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# RHODE ISLAND MEDICAL JOURNAL



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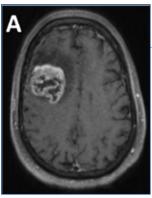


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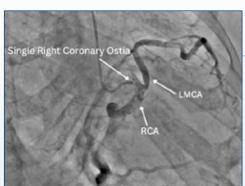


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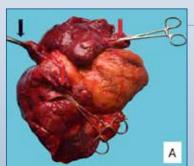


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#### Methylphenidate Reversal of Executive Dysfunction in a Patient with Bi-Frontal Lobe Glioblastoma

JAKE MCGILLION-MOORE: PRAKASH SAMPATH, MD: ERIC T. WONG, MD

#### **ABSTRACT**

An elderly man with advanced glioblastoma developed neuro-cognitive deficits that were reversed by methylphenidate. After tumor resection from the right frontal lobe, he received cranial irradiation, temozolomide and Tumor Treating Fields (TTFields). MRI afterwards showed enhancements near the resection cavity and the contralateral frontal lobe. The patient experienced mild executive dysfunction that was not limiting his activities. Adjuvant temozolomide was started along with TTFields. After 2 cycles, his brain MRI showed stable disease, but he exhibited significant executive dysfunction. Methylphenidate improved his neuro-cognitive slowing in cycles 3 and 4. His disease eventually progressed during the 5th cycle, and he experienced a marked decline in activities. Repeat head MRI revealed tumor progression and cerebral edema. Treatments were discontinued while dexamethasone improved his neurological functions and bevacizumab biosimilar was later added. This case demonstrates the activity of methylphenidate for managing executive dysfunction in patients with glioblastoma while minimizing the use of dexamethasone.

**KEYWORDS:** executive function; glioblastoma; methylphenidate

#### **INTRODUCTION**

Glioblastoma is a devastating malignancy in the central nervous system and the median overall survival of patients is only 24 months despite aggressive standard-of-care treatment consisting of external beam radiotherapy and concomitant daily temozolomide, followed by adjuvant temozolomide and Tumor Treating Fields therapy.1 At the time of recurrence, patients are typically enrolled in clinical trials, received lomustine, treated with bevacizumab, or placed in hospice, and they usually live for another 6 months before second progression or death. Although survival benchmarks have improved in the past decade, glioblastoma remains incurable, and the disease eventually progresses in an unrelenting fashion during recurrence. The rate of clinical trial participation is low, however, in the order of 8-11%.2 This is likely due to a large number of patients deemed ineligible because of their deficits arising from locations that significantly impair neurologic performance status. The neuro-oncologist's ability to recognize and manage specific neurologic syndromes will help improve patient eligibility for clinical trials and potentially their treatment outcome.

The prefrontal cortex is responsible for anticipation, planning and execution of a task or an activity. We describe an elderly patient with dysfunction of the prefrontal cortex secondary to glioblastoma, with wild-type IDH-1 on immunohistochemistry and unmethylated MGMT promoter on molecular profiling. After radiation and daily temozolomide, the patient experienced neurocognitive slowing, imbalance, and urinary incontinence. These symptoms were attributed to bi-frontal lobe dysfunction. Methylphenidate was able to reverse his neurologic deficits and improve his quality of life. The medication also kept him on treatment to control his glioblastoma for a longer period.

#### **CASE REPORT**

The patient is a 74-year-old right-handed man, with no significant past medical history other than prostatic hyperplasia, who experienced confusion, communication difficulties, head bobbing, and a grand mal seizure in November 2021. A non-contrast head CT and a gadolinium-enhanced MRI revealed a heterogeneously enhancing mass measuring 3.6 x 4.0 x 4.6 cm in the right frontal brain with adjacent cerebral edema (Figure 1). He received levetiracetam and dexamethasone to control his seizure and brain swelling respectively, and later underwent a craniotomy for partial resection of the mass (Figure 1). Pathology was consistent with a glioblastoma with wild-type IDH-1 R132H by immunohistochemistry and unmethylated MGMT promoter by molecular profiling. The Ki-67 proliferation index was 40%, indicating a high growth rate. He developed hyperglycemia but it quickly resolved when dexamethasone was rapidly weaned off 10 days after surgery.

After the diagnosis was established, the patient was enrolled in a prospective phase III clinical trial and received involved-field cranial irradiation for 6 weeks concurrent with daily oral temozolomide and Tumor Treating Fields therapy (NCT04471844). Sulfamethoxazole-trimethoprim was started for prophylaxis against Pneumocystis pneumonia because of lymphopenia that developed one month into treatment. Lymphopenia was transient and the medication



Figure 1. MR images before and after gross total resection of glioblastoma. (A) Post-gadolinium-enhanced T1-weight MP RAGE image showed a heterogeneously enhancing tumor in the right frontal lobe. (B) There was significant cerebral edema in the surrounding brain parenchyma on the right as well as the left frontal white matter. (C) Post-gadoliniumenhanced T1-weight MP RAGE image demonstrated gross total resection of the tumor. (D) The cerebral edema was also decreased on the right side while the edema in the left frontal white matter became more prominent.

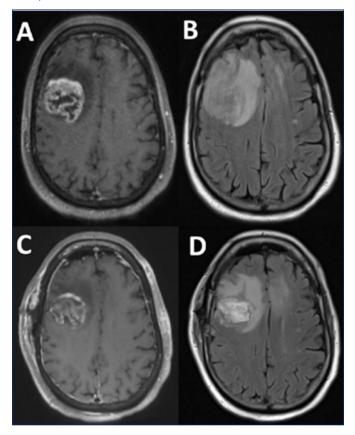
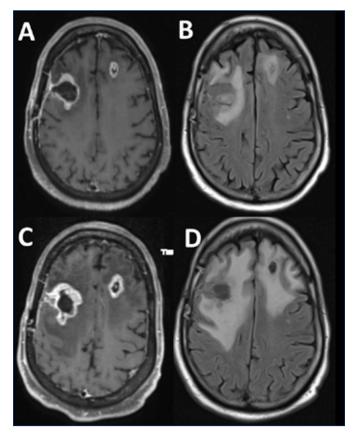


Figure 2. MR images after initial cranial irradiation and after 5 cycles of adjuvant treatment. (A) Post-gadolinium-enhanced T1-weight MP RAGE image showed a slight increase in enhancement near the surgical cavity and the contralateral left frontal white matter. (B) There was noticeable but mild cerebral edema in the right and left frontal white matter. (C) Post-gadolinium-enhanced T1-weight MP RAGE image demonstrated tumor progression in both right and left frontal lobes. (D) There was a marked increase in cerebral edema in the white matter of both frontal lobes.



was discontinued after just 4 weeks. Tumor Treating Fields therapy was maintained throughout the entire course of radiation. A post-radiotherapy gadolinium-enhanced MRI showed prominent enhancements in the brain parenchyma anterior and posterior to the surgical cavity, as well as a new 1.4 cm enhancement in the left frontal white matter (Figure 2). The patient developed mild neurocognitive dysfunction impairing his ability to perform daily tasks. He also stumbled while walking and once fell forward when hiking on an uneven trail. These symptoms were thought to be a result of executive dysfunction due to bi-frontal lobe pathology exacerbated by radiotherapy.

The patient then proceeded to the adjuvant phase of treatment, consisting of monthly temozolomide at a dose of 150-200 mg/m2/day for five days in monthly cycles and continuation of Tumor Treating Fields therapy. After the first two cycles of treatment, his neurologic symptoms worsened but his repeat gadolinium-enhanced head MRI showed stable disease. Therefore, methylphenidate 5 mg twice daily was added to treat his executive dysfunction, and it was escalated gradually to 10 and then 15 mg twice daily with marked improvement of his symptoms. After two more cycles of adjuvant temozolomide, the patient was still functioning at a high level neurologically and his gadolinium-enhanced head MRI showed stable enhancement patterns. However, during his fifth cycle of treatment, the patient exhibited worsening of neurocognitive slowing accompanied by decreased interaction with his family. He was unable to put on his socks and use utensils to eat his meals. He also stumbled more frequently than before, and developed urinary incontinence and an episode of bowel incontinence. A repeat head MRI revealed increased gadolinium enhancements in both frontal lobes indicating tumor progression (Figure 2). Temozolomide and Tumor Treating

Fields were discontinued. He then received dexamethasone 4 mg twice daily, together with omeprazole 20 mg daily, with symptomatic improvement. Metformin 500 mg twice daily was also started due to his pre-diabetes and susceptibility to steroid-induced hyperglycemia. The patient then proceeded to treatment with bevacizumab biosimilar (a monoclonal antibody that has similar biological activity as the bevacizumab originally approved by the United States Food and Drug Administration) for glioblastoma recurrence, and his executive function was maintained while dexamethasone was being weaned.

#### **DISCUSSION**

Methylphenidate is a psychostimulant that can modulate cognition.<sup>3,4</sup> Its primary physiological action is to facilitate neural transmission by preventing the reuptake of monoamine neurotransmitters dopamine and norepinephrine, at neuronal synapses.3 Specifically, pyramidal neurons in layer III of the prefrontal cortex receive dopaminergic and norepinephrinergic afferent fibers from (1) the ventral tegmental area and medial-dorsal thalamic nuclei, and (2) the locus coeruleus, respectively.<sup>5</sup> Increased dopamine and norepinephrine at these synapses result in the potentiation of excitatory activities on these pyramidal neurons. Furthermore, both D1 and D2 receptors mediate the afferent modulation and the D1 receptor definitely has a greater effect than the D2 receptor, and specifically pharmacological blockade of D1 resulted in slower neural processing speed to a greater extent than D2 in mice and primates.5

The human prefrontal cortex is essential for functions such as anticipation, planning and execution of a task or an idea. A brain tumor in this location can affect the adjacent neural substrates, either directly by mass effect, cerebral edema, or both, or indirectly by treatment effects or altered cerebral blood flow pattern. Indeed, our patient exhibited neurocognitive slowing impairing his daily functions and he also has bi-frontal lobe impairment characterized by imbalance and incontinence. It has been shown in a prospective clinical trial that methylphenidate improves attention, mood, and behavior in patients with malignant gliomas.<sup>7</sup> Increasing the dose of methylphenidate improves the function of the prefrontal cortex but only up to a maximum, after which the benefit attenuates and side effects emerge. This attenuation of benefit from monoamine neurotransmitters may be a result of desensitization due to their persistent presence at the synapse and continuous stimulation of the D1 and D2 receptors on pyramidal neurons.8 Therefore, gradual dose escalation of methylphenidate and repeat neurocognitive evaluations are important to determine the minimum dose needed in the patient. Although methylphenidate may attenuate imbalance and risk of falling due to improvement in attention, it does not typically reverse incontinence in the patient.

Modafinil and armodafinil (R-enantiomer of modafinil) are stimulants that are used to treat excessive daytime sleepiness and narcolepsy. They are also monoamine reuptake inhibitors but their effect on the dopamine and norepinephrine neurotransmitter systems is weaker than that of methylphenidate.9,10 Both drugs also prompt the release of orexin and histamine in the hypothalamus, causing heightened arousal and wakefulness.<sup>9,10</sup> However, in randomized clinical trials, neither modafinil nor armodafinil showed efficacy in improving cognition of brain tumor patients.<sup>11,12</sup> This failure may be foreseeable because methylphenidate is more potent than modafinil or armodafinil in modulating dopamine and norepinephrine reuptake at the synapses. Furthermore, activation of the pre-frontal cortex by hypothalamus-originated orexin and histamine may be attenuated due to their indirect influence on only a subset of dopaminergic and norepinephrinergic neurons from the ventral tegmental and locus coeruleus areas.13

Patients treated with cranial radiotherapy often have neurologic syndrome attributable to treatment effects. In patients with small cell lung cancer who received prophylactic whole brain irradiation, hypometabolism manifesting as low FDG uptake on PET scan can be found in the frontal lobes. 14 Compared to prophylactic radiotherapy at 2,500 or 3,000 cGy in 10 fractions, the biological equivalent for our patient's radiation treatment for glioblastoma (6,000 cGy in 30 fractions) is substantially higher and most of it is directed at the bi-frontal brain. 15,16 It is likely that, for a period of 4 months after radiation during which pseudo-progression can cause clinical deterioration, our patient experienced impaired executive dysfunction secondary to subacute radiation-induced encephalopathy and not from tumor progression. Indeed, on his head MRI, there was no change in the extent of gadolinium enhancements or FLAIR signal changes. The addition of methylphenidate greatly improved his neurocognitive processing speed, imbalance, and urinary incontinence. But his glioblastoma eventually progressed when his head MRI showed increased gadolinium enhancements. Therefore, prompt recognition of executive dysfunction and treatment with methylphenidate prevented the premature declaration of neurologic progression in our patient during his participation in a clinical trial.

In summary, this case illustrates the importance of methylphenidate for managing executive dysfunction, which is a modifier of treatment outcome in our glioblastoma patient. Future clinical trial testing will be needed to evaluate the efficacy of methylphenidate combined with other neurocognitive enhancement drugs.



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## A Case of *Pneumocystis jirovecci* in a Patient with Non-Small Cell Lung Cancer Treated with Immunotherapy

PRANAVI SANKA, MD; ANDREW HSU, MD

#### **ABSTRACT**

Immune checkpoint inhibitors have become the standard of care in the management of metastatic non-small cell lung cancer (NSCLC) and are associated with improved outcomes when compared to traditional chemotherapy regimens. However, they present with their own unique set of immune-related side effects. One immune-related adverse effect that can arise is pneumonitis, where patients present with dyspnea with nonspecific radiologic findings, making it challenging to differentiate from other etiologies causing dyspnea.

We present a case of a 58-year-old woman with NSCLC previously treated with immunotherapy, who presented with shortness of breath. She was initially thought to have immune-related pneumonitis and was treated with immunosuppressive therapy. After several days of treatment, bronchoscopy demonstrated a positive polymerase chain reaction (PCR) for *Pneumocystis jirovecii* (PJP) after an initial negative direct fluorescent antibody (DFA). The patient was started on appropriate management for PJP and no further immunosuppressive therapy was given. **KEYWORDS:** *Pneumocystis jirovecci*, checkpoint inhibitor

#### INTRODUCTION

pneumonitis, non-small cell lung cancer

Non-small cell lung cancer (NSCLC) constitutes approximately 80% of all new lung cancer diagnoses. Over the past decade, treatment of NSCLC has evolved greatly. Previously, platinum-based chemotherapy regimens were used in the treatment of advanced NSCLC. These regimens only had a response rate of 20–40%, progression-free survival (PFS) of 4–6 months, and overall survival (OS) of 12–18 months.<sup>1</sup>

Over the past decade, immunotherapy has revolutionized the management of NSCLC. Immune checkpoint inhibitors have now become the standard of care in the treatment of metastatic NSCLC. Immunotherapy is associated with higher response rates and improved OS compared to traditional chemotherapy regimens.<sup>2</sup>

Immune checkpoints are surface proteins on T cells that act as negative regulators by preventing T cell activation by antigen presenting cells, which may include tumor antigens. Immune checkpoint inhibitors work by blocking these

negative regulators and allowing the natural immune cascade to occur via T cell activation by antigen presenting cells.<sup>3</sup>

Monoclonal antibodies targeting the programmed death-1 (PD-1) checkpoint pathway, such as pembrolizumab and nivolumab, have been studied extensively in clinical trials for NSCLC. As a complication of activating the immune system, checkpoint inhibitors may activate T cell attack on self- antigen as well, leading to a set of toxicities called immune-related adverse events (i.e., pneumonitis, colitis, hypophysitis, thyroiditis, arthritis, etc.).<sup>3</sup>

Checkpoint inhibitor pneumonitis (CIP) typically presents as dyspnea with new infiltrates on chest imaging. This can be a very serious illness, in which patients usually require treatment with empiric high-dose steroids while concomitantly undergoing work-up for other etiologies.<sup>3</sup>

It can be challenging to diagnose CIP, as patients present with non-specific symptoms such as dyspnea and cough, which can also be caused by other processes such as infection, progression of cancer, or side effects of radiation therapy.

We report a case of a patient with NSCLC previously treated with an immune checkpoint inhibitor who presented to the emergency room with dyspnea. She was initially thought to have checkpoint inhibitor pneumonitis and was treated for such, but was ultimately found to have *Pneumocystis jirovecii* (PJP) pneumonia.

#### **CASE PRESENTATION**

A 58-year-old woman with metastatic adenocarcinoma of the lung, hypertension, hyperlipidemia, depression, multiple sclerosis not actively on treatment, and a 30-pack year smoking history, presented to the emergency department (ED) for weakness and shortness of breath.

For her oncological treatment history, she was initially treated with pembrolizumab, pemetrexed, and carboplatin, but had developed worsening nausea and fatigue with an associated 20-pound weight loss after three cycles and was started on a corticosteroid dose of 50 mg prednisone equivalent (PEQ) daily for failure to thrive two months prior to her presentation in the emergency room. She was not initiated on PJP prophylaxis at this time. In addition, she was then transitioned to second-line therapy with nanoparticle albumin-bound paclitaxel (nab-paclitaxel).

One week after her eighth cycle of nab-paclitaxel, she



presented to the ED with shortness of breath. She was tachycardic to 140 beats per minute and required 4 liters (L) of oxygen via nasal cannula. The remainder of her vital signs were normal. Her physical exam was significant for cachexia, dry mucous membranes, diffuse wheezing throughout all lung fields, and ulcers over her left arm.

Computerized tomography (CT) imaging was negative for a pulmonary embolism but revealed significant worsening of extensive bilateral ground-glass opacities with subpleural reticulations, compared to a CT image one week prior to her presentation.

Additional workup on presentation was significant for a negative respiratory pathogen panel, negative blood cultures, negative Chlamydia and Mycoplasma testing, and a negative urine legionella.

The patient was started on empiric, high-dose methyl-prednisolone (2 mg/kg daily) for a suspected immune-related pneumonitis from pembrolizumab. She was also empirically started on piperacillin-tazobactam and azithromycin. She underwent a bronchoscopy with studies sent off to assess for PJP, gram stain, fungal cultures. Despite empiric treatment with steroids and antibiotics, the patient's oxygen requirement continued to increase to 30L of oxygen via high-flow nasal cannula (HFNC).

After discussion with the consulting teams and the patient, a decision was made to treat for steroid-refractory pneumonitis with infliximab and increased methylprednisolone dosing to every eight hours. Due to the concern for PJP pneumonia given her immunosuppression, the patient was also started on treatment dosing with trimethoprim-sulfamethoxazole. With these changes, her oxygen requirements improved to 14L HFNC.

Studies from the patient's bronchoscopy revealed a positive Fungitell and negative PJP direct fluorescent antibody (DFA). Given these findings, PJP treatment was decreased to prophylactic dosing and she was continued on treatment for presumed immune-related pneumonitis along with the addition of intravenous immunoglobulins (IVIG) for two daily doses.

However, two days later, the patient's PJP polymerase chain reaction (PCR) was positive and treatment doses of trimethoprim-sulfamethoxazole was resumed with tapering of her high-dose steroids to PJP level of treatment. IVIG and infliximab was discontinued.

Despite PJP directed therapy, her oxygen requirements escalated with repeat CT imaging showing worsening airspace disease with new multifocal nodular airspace opacities throughout right lung and left lower lobe superimposed on diffuse background ground glass attenuation. The patient had previously been made "do not intubate" at the start of her admission and was ultimately transitioned to hospice and passed away.

#### **DISCUSSION**

This case describes a patient whose respiratory failure was believed to be due to either infection or immune-related pneumonitis. Although the management strategies are quite different, both have surprisingly similar clinical presentations that are difficult to distinguish.

CIP is a rare but very serious complication that can arise as a result of immune checkpoint inhibitor therapy, such as pembrolizumab, which this patient had been treated with months prior to presenting to the ED. The time to onset of symptoms of CIP is highly variable. In one study that looked at patients who received anti–PD-1/PD-L1 immunotherapy at Memorial Sloan Kettering Cancer Center (MSKCC) and the Melanoma Institute of Australia, the time to symptom onset ranged between 9 days to 19 months.<sup>4</sup> Furthermore, the typical presenting symptoms of CIP are dyspnea, cough, fever, and chest pain. Physical exam may be normal; however, some patients with advanced pneumonitis can present with crackles on lung exam.<sup>3</sup>

In large clinical trials, the incidence of CIP has been reported to be around 3 to 5%.<sup>3</sup> In the real world, the incidence of CIP has been higher. One study done at the University of North Carolina looked at 315 patients with lung cancer who received immune checkpoint inhibitors between 2004 to 2017 and demonstrated a CIP incidence of 9.5%, which is higher than the incidence reported in the initial clinical trials.<sup>5</sup> Given this higher than reported incidence of CIP, the medical community should have heightened awareness of this clinical entity.<sup>3</sup>

The diagnosis of CIP can be very challenging to make, as it is a diagnosis of exclusion. Typically, patients with CIP present with nonspecific symptoms, such as cough, fever, and shortness of breath. Diagnostically, the preferred imaging modality for CIP is CT chest. One study at MSKCC reviewed the imaging of CIP among 27 cases at their institution. These patients exhibited a wide array of findings on their CT imaging – 37% of the 27 patients had ground glass opacities, 19% of the patients had discrete patchy or confluent consolidation consistent with organizing pneumonia, 22% had interstitial markings, and 7% had evidence of hypersensitivity reactions. CIP may present with a variety of phenotypes on radiographic imaging.

Management of CIP is based on retrospective data as there are no prospective trials comparing different treatment modalities. Initial treatment of CIP is with empiric high-dose corticosteroids if there is suspicion for CIP, given the associated high morbidity and mortality. Patients with lower grade CIP (grade 1–2) are initiated with a dose of prednisone 1 mg/kg/day, while patients with higher grade CIP (grade 3–4) are started on prednisone 2–4 mg/kg/day.<sup>3</sup> Patients generally show clinical improvement in 48–72 hours after corticosteroid initiation, and patients who do not improve are considered steroid-refractory and started on second-line immunosuppressive agents.



