects of COVID-19 treatment, and this project is aimed at speeding their production through a new design using 3D printed and off-the-shelf parts that can be produced rapidly and locally.

PI: Edward Hawrot, Biology and Medical Science
Co-PIs: Bharat Ramratnam, Medicine; **Gregory Jay**, Emergency Medicine and Engineering; **Francesca Beaudoin**, Emergency Medicine.

An inter-institutional blood biorepository to support COVID-19 research in Rhode Island will be created.

PI: Amanda Jamieson, Molecular Microbiology and Immunology
Co-Is: Emily Oster, Economics; **Jeffrey Bailey**, Pathology and Laboratory Medicine ; **Shaolei Lu**, Pathology and Laboratory Medicine; **James Barbeau**, Pathology and Laboratory Medicine.

Responding to the existence of a large number of asymptomatic COVID-19 cases, this research seeks to gain a broader understanding of how widespread exposure to the COVID-19 virus is in the local population.

PI: Amanda Jamieson, Molecular Microbiology and Immunology
Collaborators: Graphene Composites Limited.

This research will test the ability of graphene/silver nanoparticle ink formulation to be used in personal protective equipment as a way of reducing virus transmission rates.

PI: Chun Lee, Molecular Microbiology and Immunology
Co-PIs: Jack A. Elias, Medicine; **Suchitra Kamle**, Molecular Microbiology and Immunology; **Bing Ma**, Molecular Microbiology and Immunology; **Bharat Ramratnam**, Medicine

This research will test whether Chitinase 3-like 1 (Chi3l1), a powerful inhibitor of epithelial cell death, can be used as a biomarker of CoV-2 infection that predicts disease severity and progression.

PI: Eleftherios Mylonakis, Infectious Diseases
Co-PI: Philip Chan, Medicine, Behavioral and Social Sciences

A statewide Rhode Island model will be created to understand the epidemiology and clinical outcomes of patients hospitalized with COVID-19.

PIs: Mandar Naik, Molecular Pharmacology, Physiology and Biotechnology; **Walter Atwood**, Molecular Biology, Cell Biology and Biochemistry; **Gerwald Jogl**, Molecular Biology, Cell Biology and Biochemistry; **Nicolas Fawzi**, Molecular Pharmacology, Physiology and Biotechnology

This research will identify inhibitors of the CoV2 N protein that can potentially be further developed as drugs against coronaviruses.

PI: Anubhav Tripathi, School of Engineering, Biomedical Engineering; **Rami Kantor**, Infectious Diseases

This project will develop a molecular surveillance tool and capacity to monitor spread of the virus regionally and beyond.

PI: Ira Wilson, Health Services, Policy and Practice
Co-PIs: **Omar Galarraga**, Health Services, Policy and Practice; **Amal Trivedi**, Health Services, Policy and Practice

This research will review health care claims in Rhode Island to examine the impact of COVID-19 social distancing measures on health care utilization and outcomes, particularly for the most needy people, such as chronically-ill patients

Obituaries

PETER B. BAUTE, MD, 86, of Block Island and Wakefield, RI, died at home on April 4, 2020. He was the beloved husband of Cynthia (Cindy) Baute.

He was a graduate of Lockwood High School and the University of New Hampshire. After receiving his medical degree from the Hahnemann School of Medicine in Philadelphia in 1960, he completed a fellowship in tropical medicine at Gorgas Memorial Laboratory in Panama. He then served as a Lieutenant in the US Navy Medical Corps from 1961–1964, spending two years in South Vietnam and one at the Newport Naval Hospital. Peter pursued his residency in general surgery at Wayne State University Hospitals in Detroit, serving as chief resident from 1968–1969. He was board certified by the American Board of Surgery and a fellow of the American College of Surgeons.

Peter joined the staff of Kent County Memorial Hospital in 1968, where he was Assistant Chief of Surgery from 1979–1981 and Chief of Surgery from 1981–1984. With Drs. Arthur Hardy and Richard Dyer, they formed Toll Gate Surgical Associates, Inc. Their practice expanded to include Drs. Daniel Reardon, David Luz, Candace Dyer and John Isaac. Peter was the managing partner of Toll Gate Associates, a medical office building partnership.

Throughout his career, Peter engaged extensively in research, teaching, and professional leadership. He published journal articles on breast cancer research in surgery, gynecology and obstetrics and radiology, and delivered numerous presentations on cancer care. He twice directed American College of Surgeons (ACS) Courses on Cancer Management and served as State Chairman for the ACS Commission on Cancer. He chaired the Kent County Hospital Cancer Committee and developed a model community cancer program which received accreditation by the ACS Commission on Cancer. He was President of the Providence Surgical Society from 1985–1986, served on the Executive Committee of the New England Surgical Society and was a Cancer Program Surveyor for the Commission on Cancer. Peter also volunteered on surgical teams in Honduras and Nepal. In retirement, he was a volunteer physician at the Rhode Island Free Clinic for eight years.