Patients with CIP who are steroid-refractory are a highly-morbid population, and show variable rates of response to second-line immunosuppressive agents. These agents include infliximab, IVIG, and tocilizumab. However, there is no evidence suggesting superiority of one treatment choice compared to another in patients with steroid-refractory CIP.

CIP is a diagnosis of exclusion. Its presentation is non-specific and overlaps with many other entities such as radiation pneumonitis, cancer progression, other immune-related adverse effects, and, most importantly, infectious etiologies. Therefore, while it is important to start empiric treatment for CIP if there is clinical suspicion, it is equally as important to undergo a rigorous evaluation for other etiologies. Oftentimes, a bronchoalevolar lavage (BAL) is critical in ruling out infectious etiologies.<sup>3</sup> In this case, the DFA was negative but the PCR was positive from the BAL for PJP. One study done in Thailand looked at 222 patients who were concomitantly tested by both DFA and PCR for PJP. Among non-HIV patients, a sensitivity of 91.94% was reported for PCR testing, whereas a sensitivity of 8.06% was reported for DFA testing.<sup>6</sup>

PJP occurs commonly as an opportunistic infection in immunosuppressed patients. Patients with NSCLC often receive corticosteroids for a number of reasons, including appetite stimulation, brain or spinal metastases, underlying history of COPD, immune-related adverse effects, or concurrent autoimmune disorders. Clinicians should consider PJP prophylaxis in patients who are on PEQ doses of 30 mg or greater for over four weeks or for patients who are receiving a corticosteroid dose of between 15 to 30 mg PEQ daily for over eight weeks.<sup>7</sup>

There are two case reports in the literature of patients with NSCLC who required treatment with corticosteroids for CIP, and later developed PJP. The presenting symptoms in these patients were dyspnea, cough, and fever. CT findings included bilateral ground-glass patterns and septal thickening and the diagnosis was made based on BAL findings from a PJP PCR test.<sup>8</sup>

The mainstay of treatment of PJP is antibiotics, usually a 21-day course of trimethoprim-sulfamethoxazole. Adjunctive glucocorticoids are added for patients with severe PJP, defined as having a partial pressure of oxygen less than 70 on room air, or with evidence of hypoxemia. There is some data supporting the use of adjunctive glucocorticoid therapy in patients with severe PJP who do not have HIV. One retrospective study examining patients with severe PJP without HIV, showed that the patients who received adjunctive prednisone therapy had a shorter duration on mechanical ventilation and intensive care admission. Adjunctive glucocorticoid therapy in PJP consists of prednisone 40 mg orally twice daily for five days, followed by 40 mg orally once daily for five days, followed by, 20 mg orally once daily for 11 days.

#### CONCLUSION

Overall, when a patient with NSCLC who has been treated with immunotherapy and immunosuppression presents with nonspecific symptoms such as dyspnea, it can be very challenging to determine the etiology of these symptoms. We present a case of a patient presenting with respiratory failure, whose symptoms were initially thought to be due to CIP, but later were found to be due to infection. CIP is a diagnosis of exclusion, and these patients often need a bronchoalveolar lavage to rule out an infectious etiology of their symptoms. It is crucial to tease out whether the symptoms are caused by a pneumonitis or an infectious etiology, as this can change the management and ultimately alter the clinical course of a patient.

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#### **Cyanide Poisoning and Lactate in Smoke Inhalation**

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#### **ABSTRACT**

House fires can lead to cyanide poisoning and an associated elevated serum lactate level. Because of delays in obtaining serum cyanide levels, clinical symptoms and serum lactate are often used to guide clinical decision making and antidote administration. However, as this case report identifies, lower levels of serum lactate may in fact correlate with higher levels of serum cyanide that could benefit from treatment with an antidote.

**KEYWORDS:** cyanide; house fire; lactate; antidote; toxicology; emergency medicine

#### **INTRODUCTION**

House fires lead to the burning of both natural and synthetic materials, which can result in the creation and release of hydrogen cyanide. Cyanide exposure can occur in several ways, including dermally, parenterally, and by ingestion. In house fires, cyanide is released as a gas that leads to clinical asphyxiation, and leads to acute elevations in serum lactate. Here, we present a case of smoke inhalation with a markedly elevated serum cyanide but a discordantly low level of serum lactate.

#### **CASE REPORT**

The patient was a 55-year-old female with a prior medical history of anxiety, depression, gastroesophageal reflux, and anemia, who presented to the emergency department by emergency medical services (EMS) after a house fire. She reported that she had fallen asleep after throwing a cigarette into the wastebasket, and was awoken to large flames and a smoke-filled room. EMS was contacted, and at scene arrival the patient had a reported oxygen saturation of 85% by pulse oximetry. She improved to 92% after she was placed on oxygen delivered by a non-rebreather (NRB) mask. The patient was a long-term tobacco user who currently smoked about 1 pack per day.

On arrival at the emergency department (ED), the patient was alert and oriented to person, place and time, speaking comfortably in full sentences. She was on the non-rebreather, breathing 15 times per minute (reference: 12–18 times per minute), and saturating 98% on pulse oximetry

(reference: ≥95%) on arrival. Her blood pressure was 111/56 mmHg (reference: 90–140/60–90 mmHg), and her heart rate was 110 beats per minute (reference: 60–90 beats per minute). Her face, including her lips and nares, and upper arms were covered in soot. She had soot on the anterior aspect of her tongue but there was none noted in her posterior oropharynx. No burns were noted throughout the face, nose, or oropharynx. There was no stridor, and on auscultation, the patients' lungs were clear bilaterally with no wheezing. Cardiac exam revealed a tachycardic, regular rhythm. Pulse co-oximetry, which measures carbon monoxide bound to hemoglobin, was performed in the ED and showed a level of 33.The patient was intermittently sleeping between interactions, but easily aroused to voice and could hold a full conversation with her eyes open.

A chest radiograph demonstrated bibasilar opacities thought to be secondary to atelectasis. An electrocardiogram showed sinus tachycardia, at a rate of 142 (and a PR of 136, QRS of 78, and QTC of 406). The patient's initial venous blood gas revealed a pH of 7.23, and a whole blood lactate was 6.2 mEq/L. Other blood gas and lab values are listed in Figures 1, 2. Repeat lactate after 2 hours on NRB mask and two liters of intravenous crystalloid was 1.2 mEq/L.

Initial venous carboxyhemoglobin level was 13.5%, and when repeated about 12 hours later had decreased to 3%. A cyanide level was sent on arrival and resulted the next day at >100 ug/dL (reference range 0–20 ug/dL).

The case was discussed with the regional poison center who recommended against hydroxocobalamin or

**Figure 1.** Initial venous blood gas obtained on arrival

Test	Patient Value	
рН	7.23	
PCO2	60	
PO2	50	
Venous O2	67	
Glucose	169	

**Figure 2.** Additional laboratory findings obtained in the ED

Test	Patient Value
Initial Lactate	6.2 mEq/L
Repeat Lactate (2 hours)	1.2 mEq/L
WBC	9.6 x 109/L
Hgb	16.3 g/dL
Hct	49.4 g/dl
Platelets	305 x 109/L
Sodium	139 mEq/L
Potassium	3.6 mEq/L
Chloride	102 mEq/L
CO2	22 mEq/L
Ethanol	Not detected
HS troponin	19 ng/L



transfer for hyperbaric oxygen (as this was not available at the medical center she presented to) based on the patient's clinical presentation and the available laboratory results (particularly the lactate and carboxyhemoglobin levels). The patient was maintained on 100% oxygen by NRB mask and was admitted to the hospital for observation, showing improvement in her carboxyhemoglobin level after approximately 12 hours. She remained persistently hypoxic on room air over the next several days, but was weaned to room air and was subsequently discharged to home without any oxygen supplementation.

#### **DISCUSSION**

Patients with smoke inhalation can exhibit an array of neurologic symptoms, ranging from asymptomatic to agitation/confusion to somnolence to coma. Other complications can include myocardial ischemia, dysrhythmias, and metabolic acidosis due to impaired oxygen transfer and utilization in tissues. Smoke inhalation can lead to a complex set of chemical exposures and a variety of physiological impacts, but rapid assessment and initiation of interventions to reverse tissue hypoxia and promote oxygen delivery is essential. Toxic combustion products from fires include simple asphyxiants such as carbon monoxide and cyanide, both of which have antidotes. For cyanide poisoning, several antidotes exist, but currently hydroxocobalamin is used most frequently. It is generally well tolerated and works by chelating cyanide to form cyanocobalamin which can then be excreted.

The relationship between elevations in serum lactate in cyanide poisoning, due to inhibition of cellular cytochrome c oxidase and the electron transport chain, has been well elucidated.<sup>3-5</sup> Serum lactate measurement is of particular value and interest to emergency providers given this test is widely available, portable at the point-of-care, and results rapidly.<sup>6,7</sup> This is in contrast to the time delay in obtaining serum cyanide levels, which are often either unavailable or whose results are significantly delayed, such that they are of low clinical relevance and cannot serve to guide real time decision making.

Several case reports and retrospective case series have examined serum lactate levels in the setting of smoke exposure. Data from the Paris Fire Brigade (a unit of the French army that serves as the fire and rescue service for Paris) suggested that a lactate level of 10 mmol/L or higher was a sensitive indicator of cyanide toxicity.<sup>8</sup> Of 39 victims of smoke inhalation, 23 had blood cyanide levels >40 umol/L (100ug/dL), revealing cyanide toxicity. Of the 23 patients, only 3 had plasma lactate concentrations below 10 mmol/L.<sup>8</sup> Recent work in smoke-exposed porcine animal models has also shown that there is a significant correlation between cyanide toxicity and serum lactate levels. However, this study also found that low or minimally elevated lactate levels cannot exclude lethal cyanide intoxication.<sup>9</sup>

In our case, the lactate level was 6.2 mg/L. While elevated, it fell below the threshold for hydroxocobalamin administration suggested by the existing literature and standard of care. However, this lactate concentration correlated with a cyanide concentration of >100 ug/dL (>1 mg/L). It is possible that the patient's tachycardia and sleepiness were clinical indicators of cyanide toxicity. This patient's serum cyanide level was certainly elevated, with serum levels of 1-2 mg/L considered moderate, 2-3 mg/L as severe, and >3 mg/L as lethal.7 Unfortunately, the resulted lab value in this case was simply reported as >100 ug/dL, and not a more specific value. Further, the patient's history of smoking may serve as a confounder, as smoking can lead to a baseline presence of cyanide in the serum.<sup>10</sup> Serum cyanide levels are noted to be difficult to interpret, and as with some other poisons, the test result must be clinically correlated. Given the delays in getting the results of a serum cyanide level, clinicians must make decisions based on the patient's clinical exam and other rapid diagnostics that can serve as corollaries.

The clinical symptoms seen in the Paris Fire Brigade data showed that cardiovascular instability (hypotension) and significantly depressed Glasgow Coma Scale scores can be useful clinical indicators in evaluating the risks and benefits of hydroxocobalamin administration. Further, in this case, EMS had applied oxygen on scene and thus it is possible that this intervention lowered the lactate that was drawn on ED arrival, given that elevated lactate in smoke inhalation is often multifactorial. As EMS pre-hospital care evolves, on scene point-of-care measurements of lactate by EMS could help more rapidly assess lactate level and guide early field-based administration of hydroxocobalamin.

The existing literature centers around elevated lactate levels as a corollary for elevated cyanide levels, though little data exists regarding patients with a lower range lactate and concurrent potentially lethal levels of cyanide poisoning. We report one such case here. Further evaluation through additional research may be beneficial, as it may have implications for revising protocols to be more sensitive and lead to the early administration of useful antidotes.

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#### A Bicuspid Aortic Valve with Aberrant Coronary Anatomy

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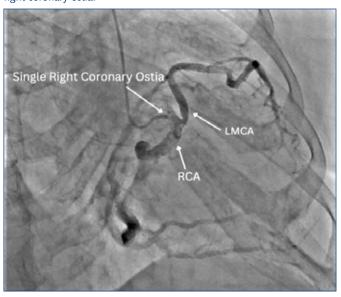
#### INTRODUCTION

A bicuspid aortic valve (BAV) is the most common congenital heart defect occurring in approximately 1-2% of individuals.<sup>1,2</sup> It can be associated with a number of other cardiac abnormalities including aortic coarctation, ascending aortic aneurysms, and coronary artery anomalies.<sup>3,2</sup> BAV can also be complicated by aortic stenosis and/or aortic regurgitation and infective endocarditis. Patients with bicuspid aortic valve stenosis usually present in their 50s and 60s, one to two decades earlier than older patients with degenerative calcific aortic stenosis, whose disease usually manifests in their 8th and 9th decades.3 This brief report will review a patient with a BAV, ascending aortic aneurysm, and aberrant coronary anatomy who underwent surgical aortic valve replacement and ascending aortic aneurysm repair. Our discussion will focus on the natural history of BAV, image modalities that aid in its diagnosis, and associated nonvalvular anomalies.

#### **CASE PRESENTATION**

A 68-year-old female was referred to a cardiologist after presenting to her primary care physician with shortness of breath, dizziness on exertion, and a loud systolic ejection murmur on exam. Transthoracic echocardiogram (TTE) was notable for a severely stenotic BAV and an ascending aortic aneurysm (49 mm). Pre-operative coronary angiography revealed no obstructive coronary disease. However, anomalous coronary anatomy was identified with the left main coronary artery originating from the ostium of the right coronary artery (Image 1). Subsequent CT imaging further characterized the course of the aberrant left main coronary artery which traveled anterior to the right ventricular outflow tract (Image 2), and confirmed the presence of the ascending aortic aneurysm. A perioperative transesophageal echocardiography (TEE) confirmed BAV stenosis (Image 3) and the ascending aortic aneurysm. The BAV was replaced with a 25 mm tissue prosthesis, and a 36mm gelweave aortic graft replacement was inserted from the sino-tubular junction to the mid-ascending aorta. The patient's hospital course was largely unremarkable and she was discharged home on postoperative day 11.

**Image 1.** Coronary Angiography demonstrating the right coronary artery (RCA) and left main coronary artery (LMCA) originating from a single right coronary ostia.



**Image 2.** CT Angiography demonstrating RCA and LMCA originating from a single right coronary ostia. Additional CT cuts showed the left main coronary artery traveling anterior to the right ventricular outflow tract before bifurcating into the left anterior descending and circumflex coronary arteries.

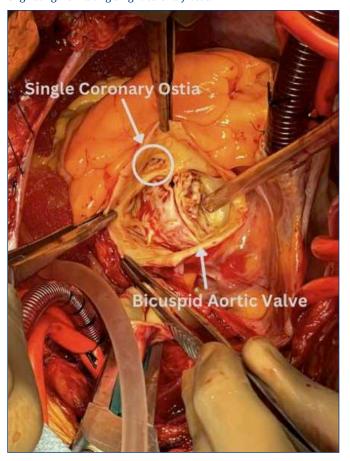




**Image 3.** Transesophageal Echocardiographic view of the bicuspid aortic valve in short axis (SAX). Here you can see the single coaptation line separating the anterior cusp (A) and posterior cusp (B).



**Image 4.** Surgical view of bicuspid aortic valve with RCA and LMCA originating from a single right coronary ostia.



#### **DISCUSSION**

A congenitally BAV is more prone to degeneration resulting in aortic stenosis (AS) and/or aortic regurgitation.<sup>2,4</sup> As the BAV becomes more stenotic, dyspnea on exertion, left ventricular hypertrophy, pulmonary edema, atrial fibrillation, and syncope become more common.<sup>5</sup>

TTE is the primary diagnostic imaging modality used to diagnose AV abnormalities.<sup>6</sup> The TTE exam must characterize the leaflet morphology and degree of hemodynamic compromise. Severe AS is defined as a valve orifice area less than 1.0 cm<sup>2</sup>, a mean gradient greater than 40 mmHg, or jet velocity greater than 4 m/s.<sup>7</sup> The short axis view of a bicuspid AV shows a clear fusion of the two AV leaflets with a single line of coaptation (Image 3,4). Once identified, a BAV warrants close surveillance as it can rapidly progress to severe stenosis or regurgitation. The two-year mortality rate for severe AS is roughly 50%.<sup>8</sup>

As seen in this patient, other non-valvular anomalies can be associated with BAV disease. Ascending aortic aneurysms may be present in up to 50% of BAV patients. Aberrant coronary anatomy is uncommon, Most congenital coronary abnormalities are discovered incidentally on coronary angiography or CTA imaging. The identification of aberrant coronary anatomy has important implications for management of BAV patients both during open surgical and percutaneous interventions.

Congenital BAV may have a genetic component. BAV disease is believed to be autosomal dominant with variable penetrance. The ACC/AHA Thoracic Aortic Disease Guidelines from 2010 state that first-degree relatives of patients with BAV or premature onset of thoracic aortic disease should be screened for BAV and associated aortic abnormalities. Description of the screened for BAV and associated aortic abnormalities.

In conclusion, BAV may present with a systolic ejection murmur in a younger patient with echocardiographic evidence of a bi-leaflet valve. Once a bicuspid valve has been identified, it is important to monitor the patient for disease progression and associated cardiovascular conditions. If surgical or percutaneous intervention is required, knowledge of the patient's coronary anatomy is key to providing safe periprocedural care.

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### Bilateral Asterixis Associated with Supratherapeutic Carbamazepine and Ammonia Levels

AHMED WAHBE, MD'23; UMER AKBAR, MD

#### INTRODUCTION

We present a case and a video demonstrating asterixis in a patient who developed toxicity on carbamazepine (Video 1), and resolution after withholding the medication (Video 2).

#### **CASE PRESENTATION**

A 65-year-old man with a 10-year history of complex partial epilepsy and hypertension, was admitted to the hospital for dysarthria, dizziness, and gait ataxia, which began gradually approximately 1 week prior to presentation. His seizures had been well controlled on carbamazepine 800 mg in the morning, 600 mg in the evening, and phenobarbital 64.8 mg twice daily. His examination revealed scanning dysarthria, slowed saccades, mild bilateral dysmetria in the arms, no nystagmus, and bilateral hand asterixis (Video 1). Given the subacute onset of his brainstem/cerebellar symptoms, stroke was initially suspected, and ruled out with an MRI brain, which showed few scattered white matter hyperintensities and no acute findings. His blood work revealed a normal comprehensive metabolic profile, including LFTs, complete blood count, and carbamazepine level of 26 (therapeutic range 4–12 UG/ ML), phenobarbital level 23 (15-40 UG/ML), and ammonia 57 (range 2-50 UMOL/L). After two days of holding carbamazepine, the level fell within the therapeutic range and his asterixis resolved (Video 2).

Click to view video 1
[0:14, https://vimeo.com/772119716]



Video 1. This video, taken at initial presentation, demonstrates asterixis (repeated, brief and rapid loss of sustained wrist extension (negative myoclonus) followed by immediate corrections). Note that the slow handflexions are not asterixis; only the fast flexions are asterixis.

Click to view video 2
[0:10, https://vimeo.com/772129122]



Video 2. This video, taken 2 days after holding carbamazepine, shows that the patient is able to maintain extension of his wrists, and the previously seen rapid flexion-movements are notably absent.

#### DISCUSSION

Asterixis is a "clinical sign that describes the inability to maintain sustained posture with subsequent brief, shock-like, involuntary movements" caused by electrical silence for under 1/10 second in the tonically contracting muscle. Asterixis may be seen in any limb and may cause falls if the legs are involved. Bilateral asterixis points to a toxic or metabolic encephalopathy, which in this case is likely due

to elevated ammonia and supratherapeutic carbamazepine levels. Most previous reports of patients taking carbamazepine in therapeutic doses and developing asterixis found elevated serum ammonia.<sup>3,4,5,6</sup> There are a few other reports of patients developing asterixis after having a therapeutic dose of carbamazepine added to their regimens in which carbamazepine levels in serum were elevated; however, serum



ammonia levels were not provided.<sup>7</sup> One case reported a patient developing hyperammonemia, agitation and aggressive behavior without developing asterixis.<sup>8</sup> The cause of the supratherapeutic CBZ level after 10 years of stable intake is unknown.

While an asymptomatic transient elevation of liver enzymes in patients taking carbamazepine is common<sup>2</sup>, instances of carbamazepine-induced asterixis and hyperammonemia have been rarely reported.

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#### Modified Method to Perform Autopsy Safely During the COVID-19 Pandemic

WEIBIAO CAO, MD; KATELYN DANNHEIM, MD

#### **ABSTRACT**

During autopsies, pathologists, pathology residents and their support staff in the autopsy suite face potential risk of being exposed to SARS-CoV-2 because some procedures such as lung dissection may produce aerosols. In addition to follow the CDC guidelines for postmortem examination, we modified the method of organ dissection and evisceration for additional mitigation of risk. The lung weight was calculated by subtracting the weight of the formalin by volume from the weight of the lung after formalin fixation. 272 autopsies, including 27 COVID-19-positive cases, were performed from Feb. 2020 to Jan. 2021. None of 22 autopsy personnel were infected with COVID-19. The calculated lung weights (537.2±42.5 grams) were not significantly different from the fresh lung weights (541.3±43 grams, p=0.95). We conclude that autopsies may be performed safely during COVID-19 pandemic. The autopsy method shared here may be useful for future respiratory infectious diseases.

**KEYWORDS:** Autopsy; COVID-19; Lung Weight; Skull Opening; Sars-Cov-2; Autopsy Protocol

#### INTRODUCTION

Most are now quite familiar with the background of coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which was first identified in Wuhan, China, in late 2019. It is a highly contagious virus, transmitted primarily through inhalation of respiratory droplets.