Peter determined that he would stop doing surgery when he turned 65 and he did, but he could not give up the practice of medicine. Instead, in 2001 he accepted a position as Co-Medical Director at Block Island Health Services. For many years, Pete had covered for island doctors on leave. He and Cindy had fallen in love with Block Island and built a home on the island. He confessed to a friend that retooling from surgery to primary care was a major challenge in late career, but he loved getting to know each patient, their family members, even their pets, a few of which were also seen "professionally" in emergencies. After retiring in 2006, Peter completed URI's Master Gardening Program and volunteered at the Roger Williams Botanical Gardens. He was elected to the New Shoreham Town Council in 2006 and served for three terms where he successfully championed the wind farm and expanded solar power on the island. His passionate efforts to create bike paths on the island did not come to fruition but he retained hope in that quest.

In addition to his wife Cindy, Peter is survived by siblings, Joseph Baute and his wife Stephanie; Barbara Dowd, MD, and Robert Baute, MD, and his wife Barbara J. Baute. He was predeceased by brother-in-law, Thomas Dowd, MD and sister-in- law, Cynthia F. Baute. Peter is also survived by four children, Linda Crosette, Peter Baute, Jr, Barbara Baute, and Michael Baute; six grandchildren, several nieces and nephews, and by Cindy's daughters, Kimberly Cardarelli and Jennifer Koziol and grandson Colby Cardarelli.

A Mass of Christian burial will be celebrated when it is possible for family and friends to gather.

Pete will be remembered for his sharp powers of observation and analysis, his quiet wit, his dedication to public service and his devotion to the promotion of health care in a wide range of settings. In 2018, Block Island Health Services established an endowment for the Peter Baute Award to recognize individuals who demonstrate the traits that are Peter's legacy: exceptional interpersonal skills and compassion coupled with a high level of acumen in delivering healthcare on Block Island and also to support health education and research advancing knowledge and awareness of wellness on Block Island. Memorial gifts may be directed to Block Island Health Services, Box 919, Block Island, RI 02807 or to the Rhode Island Free Clinic, 655 Broad Street, Providence, RI 02907. ❖

VINCENT A. DEROBBIO, MD, 86, passed away peacefully at the RI Veterans Home on May 13, 2020. He was the beloved husband of the late Patricia (Gasbarro) DeRobbio for 53 years. Born in Providence, he was the son of the late Angelo and Gesualda (Castaldi) DeRobbio.

He was a graduate of Classical High School, Class of 1951, and Providence College, Class of 1955. He attended Dalhousie Medical School in Nova Scotia, Canada, and upon completion of his medical training, he became an officer in the Naval Medical Corps. Dr. DeRobbio practiced internal medicine in RI until 1980 and then specialized in occupational medicine working for New Jersey Bell. His last position was as Medical Director at the RI Veterans Home in Bristol. Special thanks are extended to

the nurses and staff of Bravo 1 at the RI Veterans Home for the love shown and the exceptional care given Dr. "D" during his stay at the facility.

He is survived by his daughters, Patti-Dee Cioe (Ronald) of Warwick, Michele Kovacs (Charles) of Manchester, NJ and Sandra Manco of Cranston. He was also the father of the late Tracey DeRobbio-Laranjo. He was the grandfather of Nicholas J. and Christopher J. Cioe, Jillian Marsiglia, Anthony J. and John A. Cunha, Elisha Curran, and Vincent DeRobbio and Tyler Laranjo, as well as 13 great-grandchildren. He was the brother of Richard DeRobbio and the late Madelaine DeRobbio.

His funeral and burial will be private due to the current health protocol. In lieu of flowers, memorial donations in his memory may be made to America's Vet Dogs, 371 East Jericho Turnpike, Smithtown, NY 11787, or the Rhode Island Veterans Home, 480 Metacom Ave, Bristol, RI 02829. maceroni.com ❖

ANDREW EDMUND SLABY, MD, PhD, MPH, 78, died peacefully on May 4, 2020, from complications from COVID-19. Dr. Slaby was a psychiatrist in private practice in New York, New York as well as in Summit, New Jersey. Dr. Slaby also served as a clinical professor of psychiatry at New York University School of Medicine, and as an adjunct professor in the Department of Psychiatry and Behavioral Sciences at New York Medical College. He was President of the HealthCare Chaplaincy Network; a board member of the Albert Ellis Institute; a member of the National Board of the American Foundation of Suicide Prevention; Treasurer of the Board of the International Academy of Law & Mental Health; and co-chair of the Decorative Arts Committee of the National Arts Club. Dr. Slaby earned a Doctor of Medicine degree from Columbia University's College of Physicians & Surgeons, a Doctor of Philosophy degree as well as a Master of Public Health from Yale University, and a Bachelor of Science degree from the University of Wisconsin.

In 1978, Dr. Slaby moved to Brown University (working with Yale Psychiatry alumni, Richard Goldberg, MD, and Peter Kramer, MD) as professor of Psychiatry and Psychiatrist-in-Chief of Rhode Island Hospital and then, in 1979, Women & Infants Hospital.

In addition, Dr. Slaby served in the United States Public Health Service, stationed at The Staff College, National Institute of Mental Health, and at the United States Public Health Service, stationed at the Laboratory of Clinical Psychopharmacology.

Andrew is survived by Rosemarie Dackerman, his partner of 25 years, as well as by his sisters Constance Curtis (Gary Curtis, husband); Doreen Slaby (Bill Delo, husband); and sister-in-law Maureen Slaby (Theodore Slaby, deceased husband).

In addition, Andrew is survived by nephews: Shaun Curtis (Sarah Curtis, wife); Shannon Curtis (Sasha Curtis, wife); Stefan Curtis (Katy Curtis, wife); Jeffrey Slaby (Carlene Slaby, wife); Theodore Slaby, Jr. (Kerry Houlihan Slaby, wife); and nieces Sierra Curtis; and Jill Slaby-Rotunda (FJ Rotunda, husband). Andrew is also survived by six great nieces and nephews.

In lieu of flowers, donations may be made in Andrew Slaby's memory to the Albert Ellis Institute; the American Foundation for Suicide Prevention; the HealthCare Chaplaincy; the National Arts Club; the New York Junior League and the Single Parent Resource Center. For more information, please contact Angela Ippolito at angela@ippolitofuneralhomes.com. ❖

From the Civil War to the Present: A Snapshot of Floating Hospitals

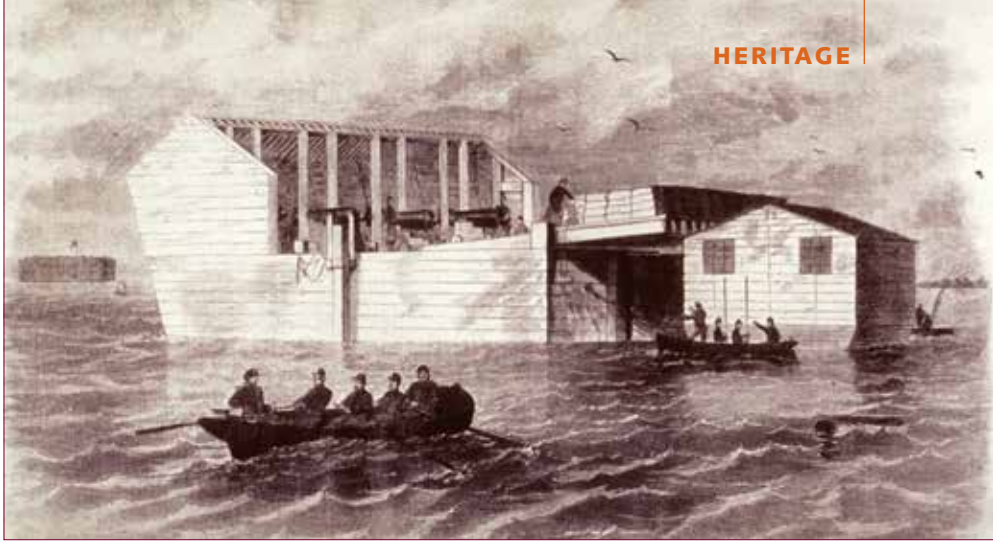
MARY KORR
RIMJ MANAGING EDITOR

The following pages offer a graphic glimpse into the strategic role floating hospitals have played in taking care of the wartime wounded and the most vulnerable in American society over the centuries.

From the Civil War to the present, from the Mississippi to the Narragansett waterways, these ships and their dedicated cadre of healthcare providers have made a difference in the lives of those facing war, contagion and what today is termed health inequities.

The historic photos and illustrations also capture the dedication of photographers, artists and journalists who pursued these stories relentlessly, whether working for the illustrated weeklies of a bygone journalistic era or for the government and military of yesteryear as well as today.