The pathogenesis and clinical course of COVID-19 are still not fully understood. Historically, postmortem examination has helped in understanding the pathogenesis, epidemiology, and natural course of disease, and COVID-19 is no exception. Autopsy has already begun to provide valuable insights, and it is very likely that the findings of gross and histologic examinations and the research that stems from the samples pathologists collected will arm us to combat this deadly disease. Therefore, it is critically important to continue performing autopsies during COVID-19 pandemic.

Pathologists perform autopsies with pathology residents during their training, and the pathologists, pathology residents and their support staff in the autopsy suite face

potential risk of being exposed to SARS-CoV-2. In our health care system, at the beginning of the pandemic when relatively little was understood about SARS-CoV-2 virus, we modified our usual practices to enhance protections from airborne infectious agents, and taught pathology residents and staff about the modified protocol for performing autopsies. All autopsies were performed in a single site with the modified procedures, and here this protocol used at Rhode Island Hospital (RIH) and Brown University is shared. We hope it will be beneficial for pathology residents, physicians, and staff in other institutions who perform autopsies.

#### **METHODS**

#### Morgue requirement

The morgue should have negative pressure with no air recirculation to adjacent spaces and the air should be exhausted outside of the building. The minimum air changes per hour (ACH) are 6 for the existing morgues and 12 for renovated or new morgues per the Centers for Disease Control and Prevention (CDC) guidelines. Please see more details at the CDC website.<sup>2</sup>

#### Personal protective equipment (PPE)

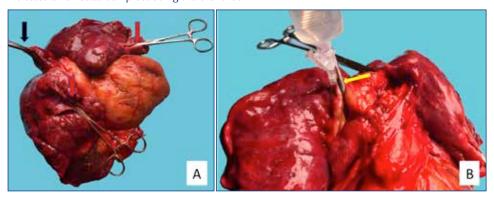
We followed CDC guidelines for PPE, including use of NIOSH-certified disposable N-95 respirators and/or battery-powered air-purifying respirators (PAPRs)/controlled air-purifying respirators (CAPRs) with HEPA filters, surgical caps, long sleeve disposable water resistant gowns, shoe covers, and double surgical gloves. Please see additional details at the CDC website.<sup>3</sup>

#### **Performing Autopsies**

If a COVID-19-positive status had not already been established within a week before the time death, we performed postmortem SARS-CoV-2 testing prior to starting the autopsy. Out of an abundance of caution, nasal swabs were performed inside the negative pressure area (with appropriate PPE), even though, per CDC guidelines, a negative pressure room is not required to perform nasopharyngeal swabs.<sup>2</sup> The reason for this was to avoid any possible contamination of the morgue storage cooler and common areas, which have the potential to expose nursing staff, transporter staff, and funeral home staff.



**Figure 1.** Heart and lung block. (**A**) Heart and lung block with hemostat clamps. Black arrow indicates the trachea. Red arrows indicate lung culture sites. (**B**) Formalin was injecting into the bronchus. Yellow arrow indicates a hemostat clamp occluding the bronchus.



We limited the number of personnel working in the morgue up to three individuals and performed only one autopsy at a time. If more than one autopsy was performed in a day, one hour was allowed to elapse between cases to allow for complete air exchange, based on the calculation that our morgue's ACH of 34 requires less than 20 minutes to achieve airborne contaminant removal at 99.9% efficiency (see the CDC website for additional details<sup>4</sup>). In our modified procedure, the up-to-three individuals performing the autopsy did not exit the negative pressure area after starting the autopsy until the case was complete. To allow this, everything was prepared for the entire procedure before donning PPE and bringing the body.

Our procedure was additionally modified to reduce the risk of exposure to pulmonary droplets and to reduce the time exposed to fresh tissue. We cross-clamped the trachea with two hemostat clamps and cut the trachea between the two clamps (Figure 1A), then separated the heart and lungs from the other organs, creating two blocks, which were placed into two separate large containers of formalin. When lung cultures or fresh lung tissues were needed, we clipped the lung tissue with two hemostat clamps and cut the lung tissue between the two clamps. In this way, aerosolization was limited. To reduce aerosol generation during the infusion of formalin into the bronchus, the lungs were inflated by injection of the formalin into bronchi or the lung parenchyma with a needle and syringe after the left and right bronchi were clamped by hemostat clamps (Figure 1B). The amount of formalin injected on each side was recorded. The solid organs were carefully sectioned at intervals while submerged in formalin to help with fixation. The stomach and bowels were opened and rinsed while wearing PAPRs/ CAPRs. After 48 hours of fixation, the organs were completely dissected and examined grossly.

Opening the skull with an oscillating saw is considered an aerosol-generating procedure. In cases where it was felt necessary to examine the brain for definitive postmortem diagnosis, modified procedures were devised to provide additional protection for our pathology assistants, pathology residents and pathologists. The skull may be opened in a wood or metal frame covered by a clear plastic bag, in a clear plastic bag without the wood or metal frame or by using a saw with a bone dust vacuum collector.

#### After autopsy

We followed institutional and CDC guidelines to remove PPE and to clean the morgue. A full hour was allowed to elapse before any personnel could enter the

morgue without PPE and respiratory protection (N95 respirator or higher) to allow for complete air exchange (based on an ACH of 34 as described above). Please see more details at the CDC website.<sup>2</sup>

#### Lung weights

The lung weight was calculated by the weight of lung after formalin fixation minus the amount of formalin injected. To evaluate the feasibility, we measured the lung weights before and after 48-hour fixation. The calculated weights were compared with the fresh lung weight. Three non-COVID patients were from Rhode Island Hospital. The protocol was approved by Rhode Island Hospital IRB committee.

#### **Statistics**

The lung weight was analyzed by using Student's t test.

#### **RESULTS**

#### **Autopsy cases performed**

We performed 272 autopsies from February 2020 to January 2021, including 27 COVID-19-positive autopsies. None of the 15 pathology residents, 5 attending pathologists, or 2 pathology assistants on the autopsy service were infected with COVID-19.

#### Lung weights

In order to reduce the release of respiratory droplets from the fresh lungs, we did not obtain the fresh lung weights in COVID-19 positive cases. The lung weight was calculated by the weight of lung after formalin fixation minus the amount of formalin injected. The density of 10% formalin is about 1 g/cm.³ If 100 ml formalin was injected, we deducted 100 grams from the lung weight after formalin fixation.

To evaluate the lung weight accuracy, we compared the fresh lung weights with the calculated lung weights in three non-COVID patients (**Table 1**). The fresh lung weights were 541.3±43 grams, whereas the calculated weights were

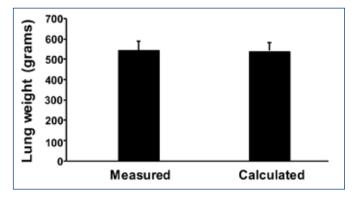


Table 1. Lung weight in grams

				Weight measured		Average of	
		Fresh weight	Injected formalin (ml)	after injection	Weight calculated	calculated weight	P value
	Right	523	50	572	522	520	
			100	618	518		
Patient 1			150	670	520		
	Left	364	50	413	363	363	
			100	463	363		
			150	512	362		
	Right	664	50	715	665	662	
			100	762	662		
Patient 2			150	810	660		
	Left	516	50	563	513	512	
			100	612	512		
			150	661	511		
	Right	630	130	751	621	621	
Patient 3	Left	551	90	635	545	545	
	Average	541.3				537.2	P=0.95
	SE	43.0				42.5	

#### Figure 2. Lung weights

The lung weight was calculated by the weight of lung after formalin fixation minus the weight of formalin injected by volume. The density of 10% formalin is about 1 g/cm³. If 100 ml formalin was injected, we deducted 100 grams from the lung weight after formalin fixation. The calculated lung weights were compared with the fresh lung weights. There was no statistically significant difference between the calculated lung weights and the fresh lung weights, indicating that it is feasible to use the calculated lung weight after formalin fixation.



537.2±42.5 grams. The difference was not statistically significant (**Figure 2**), indicating that it is feasible to use the calculated lung weight after formalin fixation.

#### **DISCUSSION**

The autopsy is an important medical procedure, and may be helpful in determination of the cause of death, comparison between clinical diagnosis and postmortem diagnosis, and identification of new diseases. In our institution, the pathology residents, working with the attending staff and pathology assistants, review the clinical history, perform external examination of the body, eviscerate (usually with assistance of a pathology assistant) and dissect the organs, identify any gross abnormalities, review microscopic slides and draft the final report. During the external examination of the

body, organ evisceration, organ dissection, and examination of gross organs, pathology residents, pathologists and staff may be exposed to a variety of infectious diseases, including COVID-19. In this paper, we describe a method that was developed to perform autopsies safely during COVID-19 pandemic.

We treated all autopsies as potential COVID-19-positive cases, as the sensitivity of the nasopharyngeal swab for the postmortem detection of SARS-CoV-2 was not yet fully understood. For instance, one study showed that the sensitivity of naso-

pharyngeal swab for COVID-19 testing in asymptomatic and mild COVID-19 infection was 44.5%.<sup>5</sup> On our autopsy service, we had one case with multiple negative SARS-CoV-2 PCR tests on premortem and postmortem nasopharyngeal swabs. However, SARS-CoV-2 was detected in the lung tissues by the CDC (this further testing was prompted by clinical suspicion and classic histopathologic findings).

Based on our evaluation of post-fixation lung weights, our modified procedure included calculation of lung weights by subtracting the amount of injected formalin by volume. Although the calculated weight was slightly lower than the real measurements, the difference was not statistically significant and was felt to be negligible in its effect on the pathological interpretation. The lower calculated weight may be due to leakage around the needle at the time of formalin injection, or leakage of formalin from the tissue during fixation.

During the COVID-19 pandemic, modified autopsy protocols have been reported. For example, in a Brazil study, minimally invasive autopsies, also known as minimally invasive tissue sampling, were used.<sup>6</sup> One study from India used a hand-held hammer and chisel to open the cranial cavity.<sup>7</sup> We felt that it was safe to open the skull in a wood or metal frame covered by a clear plastic bag or in a clear plastic bag without the wood or metal frame by using an electrical saw.

We conclude that autopsy may be performed safely by pathology residents, pathologists and staff during the COVID-19 pandemic. This autopsy method may also be useful for other infectious diseases transmitted by respiratory droplets in the future. Our pathology residents, autopsy pathologists and staff have now also had the opportunity to receive COVID-19 vaccination, further reducing the risk of infection. However, new variants may occur at any time and uncertainty remains regarding the efficacy of vaccines in preventing infection in new variants of COVID-19. Therefore, we plan to continue following our newly-designed protocol for autopsies until the risk of COVID-19 infection has largely subsided.



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## BNT162b2 and mRNA-1273 Vaccine Effectiveness against SARS-CoV-2 and Variants in the Urban Underserved Population

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#### **ABSTRACT**

The real world COVID-19 vaccine effectiveness among the urban underserved Hispanic/Latino populations is unknown.

We evaluated the mRNA vaccine effectiveness in preventing SARS-CoV-2 infections at a major federally qualified health center in Providence, Rhode Island, and a total of 38,602 patients were included. Time period was used as the SARS-CoV-2 variant proxy.

Compared to the unvaccinated group, the adjusted vaccine effectiveness for 2 doses of BNT162b2 and mRNA-1273 were 94.6% and 97.5% respectively against the alpha variant/wild type, which dropped to 64.8% and 65.0% respectively against the delta variant and 31.6% and 25.6% respectively against the omicron variant. However, once received the booster dose (3rd dose) of BNT162b2 and mRNA-1273, the vaccine effectiveness against the omicron variant improved to 79.9% and 71.2% respectively.

Improving the COVID-19 vaccine education and encouraging to receive a booster dose may help further reduce the burden of SARS-CoV-2 infection in this population.

**KEYWORDS:** COVID-19; variants; vaccine effectiveness; underserved; Hispanic/Latino

The worldwide pandemic of coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), has resulted in significant morbidity and mortality including in the United States (US). Two mRNA-based vaccines, BNT162b2 (Pfizer) and mRNA-1273 (Moderna), were developed and received emergency use authorization by the US Food and Drug Administration in December 2020. As of September 2022, over 591 million doses of the mRNA-based vaccines have been administered in the US.1 Several SARS-CoV-2 variants have been identified since the pandemic. Two Variants of Concern (VOC) have been circulating globally since December 2020 and November 2021 respectively. The B.1.617.2 (Delta) variant was first identified in the US in March 2021 and soon became the predominant variant which resulted in the surge of COVID-19 cases in July 2021.2 The B.1.1.529 (Omicron) variant was first reported in November 2021 and spread around the world. Both mRNA vaccines showed high efficacy in preventing symptomatic SARS-CoV-2 infection in randomized controlled trials.<sup>3,4</sup> This study is to evaluate mRNA vaccine effectiveness in real-world conditions in an urban underserved population in preventing SARS-CoV-2 infections between those fully vaccinated with two doses of mRNA vaccines, boosted with a 3rd dose of mRNA vaccines, and unvaccinated.

We reviewed data from a major federally qualified health center (FQHC) in Providence, Rhode Island, which consisted of 10 community clinics. Patients aged 12 years and older tested for SARS-CoV-2 by reverse-transcription polymerase chain reaction (RT-PCR) were included in this study from January 1, 2021 to December 31, 2021. The estimated vaccine effectiveness was assessed 14 days after receipt of the latest dose, using only the latest SARS-CoV-2 PCR test from each vaccinated patient and the first COVID-19 PCR test from those unvaccinated. Hybrid doses (different vaccine combinations) were omitted from analysis due to small number, as well as the J&J/Janssen COVID-19 vaccine. We used the period of time as the variant proxy-1/1/2021-6/30/2021 as the alpha variant (B.1.1.7)/wild type proxy, 7/1/2021-11/30/2021 as the delta variant (B.1.617.2) proxy, and 12/1/2021-12/31/2021 as the omicron variant (B.1.1.529) proxy. The patient population at this FQHC is predominantly Hispanic/Latino and 90% of households are under the 200% federal poverty level. χ² tests and Wilcoxon rank-sum tests were applied to determine statistically significant differences among groups. Logistic regression model was applied to yield the odds ratios (OR) then transformed to the incidence rate ratio (IRR). (IRR = OR / ((1-Pinfected unvaccinated group)+( Pinfected unvaccinated group \*OR)). Adjusted vaccine effectiveness was calculated by 100% x (1-IRR), adjusted for race/ ethnicity, age groups (12-17, 18-39, 40-64, 65+ years old), and reinfection status (defined as a new infection >90 days from the previous positive SARS-CoV-2 PCR test). A twosided significance threshold was set at P<0.05. The Providence Community Health Centers Review Committee approved the project. All analyses were run using STATA 13.1 (StataCorp, LLC) and SAS 9.4 (SAS Institute, Inc).

Of the 38,602 patients included, the median age was 34 years (IQR 23–51), and over 60% self-identified as Hispanic/Latino. A total of 43.0% of patients completed the primary vaccine series, 4.0% received a booster dose, and 53.0% were partially or unvaccinated. Of the 38,602 patients, 22,247 had



at least one SARS-CoV-2 PCR test and were included in the analysis. (Table 1)

Compared to the unvaccinated group, the adjusted vaccine effectiveness for 2 doses of BNT162b2 and mRNA-1273 were 94.6% and 97.5% respectively against the alpha variant/wild type, which dropped to 64.8% and 65.0% respectively against the delta variant. The effectiveness for 2 doses of BNT162b2 among different age groups (18-39, 40-64, ≥65 years old) against the alpha variant/wild type was similar; however, decreased effectiveness was observed with the increase of age against the delta variant (89.7% for 12-17 years old and 53.2% for 65 years and older). Even though 2 doses of BNT162b2 and mRNA-1273 showed similar all-age effectiveness against the delta variant, when stratified by age groups, mRNA-1273 showed higher effectiveness among those 65 years and older (65.4% vs 53.2%).

The effectiveness for 2 doses of BNT162b2 and mRNA-1273 further dropped to 31.6% and 25.6% respectively against the omicron variant. However, once received the booster dose (3rd dose) of BNT162b2 and mRNA-1273, the vaccine effectiveness against the omicron variant improved to 79.9% and 71.2% respectively. (Table 2)

In this study, we combined PCR testing data from the Rhode Island Department of Health and collaborating testing laboratories to capture as many tests as possible from our patients. Antigen testing may be less of an issue in this time period, when tests were scarce, than it would be in the recent months. The limitation of this study includes that it was a single study site and may not represent other settings in the United States. We were not able to compare the effectiveness of those who received a booster dose between age groups due to smaller sample size. The study was also limited by its observational, retrospective nature and use of administrative data. Thus, we may not know definitively whether the patients were PCR tested because of symptoms or due to known exposure or other reasons, and whether or to what extent we may be missing infections among patients who were not tested.

Table 1. Demographic characteristics of the study population

	SARS-CoV-2 variant proxy			
	01/01/2021– 06/30/2021	07/01/2021– 11/30/2021	12/1/2021– 12/31/2021	
	Alpha variant (B.1.1.7)/wild type	Delta variant (B.1.617.2)	Omicron variant (B.1.1.529)	
Median age (IQR) years	33 (25–46)	33 (24–46)	32 (23–45)	
Race/ethnicity				
Non-Hispanic White	881	602	186	
Non-Hispanic Black	970	629	182	
Hispanic/Latino	5,143	3,370	1,283	
Asian	260	189	70	
Other	4829	2763	890	
Total unvaccinated (persons)/positive for SARS-CoV-2 PCR (persons)	11,575/1981	5,310/784	1,762/753	
Total fully vaccinated (persons)/ positive for SARS-CoV-2 PCR (persons)	508/4	2,196/114	784/232	
Total boosted (persons)/positive for SARS-CoV-2 PCR (persons)	_	47/0	65/6	

Table 2. Vaccine effectiveness against different SARS-CoV-2 variants

Vaccine effectiveness in % (95% CI)					
	SARS-CoV-2 variant proxy				
	Alpha variant (B.1.1.7)/wild type	Delta variant (B.1.617.2)	Omicron variant (B.1.1.529)		
Fully vaccinated					
BNT162b2 (2 doses)					
All ages	94.6 (83.4–98.3)	64.8 (54.2–73.0)	31.6 (19.6–42.5)		
Age 12-17 years old	_	89.7 (67.9–96.8)	63.6 (38.8–79.6)		
Age 18-39 years old	93.7 (57.3–99.1)	65.5 (49.2–76.8)	33.4 (16.3–48.3)		
Age 40-64 years old	96.0 (72.4–99.4)	51.0 (24.4–68.8)	4.4 (-22.8-29.5)		
Age ≥ 65 years old	92.5 (49.4–99.0)	53.2 (3.0–78.4)	-17.3 (-69.7-35.3)		
mRNA-1273 (2 doses)					
All ages	97.5 (82.5–99.7)	65.0 (52.9–74.1)	25.6 (10.7–39.0)		
Age 12-17 years old	_	_	_		
Age 18-39 years old	_	71.2 (53.1–82.5)	17.4 (-5.3-37.5)		
Age 40-64 years old	_	55.4 (31.6–71.4)	24.4 (1.0–44.6)		
Age ≥ 65 years old	94.1 (59.4–99.2)	65.4 (27.4–84.1)	49.2 (-1.8-78.8)		
Fully vaccinated and boosted†					
BNT162b2 (3 doses)	_	_	79.9 (44.3–93.5)		
mRNA-1273 (3 doses)	_	_	71.2 (24.0–90.8)		

<sup>\*</sup> The vaccine effectiveness was adjusted for race/ethnicity, age groups (12-17, 18-39, 40-64, 65+), and reinfection status (defined as a new infection >90 days from the previous positive SARS-CoV-2 PCR test). † Stratification by age group was not done for the fully vaccinated and boosted group due to the smaller sample size.



As one of the first studies from the real-world condition and the medically underserved Hispanic/Latino dominant population, our findings in the New England region evidenced the high effectiveness against the omicron (B.1.1.529) variant infection from 2 doses of the BNT162b2 and mRNA-1273 with the booster dose (3rd), consistent with other recent studies.<sup>5</sup> Improving the COVID-19 vaccine education and encouraging to receive a booster dose may help further reduce the burden of SARS-CoV-2 infection in this population.

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#### Ethics approval

The study was approved by the Providence Community Health Centers Review Committee. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008

#### **Prior presentations**

None.

#### **Data Availability Statement**

The data that support the findings of this study are available on request from the corresponding author, C-H W. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

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#### Older Adult Pedestrian Injury in Rhode Island, 2017–2020

NIRALEE SHAH, MD, ScM; MICHAEL J. MELLO, MD, MPH; JULIE R. BROMBERG, MPH, CCRP; STEPHANIE LUECKEL, MD, ScM

#### **ABSTRACT**

**OBJECTIVE:** To understand the epidemiology and clinical outcomes of older adult pedestrian injury in Rhode Island. **METHODS:** Descriptive univariate analysis of data from Rhode Island Hospital's trauma registry on patients admitted for pedestrian-related injuries between 2017–2020. **RESULTS:** The rate of pedestrian injury in older adults was 1.5 times the rate in adults age 18–49. Injured older adult pedestrians experienced a higher rate of serious adverse events during hospitalization (18.0%) than their younger counterparts (10.3%) and had almost twice the mortality rate (14.9% versus 7.6%). Across ages, pedestrian injury rates are higher in densely populated areas, and those injured disproportionately are male and have comorbid alcohol and substance use disorders.

**CONCLUSIONS:** The increased risk of pedestrian injury in older adults is evident and necessitates intervention. Further research is warranted on the root causes of higher pedestrian injury and mortality rates among older adults.