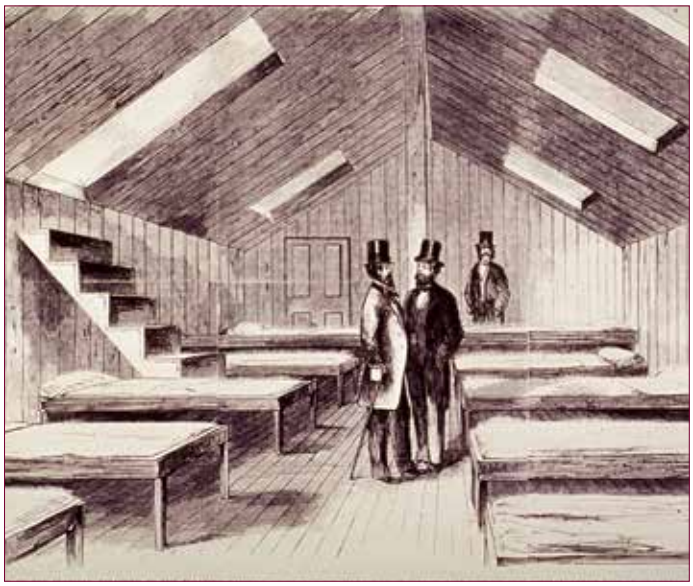
The final piece on the Providence Floating Hospital, which first appeared in RIMJ in 2015, is the home-town story the City can be proud of. ❖



Dr. Columbus DaVega
[WARING HISTORICAL LIBRARY, MEDICAL COLLEGE OF THE STATE OF SOUTH CAROLINA]

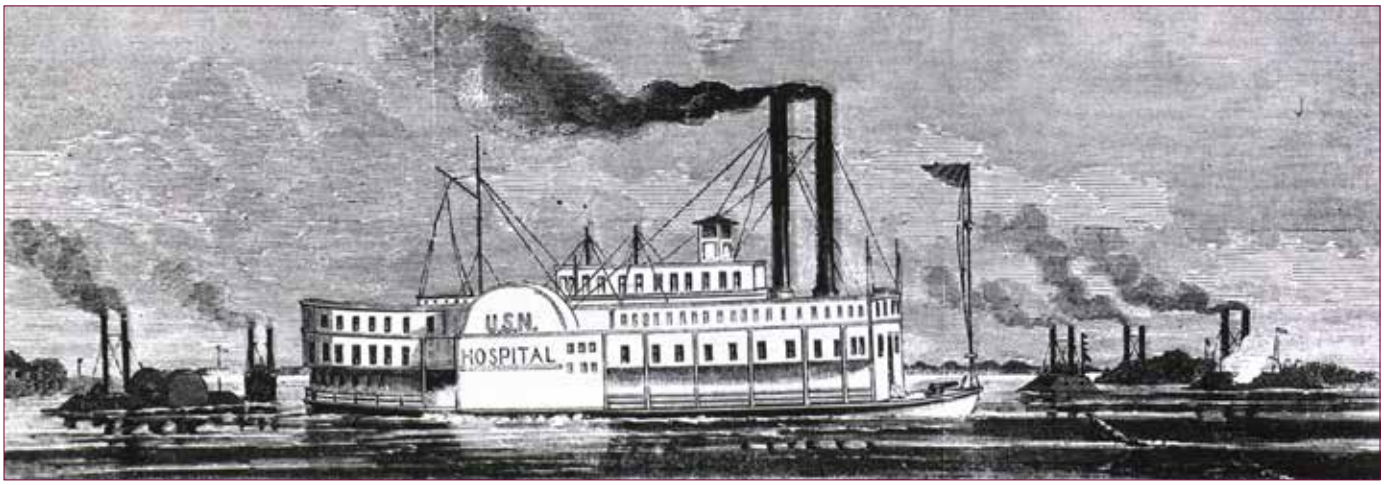
Charleston, South Carolina, 1861

Interior and exterior views of the floating battery and hospital in Charleston Harbor. During the Civil War, Dr. Columbus DaVega served as a surgeon aboard the hospital, which had 10 beds and medical supplies to treat soldiers wounded on the battery, built to attack Fort Sumter from the water.
[NATIONAL LIBRARY OF MEDICINE, FRANK LESLIE'S ILLUSTRATED NEWSPAPER, 1861]



USS Red Rover, 1863

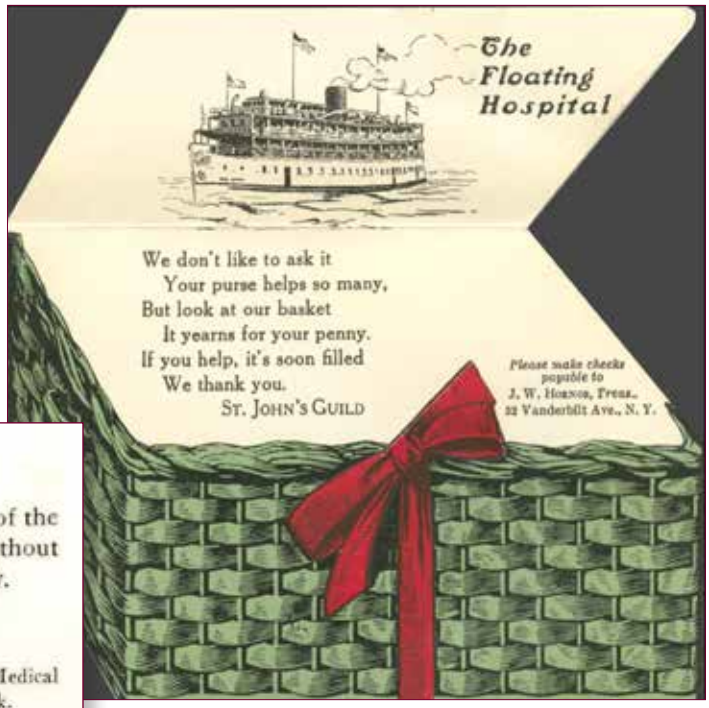
This illustration of the USS Red Rover, the first US Navy floating hospital, appeared in Harper's Weekly on May 9, 1863. The steamer was captured from the Confederacy and used as a hospital ship during the Civil War as part of the Mississippi Squadron. Its medical staff included nurses from the Sisters of the Holy Cross, the first female nurses to serve on board a Navy ship. In addition to caring for and transporting sick and wounded men, the ship provided medical supplies to Navy ships plying the Mississippi waterways. [THE NATIONAL LIBRARY OF MEDICINE]



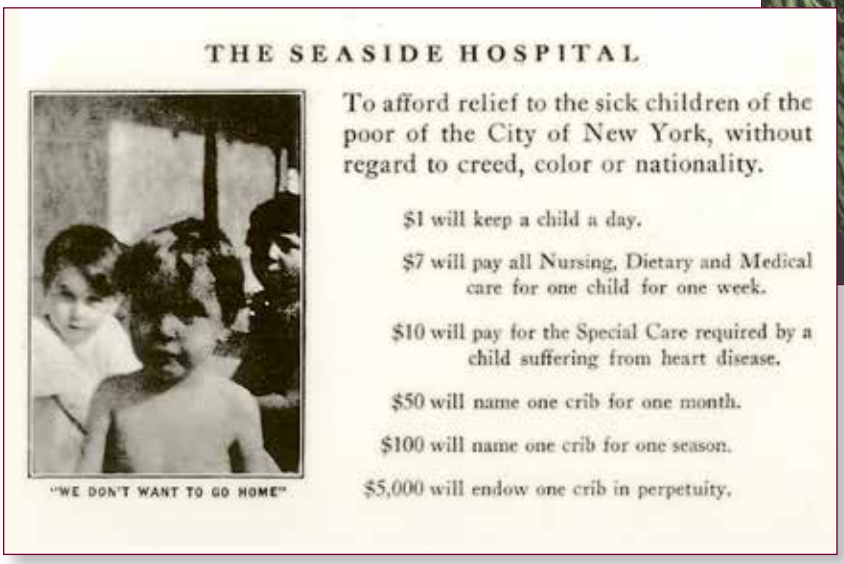
The Helen C. Juilliard, (above), a riverboat used as a hospital, was operated for the poor by St. John's Guild in New York Harbor, shown here in the early 1900s. [LIBRARY OF CONGRESS]

St. John's Guild, 1866

Founded in 1866, The Floating Hospital was one of the first healthcare charities in New York City, dedicated to caring for the sick children of families living in tenement homes. While they were aboard, the staff of pediatricians, dentists, nurses, and social workers would provide healthcare services to indigent children and health and nutrition education to their parents and caregivers. ❖



According to its website, thefloatinghospital.org, "We were a revolutionary concept in the late 1800s, turning the routine occurrence of quarantine barges into a health excursion that combined medical care, healthy eating, and entertainment into one experience." [THEFLOATINGHOSPITAL.ORG]


THE SEASIDE HOSPITAL

"WE DON'T WANT TO GO HOME"

To afford relief to the sick children of the poor of the City of New York, without regard to creed, color or nationality.

$1 will keep a child a day.

$7 will pay all Nursing, Dietary and Medical care for one child for one week.

$10 will pay for the Special Care required by a child suffering from heart disease.