**KEYWORDS:** pedestrian; injury prevention; older adult; traffic accident

#### INTRODUCTION

Walking provides substantial physical and mental health benefits across all ages. It has been shown to reduce all-cause mortality,<sup>1</sup> with the greatest impact seen in adults over 65.<sup>2</sup> Moreover, walking promotes more environmentally<sup>3</sup> and economically<sup>4</sup> sustainable communities, enhancing overall quality of life.<sup>5</sup> However, the United States has lagged behind other high-income countries in reducing pedestrian fatality and serious injury rates.<sup>6</sup> In the past decade, the U.S. saw the largest percentage increase in pedestrian fatalities among 30 countries in the Organization for Economic Cooperation and Development (OECD), the majority of whom saw decreases in pedestrian fatalities.<sup>7</sup>

While older adults have the most to gain from shifting to active transport modalities,<sup>8</sup> as pedestrians they face the greatest risk of injury<sup>9</sup> and fatality.<sup>10</sup> The fatality rate for older adult pedestrians is twice the rate of the overall U.S.

population, and the rate of severe injury among older adults is almost twice the national average<sup>6</sup> and rising.<sup>11</sup> Rhode Island has not been immune to this development. Between 2014-2018, adults 65 and older, accounted for 38% of pedestrian fatalities in Rhode Island,<sup>12</sup> almost twice the national rate.<sup>13</sup> Studying the clinical course and outcomes for older adult injured pedestrians can better illustrate the impact on our community and healthcare system and inform investments in safer communities for pedestrians. For this reason, we reviewed recent data on Rhode Island adults hospitalized with pedestrian-related injuries.

#### **METHODS**

This is a descriptive study of adults admitted for pedestrian-related injuries to Rhode Island Hospital, the state's only adult Level I Trauma Center, between 2017–2020. The study was approved by the Lifespan Institutional Review Board. Deidentified data was collected from the Rhode Island Hospital trauma registry for patients admitted between January 1, 2017 to December 31, 2020 who were over age 18 and whose injury code fell under "MVT-Pedestrian" or "Pedestrian, other" on the ICD-10-CM External Cause of Injury Matrix. Data points included MRN, age, sex, race, ethnicity, comorbidities, home and injury zip code, mechanism of injury, ICD-10 diagnoses, injury severity score, hospital and ICU length of stay, adverse hospital events, and mortality outcome

We examined population rates of pedestrian injury within 10-year age brackets using American Community Survey (ACS) 2019 5-Year census data. Based on the markedly higher injury rate in adults over 50, we expanded the definition of "older adults" in this study to include those age 50 and over and be inclusive of this potentially higher risk group. We designated age 50 as our cutoff for comparison of demographics and clinical outcomes between "adults (18–49)" and "older adults" age 50 and over.

Population estimates were obtained from the ACS 2019 5-year census data to calculate pedestrian injury rates disaggregated by age, sex, and county. We used univariate descriptive analysis to compare comorbidities, mechanism of injury, and clinical outcomes between adults (18–49) and older adults.



#### **RESULTS**

The initial data set included 516 adult trauma patients admitted to Rhode Island Hospital between 2017–2020. Four cases did not meet inclusion criteria as the injury mechanism was not pedestrian-related, leaving a final data set 512 patients.

Pedestrian injuries in this study included pedestrians injured on foot and other conveyance (e.g., skateboard, roller-skates). There are no notable differences in the mechanism of injury between adults (18–49) and older adults. Most cases involve pedestrians injured in a traffic accident with unspecified motor vehicles (331 cases) or involving a car, pick-up truck, or van (100 cases).

The rate of pedestrian injury across adult age groups are summarized in **Table 1** and is notably higher among older adults. Below age 50, the average rate is 50.0 per 100,000 whereas in older adults it is 75.5 per 100,000 with a peak rate of 89.9 per 100,000 among adults ages 70–79. This higher rate of pedestrian injury in older adults persists when we disaggregate the data by sex. Across age groups, the rate of injury is higher among men than women. Among older adults, the rate of injury is 93.0 per 100,000 among men versus 61.6 per 100,000 among women.

Table 1. Rate of pedestrian injury among Rhode Island adults, 2017–2020

Age range,	Total		Male		Female	
years	Cases Rate pe		Cases	Rate per 100,000	Cases	Rate per 100,000
18–29	88	46.4	56	57.9	32	34.5
30–39	71	53.0	43	64.3	28	41.7
40–49	64	50.7	39	62.6	25	39.1
50–59	98	64.6	5	78.3	41	52.0
60–69	88	68.3	55	89.1	33	49.2
70–79	65	89.9	35	107.9	30	75.2
80+	38	79.1	16	96.5	22	69.9

The Rhode Island Hospital Trauma Registry includes a limited list of common comorbidities. Medical problems that increase in prevalence with age are seen at a higher rate among older adult pedestrians, including hypertension (48.8% in older adults versus 7.6% in adults 18–49), respiratory disease/COPD (5.9% versus 1.3%), diabetes (17.3% versus 4.9%), and functionally dependent health status (7.6% versus 2.7%). Higher rates of ADHD and substance use disorder are seen in adults (18-49) than older adults. Across ages, substance use rates among injured pedestrians are notably high. Specifically, 11.2% (age 18–49) and 12.5% (age 50+) have alcohol use disorder and 23.8% (18–49) and 8.7% (age 50+) have substance use disorder.

The data set did not include injury zip code for 110 of the total 512 cases. Rates of pedestrian injury were calculated in each RI county, and across all counties the rate was higher

in older adults. Moreover, the rate of injury in Providence County – 55.9 per 100,000 among older adults and 39.1 per 100,000 in adults 18–49 – is nearly double the rate in other RI counties, which average 25.8 per 100,000 and 13.6 per 100,000, respectively.

This data set included 874 distinct ICD-10 diagnosis codes. The most frequently occurring diagnosis among all adult injured pedestrians is fracture of the knee, tibia, or fibula (377 events), followed by vertebral fracture (307 events), fracture of the skull or facial structures (221 events), and fracture of the hip or pelvis (162 events). In each of these categories, the relative frequency of the injury is higher in older adults. Additionally, the relative frequency of injury in older adults is particularly high for clavicular fracture (0.85), subarachnoid hemorrhage (0.73), spinal cord injury (0.84), and injury to the major arteries (0.88).

The data set included 22 distinct adverse events occurring during hospitalization, ranging from minor (e.g., pressure ulcer or DVT) to more serious and life-altering (e.g., pulmonary embolism or cardiac arrest with CPR). **Table 2** summarizes the serious adverse events occurring in each age group. Higher rates of serious adverse events during hospitalization are seen in older adults (18.0%) and adults 18–49 (10.3%).

The mortality rate during admission for pedestrian injury is higher among older adults, with a rate of 14.9% versus 7.6% among those age 18–49.

**Table 2.** Serious adverse events occurring during hospitalization injured pedestrian adults in Rhode Island, comparison between those age 18–49 and those age 50+

Adverse event	Number of Cases		
	Age 18–49	Age 50+	
Myocardial infarction	0	1	
Unplanned intubation	3	10	
Reintubation	3	4	
Pulmonary embolism	2	3	
Alcohol withdrawal	5	8	
Cardiac arrest with CPR	0	4	
latrogenic injury	0	4	
Incidental	7	16	
Escalation in care	3	2	

#### DISCUSSION

This study demonstrates that between 2017–2020, the pedestrian injury rate among patients presenting to Rhode Island Hospital was 1.5 times higher for older adults (75.5 per 100,000) than adults 18–49 (50.0 per 100,000). Furthermore, older adult pedestrians experienced more serious adverse events during hospitalization (18.0% versus 10.3%) and had higher mortality rates (14.9% versus 7.6%).

The higher injury rate among older adult pedestrians seen at Rhode Island Hospital parallels a concurrent national rise



in older adult pedestrian fatalities.<sup>10</sup> Recent studies have explored the cause of increased injury risk in older adults. In a systematic review of the literature, Wilmut et al<sup>15</sup> proposed several individual factors at play including perceived versus actual behavior control, underestimation of walking time, time-to-arrival judgements, waiting endurance, and cognitive function. Naumann et al<sup>9</sup> defined 'pedestrian injury' more broadly than this study – including additional ICD-9-CM injury codes like falling and over-exerting oneself – and found that the leading mechanism of injury in older adults was falls often involving a curb.

Our finding that older adult pedestrians experience a worse clinical course and outcomes is consistent with existing literature. Rod et al's16 systematic review and meta-analysis of injury outcomes for 1 million pedestrians found that globally, pedestrians over age 60 have a higher risk of severe or fatal injury when involved in a pedestrian collision. Similarly, Reske-Nielsen et al's17 review of geriatric trauma found that older pedestrians struck by a vehicle have a higher incidence of severe injury and death compared to younger patients, and older adult motor vehicle collision patients were more likely to present with severe injuries caused by low-speed collisions. In general, older hospitalized patients experience more adverse events than their younger counterparts,18 with potential causative factors including clinical complexity, comorbidity, illness severity, reduced functional ability, and lower quality of care. 19

This study found a higher rate of pedestrian injury among Rhode Island males, regardless of age. This parallels national studies showing that men outnumber women among fatally injured pedestrians, <sup>10</sup> making up 70% of pedestrians killed in traffic collisions. <sup>20</sup> This cannot be attributed to differences in exposure, since men in the U.S. do not walk more than women. <sup>21</sup> We suspect this correlation is at least partially confounded by the effect of alcohol use. There is strong evidence that men drink more than women <sup>22</sup> and that alcohol use is associated with pedestrian fatalities. <sup>23</sup>

Data on drug screening and blood-alcohol-concentration were not obtained for this study. However, this study found high rates of substance use history among injured pedestrians, in most cases much higher than the prevalence of those disorders in the general Rhode Island population. Among injured pedestrians, 11.2% (age 18–49) and 12.5% (age 50+) have alcohol use disorder versus 6.9% of the adult general population in Rhode Island, and 23.8% (18–49) and 8.7% (age 50+) have a diagnosis of substance use disorder versus 8.9% of RI adults. Substance use impairs coordination and judgment and can lead to riskier pedestrian behaviors, increasing the risk of injury and death. In older pedestrians, it is possible that polypharmacy, which can cause similar impairments in judgment, alertness, motor skills, and coordination, may similarly contribute to injury risk.

In this study, the rate of pedestrian injury was remarkably higher in densely populated areas of Rhode Island, with rates in Providence County nearly double those in other RI counties. This mirrors existing evidence that urban environments are particularly dangerous for pedestrians; in 2014 almost 80% of pedestrian fatalities nationally occurred in urban areas.<sup>25</sup> This suggests that injury prevention efforts ought to target more densely populated areas. To better assess the impact of the built environment (pedestrian infrastructure, walking paths, green spaces) on pedestrian injury in Rhode Island, we need more granular geographic data on the location of pedestrian collisions. This could involve linking medical records of injured pedestrians with associated police reports and environmental data. Such an investigation could inform the specific environmental countermeasures to decrease pedestrian injury. Meanwhile, automated speed enforcement, median crossing islands, pedestrian hybrid beacons, and road diets can effectively improve pedestrian safety on high-capacity urban roads.11 Other measures that reduce motor vehicle speeds, both road characteristics and reducing speed limits, are also effective pedestrian safety measures.26

Racial and ethnic disparities in health care access and equity are well-documented.27 The data provided by the Rhode Island Hospital Trauma Registry included patient race and ethnicity abstracted from the electronic health record (EHR). However, the existing EHR data fields for race provide ill-defined categories. Moreover, while in principle this data is self-reported, in practice there are often inconsistencies between EHR-derived data and patients' self-identified race and ethnicity.<sup>28</sup> For this reason, this study excluded analysis of race and ethnicity of injured pedestrians. Importantly, other studies have found increased rates of pedestrian injury and fatality among racial and ethnic minorities,<sup>29</sup> highlighting that the health disparities typically seen in historically marginalized groups extend to the pedestrian population. We speculate that this is strongly tied to environmental conditions associated with lower resources and neighborhood social inequities, such as less investment in pedestrian infrastructure: crosswalks, sidewalks, walk signals, refuge islands, green spaces, and safe play areas for children. Future studies on pedestrian injury that directly examine geographic differences in allocation of resources and social inequities, rather than examining race and ethnicity as proxies for these environmental factors, would more effectively highlight the reasons for health disparities and inform appropriate interventions.

A recent report by the Governors Highway Safety Association found that while nationwide driving declined by 13% in early 2020 due to the COVID-19 pandemic, pedestrian fatalities remained the same as in early 2019 – thus the nation saw a 20% relative increase in pedestrian deaths.<sup>23</sup> Simultaneously, at the peak of the initial lockdown, we saw a decrease in walking nationwide,<sup>30</sup> suggesting that pedestrian exposure was further decreased and the relative fatality rate was likely higher. Specifically, we saw a decrease in utility



walking and increase in recreational walking. Previously, residents of low-income areas walked more than residents of high-income areas; after implementation of COVID-19 response measures, we saw this pattern reverse with residents of high-income areas walking more.<sup>30</sup> This again high-lights the importance of examining environmental factors, resource allocation, and neighborhood social inequities in study of pedestrian behaviors, injury, and fatality.

#### **LIMITATIONS**

Our sample is limited to adults admitted for trauma at Rhode Island Hospital and thus excludes patients who did not have Rhode Island Hospital trauma services activated but still required outpatient or rehabilitative care, as well as those declared deceased at the site of collision. Thus, this study likely underestimates pedestrian injury rates. Second, the rates of pedestrian injury and fatality do not take into account exposure, e.g., miles walked by pedestrians of different ages, sex, and location. There was insufficient data on pedestrian behaviors in Rhode Island to calculate exposure-based rates. Third, patients with impaired hearing and vision often do not have this diagnosis documented in the EHR—therefore this is likely underreported in this study and may be a significant contributing factor to pedestrian injury. Lastly, using zip code for geographic location of injury did not provide granular enough data to examine the correlation between environmental factors and injury rates.

#### CONCLUSIONS

This study found that the pedestrian injury rate of patients admitted to Rhode Island Hospital was 1.5 times higher for older adults than adults (18–49). Older adult pedestrians also experienced more adverse events during hospitalization and had two times the mortality rate. This warrants further research on the causes of higher pedestrian injury and mortality rates in this group, as well as the most effective safety countermeasures.

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## Reasons for Use of Electronic Cigarettes, Cigars, and Hookah in Pregnant Women in Rhode Island: A Preliminary Study

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#### **ABSTRACT**

**BACKGROUND:** The current study examined reasons pregnant women in Rhode Island use non-cigarette nicotine/tobacco products during and prior to pregnancy.

**METHODS:** Of the 124 pregnant women in Rhode Island enrolled in the study, 91% self-reported ever using ecigarettes, hookah or cigars, and reasons for their use. We compared responses between participants who used these products during pregnancy (prenatal) and those who used prior to pregnancy (lifetime) for each product separately.

**RESULTS:** Participants reported using e-cigarettes as a cessation aid, hookah for entertainment, and cigars as a vehicle for marijuana consumption as primary reasons for use. There were no significant differences in reasons for using hookah or cigars between prenatal and lifetime users, but prenatal e-cigarette users were more likely to report affordability as a reason for use compared to lifetime e-cigarette users.

**CONCLUSIONS:** Differential reasons for use by tobacco product may have implications for targeted interventions in pregnant people in Rhode Island.

**KEYWORDS:** pregnancy, reasons for use, e-cigarettes, hookah, cigars

#### INTRODUCTION

In-utero exposure to nicotine and tobacco is known to have teratogenic effects.¹ While rates of cigarette smoking during pregnancy have declined in the US, rates of non-cigarette nicotine/tobacco products (NCNTP) use during pregnancy have either remained stable or increased.²-⁴ Due to differences in state laws, there are geographical variations in state-specific prevalence of NCNTP use during pregnancy.⁵ While much emphasis has been placed in Rhode Island on tobacco regulatory policies,⁶ there is little examination of NCNTP use among pregnant people in Rhode Island. For instance, while one study found that e-cigarette use among pregnant people in Rhode Island had decreased from 4.7% (2015–2016) to 2.4% (2017–2018),⁶ no studies to date have examined use of other NCNTP products (e.g., hookah, cigars) in pregnant people in Rhode Island.

Despite stable or rising rates of use, little is known about reasons for use of NCNTPs among pregnant people. Much

of the extant research focuses on e-cigarettes. This literature has largely identified smoking cessation or relapse prevention and harm reduction to the pregnant person, fetus, and others as primary reasons for e-cigarette use in pregnancy, paralleling e-cigarette studies in adults, where key reasons for use are as a safer and healthier alternative to cigarettes and as a potential smoking cessation aid. NCNTPs are also available in a variety of flavors, which may make them more appealing; flavors are a top reported reason for NCNTP use – particularly hookah and e-cigarettes – in studies of adult populations. In addition, in studies of general populations, dependence levels, reasons for use, and cessation intentions tend to vary by product, suggesting very different pathways toward intervention for each NCNTP. 10,12,13

Despite the importance of elucidating differential reasons for use of NCNTPs during pregnancy for development of tailored intervention efforts, to our knowledge, no studies have specifically examined reasons for hookah or cigar use during pregnancy in the US or Rhode Island or e-cigarettes in Rhode Island. Given the known health impacts of NCNTP use during pregnancy,¹ and evidence for stable or increased use during pregnancy over time,²-⁴ the current study sought to understand reasons for use of e-cigarettes, hookah and cigars in a sample of low-income, racially and ethnically diverse pregnant women in Rhode Island. Our aim was to compare reasons for use of NCNTPs between pregnant women who reported lifetime but no current use of NCNTP, and those who reported NCNTP use during pregnancy.

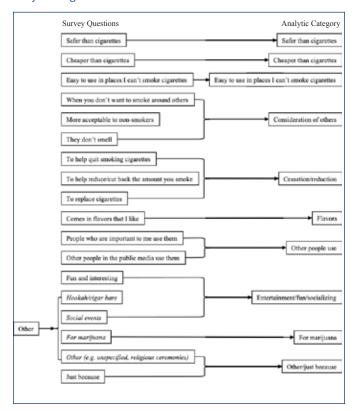
#### MATERIALS AND METHODS

Participants were 124 pregnant women from the greater Rhode Island area who were English-speaking, primarily low-income, and with diverse racial and ethnic identities. Participants were drawn from a parent study examining the impact of cigarette smoking during pregnancy on fetal development. Participants were over-sampled for prenatal cigarette use with no exclusions based on other tobacco product use. Recruitment took place at obstetrical offices, health centers, and community postings in Rhode Island. Participants in the parent study provided written informed consent to participate in a substudy conducted at  $M_{\rm gestation}$ =34 weeks focused on use and perceptions of several NCNTPs (e-cigarettes, hookah, cigars). All participants provided written informed consent; study procedures were approved by local Institutional Review Boards.



One hundred and thirteen (91%) of the participants surveyed reported using e-cigarettes, hookah, or cigars in their lifetimes. We examined reasons for NCNTP use by prenatal versus lifetime (ever used prior to pregnancy) use groups for each product. Reasons for using each product were assessed using the prompt "What are the reasons why you use(d) [the product]?" Participants were instructed to select as many reasons as applied from a list of 15 options, which included an optional text response (**Box 1**). The original reasons were consolidated into nine categories, and a tenth category was added based on text responses: 1) safer than cigarettes; 2) cheaper than cigarettes; 3) usable when smoking is not permitted; 4) consideration of others; 5) cessation/reduction aid; 6) flavors; 7) entertainment/fun/socializing; 8) others use; 9) another reason/just because; and 10) for using marijuana.

**Box 1.** Classification of reasons for use from original survey questions to analytic categories



#### **RESULTS**

**Table 1** shows sample characteristics among respondents who reported ever using any of the three NCNTPs (N=113; n=58 for e-cigarettes; n=78 for cigars; n=103 for hookah). Rates of prenatal and lifetime use (respectively) were 8% and 47% for e-cigarettes; 13% and 84% for hookah; and 12% and 63% for cigars. Most participants (75%) reported having ever tried two or more NCNTPs. Of the 36 participants who reported using NCNTPs prenatally, n=4 (11%) reported using two or more products.