$50 will name one crib for one month.

$100 will name one crib for one season.

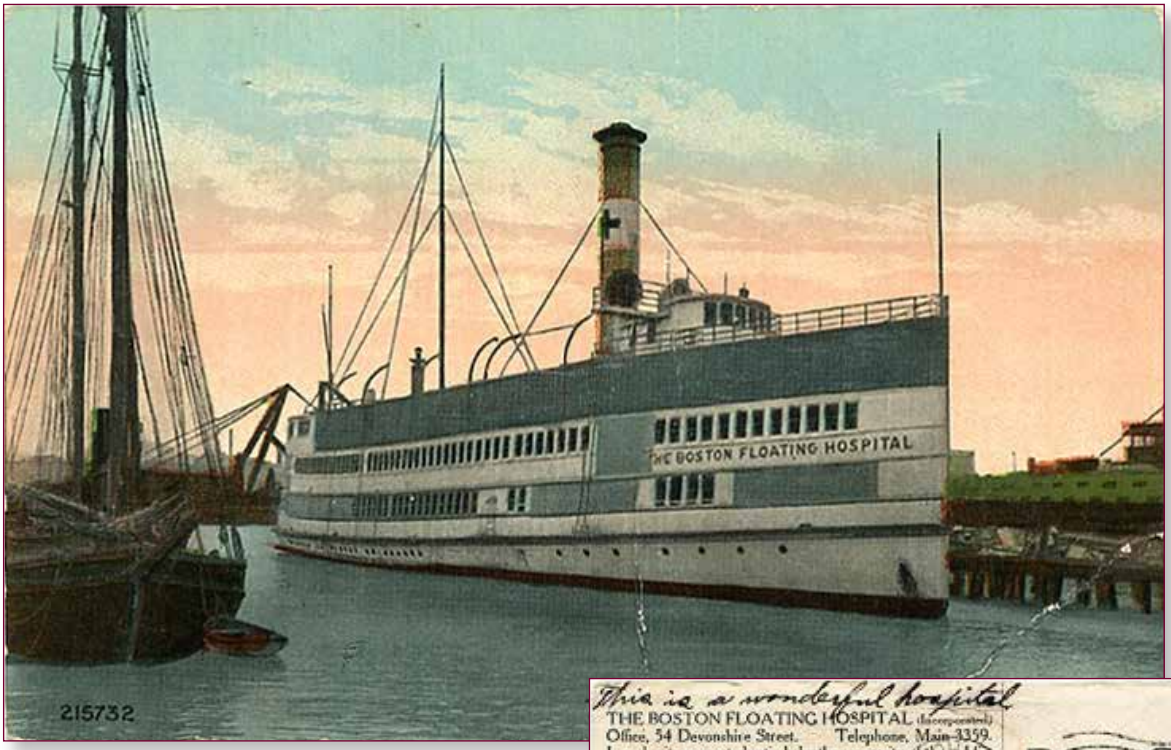
$5,000 will endow one crib in perpetuity.

This vintage photo shows a shuttle car transporting a family to the Boston Floating Hospital in the first half of the 20th century. [TUFTS MEDICAL CENTER]

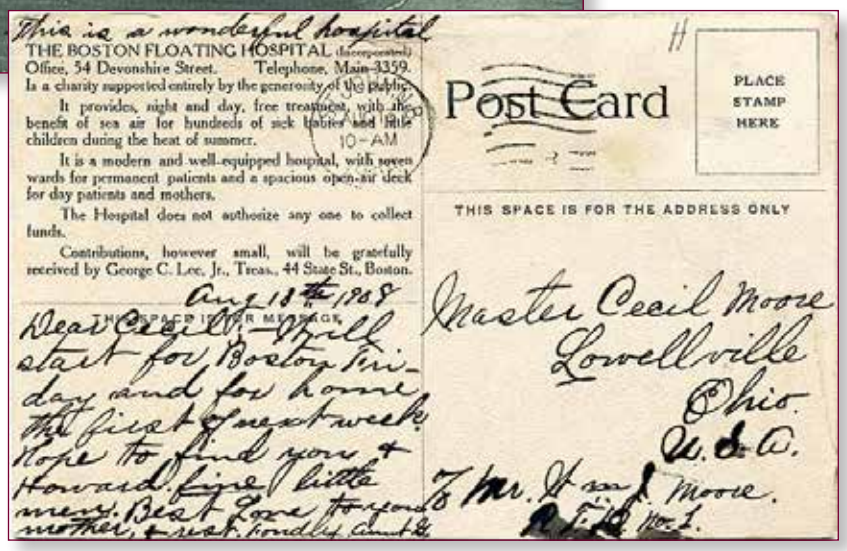
Hospital in the Boston Harbor

The S.S. Boston Floating Hospital, a 672-gross ton excursion steamer, was built in 1905–1906 to provide Boston's disadvantaged children with healthful harbor cruises and other medical services. It was operated by a philanthropic organization of the same name that had been founded in 1894, inspired by a similar New York City institution, due to the efforts of Rev. Rufus B. Tobey. The 1894-period barge plied the waters of Boston Harbor, offering fresh air and a respite to the city's poor children, who had the opportunity to be seen by volunteer doctors and nurses.