**Table 1.** Sample characteristics

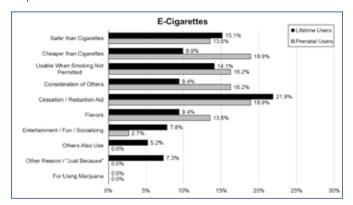
	Overall	Lifetime	Lifetime	Lifetime	
	(N=113)	E-Cig Use	Cigar Use	Hookah Use	
		(n=58)	(n=78)	(n=103)	
		Freq	. (%)		
Hispanic ethnicity	40 (35.4)	15 (26.3)	25 (32.1)	39 (37.9)	
Race					
White	46 (40.7)	27 (47.4)	32 (41.0)	39 (37.9)	
Black	25 (22.1)	11 (19.3)	18 (23.1)	22 (21.4)	
Another race	29 (25.7)	12 (21.1)	18 (23.1)	29 (28.2)	
Multiracial	13 (11.5)	7 (12.3)	10 (12.8)	13 (12.6)	
Employed	73 (64.6)	36 (63.2)	50 (64.1)	70 (68.0)	
Annual HH income <\$30,000	68 (63.0)	33 (60.0)	47 (63.5)	61 (62.2)	
Education					
Less than HS	23 (20.4)	14 (24.6)	14 (18.0)	20 (19.4)	
HS/GED	34 (30.1)	14 (24.6)	22 (28.2)	32 (31.1)	
Some college/ associate's	50 (44.3)	27 (47.4)	39 (50.0)	46 (44.7)	
College or greater	6 (5.3)	2 (3.5)	3 (3.9)	5 (4.9)	
Used e-cigs during pregnancy	10 (8.1)	10 (17.2)	7 (9.0)	9 (8.7)	
Used cigars during pregnancy	15 (12.1)	6 (10.5)	15 (19.2)	15 (14.6)	
Used hookah during pregnancy	16 (12.9)	7 (12.3)	10 (12.8)	16 (15.5)	
	Mean (SD)				
Gestational age (weeks)	34.1 (1.6)	34.2 (1.6)	34.0 (1.7)	34.2 (1.5)	
Parity	0.9 (1.1)	1.0 (1.3)	0.9 (1.2)	0.8 (1.0)	
Age (years)	26.3 (4.5)	26.3 (4.4)	26.6 (4.7)	25.9 (4.4)	

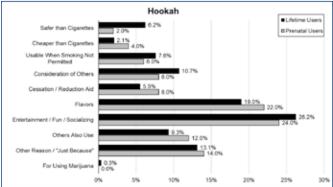
Note. HS, high school; GED, General Equivalency Degree; E-cig, electronic cigarettes; HH: household inccome

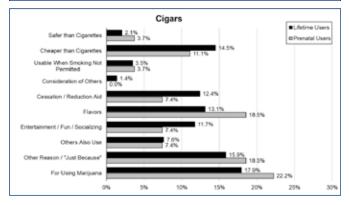
Reasons of reported prenatal and lifetime use by product among pregnant women from the greater Rhode Island area are shown in Figure 1. The primary reported reason for lifetime use was as a cessation aid (22%) for e-cigarettes (Figure 1A); for entertainment/fun/socializing (26%) for hookah (Figure 1B); and to consume marijuana (18%) for cigars (Figure 1C). The primary reported reason for prenatal use was as a cessation aid and affordability relative to cigarettes (both 19%) for e-cigarettes; for entertainment/fun/ socializing (24%) for hookah; and to consume marijuana (22%) for cigars. Participants who used e-cigarettes prenatally were more likely to report affordability (19%) as the reason for use vs. those who reported lifetime e-cigarette use (10%) (p<0.001). No participants reported using e-cigarettes as a means to use marijuana. No differences in reasons for use emerged between prenatal and lifetime use groups for hookah or cigars.



Figure 1. Proportion of sample (n = 113) reporting reasons for (A) ecigarettes, (B) hookah, and (C) cigars use based on history of use (lifetime vs. prenatal use)







#### **DISCUSSION**

This study aimed to understand reasons for use of e-cigarettes, hookah, and cigars among pregnant people in Rhode Island. The present study is the first, to our knowledge, to explore reasons for using hookah and cigars during pregnancy in the US. Consistent with findings from studies of general populations, pregnant people in Rhode Island reported differing reasons for use by product: smoking cessation was the most common reason for use of e-cigarettes, entertainment/fun/socializing for hookah, and to deliver marijuana for cigars. Consistent with non-pregnant populations, <sup>10</sup> pregnant women perceive e-cigarettes as a safer and healthier alternative compared to smoking conventional

cigarettes - although this was a more popularly endorsed reason for lifetime versus prenatal use. Hookah is widely considered a social activity with low perceived risk.14 Findings from the present study that key reasons for hookah use in pregnant women were for social reasons and flavors parallel studies from general populations pointing to social factors and flavors as key reasons for hookah use, 15,16 along with affordability.<sup>17</sup> Our finding that consuming marijuana was the most common reason for cigar use in pregnant women is consistent with findings from a nationally representative general sample showing that blunts are more commonly smoked than unadulterated cigars among pregnant people and women of reproductive age in the US.3 Blunts are cigars that are partially or fully hollowed and filled with marijuana, or marijuana wrapped in cigar wrappers. Because cigar wrappers are made of tobacco, blunts deliver both tobacco and marijuana to people who smoke them.

Study findings should be considered in the context of limitations. The generalizability of these results may be limited due to convenience sampling methods. The current sample is also higher risk than the general population due to socio-demographic and behavioral factors. The self-report measure of reasons for use was retrospective, and is subject to recall bias, as well as forms of desirability bias. In addition, we did not have adequate sample size to assess for differences between reasons for use of tobacco products in pregnancy versus lifetime. We also did not specifically assess product switching during pregnancy or the postpartum period.

While overall, study findings suggest that the reasons for use of NCNTPs do not differ strongly between prenatal and lifetime users, results highlight differing reasons for use by type of NCNTP among pregnant women. These findings underscore the importance of assessing for use of multiple NCNTPs in addition to cigarette smoking during pregnancy. Findings also highlight the need for targeted education and health communication efforts to address misconceptions and risks for each NCNTP among pregnant people, especially for individuals who switch from cigarette use to NCNTP use due to perceived diminished risk. For instance, while individuals may be using e-cigarettes during pregnancy for smoking cessation, there may be no fetal health advantage to switching to e-cigarettes - especially as the prevalence of preterm birth, small for gestation age, and low birthweight has been shown to be similar between those who smoked e-cigarettes compared to combustible cigarettes.<sup>18</sup> In addition to implementing evidence-based strategies for cessation, healthcare professionals who treat pregnant people who smoke should consider tailoring behavioral counseling strategies based on each type of NCNTP and potential reasons for using. 19 For instance, cessation strategies targeting increasing social support and reducing the amount of time spent in social places that are associated with NCNTP use may be especially effective for individuals who use hookah during pregnancy. Similarly, evidence-based interventions targeting marijuana



use may be particularly helpful for cigar users who may be using blunts, such as incorporating behavioral components of motivational interviewing or contingency management.<sup>20</sup>

Although we did not address significance of differences between prenatal and lifetime reasons for use, findings that reasons for use did not differ substantially between prenatal and lifetime use for specific NCNTPs suggests that policies and interventions intended to decrease use by addressing reasons for use in the general population may also serve to reduce use in pregnant people. Further, given known adverse effects of NCNTPs on maternal and offspring health, policies designed to reduce NCNTPs in the general population would also impact maternal use and maternal and offspring health. Future research is needed to confirm lack of differences between reasons for use in lifetime versus prenatal periods in larger samples. Additional research is also needed to investigate switching between NCNTPs, from NCNTPs to cigarettes, and from tobacco use to marijuana use during pregnancy and in the postpartum period.

#### CONCLUSION

The present study revealed differential reasons for use by NCNTP in pregnant women in Rhode Island. Elucidating reasons for using NCNTP provides essential information for developing tailored cessation strategies at individual, local, and state-wide levels to engage marginalized populations in Rhode Island. Recent moves by the US Food and Drug Administration to ban menthol cigarettes<sup>21</sup> and reduce nicotine in cigarettes to non-addictive levels22 makes research focused on NCNTPs particularly timely and relevant. While many cities in Rhode Island (i.e., Providence, Central Falls, Barrington, Johnston, Middletown) have established local restrictions banning the sale of flavored tobacco- or nicotinecontaining products in 2012,23 Rhode Island began regulatory steps to prohibit the sale of flavored e-cigarette products to curb youth use in 2019, and permanently banned flavored e-cigarettes in 2020.<sup>24</sup> Given that flavors is an important reason for use across NCNTPs, but particularly for hookah, the establishment of state-wide regulations to prohibit the sale of all flavored tobacco products could further facilitate reduction of tobacco dependence and disease in Rhode Island, 25,26 including among pregnant people.

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# Where's My Doctor? The Impact of the Primary Oncologist's Visit with Their Hospitalized Patients

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#### **ABSTRACT**

**BACKGROUND:** Continuity of care is a cornerstone of the patient-practitioner relationship. Previously, patient satisfaction has been related to perceived provider communication skills and competence. Our study assessed the relationship between the inpatient continuity visit (ICV), a face-to-face patient-provider interaction with the primary oncologist, and patient satisfaction.

**METHODS:** Subjects were adult inpatients on the oncology unit at The Miriam Hospital who had an oncologist at the hospital-based cancer center. A survey, given at discharge, included a 5-point Likert scale ranging from greatly worsened to greatly improved satisfaction to assess the impact of the ICV on patient satisfaction.

**RESULTS:** Of 75 participants, 43 (57.3%) reported a visit by their outpatient oncologist. Of these, 39 (90.7%) reported that this visit either greatly or somewhat improved satisfaction with their hospital stay. Of subjects who had a single ICV, 93.7% reported either greatly or somewhat improved satisfaction compared to 88.9% who had more than one visit. Of 32 (43.3%) subjects who did not receive a visit, 15.6% reported that the lack of visit either greatly or somewhat worsened their satisfaction during their hospital stay, while 84.4% reported no impact.

**CONCLUSIONS:** Our study suggests that an ICV improves satisfaction of care in cancer patients on a hospitalist service, and a lack of ICV negatively impacted satisfaction. There was no improvement in satisfaction for multiple versus single ICVs. While the practicality of this intervention should be reassessed with the emergence of more accessible telehealth modalities, the efficacy of a single visit to improve satisfaction is informative.

**KEYWORDS:** patient satisfaction; continuity of patient care; oncology; hospitalist

#### **INTRODUCTION**

Continuity of care is a central element of the patient-practitioner relationship, and thus at the heart of healthcare delivery. Previous research has shown that continuity of

care impacts level of patient satisfaction, 1,2,3 interpersonal and functional aspects of healthcare delivery, 4,5 and health outcomes.6 As the field of medicine continues to expand, this continuity has been challenged by the widespread adoption of the hospitalist system. Hospitalists, physicians who work full-time in an inpatient setting, have replaced the traditional practice of outpatient doctors managing the hospital care of their outpatients. Although this responsibility of care has transferred hands, the importance of the outpatient practitioner to understand the hospital course and integrate this into the outpatient care plan remains. This knowledge can come from a discussion with the inpatient attending physician, a letter or electronic communication from the inpatient medical team to the outpatient provider, or an in-person visit by the provider to their patient in the hospital, known as an inpatient continuity visit (ICV). The continuity visit can range from a brief face-to-face "social/ continuity visit" to a comprehensive patient assessment between an outpatient provider and one of their hospitalized patients. The encounter encompasses a discussion regarding care and decision-making and may or may not also include a physical exam and interface with the hospitalist.<sup>7</sup>

The link between continuity of care and patient satisfaction is also important given that levels of patient satisfaction with care have been related to patient perception of physician conduct, including communication skills.<sup>8</sup> In the oncology population, meta-reviews have showcased the importance of multi-professional support in the setting of advanced cancer.<sup>9</sup> However, to date, no studies have shown the impact of a continuity visit in the oncology inpatient population. The oncology inpatient frequently is afflicted with acute complications from disease or treatment that threatens to disrupt the care plan, which emphasizes the need for seamless continuity of care with the outpatient provider.

There is wide practice variation in the utilization of the inpatient continuity visit by primary oncologists once their patient is admitted to the inpatient oncology hospitalist service. The current study assessed the relationship between overall patient satisfaction with care and the ICV. The authors hypothesize that subjects who report one or more continuity visits by their outpatient oncologists will report higher satisfaction ratings.



#### **METHOD**

#### **Participants**

The study population was comprised of adult inpatients on The Miriam Hospital, Providence, RI, oncology service admitted from January, 2016 to May, 2019. All subjects followed with an outpatient oncologist at the Lifespan Cancer Institute at The Miriam Hospital, located across the street from the main hospital. The inpatient attending physician was a dedicated oncology hospitalist who was not involved in the clinical outpatient care of the patient. Subjects were provided with an informational letter and given opportunity to ask questions of study staff. Exclusion criteria included patients who did not speak English, Spanish, or Portuguese and those patients who did not have a primary oncologist at the Lifespan Cancer Institute at The Miriam Hospital.

#### **Procedure**

The study received approval from the Institutional Review Board (IRB) of The Miriam Hospital. The data for this study was collected using a de-identified survey on the day of discharge. Trained study staff provided each potential participant with a consent form that included the name and contact information for the principal investigator and IRB. Study staff were available to answer any questions about the project or survey should they arise. English information letters and surveys were transcribed into Spanish and Portuguese by trained medical interpreters.

#### Questionnaire

The survey was developed in collaboration with the hospital's biostatistics department and local practicing oncologists. It included a 5-point Likert scale ranging from greatly worsened to greatly improved to assess the impact of the ICV on patient satisfaction (Figure 1).

#### **RESULTS**

A total of 82 surveys were completed with 75 unique participants. Surveys that were duplicated by the same participant at a second separate, inpatient visit were not included in analysis. Patient demographics are shown in **Table 1**. Overall, more male patients participated in the study than female patients, with a large proportion identifying as White. The most common malignancies represented were gastrointestinal and hematologic.

Out of the 75 participants, 43 reported that they had received a visit from their outpatient oncologist during their hospitalization, while 32 subjects reported they did not receive a visit. The study showed that for the 43 inpatients who received a visit by their outpatient oncologist, 90.7% (n = 39) of them reported that this visit either greatly or somewhat improved their satisfaction with care. The remaining 9.3% (n = 4) of patients with an ICV reported no impact. None reported that the ICV greatly or somewhat

Figure 1. Study questionnaire

Date of Birth:  Gender:   Male  Female  Other  Race: (Circle one): a. White b. Black or African-American c. Asian d. American Indian or Native Alaskan e. Pacific Islander f. Other  Ethnicity (Circle one): a. Hispanic or Latino b. Non-Hispanic or Latino
Date of admission to The Miriam Hospital:  Date of discharge from The Miriam Hospital:  Reason for admission:  Who was the attending INPATIENT oncologist during your hospitalization?*
Who is your OUTPATIENT (primary) oncologist?*  For how many years have you been seeing your OUTPATIENT (primary) oncologist?  During that time, how often did you see your primary oncologist? (Circle one):  a. Daily b. Once a week c. Once a month d. Once a year
Did your OUTPATIENT (primary) oncologist visit you during this hospitalization? (Circle one)
YES or NO
If YES, please respond to the following questions:  a. How many times did your OUTPATIENT oncologist visit?  b. Did this visit from your OUTPATIENT oncologist impact your overall satisfaction with your hospital stay? (Check One)  GREATLY IMPROVED satisfaction with hospital stay.  SOMEWHAT IMPROVED satisfaction with hospital stay.  NO IMPACT on satisfaction with hospital stay.  SOMEWHAT WORSENED satisfaction with hospital stay.  GREATLY WORSENED satisfaction with hospital stay.  GREATLY WORSENED satisfaction with hospital stay.  C. Please explain the above answer selection:
If NO, please respond to the following questions:  a. Did the lack of visitation by your OUTPATIENT oncologist impact your overall satisfaction with your hospital stay? (Check one)  GREATLY IMPROVED satisfaction with hospital stay.  SOMEWHAT IMPROVED satisfaction with hospital stay.  NO IMPACT on satisfaction with hospital stay.  SOMEWHAT WORSENED satisfaction with hospital stay.  GREATLY WORSENED satisfaction with hospital stay.  B. Please explain the above answer selection:

**Table 1.** Demographics of study population

Characteristic	N (Total = 75)	Percentage	
Gender			
Male	44	58.7	
Female	31	41.3	
Age			
Mean (range)	67 (32–90)		
Race			
Black/African American	3	4.0	
White	69	92.0	
American Indian/Native Alaskan	1	1.3	
Other	1	1.3	
Chose not to answer	1	1.3	
Ethnicity			
Hispanic/Latino	1	1.3	
Non-Hispanic/Latino	47	62.7	
Chose not to answer	27	36.0	
Malignancy Type			
Gastrointestinal	17	22.7	
Thoracic	10	13.3	
Genitourinary	15	20.0	
Breast	5	6.7	
Hematologic	17	22.7	
Chose not to answer	11	14.7	
Months with Outpatient Oncologist			
Mean (range)	35 (0–384)		



worsened their satisfaction. For the 32 subjects who did not receive a visit, 15.6% (n=5) reported that the lack of visit either greatly or somewhat worsened their satisfaction with the hospital stay, while 84.4% (n=27) reported no impact. We also compared responses of patients whose oncologist visited once during their hospital course versus more than once. It showed that of patients whose oncologist visited once, 93.7% reported either greatly or somewhat improved satisfaction compared to 88.9% who had more than one visit.

#### **DISCUSSION**

Our study showed that a visit or lack of visit by the outpatient oncologist during an inpatient stay on an oncology hospitalist service did have an impact on patient satisfaction.

The utilization of an ICV by oncologists is often dictated by logistical factors including constraints of time and distance of the hospital from the outpatient clinic. For oncologists that practice in an outpatient clinic located on the hospital campus, such is the case of our facility, the primary limiting factors then becomes time and resources. These results suggest that even a single inpatient visit can improve satisfaction of care in cancer patients on a hospitalist service. Insurance reimbursement of the ICV may also be available if the patient was not seen that day by an inpatient oncologist and a note documenting the visit is placed by the outpatient oncologist. As the use and availability of telehealth products and services increases, investigation of these modalities as potential alternatives to the face-to-face ICV would be informative.

Initially, the primary goal of looking at the impact of the ICV on patient satisfaction was to demonstrate for outpatient providers the importance of this visit to help promote its use. Although further research is needed, the powerful results of this pilot study prompted us to pursue larger interventions to improve the experience of cancer patients receiving inpatient care. First, data was presented to outpatient clinical teams to encourage inpatients visits. We then hired inpatient oncology hospitalists who would be responsible for caring for these inpatients and help to bridge the gap between the inpatient and outpatient care teams. These interventions are not only important for our institution alone, but also for other organizations who are moving towards a hospitalist oncology service. It is noteworthy that our study showed an impact of the ICV for inpatients being cared by a hospitalist trained in oncology rather than internal medicine, which is becoming more prevalent.

Limitations of our study include a small sample size, predominantly White population, and lack of representation of certain types of malignancies especially female gynecologic and head and neck. The single-institution model also limits evaluation as to the feasibility and generalizability of this type of intervention at other academic institutions. We also acknowledge potential bias of only including patients who spoke English, Spanish, or Portuguese although to our knowledge, there were no patients prevented from participating in our study due to language barriers.

Being able to pursue further research to establish the efficacy and importance of this intervention to maintain continuity of care and improve patient satisfaction and clinical outcomes will provide the data needed to encourage other institutions to make similar efforts.

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# Calls of Despair: An EMS Perspective on Suicide and Overdose in Rhode Island during COVID-19

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#### **ABSTRACT**

In 2020, Americans suffered marked increases in overdose deaths and self-reported suicidal ideation, widely attributed to COVID-19. However, the recent pandemic's full effect on suicide and drug overdose, two of the "deaths of despair", remains poorly understood. This study aims to illustrate the impact of COVID-19 on suicide and overdose calls to emergency medical services (EMS) in Rhode Island using syndromic analysis as a novel public health surveillance tool. Utilizing computer algorithms, suicide and overdose EMS calls were identified during the pre-pandemic (March 2019-February 2020) and pandemic (March 2020-February 2021) years. Versus the prior year, pandemic year mean monthly call volume declined significantly for opioid (-16.2%), overdose (-15.5%), and suicide ideation (-6.2%) syndromes. Given elevated national overdose deaths and suicidality, our results suggest that hesitancy to call 911 amid COVID-19 hampered EMS intervention on suicide and overdose patients, potentially compounding their despair and the acuity of their eventual presentation.

**KEYWORDS:** COVID-19; Drug Overdose; Emergency Medical Services; Public Health Surveillance; Suicide

#### INTRODUCTION

In 2020, the average life expectancy in the United States (US) declined 1.8 years, 1 reaching levels not seen since 2003.2 While much of the decrease is attributed to deaths from SARS-CoV-2 (COVID-19) infection, 1 the repercussions of COVID-19-related psychosocial hardship on US mortality remain poorly understood. Of particular concern is the impact of heightened economic stress, diminished social support networks, and increased isolation on suicide and drug overdose deaths, which together with alcoholic liver disease are often referred to as the "deaths of despair". 3-6

The impact of COVID-19 on drug overdoses appears to be severe; the United States Centers for Disease Control and Prevention (CDC) reported overdose deaths increased by 31% in 2020 (the first calendar year of the pandemic) compared to 2019.<sup>7</sup> In 2021, overdoses climbed by another 15%.<sup>8</sup> The CDC also found that US suicide deaths declined

by 3% in 2020 compared with 2019,<sup>9</sup> which independent studies have largely corroborated.<sup>10,11</sup> However, a June 2020 national study found that 10.7% of surveyed adults contemplated suicide in the prior 30 days,<sup>6</sup> up 4.3% from 2018.<sup>12</sup> It also found that 13.3% of respondents reported increased substance use to cope with COVID-19 stress.<sup>6</sup>

Data from emergency medical services (EMS) calls for suicide and overdose syndromes (medical emergency classifications based on established criteria) represent a promising tool for public health surveillance of and intervention upon drug use and suicidality. EMS data are available in real time, often within hours of the event, and provide a clear incident location. Additionally, they capture patients who receive EMS care but refuse transport, which appears particularly relevant during the COVID-19 pandemic. 15,16

Local, state, and national US studies found increased EMS calls for drug overdose during the COVID-19 pandemic as compared to corresponding 2019 calendar timeframes. 15,17-20 Similar inquiries of EMS calls for suicide revealed mixed results. 21-25 However, none of these studies examined statewide year-to-year changes in both suicide and overdose call volume across the first 12 months of the COVID-19 pandemic; nor did they parse suicide ideation from suicide attempt to characterize the severity of a suicide-related emergency.

This study aims to characterize the EMS response to acute mental health emergencies in Rhode Island (RI) during the first year of the COVID-19 pandemic by examining changes in statewide 911 calls for drug overdose and suicide. It demonstrates the utility of EMS syndromic analysis as a public health surveillance tool for describing and quantifying these emergencies. Moreover, it 1) identifies potential pandemic-associated demographic changes in suicide and drug overdose risk by age and gender and 2) illuminates possible temporal associations of these behaviors with COVID-19-related stressors.