In early January 1918, the ship was taken over by the U.S. Navy and placed in commission as USS Boston Floating Hospital but was returned to her owner in June of that year. The ship then returned to her original purpose, which lasted until 1927, when fire damage caused her retirement. Though no longer a shipborne facility, Boston Floating Hospital conceptually lives on as the land-based Floating Hospital for Children, the pediatric component of the Tufts Medical Center. ❖



Color tinted photograph of the ship tied up at Boston, with weather screens erected around many of her deck openings, published on a postcard by The Leighton & Valentine Co., New York City, during the first two decades of the 20th century.



Reverse of a postcard published in 1908 by the Boston Floating Hospital, Incorporated, 54 Devonshire Street, Boston, MA. The card was mailed in Boston on August 18, 1908 and addressed to Cecil Moore of Lowellville, Ohio.

[INFORMATION AND PHOTOS: U.S. NAVAL HISTORICAL CENTER PHOTOGRAPH; DONATION OF CAPTAIN STEPHEN S. ROBERTS, USNR (RETIRED), 2007]

The Military Sealift Command hospital ship USNS Comfort (T-AH 20) is escorted by U.S. Coast Guard, New York Police Department and New York Fire Department assets as the ship arrives in New York City on March 30, 2020. Comfort deployed in support of the nation's COVID-19 response efforts and will serve as a referral hospital for COVID and non-COVID 19 patients currently admitted to shore-based hospitals. [U.S. COAST GUARD PHOTO BY PETTY OFFICER 2ND CLASS CORY J. MENDENHAL]

USNS Comfort Departs NYC

Prepared for Future Tasking, Military Relief Efforts Continue

NEW YORK (NNS) – The hospital ship USNS Comfort (T-AH 20) departed New York City on April 30th, after supporting the Department of Defense's COVID-19 response efforts to New York and New Jersey residents during the coronavirus outbreak.

USNS Comfort has been at Pier 90 in New York City for a month, providing relief to a healthcare system stressed by the surge of COVID-19 patients. Even as USNS Comfort departs NYC, the ship and its embarked medical task force remain prepared for future tasking. The Navy, along with other U.S. Northern Command-dedicated forces, remains engaged throughout the nation in support of the broader COVID-19 response.

Comfort, which arrived in New York City March 30, was originally tasked with providing care to non-COVID patients, bringing the first aboard on April 1. It quickly became apparent that in order to be of help to the city, Comfort needed to treat all patients, regardless of their COVID status. April 6, after being directed to accept COVID-positive patients and following a thorough assessment of the existing design of the ship, Military Sealift Command civil service mariners physically separated the hospital from the rest of the ship by cordoning off doors and ladder wells on the main deck; reconfiguring the ship to admit and treat all patients.

"This amazing crew of over 1,200 people treated 182 patients, of which approximately 70 percent were afflicted by COVID-19," said Capt. Patrick Amersbach, commanding officer of the Comfort's Medical Treatment Facility. "We were dedicated to providing the highest quality of care to each person who arrived to our hospital."

In Comfort's intensive care units, critical care nurses and respiratory technicians in particular worked together to provide constant care to many complex, high-acuity COVID-19 patients. Many of these patients suffered from rapid, multi-system organ failure requiring ventilator support.

More than 110 surgical procedures such as appendectomies, bronchoscopies, chest tube insertions, laparoscopic procedures, and tracheotomies were performed aboard. Additionally, the Comfort's radiology technicians performed more than 540 x-rays and CT-scans, while the pharmacy department prepared more than 1,300 intravenous and oral medications for the patients who received care aboard this ship. The ship's supply department ensured the distribution of ample personal protective equipment for all personnel, which were procured via a robust logistics system.

Comfort is scheduled to return to Naval Station Norfolk, Virginia where the ship will return to a "Ready 5" status to remain ready for future tasking for COVID-19 operations in support of FEMA

According to André B. Sobocinski, a historian at the US Navy Bureau of Medicine and Surgery, during the Great Influenza Pandemic of 1918, Comfort (AH-3) and Mercy (AH-4) were each briefly stationed in New York where they took care of overflow patients before sailing across the Atlantic to ferry thousands of World War I wounded and sick (including virulent cases of the flu) back to stateside facilities. ❖.

USS Comfort (AH-3) serving as ambulance ship, ca. 1918 [BUMED ARCHIVES, 14-0058-003]

100 Year Ago – July 1915: A Floating Hospital for Children Launches in Narragansett Bay

Chair of RIMS pediatric section heads the medical effort

MARY KORR
RIMJ MANAGING EDITOR

In July 1915, thanks to the efforts of seven members of the Women's Alliance of the New-Church of the General Convention of New Jerusalem in Providence, a group of 30 poor mothers and their young children took a day-long cruise on the steamer *Minnie V. Pope*, owned by E. H. Wardwell of Bristol, who provided the ship *gratis*.

Physicians and nurses volunteered their time to carefully screen and examine the children for any contagious diseases. A simple lunch was provided for the mothers, mostly immigrants from Italy, Ireland and Eastern Europe. There were instructed in well baby care and the infants were bottle-fed sterilized milk.

According to the *Rhode Island Medical Journal* (RIMJ) of November 1917, **DR. HENRY WINANS BURNETT** led the medical effort. He labored for many years at the Children's Outpatient Dept. at Rhode Island Hospital and the North End Dispensary and was the first chairman of the Pediatric Section of the Rhode Island Medical Society.

RIMJ noted, "in the early days of his work he did much for the baby camps close to the congested districts and from its inception was Chairman of the Baby Welfare Committee."

It was from these crowded tenements that the passengers of the floating hospital came from. After that first successful summer, The Floating Hospital Association was incorporated and selected Dr. Burnett as its examiner.

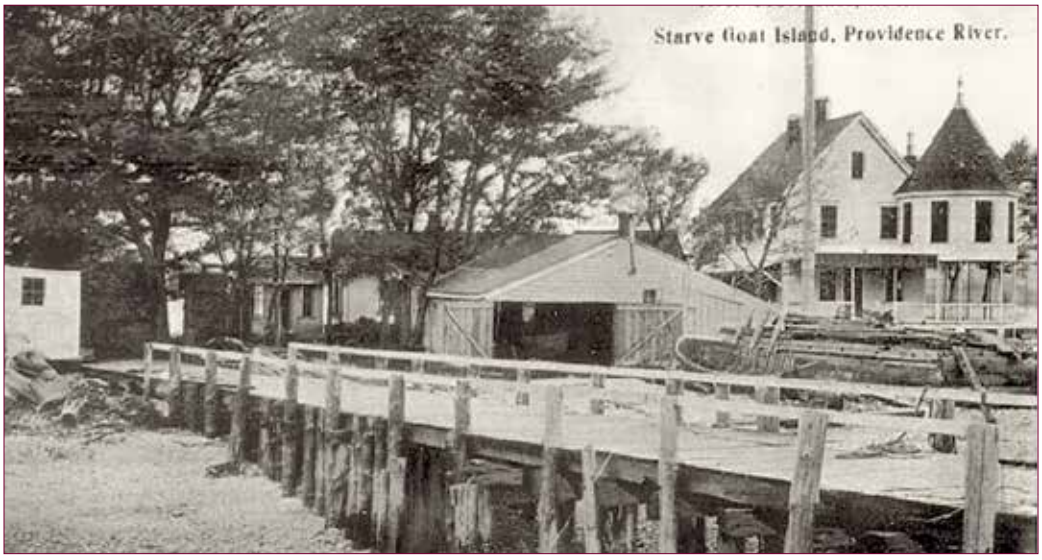
In 1917, the Association purchased a large houseboat for $3,000, which replaced the *Minnie* and served as the floating hospital until 1920, when the owner of Starve Goat Island, Frank Pettis, an oyster dealer, offered the premises for use by the Association. The houseboat was "beached" on the island off Field Point in the Providence River, off Pawtuxet Village, and transformed into a land facility for summertime use by children. The island was later dubbed "Sunshine Island." Parents were permitted a monthly visit.

The floating hospital, funded by the City of Providence at $2,000 per annum, existed until 1938, when the Great Hurricane destroyed the island. The Association then used land in Barrington and Warwick for its summer camps, until 1961. ❖

For more photos of the floating hospital and Sunshine Island, visit http://rhodetour.org/items/show/3?tour=1&index=2

[Above] *Providence Journal* photograph of the Providence Floating Hospital Association's houseboat.

[Right] Starve Goat Island later became known as Sunshine Island when the Providence floating hospital for children relocated here.



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