#### **METHODS**

#### **Setting**

Rhode Island provides a useful setting for the comprehensive study of suicide and drug overdose emergencies during the first year of the COVID-19 pandemic. RI is a diverse state of approximately 1 million people, encompassing urban,



suburban, and rural geography. It is also governed by a single public health department which creates consistency in COVID-19-related gathering restrictions and, to a lesser extent, the availability of social support services. The Center for Emergency Medical Services at the Rhode Island Department of Health (CEMS) is responsible for all EMS protocols and regulatory oversight in the state. CEMS requires all RI EMS agencies to submit standardized patient care data from every call into the Rhode Island Emergency Medical Services Information System (RIEMSIS), facilitating analysis of statewide data.

Rhode Island was among the hardest hit states in the US during both the spring 2020 and early winter 2021 spikes in COVID-19 cases. <sup>26,27</sup> RI has mirrored national overdose trends, setting record high overdose deaths in both 2020 and 2021. <sup>28,29</sup> Suicides in RI declined by 24% from 2019 to 2020. <sup>30</sup> Per 100,000 citizens, the RI overdose death rate climbed from 35.0 in 2019 to 39.6 (13%) in 2020. <sup>28,31</sup> while the suicide death rate decreased from 11.2 in 2019 to 8.6 (–24%) in 2020. <sup>30,31</sup>

#### **Data Source and Collection**

Data were collected using syndromic analysis software by biospatial, Inc. (biospatial, Research Triangle Park, NC). Biospatial harvests data from RIEMSIS, which contains the patient care reports for all EMS calls in the state and adheres to National Emergency Medical Services Information System (NEMSIS) version 3.4.0 standards.<sup>32</sup>

EMS calls were reviewed for two distinct periods: 1) the "pre-pandemic year" (Pre-PY), from March 1, 2019 to February 29, 2020, and 2) "pandemic year 1" (PY1) from March 1, 2020 to February 28, 2021. To capture the maximum number of relevant emergencies, calls were included for the NEMSIS "type of service requested" categories: 911 response (first responding EMS unit), mutual aid (unit responding to emergency outside its primary municipality), and intercept (assisting EMS crew meeting primary unit enroute to hospital). Data were only collected for patients aged 18 and older. All data analyzed in this study were queried from biospatial between January 25, 2022 and March 18, 2022. The Rhode Island Department of Health (RIDOH) Institutional Review Board approved this study in June 2021.

#### **Syndromic Analysis**

Syndromic analysis, a subset of syndromic surveillance, is the use of computer algorithms to process and categorize patient care reports, including both formatted ("click box") and free text data.<sup>33-35,14</sup> When used in real-time, syndromic analysis allows for public health agencies to monitor upticks and clusters of disease in a community.<sup>33,34,14</sup> Past studies have applied it to EMS and ED data as a tool for overdose surveillance, where patient care reports and billing data were analyzed and classified into drug-related "syndromes", or categories based on the nature of a call's emergency.<sup>13,14,35-37</sup>

For this study, the syndromic analysis drew upon ICD-10 billing codes and patient care report fields, including chief complaint, provider impression, provider narrative, and medications administered. Calls fitting the following syndromes were analyzed for this study: suicide ideation, suicide attempt, opioid, and overdose. Suicide ideation encompasses all suicide-related emergencies, while suicide attempt applies only to suicide emergencies where the patient undertook an attempt. The opioid and overdose definitions were based on the RIDOH-enhanced state opioid surveillance EMS case definitions.<sup>38,13</sup> The opioid syndrome captures opioid-specific drug emergencies, while the overdose syndrome encompasses all drug-related 911 emergency calls.<sup>38</sup> Both definitions exclude therapeutic uses of opioids, such as treatment of EMS patient pain.<sup>38</sup>

#### **Data Analysis**

Following syndromic classification, data were exported into a spreadsheet for further analysis. For all four syndromes, Pre-PY to PY1 changes were analyzed in total, by season, as well as for patient gender identity ("gender") and age. Seasons were defined: spring = March-May, summer = June-August, fall = September-November, and winter = December-February. Due to limitations of NEMSIS v3.4.0,<sup>32</sup> gender was categorized as male and female. Ages were grouped 18–29, 30–39, 40–49, 50–59, and 60+.

For each syndrome, Pre-PY and PY1 call volumes were compared for absolute and percent change. The incident rate for each syndrome was calculated by dividing syndromic totals by the total RI EMS call volume for the same period. 95% confidence intervals were calculated based on Pre-PY to PY1 monthly percent change values, and thus, all year to year percent changes analyzed for significance were expressed as the mean of the Pre-PY to PY1 percent changes for the 12 respective months ("mean monthly percent change"). Seasonal mean monthly percent changes reflect a 3-month mean of Pre-PY to PY1 percent changes. P-values were also calculated using a paired t-test comparing monthly totals between the two study periods. Male and female Pre-PY to PY1 monthly percent change datasets were compared to ascertain if the year to year changes were significantly different between genders.

#### **Syndromic Validation**

There are few validation studies examining syndromic classification of suicide and overdose EMS calls. <sup>13,14</sup> Thus, a validation sub-study of five calls from each month between March 1, 2019 and February 28, 2021 (N=120 calls) was performed. Calls were selected from RIEMSIS using a random number generator, and both 911 and nonemergent calls were included. All 120 selected EMS reports were read in their entirety by one author (JLT) and judged whether they fit within biospatial and RIDOH syndromic definitions for suicide ideation, suicide attempt, opioid, and overdose. These assessments were then compared with the biospatial syndromic classifications for the same calls. Validation data were queried from RIEMSIS and biospatial between October 27 and November 23, 2021.



Using the investigator review as a standard, the sub-study yielded sensitivity and specificity values of 1 for the biospatial opioid, overdose, and suicide ideation syndromes. The suicide attempt syndrome had a sensitivity of 1 and a specificity of 0.99 (Table 1).

Table 1. Validation of biospatial, Inc., syndromic algorithms\*

	Opioid	Overdose	Suicide ideation	Suicide attempt
True Positive	1	1	6	2
True Negative	119	119	114	117
False Positive	0	0	0	1
False Negative	0	0	0	0

<sup>\*</sup>Investigator review of EMS patient care report used as standard

Table 2. RI Pre-PY (March 2019–February 2020) and PY1 (March 2020–February 2021) EMS call volume with mean monthly % change\*

Syndrome	Pre-PY	PY1	Mean Monthly % Change	95% CI
Opioid	1780	1473	- 16.2%	[- 24.9%, - 7.6%]
Overdose	2642	2221	- 15.5%	[- 22.0%, - 9.2%]
Suicide Ideation	5318	4987	- 6.2%	[- 10.5%, - 1.9%]
Suicide Attempt	1783	1739	- 1.9%	[-8.6%, 4.9%]

<sup>\*</sup>mean monthly % change is calculated as the mean of Pre-PY to PY1 % changes for 12 respective months

#### **RESULTS**

#### **Drug-related Emergencies**

From Pre-PY to PY1, opioid and overdose absolute EMS call volume declined significantly by 307 (16.2%) and 421 (15.5%) calls, respectively (**Table 2**). The corresponding declines in the incident rates were insignificant. Both opioid and overdose call volumes decreased significantly and by over 20% in the fall of PY1. Overdose call volume also declined significantly in the winter of PY1, by 86 (14.5%) calls (**Table 3a**).

Opioid and overdose calls declined significantly for both females and males, but these declines were not statistically different from one another. Opioid and overdose call volume also declined for all age groups, to the greatest extent in ages 18–29 (**Figure 1**).

#### **Suicide Emergencies**

PY1 suicide ideation calls significantly decreased by 331 (6.2%) from Pre-PY, and suicide attempt calls did not significantly change between the study years (**Table 2**). The incident rates remained largely unchanged for either syndrome. The largest, and only statistically significant, seasonal decline in suicide ideation calls was by 232 (10.1%) calls in the PY1 spring. Seasonal suicide attempt call totals were essentially unchanged in PY1 (**Table 3b**).

There was not a significant difference in the year to year trends of male versus female suicide ideation and suicide attempt call totals. Suicide ideation and attempt calls decreased in patients aged under 40, but they increased in ages over 50. Notably, suicide attempt calls increased by 20% in ages 60 and older (Figure 2).

Table 3a. RI seasonal opioid and overdose EMS call volume for Pre-PY and PY1 with mean monthly % change

	Opioid					Overdose			
Season*	1* Pre-PY PY1 Mean Mo		Mean Monthly % Change	95% CI	Pre-PY	PY1	Mean Monthly % Change	95% CI	
Spring	450	351	-20.6%	[–58.3%, 17.1%]	665	527	-19.8%	[-54.4%, 14.8%]	
Summer	515	461	-8.1%	[-43.8%, 27.6%]	753	689	-7.2%	[-36.0%, 21.7%]	
Fall	436	325	-25.5%	[-38.5%, -12.5%]	640	507	-20.8%	[-31.6%, -10.1%]	
Winter	379	336	- 0.8%	[-50.0%, 28.4%]	584	498	-14.5%	[-28.2%, -0.9%]	

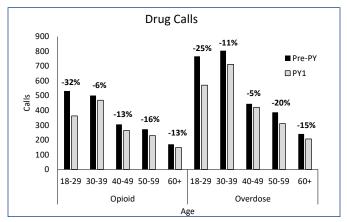
<sup>\*</sup>seasons defined: spring = March–May, summer = June–August, fall = September–November, and winter = December–February

Table 3b. RI seasonal suicide ideation and suicide attempt EMS call volume for Pre-PY and PY1 with mean monthly % change

	Suicide Ideation					Suicide Attempt			
Season	Pre-PY	PY1	Mean Monthly % Change	95% CI	Pre-PY	PY1	Mean Monthly % Change	95% CI	
Spring	1307	1175	-10.1	[-13.1%, -7.1%]	396	397	1.1%	[-33.2%, 35.4%]	
Summer	1352	1279	-5.0	[–27.2%, 17.2%]	462	462	0.3%	[-30.3%, 30.8%]	
Fall	1349	1324	-1.8	[–14.4, 10.8%]	504	464	-7.8%	[–32.6%, 16.9%]	
Winter	1310	1209	-7.7	[-30.8%, 15.4%]	421	416	-0.9%	[–27.4%, 25.6%]	

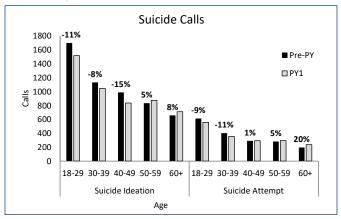


Figure 1. RI EMS Pre-PY and PY1 call volume for opioid and overdose syndromes by age\*



<sup>\*</sup>year to year % change in total call volume listed above its respective age group

Figure 2. RI EMS Pre-PY and PY1 call volume for suicide ideation and suicide attempt syndromes by age\*



\*year to year % change in total call volume listed above its respective age group

#### **DISCUSSION**

Our results indicate that EMS calls for suicide and overdose largely decreased in RI during the first 12 months of the COVID-19 pandemic. However, the PY1 decline in overdose call volume of 16% is contradicted by a 2019 to 2020 increase in official statewide overdose deaths of 13%. The RI suicide death rate declined to a much greater extent (–24%) in 2020 than PY1 suicide ideation calls (–6%) or suicide attempt calls, which did not significantly change. The suicide attempt calls, which did not significantly change.

Nationally, our findings are contrary to record overdose deaths and increased self-reported suicidality during the first year of the COVID-19 pandemic.<sup>6,7,39</sup> These discrepancies suggests that there may have been a prevailing hesitancy or inability to call 911 – likely due to fear of COVID-19 infection, creating a barrier to EMS intervention on mental health crises.

One interpretation of contrasting overdose 911 call and death data is that the severity of drug emergencies in RI

increased. Overdose calls declined the most in ages 18–29, indicating that gathering restrictions may have dampened "social" drug use among young partygoers. 40 A smaller population, including older demographics, may have experienced increased substance use to cope with heightened psychosocial stressors. 6,39 COVID-19-associated hesitancy to call 911 may have prevented this group from receiving early EMS intervention, further compounding their despair and leading to more acute overdose presentations. The conflict between RI EMS overdose call volume and the existing EMS literature during COVID-19 could be attributed to regional heterogeneity. 15,17-20,41 Nonetheless, our findings are consistent with their call for improved overdose surveillance and substance-use intervention.

Despite decreased RI suicide ideation calls, calls for suicide attempt remain unchanged, reflecting an increase in the proportion of suicidal patients acting on their ideations. In the face of increased self-reported suicidal thoughts, 6,39 this raises concern that many suicidal patients may have received delayed or no emergency intervention during COVID-19. While 2020 national and RI data indicate declining suicide deaths, 9,30 improved intervention upon actively suicidal patients by EMS and other providers requires further examination and resources, as the mental health of Americans remains a serious concern.

Spring 2020 was the only PY1 quarter where suicide ideation calls significantly declined. In addition to fear of contagion, this could have occurred due to an initial pulling-together or "honeymoon" effect where suicidal behavior drops in the immediate aftermath of a disaster due to a shared purpose. 42,43,11 This phenomenon has been documented in various disaster circumstances (including COVID-19),42-44,11 and it can precede a delayed increase in suicidality due to subsequent disillusionment. 42 Thus, it is plausible that the shared purpose of flattening the COVID-19 curve contributed to both spring 2020 and total PY1 decreases in suicide ideation calls and suicide deaths. Additionally, increased PY1 suicide calls in patients over 50 may have resulted from increased isolation in this population due to social distancing. 45-47

EMS syndromic analysis has the potential to quantify the population burden, recognize macroscopic precipitating stressors, and identify demographics at elevated risk of deaths of despair. Utilized by public health agencies, it could illuminate clusters of overdose and suicide calls in real-time and guide the dispatching of pertinent resources, such as bystander training initiatives, naloxone kits, and mental health professionals.

#### **LIMITATIONS**

Syndromic analysis of EMS documentation is a new method that requires further validation. While EMS calls were used as a proxy for suicidality and drug use within a population,



many confounding factors could have led to discrepancies in 911 volume and population-wide behavior. For demographic analysis, gender minorities and race/ethnicity were not analyzed due to limitations in RIEMSIS. Patients under age 18 were also excluded from the study. Last, COVID-19 cases, support services, and gathering restrictions differed by state during the study period. Trends in suicide and substance use may also vary regionally. Thus, as RI is a small state in the Northeast, our results may not be generalizable to other areas of the US.

#### CONCLUSION

This study found the incidence of EMS calls for drug overdose and suicide to largely decline during the first 12 months of the COVID-19 pandemic in RI – a period when national overdose deaths and self-reported suicidality markedly increased. In this context, our results suggest a widespread hesitancy of those in acute despair to seek and receive EMS intervention. Thus, COVID-19-associated barriers to EMS care may have increased the severity of suicide and drug use emergencies, indicating a heightened need for effective prevention, surveillance, and targeted outreach to at-risk communities.

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# Impact of a Quality Improvement Initiative on Increasing Height Measurement Among Children with Medical Complexity

JESSICA HOFFEN, MD-ScM'23; ALLISON BRINDLE, MD

#### **ABSTRACT**

**BACKGROUND:** This quality improvement project aimed to increase the rate of height measurement among children with medical complexity (CMC) seen for well-child visits.

**METHODS:** Three interventions were implemented over 17 months. Retrospective chart review of well-child visits for patients 35 months through 18.5 years was conducted for children with medical complexity. Height measurement rates were analyzed across intervention phases.

**RESULTS:** Overall rate of height measurement was 81.1% for children with medical complexity. From start to finish, rate of height measurement for CMC increased -63.6% to 100.0% (P=0.006).

**CONCLUSION:** Quality improvement methodology increased height measurement rates at well-child visits amongst children with medical complexity. This approach can be utilized to address health care inequities among individuals with medical complexity.

**KEYWORDS:** children with medical complexity; quality improvement; height measurement

#### INTRODUCTION

#### **Background**

Height measurement is a standard method for tracking the growth, development, and nutritional status of children. <sup>1-3</sup> The American Academy of Pediatrics (AAP) recommends annual height measurement of children over the age of three at preventative health appointments known as well-child checks or visits (WCC). <sup>4</sup> Height is typically measured by a medical assistant, certified nursing assistant, or nurse using a stadiometer (a measuring stick with a blade that adjusts to rest atop a patient's head) which requires a patient be able to assume a straight-legged standing posture.

Among children with medical complexity (CMC) this posture is often unattainable. Children with medical complexity are individuals under the age of 18 who have chronic health conditions and/or disabilities leading to medical fragility, significant health care use, and functional limitations.<sup>5-7</sup> They are at increased risk of malnutrition and stunting, and require close surveillance of growth and development.<sup>8-10</sup>

Alternative validated methods of growth measurement for CMC include upper-arm length, tibial length, and knee height. Measurement of knee height – the distance from a patient's anterior thigh to their heel – with a knee height caliper (KHC) is the most reliable method and measurements can be converted to standing heights using validated calculations. 11-13

#### **Specific Aims**

Approximately 100 children with medical complexity receive primary care and complex care coordination through the complex care center at the Hasbro Primary Care Clinic (Primary Care Clinic) - an academic medical center based clinic. This program has a dedicated physician and nurse case manager but operates out of the Primary Care Clinic and utilizes their space, equipment, medical assistants, and nursing staff. Children with and without medical complexity receive height measurement from Primary Care Clinic-based medical assistants or nurses at the start of their well-child visits. Children with medical complexity were noted to be receiving height measurement at approximately 40% fewer well-child visits than their peers without medical complexity. This quality improvement (QI) project sought to improve adherence to AAP guidelines and equity in care of children with medical complexity, by increasing the rate at which CMC receive height measurement during wellchild visits. The Specific, Measurable, Applicable, Realistic, and Timely aim (SMART aim) was to achieve 100% height measurement amongst CMC within 12 months of the first intervention.

#### **METHODS**

A two-person team – the complex care center physician and a medical student – conducted this Institutional Review Board-approved project. Specific interventions were decided upon following informal conversations with Primary Care Clinic staff, as well as a nurse practitioner and two medical assistants at the interdisciplinary Spina Bifida Clinic where KHC use had been previously integrated. Key challenges to height measurement amongst CMC were identified as access to a knee height caliper (which was shared with the Gastrointestinal Clinic down the hall), uncertainty regarding use of the KHC and corresponding standing height



conversion calculations, and time needed to calculate standing heights from knee heights. Three phases of targeted interventions were implemented to address these challenges. Intervention success was measured by retrospectively reviewing electronic medical records from the WCCs of children with medical complexity over 17 months spanning from four months prior to the first intervention through the two months following the third and final intervention. Up to 10 well-child visits of children ages 35 months through 18.5 years were included from each month. Data was grouped into four phases; pre-Intervention - the four months prior to implementing any intervention, post 1st Intervention - the four

months following implementation of Intervention 1, post 2nd Intervention – the four months following implementation of Intervention 2, and post 3rd Intervention – the two months following implementation of Intervention 3. Data included patient demographic variables, ambulatory status, technology dependence, height, and mechanism of height measurement. Data were stored in REDCap.<sup>14</sup>

#### Intervention 1

A KHC was purchased for complex care center patients and placed in the Primary Care Clinic. Staff were shown the KHC's location.

#### **Intervention 2**

The study team held a 20-minute training session during a Primary Care Clinic Friday morning huddle. Approximately seven staff members attended including nurses, medical assistants, the complex care nurse case manager, and the Primary Care Clinic manager. The session reviewed proper KHC use and calculation of standing heights from knee heights. A flyer detailing KHC use and height conversion calculation was distributed. The complex care physician additionally began noting requests for KHC measurements on the daily clinic schedule.

#### Intervention 3

An automatic knee height to standing height conversion tool was added to the clinic's electronic health record-based vitals flowsheet. This eliminated the need for staff to independently calculate standing height in order to use patient growth charts and measure body mass index.

Table 1. Participant demographics by intervention period

Characteristics of the study sample of 90 well-child visit patients seen at the Complex Care Clinic compared by intervention phase.

	Pre- Intervention (n=33)	Post 1st Intervention (n=15)	Post 2nd Intervention (n=31)	Post 3rd Intervention (n=11)	P-value	Full Study Period (n=90)
Age: Mean (standard deviation)	9.6 (4.5)	8.8 (5.1)	9.8 (4.7)	10.1 (5.5)	0.90	9.6 (4.7)
Male sex: Number (%)	17 (51.5)	8 (53.3)	15 (48.4)	3 (27.3)	0.54	43 (47.8)
Preferred language: Number (%) English	24 (72.7)	11 (73.3)	24 (77.4)	5 (45.5)	0.28	64 (71.1)
Spanish	8 (24.2)	2 (13.3)	6 (19.4)	5 (45.5)		21 (23.3)
Other	1 (3.0)	2 (13.3)	1 (3.2)	1 (9.1)		5 (5.6)
Ambulates with an assistive device: Number (%)	23 (69.7)	10 (66.7)	19 (61.3)	8 (72.7)	0.89	60 (66.7)
Dependent on medical technology: Number (%)	12 (36.4)	6 (40.0)	15 (48.4)	5 (45.5)	0.82	38 (42.2)

<sup>\*</sup> P<0.05

#### **Data Analysis**

Patient demographics were analyzed using analysis of variance and Fisher's exact test. Height measurement rates were compared across all four intervention phases. Months during which an intervention took place (3 months total) were omitted from analysis. Stata SE version 17.0 (College Station, TX) was used for statistical analyses; *P*<0.05 was considered statistically significant.<sup>15</sup>

#### **RESULTS**

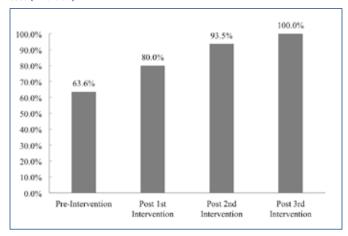
This study included 90 patient visits – 33 pre-Intervention, 15 post 1st Intervention, 31 post 2nd Intervention, and 11 post 3rd Intervention. The mean age of patients was 9.6 years (SD=4.7), 47.8% were male, 71.1% had a preferred language of English, 66.7% ambulated with an assistive device (walker, cane, wheelchair, and/or braces), and 42.2% were dependent on medical technology (tracheostomy tube, ventilator, gastrostomy tube, and/or jejunostomy tube) (**Table 1**). Patient demographics varied across the intervention phases, however there were no statistically significant differences (**Table 1**).

Over the study duration, CMC received height measurements at 81.1% of WCCs. Rate of height measurement increased over the four intervention phases from 63.6% pre-Intervention to 100.0% post 3rd Intervention (P=0.006) (**Figure 1**). The largest improvement in height measurement occurred from the pre-Intervention phase to the post 1st Intervention phase – a 16.4% increase.



Figure 1. Percent of patients receiving height measurement over four intervention phases

Chart of the percent of children who received a height measurement at their well-child visit by intervention phase. A statistically significant difference across the four intervention phases was found using Fisher's exact test (P=0.006).



#### DISCUSSION

This QI project sought to achieve 100% height measurement at well-child visits amongst children with medical complexity. Over 17 months and three interventions, children with medical complexity received height measurements at increased rates, reaching 100% height measurement following the final intervention. This finding supports implementation of a QI process to improve rates of task completion within primary care clinics. This finding furthermore underscores the value of modifying typical clinic work flows to ensure equal and appropriate health care is provided to individuals with medical complexity.

Past research has consistently found that individuals with disabilities and chronic medical conditions, such as complex care center patients, encounter barriers to accessing health care services and are subsequently less likely to receive appropriate exams, screenings, and treatments.7,16,17 According to systematic reviews by Manikandan et al and Mitchell et al inaccessible environments, as well as lack of knowledge and experience regarding the needs of individuals with disabilities are significant barriers to accessing appropriate health care for this population.<sup>17,18</sup> This literature indicates that the standard design of health care settings and training of health care providers excludes individuals with medical complexities, and supports our findings that interventions such as purchase of accessible equipment and staff training, can significantly improve access to appropriate health care for this population.

The success of this project was driven by a combination of mechanisms including improved equipment access, reduction in time to complete height measurement for CMC, and increased knowledge of and ability to meet the unique needs of CMC. The acquisition of a dedicated clinic-based KHC ensured KHC availability. This played the largest role in improving height measurement amongst CMC, underscoring the importance of timely access to appropriate equipment. However, 100% height measurement was not achieved with purchase of the KHC alone. Formal training in KHC use along with reminders on when to use it and automatization of a particularly time-consuming component of KHC use – knee height to standing height calculation – likely all played a role in integration of the KHC into clinic workflow and the subsequent improvement in rates of height measurement.

#### Limitations

Among limitations of this project was the impact of the COVID-19 pandemic on well-child visit attendance. Complex care center well-child visits were frequently made virtual or postponed to avoid potential exposure of CMC to COVID-19 during periods of heightened infection. This led to a smaller study population at certain time points. Additionally, there was likely variation in the accuracy of KHC measurements amongst patients with severe contractures, or limb malformations. However, assessing accuracy of KHC measurements is outside the scope of this project. Furthermore, this project's success relied on institutional resources to purchase the KHC and provide staff training which may limit its applicability among community-based clinics with fewer resources. A community-based clinic would need to replicate this project to fully understand its applicability outside of an academic medical center.

#### CONCLUSIONS

Studies continue to document deficits in health care access and quality among individuals with disabilities and chronic medical conditions.<sup>17,18</sup> The results of this project demonstrate that by addressing needs for adaptive equipment and staff training, clinics can improve the quality and consistency of health care provided to this population. Further research in both academic and community-based settings is needed to improve equity in health care accessibility for individuals with medical complexity.

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# **Comparing Effectiveness of Remote-learning Formats for Resident Physician Didactics**

JULIA K. SHINNICK, MD; JENNIFER L. NARVAEZ, MD; CHRISTINA RAKER, ScD; E. CHRISTINE BROUSSEAU, MD

#### **ABSTRACT**

**BACKGROUND:** It is important to investigate remote-learning options for medical education. We evaluated retention of research-related knowledge after exposure to pre-recorded audio-based didactics (AUDIO) versus video conference-based didactics (ZOOM).

**METHODS:** Obstetrics and Gynecology residents over the 2020-2021 academic year were randomized to didactics delivered in AUDIO versus ZOOM formats. At baseline, immediately post-exposure, and 3-month post-exposure, objective knowledge was assessed through 15 multiple choice questions. Confidence and satisfaction were assessed on a 5-point Likert scale. Median differences and 95% confidence intervals (CI) were applied to identify a 10% non-inferiority margin.

**RESULTS:** Thirty of thirty-one (30/31, 96.8%) eligible residents participated. At 3-month post-exposure, AUDIO was non-inferior to ZOOM (6.3% mean difference in knowledge scores, 95% CI –3.5–16.2). There were no differences in satisfaction or confidence, though a greater proportion of AUDIO participants indicated they would use a similar resource independently (p=0.008).

**CONCLUSION:** AUDIO didactics may be non-inferior to ZOOM.

**KEYWORDS:** remote learning; postgraduate medical education; ZOOM; comparative effectiveness in medical education

#### **INTRODUCTION**

In the United States, postgraduate medical education programs are required to include formal activities that enhance knowledge of research methodology and its applications to clinical practice. Prior studies in the field of Obstetrics and Gynecology have noted varying approaches to teaching postgraduate learners about the performance and interpretation of research. The opportunity for further variability in research-related didactic experiences emerged with the transition to remote didactics prompted by the COVID-19 pandemic, as some programs supplemented educational experiences with online modules, videos, Podcasts, and webinars.

While social distancing guidelines related to the COVID-19 pandemic have evolved with time, the integration of remote learning into medical education appears unchanged. Studies have already noted that some learners perceive remote learning to be as effective, or more effective, than traditional in-person didactics. <sup>6,7</sup> Furthermore, the benefits of remote learning are predicted to transcend the pandemic, given their greater accessibility, participant satisfaction, and facilitation of multidisciplinary collaboration. <sup>8</sup>

One option for remote learning that has gained popularity over recent years is Podcast-style learning. Recent literature has supported the use of Podcasts in medical education, with studies showing that they are both effective and widely accepted amongst medical trainees.9-12 In 2017, Back et al found greater knowledge gains and higher satisfaction amongst medical students randomized to a Podcast about orthopedic diseases when compared to those randomized to a book chapter. Lee et al found that medical students whose airway skill training was supplemented with Podcast videos outperformed those who did not receive the Podcasts.10 Specifically, in the field of Obstetrics and Gynecology, Dmytryshyn and Selk noted sustained increases in vulvovaginal disease-related knowledge after exposure to Podcast episodes related to herpes and lichen sclerosis.<sup>11</sup> Furthermore, in 2020, Cai et al found that in the first year of production of their weekly Ob/Gyn trainee-targeted Podcasts, they had >173,000 downloads, over 600 Twitter followers, and an average iTunes rating of 4.86 out of 5 stars. 12

Despite the popularity of Podcasts over recent years, many residency training programs defaulted to delivering their typical didactic content via video conference during the COVID-19 pandemic. While transitioning to a webinar-based format intuitively makes sense in terms of remote replication of the classroom experience, there is a paucity of evidence regarding the comparative effectiveness of remote-learning formats in medical education. The primary objective of this study was to compare the effectiveness of two remote-learning formats in increasing objective measurements of research-related knowledge on 3-month follow-up.



#### **METHODS**

We performed an IRB exempt (1584418) randomized non-inferiority trial to assess change in objective knowledge scores after exposure to audio-based (AUDIO) versus video conference-based (ZOOM) didactics. Participants included Obstetrics and Gynecology residents at a single tertiary care institution. The study was administered on two didactic sessions during the 2020-2021 academic year, with the first taking place December 2020 and titled 'Developing a Study Question.' The second study-related didactic session was held January 2021 and titled 'Calculating a Sample Size.' Residents were able to participate in one or both sessions.

On the study dates, residents attended their regularly scheduled remote didactics sessions delivered via ZOOM® (ZOOM Video Communications, Inc). The study was explained, and informed consent was obtained. Residents who declined participation in the study, or were involved in the study design, were excluded. Study participants completed a pre-didactic assessment where they self-identified their postgraduate year, prior use of technology for learning outside of required didactic settings, preferences in learning style, prior research training, and confidence in approaching various research-related subjects on a Likert scale. Participants then completed 15 multiple choice questions that objectively measured knowledge related to the didactic material scheduled for that day.

Upon completion of the pre-didactic knowledge assessment, participants were block randomized by postgraduate year into one of two remote learning formats: 1) AUDIO, which consisted of pre-recorded audio files accessible from any computer or mobile device and 2) ZOOM, which consisted of lectures delivered through a video conferencing system utilizing a slide-set with a live presenter. Links to the respective didactics were sent to each participant's email upon enrollment in the study.

Both the AUDIO and ZOOM didactics were designed to provide knowledge regarding the basics of designing and implementing clinical research, as described by Hulley et al, with delivery founded in the educational principles as described by Stahl and Davis.<sup>13,14</sup> The didactic content was designed for remote delivery through an iterative process that included pilot testing and feedback from stakeholders within the institution's Division of Research, Division of General Obstetrics and Gynecology, and trainees.

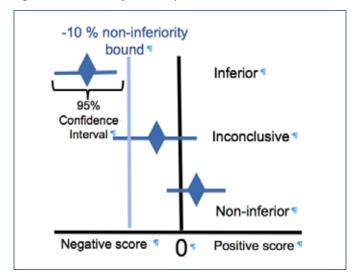
The two formats of the didactics were delivered by the same clinical instructor, with their length and content standardized between formats. Each didactic lasted 10-12 minutes. Only those exposed to the ZOOM didactic had a visual aid (PowerPoint slides) during the didactic. Additionally, only ZOOM participants had the opportunity to ask questions during the presentation, though AUDIO participants were able to email the instructor their questions following the didactic session.

After exposure to the didactic, participants completed a post-test, which included the same 15 multiple choice objective knowledge questions and confidence questions that the participants completed before exposure to the didactic. Additionally, participants were asked to rate their likeliness to use the didactic module on their own time, and likeliness to recommend a similar resource to a peer, on a Likert scale. The same post-didactic assessment was repeated 3-month post-exposure. All assessments were hosted on REDCap. 15,16

This study sequence (presenting to regularly scheduled didactics, pre-test, randomization, exposure to a ZOOM or AUDIO didactic, immediate post-test, and 3-month post-test) was repeated for a total of two iterations. Participants were re-randomized between the two iterations. Thus, some participants were exposed to two AUDIO didactics, some were exposed to two ZOOM didactics, and some were exposed to one AUDIO and one ZOOM. If a participant completed one didactic session in the study, they could opt out of participation in the next didactic. Likewise, participants who initially declined participation, or otherwise did not attend the first study didactic session, could still participate in the second study didactic if they desired.

The study was designed as a feasibility study with a convenience sample, as there were no available data for power calculation. A block randomization list was used to randomize participants, with the list generated on the SealedEnvelope website (London, United Kingdom).<sup>17</sup> The primary outcome was change in objective knowledge scores from pre-test to immediate post-test. Mean or median changes in scores were compared between groups by T-test or Wilcoxon rank-sum test and within participants by paired T-tests or Wilcoxon signed-rank tests. The study team prespecified a margin of –10% to determine non-inferiority (**Figure 1**). The existence of period and sequence effects was examined by

Figure 1. Non-Inferiority Trial Interpretation





multiple linear regression with a random participant effect to account for within-participant correlation. Questions assessing confidence and likelihood to use the didactic on one's own time were compared by Chi-square or Fisher's exact test. Changes in confidence level within participants were compared by McNemar's test. Data analysis was performed with SAS version 9.4 (SAS Institute, Cary, NC). A p-value<0.05 was considered statistically significant.

#### **RESULTS**

Thirty-one residents were eligible for inclusion. The resident population at the institution during the 2020-2021 academic year was 87.5% (28/32) female, and 62.5% White (20/32). Study participants were relatively evenly distributed across postgraduate years, with 8/30 (26.7%) being in the first postgraduate year, 8/30 (26.7%) in the second postgraduate year, 8/30 (26.7%) in the third postgraduate year, and 6/30 (20.0%) in the fourth postgraduate year. Participants had varying learning preferences, with 12/30 (40%) preferring classroom-based learning, 10/30 (33.3%) preferring experiential learning, 7/30 (23.3%) preferring visual-based learning, and 1/30 (3.3%) preferring ZOOM-based learning. Four participants (4/30) had obtained an MPH or PhD prior to residency.

Prior to inclusion in this study, 29/30 (96.7%) of participants stated they had used an audio-based learning tool in the past. Nearly half (13/30, 43.3%) reported using an audio-based learning tool approximately once a month over the course of the prior 12 months. Many participants (20/30, 66.7%) reported that the typical length of time that they remain engaged in such a resource is 10-20 minutes.

In total, 24 residents attended the first didactic session, with 12 randomized to ZOOM and 12 randomized to AUDIO. Similarly, 24 residents attended the second didactic session, where again 12 were randomized to ZOOM and 12 were randomized to AUDIO. A total of 17 residents attended both sessions and completed post-didactic questionnaires for both, with 5 being exposed to ZOOM both times, 5 being exposed to AUDIO both times, and 7 being exposed to each format once.

Composite change in objective knowledge immediately post-exposure, the findings were inconclusive regarding the non-inferiority of the AUDIO format compared to the ZOOM format, with a lower bound of the 95% confidence interval crossing the –10% non-inferiority margin (mean difference –2.2%, 95% CI –12.4 to 8.0). However, for the primary outcome of knowledge difference at 3-month post-exposure, the AUDIO format was found to be non-inferior to ZOOM, with a mean difference of 6.3%, favoring greater increases in objective knowledge scores amongst participants exposed to the AUDIO format of the didactic (95% CI –3.5 to 16.2; **Figure 3**). There were no differences in 3-month follow-up scores amongst those with versus without prior research

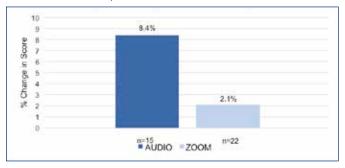
#### Figure 2. Composite Change in Objective Knowledge Scores Immediately Post-Exposure

Participants were exposed to pre-recorded audio-based didactics (AUDIO) or live video-conference-based didactics (ZOOM). The two didactic formats were standardized for length, content, and delivery. Objective knowledge was measured prior to randomization, immediately after exposure to the didactic, and 3 months after exposure to the didactic. When comparting the composite change in objective knowledge between the groups immediately post-exposure, the mean difference was -2.2%, with AUDIO participants having slightly lower score increases (95% CI –12.4 to 8.0, p>0.05).



Figure 3. Change in Knowledge 3 Months Post-Exposure

Participants were exposed to pre-recorded audio-based didactics (AUDIO) or live video-conference-based didactics (ZOOM). The two didactic formats were standardized for length, content, and delivery. Objective knowledge was measured prior to randomization, immediately after exposure to the didactic, and 3 months after exposure to the didactic. When comparting the composite change in objective knowledge between the groups 3 months post-exposure, the mean difference was 6.3%, with AUDIO participants having slightly higher score increases (95% CI –3.5 to 16.2, p>0.05).



experience and those planning versus not planning a future career in research (all p > 0.05).

The didactic formats were also analyzed by the content of the educational material they covered. For the 'Developing a Study Question' didactic, AUDIO was found to be non-inferior to ZOOM both immediately and at 3-month follow-up (Table 1). However, for the 'Calculating a Sample Size' didactic, the findings were inconclusive both immediately and at 3 months (Table 2).

Regarding the outcomes of confidence and satisfaction, prior to exposure to the didactics, many participants felt somewhat or very confident developing a study question



Table 1. Immediate and 3-Month Objective Knowledge Scores for the 'Developing a Study Question' Didactic

Participants were exposed to a pre-recorded audio-based didactic (AUDIO) or a live video-conference-based didactic (ZOOM) for two didactic sessions. Objective knowledge was measured through 15 multiple choice questions prior to exposure to each didactic, immediately after each didactic, and again 3 months later. Median scores, ranges, 95% confidence intervals, and p values by Wilcoxon rank-sum test for the "Developing a Study Question" didactic are shown. A confidence interval with a lower bound above -10 meets study criteria for non-inferiority. Results that include this bound are considered indeterminate.

	AUDIO	ZOOM	AUDIO vs ZOOM Difference (95% CI), p value
Pre-test	86.7 (60–100)	90 (66.7–100)	
Immediate Post-test	100 (86.7–100)	96.7 (80–100)	0 (0 to 6.7), p=0.57
3-Month Post-test	96.7 (86.7–100)	90 (13.3–100)	6.7 (-6.7 to 20.0), p=0.24
p for within-group change	p=0.008	p=0.016	

Table 2. Immediate and 3-Month Objective Knowledge Scores after the 'Calculating a Sample Size' didactic

Participants were exposed to a pre-recorded audio-based didactic (AUDIO) or a live video-conference-based didactic (ZOOM) for two didactic sessions. Objective knowledge was measured through 15 multiple choice questions prior to exposure to each didactic, immediately after each didactic, and again 3 months later. Median scores, ranges, 95% confidence intervals, and p values by Wilcoxon rank-sum test for the "Calculating a Sample Size" didactic are shown. A confidence interval with a lower bound above –10 meets study criteria for non-inferiority. Results that include this bound are considered indeterminate.

	AUDIO	ZOOM	AUDIO vs. ZOOM Difference (95% CI), p value
Pre-test	60 (46.7–80)	56.7 (20–80)	
Immediate Post-test	70 (6.7–80)	66.7 (46.7–93.3)	0 (-13.3 to 20.0), p=0.98
3-Month Post-test	66.7 (46.7–86.7)	60.0 (33.3–86.7)	6.7 (-13.3 to 20.0), p=0.48
p for within-group change	p=0.12	p=0.03	

(14/24, 58.3%). However, only one participant felt somewhat or very confident in calculating a sample size (1/24, 4.2%) at baseline. On 3-month follow-up, less than one-third of participants (5/16, 31.3%), noted an increase in their confidence level in developing a study question, whereas greater than three-quarters increased their confidence in calculating a sample size (17/21, 81.0%). There were no significant differences in confidence increases when comparing AUDIO versus ZOOM (p=0.33). There were also no differences in change in confidence when stratified by preferred learning style, plan to pursue fellowship, or plan for a future career in research (all p>0.05).

At 3-month follow-up, a greater proportion of AUDIO participants indicated they would be "Likely or very likely" to use a similar educational resource on their own time (p=0.008). Similarly, at 3 months, a significantly greater proportion of AUDIO participants endorsed being "Likely or very likely" to recommend a similar resource to a peer (p= 0.04).

#### **DISCUSSION**

The current study found that AUDIO didactics were non-inferior to ZOOM didactics with respect to mean change in objective knowledge and participant satisfaction at 3 months. Furthermore, participants perceived themselves more likely to engage with an AUDIO didactic outside of scheduled didactic time, and more likely to recommend use of an AUDIO didactic to a friend. These findings support the use of audio-based learning tools, such as Podcasts, in medical education. Furthermore, the current study challenges the assumption that video conferences, such as ZOOM, should be the default in remote-learning settings.

While overall the 3-month follow-up results of this study were reassuring, the data was nuanced when examined by individual didactic topic. At baseline, participants had high levels of confidence in their ability to develop a study question, and this was mirrored by high baseline objective knowledge scores. The authors hypothesize that these high baseline knowledge and confidence levels are why the AUDIO and ZOOM formats of the 'Designing a Study Question' didactic did not have significant differences between their changes in objective knowledge scores when compared to one another. However, only the AUDIO group had a significant increase in knowledge from baseline to 3-month follow-up.

In contrast, participants had lower baseline levels of confidence in their ability to calculate a sample size, with similarly low objective knowledge scores. Interestingly, change in objective knowledge scores after exposure to the 'Calculating a Sample Size' AUDIO didactic were not found to be significant, and the determination of inferiority of the AUDIO didactic to the ZOOM didactic was inconclusive, with the lower bound of the 95% confidence interval crossing the non-inferiority bound.



The authors hypothesize that these different findings based on didactic topic are related to the content of the didactic. The 'Developing a Study Question' didactic involved more creative thinking, which is perhaps more amenable to audio-based learning. The 'Calculating a Sample Size' didactic involved concrete application of mathematical concepts, including how changing alpha or beta influences sample size. It is possible that the provision of a visual aid (Power-Point slides) conferred a benefit, particularly when it came to model calculations.

While the advantages of visual aids in medical education are known, the benefits of audio-based learning are emerging. The audio-based format used in this study was specifically designed to mirror a traditional Podcast. Many Podcasts are designed to be listened to without the use of visual aids, and easily accessible during free time for asynchronous, self-directed learning. Podcasts have increased in popularity in medical education over the years and are recognized as an effective platform for delivery of medical knowledge with high levels of usability and satisfaction. <sup>12,18</sup>

Although audio-based learning tools, such as Podcasts, have benefits when used in isolation, they are also a promising tool that can be incorporated into hybrid and flipped classroom learning models. Recent studies have found significant knowledge increases associated with using a flipped classroom approach, with participants noting preferences for the flipped classroom format. <sup>19,20</sup> Studies examining such approaches have typically utilized didactic modules – such as videos, websites, or Podcasts – completed asynchronously by learners prior to engagement in synchronous learning, with many noting sustained knowledge increases associated with this approach. <sup>21-25</sup>

This study has many strengths, including the rigorous development and pilot testing of the didactic content and assessments. Furthermore, its emphasis on remote learning of general research concepts enhances applicability and relevance to diverse learning settings and systems. Most importantly, our results may help inform the design of future studies investigating the comparative effectiveness of remote-learning formats.

This study also has many limitations. The Hawthorne effect may have influenced participants' answers and engagement in the didactic modules, and response bias may have impacted the results. Also, the authors did not assess whether learning-format preferences changed after exposure to the two formats. Furthermore, our small sample size limited comparisons, and larger studies are needed to assess potential differences more definitively. Although the p values for between group comparisons were all >0.05, consistent with our non-inferiority hypothesis, the within-group change after exposure to the AUDIO version of the 'Calculating a Sample Size' didactic was also >0.05, which raises question regarding the effectiveness of that didactic module.

Given these many limitations, the current study should be contextualized as a feasibility study to help inform the design of future large-scale studies investigating the two learning modalities. The authors emphasize that the many limitations of this study prohibit it from definitively determining the non-inferiority of either learning modality

#### CONCLUSION

Even prior to the COVID-19 pandemic, there was a shift toward self-directed and asynchronous learning in medical education. <sup>26</sup> This likely reflects the evolving preferences of learners, which include less in-person didactic time, and more opportunities for interactive and self-directed learning activities. Educators must strive to rigorously evaluate different didactic modalities to meet the needs of the next generation of learners. The findings of the current study challenge the paradigm of ZOOM-based remote learning and support the non-inferiority of Podcast-type didactics in conferring research-related knowledge. However, more robust studies are needed to elucidate potential differences between these two learning modalities.

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The views expressed herein are those of the authors and do not necessarily reflect the views of the Care New England, Women & Infants Hospital, or Emory University.

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## **Robotic Spine Surgery in Rhode Island**

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#### **ABSTRACT**

Surgical robots were first proposed in the 1960s with subsequent development and clinical implementation in the 1980s and 1990s. Recent advances in technology have led to widespread utilization of robots in many surgical subspecialties. In spine surgery, robots are primarily utilized for pedicle screw placement, with several studies highlighting the potential benefits of improved accuracy and reduction in radiation exposure. Once streamlined, robotic spine surgery (RSS) can provide financial renumeration through potential cost savings and marketing benefits, and in the future will likely aid in more complex surgeries. In Rhode Island, this technology has been implemented and has the potential to deliver optimized outcomes for patients. Robotic spine surgery is not a substitute for a skilled spine surgeon however, and careful diagnosis, care planning, and surgical execution are still mandatory to deliver the best possible patient outcomes. In this review, we chronicle the history of RSS, outline currently available RSS platforms, describe the efficacy, risks, and complications of RSS procedures, and explain the current and future utilization of RSS in Rhode Island.

**KEYWORDS:** robotic surgery; spine surgery; Rhode Island

# BACKGROUND AND HISTORY OF ROBOTIC SURGERY AND ROBOTIC SPINE SURGERY

Advances in robotic technology have led to increased implementation of robotic spine surgery (RSS) platforms. This technology is rapidly improving and is becoming more common across the country. This technology has recently been implemented in Rhode Island, and thus education regarding this new technology will be important for patients and their care team can make informed decisions regarding robotic spine surgery.

Initial investment in robotic surgery began in the 1980s as NASA attempted to resolve the issue of providing surgery to astronauts in space. In terrestrial operating rooms, the first documented robotic surgery was in 1985, when a brain biopsy was performed using a Programmable Universal Machine Assembly (PUMA) to place and stabilize a biopsy cannula. Subsequent to these early trials, the private

sector amassed substantial investment, allowing surgeons to explore these novel techniques, and the first Food and Drug Administration (FDA)-approved surgical robot was the Automated Endoscope System for Optional Positioning (AESOP) in 1989.<sup>2</sup> This set the stage for further advancement, and in the 1999, Intuitive Surgical launched the DaVinci Standard, a platform still widely used today.<sup>3</sup> Since then, the field of surgical robotics has rapidly evolved and become mainstream – now surgical robots are used in many surgical specialties including gynecology, urology, pediatric surgery, general surgery, neurosurgery, cardiothoracic surgery, otolaryngology, and orthopedics.<sup>3–10</sup>

RSS was first attempted in the 1990s. The German Aerospace Center developed the "Miro System," and the Center for Intelligent Surgery Systems in China developed the "Spine Bot". 11,12 Lack of flexibility with the robotic arm, software malfunctions, confusing user interfaces, and failure to effectively synchronize pre and peri-operative imaging limited the success of these preliminary systems. 13,14 However, these platforms set the foundation for technological advancement in the early 2000s that culminated in the RSS platforms that are widely used today. 15

#### **ROBOTIC SPINE SURGERY ROBOT TECHNOLOGY**

Today, a wide variety of RSS platforms exist. These platforms are all known as shared control systems, meaning they are controlled by both the robot and the surgeon in real time.<sup>16</sup> RSS platforms utilize an intraoperative navigation system as well as a robotic arm for pedicle screw placement. Intraoperative navigation systems can exist on their own or in concert with a surgical robot.<sup>17</sup> These navigation systems allow surgeons to precisely track the position of surgical instruments and project this position onto preoperative or intraoperative imaging data. Within RSS platforms, the options for intraoperative navigation are preoperative or intraoperative CT, or intraoperative fluoroscopy.<sup>18</sup> RSS platforms map spinal anatomy in a "frame based" manner. A spinous process clamp, pelvic pin, or other fixed standard point of reference is recognized by the robot's navigation system, allowing direct image to robot registration. This stability allows RSS systems to be faster, more precise, and more accurate than frameless systems which do not utilize a physical landmark to navigate. 19,20



# CURRENTLY AVAILABLE FDA-APPROVED SPINE ROBOTS

One of the most ubiquitous RSS platforms is Mazor (Medtronic Navigation, Louisville, CO, USA). From 2004-2011, the SpineAssist was the only FDA-approved RSS robot. It planned pedicle screw trajectories by pairing preoperative CT with intraoperative fluoroscopy. 21,22 However, this robot was restricted by the number of vertebral bodies that it could image, drill skive against the lamina and transverse processes, the number of rail mounts and arm attachments, and soft tissue pressure on the arm. These factors contributed considerably to malpositioned screws after it was first approved.<sup>23</sup> In 2011, the FDA approved the Mazor Renaissance which improved artifact rejection, allowed auto-segmentation of vertebral bodies, and provided faster image processing. These upgrades improved pedicle screw placement accuracy.<sup>23,24</sup> The Mazor X launched in 2016 and included a fully automatous robotic arm that no longer required attachment to the patient (attaches to operating table instead), software upgrades allowing independent registration of each vertebral body augmenting surgical planning, and an optic camera that allows the robot to self-detect its location and avoid intraoperative collisions.<sup>2</sup> In 2019 Medtronic acquired Mazor robotics and integrated their Stealth navigation platform into Mazor X, providing fully independent navigation capability and real-time instrumentation position feedback.<sup>21</sup> This fourth generation is known as the Mazor X Stealth addition. All Mazor Robotic arms have six degrees of freedom.<sup>25</sup>

The Excelcius GPS (Globus Medical, Inc., Audubon, PA, USA), launched in 2017 and includes a fully integrated navigation platform that allows real-time instrument tracking and pedicle screw placement without guidewires. This navigation platform is compatible with multiple imaging modalities (both two and three dimensional), can merge preoperative CT scans with intraoperative fluoroscopic imaging, and can localize manufacturer specific instrumentation. The arm is anchored to a floor mounted base station, as opposed to the patient or operating table, as in some versions of the Mazor robots. This rigid, modular arm has six degrees of freedom, allows the attachment of additional surgical instruments and can withstand extreme deflection forces of up to 200N.<sup>27</sup>

The ROSA (Zimmer Biomet, Warsaw, IN, USA) received FDA clearance in 2016 and can be used for instrumentation in cranial surgeries and knee arthroplasties, as well as in spine surgery. It uses preoperative and intraoperative CT images to plan screw trajectories that are placed over guidewires using a fully automated robotic arm with six degrees of freedom.<sup>28</sup> The ROSA ONE received FDA clearance in 2019 and added a fully integrated navigation system that is compatible with manufacturer specific instrumentation.<sup>21</sup>

Other new types of RSS platforms include the Cirq Robot (Brainlab, Munich, Germany) which received FDA clearance for spine procedures in September 2019, the TiRobot (TINAVI Medical Technologies, China) which is not yet

FDA-approved but is widely used in China, and the Remi Robotic Navigation system (Accelus, Palm Beach Gardens, FL), recently FDA-approved in 2021.

# EFFICACY, SAFETY AND OTHER POTENTIAL BENEFITS

RSS has been shown to increase accuracy in pedicle screw placement and prevent associated complications, as demonstrated by multiple meta-analyses.<sup>29,30</sup> Fatima et al conducted a meta-analysis of 19 studies that included a total of 1,525 patients (7,379 pedicles screws). Patients in the RSS group had significantly higher "perfect" and "clinically acceptable" pedicle screw placement accuracy, a 92% lower rate of cranial facet joint violation, 69% lower rate of overall complications, and significantly lower radiation exposure, but longer overall intraoperative time compared to the traditional fluoroscopy-assisted screw placement group.<sup>29</sup> Kosmopoulos et al analyzed 130 studies on robotic versus conventional pedicle screw implantation (37,337 total implanted pedicle screws). In the RSS group, pedicle screw placement accuracy was 99.2% in the cervical spine, 85.1% in the thoracic spine, and 92.1% in the lumbar spine compared to 91.3% in the cervical spine, 56.0% in the thoracic spine, and 87.3% in the lumbar spine in non-navigated surgeries.30 Finally, studies have also shown that despite an increased operative time, total radiation exposure to both the patient and surgical team are dramatically reduced when using robots, and that as experience with the robot increases, surgeons become more efficient and operative time decreases.31,32

## LEARNING CURVE, TRAINING CONSIDERATIONS, RISKS AND POTENTIAL COMPLICATIONS

Studies suggest a surgeon and their OR team need to carry out 20-30 cases to achieve proficiency and efficiency in pedicle screw placement using RSS.<sup>33–37</sup> Additionally, blood loss, radiation exposure, and operative time all decrease after surgeons and their OR teams have performed more cases.<sup>24,38,39</sup>

The most concerning complication unique to RSS is frameshift. This occurs when a robotic navigation system does not have the patient's anatomy mapped correctly, which can occur due to a shift in the tracking arm or patient anatomy, subsequently resulting in inaccurate 3D referencing. This may lead to malpositioned screws, inaccurate instrument navigation, and catastrophic neurological or vascular complications. Another potential disadvantage of RSS is that surgeons do not experience the same degree of tactile feedback as with traditionally open techniques. This accentuates the critical importance of accurate surgical referencing when using robots, and checking instrumentation with fluoroscopy or 3D imaging prior to leaving the operating room. Additionally, RSS has high up-front financial and time expenditures, and comprehensive training programs are mandatory for the entire surgical team prior to RSS implementation.<sup>40</sup>



#### UTILIZATION AND EPIDEMIOLOGY

The number of patients undergoing spine surgery is increasing. Each year, approximately 4.83 million spinal operations are performed, with 1.34 million of those occurring in the United States.<sup>22</sup> New RSS systems have improved to meet demand and improve surgeon performance. Robots are principally used to place pedicle screws, but latest research has demonstrated utility in more complex surgeries such as spinal tumor resections and ablations, vertebroplasties, interbody fusions, and osteotomies for deformity correction.<sup>22,26,41</sup>

#### HISTORY OF RSS IN RI

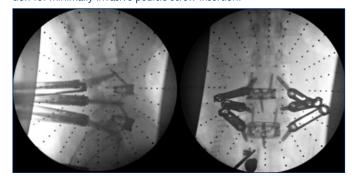
In Rhode Island, robot-assisted surgery has become an integral part of patient care across numerous surgical specialties. In 2014, 38% (5/13) of RI hospitals performed a total of 1312 robot-assisted surgeries, all of which utilized the DaVinci (Intuitive). The majority of cases were hysterectomies and unicompartmental knee arthroplasties.<sup>42</sup> In spine surgery, the utilization of surgical robots has grown nationwide since their implementation in the early 2000s. However, Rhode Island has only recently adopted RSS. The first RSS case in Rhode Island was a lumbar decompression and spinal fusion with the ExcelsiusGPS performed in January 2019 at South County Hospital. At the time, South County Hospital was the only hospital in the state of Rhode Island that offered RSS.43 In January 2021, a surgeon at Ortho Rhode Island reported to The Independent that they implement robots in half of their spine cases.<sup>44</sup> In May 2021, University Orthopedics surgeons using the ExcelsiusGPS became the first orthopaedic surgeons to perform RSS in Northern Rhode Island at Our Lady of Fatima Hospital.<sup>45</sup> In June of 2022, Orthopedic surgeons at The Miriam Hospital performed the first Mazor-X assisted spinal surgery in Rhode Island. Neurosurgeons at Rhode Island Hospital also launched the brain and spine robotic surgical platforms using the ExcelsiusGPS in June 2022.46

#### CURRENT ESTABLISHED CLINICAL USES IN RI AND CASE EXAMPLES

Posterior lumbar fusions and thoracolumbar fusions can be performed using robotic surgical devices, and these procedures are being successfully implemented in RI. Robotic spine surgery is also utilized for combined single-position lateral and posterior spinal fusion, and to assist in increasingly complex minimally invasive surgical operations. The recent addition of the Mazor X robotic system to the Miriam Hospital has had a positive impact upon patient care. The case presented illustrates the intraoperative and post-operative radiographs for a patient with spondylolisthesis and degenerative scoliosis undergoing a two staged surgery with interbody fusion and posterior spinal fusion. Intraoperative

navigation of the minimally invasive pedicle screw placement was performed using fluoroscopy and a tracking marker (Figure 1). The Mazor X robot was utilized for pedicle screw insertion from L4-S1 with a percutaneous approach (Figure 2). There were no complications intraoperatively and the patient was discharged two days later. At follow-up, the patient reported improved pain and imaging demonstrates intact instrumentation and no cage subsidence and accurate screw placement (Figure 3).

**Figure 1**. Intraoperative fluoroscopy images of tracking marker navigation for minimally invasive pedicle screw insertion.



**Figure 2.** Incision site for the minimally invasive percutaneous screw placement.



**Figure 3.** AP and lateral radiographs demonstrating a posterior L4-S1 interbody fusion with L4-L5 and L5-S1 ALIF.





#### **FUTURE DIRECTIONS IN RI**

The utilization of RSS is gradually increasing on an annual basis across the country, including the state of Rhode Island. At this point, there are 4 RSS programs at 4 hospitals in Rhode Island (Rhode Island Hospital, The Miriam Hospital, South County Hospital, and Our Lady of Fatima Hospital), providing patients from all corners of the state with access to RSS. In addition, many of these programs will also be supplemented with technologies such as intraoperative 3D navigation, which will further improve safety and accuracy of spinal instrumentation even when RSS platforms are not available. While these enabling technologies have the potential to improve patient care, they cannot become a substitute for traditional open surgical techniques. Ultimately, all spine surgeons should understand and maintain proficiency with freehand techniques, as there will be times where these technologies are either unavailable or malfunctioning.

#### CONCLUSION

A common adage in spine surgery is that enabling technologies, such as RSS and intraoperative navigation, are tools that don't make a bad surgeon good but a good surgeon better. With the development of several robotic spine surgery programs in various locations throughout the state, patients will have improved access to these technologies, which have the potential to improve the delivery of spine care to patients in Rhode Island. However, surgeons should be careful that they do not become completely reliant on these technologies, and they should never be a substitute for a good diagnostician, a thoughtful surgical plan, and a skilled spine surgeon.

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

	REPORTING PERIOD					
VITAL EVENTS	JUNE 2022	ENDING WITH JUNE 2022				
VIIAL EVENTS	Number	Number	Rates			
Live Births	965	11,398	10.8*			
Deaths	830	11,349	10.7*			
Infant Deaths	4	39	3.4#			
Neonatal Deaths	4	33	2.9#			
Marriages	804	6,759	6.4*			
Divorces	239	2,705	2.6*			

<sup>\*</sup> Rates per 1,000 estimated population

<sup>#</sup> Rates per 1,000 live births

	REPORTING PERIOD						
Hadayling Causa of Doobh Catagoni	DECEMBER 2021	DECEMBER 2021					
Underlying Cause of Death Category	Number (a)	Number (a)	Rates (b)	YPLL (c)			
Diseases of the Heart	251	2,378	216.7	3,616.5			
Malignant Neoplasms	201	2,201	200.6	4,300.0			
Cerebrovascular Disease	44	471	42.9	537.5			
Injuries (Accident/Suicide/Homicide)	88	1,076	98.1	15,569.5			
COPD	41	392	35.7	440.0			

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

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.



<sup>(</sup>b) Rates per 100,000 estimated population of 1,097,379 for 2020 (www.census.gov)

<sup>(</sup>c) Years of Potential Life Lost (YPLL).



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## Perspectives on the Art of Scientific and Medical Writing

ROLAND HAMMOND, MD; JOSEPH H. FRIEDMAN, MD; KENNETH S. KORR, MD; GEORGE BAYLISS, MD; MARY KORR; WILLIAM BINDER, MD

(Managing Editor's Note: This year the Rhode Island Medical Journal (RIMJ) celebrates its 106th year. In this collective commentary, the Journal's editors - past and present – share their editorial journeys with tips and takeaways, starting with "The King's English," which appeared in the inaugural January 1917th issue.)

### The King's English

ROLAND HAMMOND, MD, ET AL

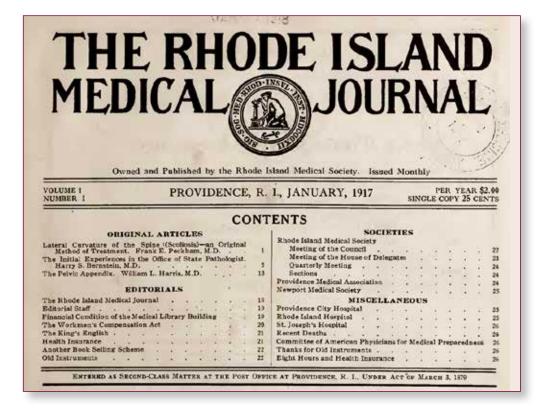
It has been said that even a doctor should be able to speak and write correctly. A few can. Many

> either cannot, or begrudge the time or effort to do so. A glance

over contributions to the modern medical journal too often reveals such wholesale murder of our mother tongue as would bring a blush of shame to the cheek of any high school student. Furthermore, many of these contributors, whose conscience and training impel them to write grammatically, abandon all attempt to attain the "unity, coherence, and force" urged upon

them in their college days, and succeed in cleverly concealing their few salient facts in such a mass of disordered detail that the patience of man is exhausted ere the first gem of important information is unearthed.

The article which begins by clearly stating just what ground it is going to cover, sets forth its main facts in logical order, arranges its detail of history, case reports, or experimental data so that it can be readily recognized and conveniently disregarded by the busy reader, and ends with a clean-cut and effective recapitulation of its essential points is, in the world of medical literature, a gem indeed. .



### 'Shorter is Always Better'

JOSEPH H. FRIEDMAN, MD

My first publication1 was a case report in Neurology, the most read journal in the field. The editor-inchief was the chair of the department where I was then a medical student. His pre-publication comment, handwritten with a fountain pen, was: "Admirably brief. Please add answers to the following questions and reduce the length of the



Joseph H. Friedman, MD Editor-in-Chief, 1999-2019

ms." Take home message: shorter is always better.

When I moved to Rhode Island in 1982, fresh out of residency, in the days when the subspecialty discipline of movement disorders was nascent, with only two fellowships in the country, I proclaimed myself a movement disorders specialist and sought to attract patients. There were 13 neurologists in Rhode Island at that time, with 11



### **EDITORIALS**

THE RHODE ISLAND MEDICAL JOURNAL.

Editorial page header from the January 1917 issue of RIMJ

in Providence. I thought I could advertise myself by publishing in RIMJ, and wrote a few columns. With time, I became friendly with its editor-in-chief, Stan Aronson, and when he decided to step down after 10 years, no one responded to the ads in the Journal. In desperation, he asked me, and it was difficult to ever say no to Stan; plus,



Stanley M. Aronson, MD Editor-in-Chief.1989–1998

I was flattered. I became editor-in-chief and remained in that position for 20 years. I gave myself the task of writing a monthly column. My only background was the papers I had published, guest-editing neurology issues for RIMJ, and a lot more energy than I have today.

I don't think the mission of the Journal has changed since Dr. Aronson became the editor-in-chief 35 years ago, which is to provide public access to the accomplishments, capabilities and needs of the Rhode Island health care community, while promoting the careers of those of us who do

the work. I continue to view RIMJ as a medium for local physicians and other health care workers to advertise their expertise, alert us to problems, and to advance their academic careers, in addition to educating the rest of us. •

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Kenneth S. Korr, MD Associate Editor

### My First Publication: Lessons Learned

KENNETH S. KORR, MD

My first publication was a case report which appeared in JAMA in 1980.<sup>1</sup> It described a 66-year-old male patient who presented with an acute inferior and right ventricular infarction complicated by high-grade AV heart block, severe tricuspid insufficiency, and cardiogenic shock refractory to fluid

resuscitation, pressors, and intra-aortic balloon counterpulsation. The patient ultimately required emergency open heart surgery, including tricuspid valve replacement, and permanent pacemaker implantation. Surgery was lifesaving, the patient survived and did well over the ensuing years.

Writing this paper was a uniquely valuable learning experience for me on the unusual hemodynamic pattern of RV infarction and its similarity to constrictive pericarditis, as well as the fact that you could actually survive without a functioning right ventricle if you had a competent tricuspid valve and sinus rhythm. It was the senior authors who saw those important parallels within the broader spectrum of cardiac disease, and the unique hemodynamic and pathophysiologic aspects which made this paper so much more interesting. Reading it now after so many years, I still recall many of the discussions we had relating to specific aspects of this case and how best to present them. It left a lasting impression and one which has guided my writing and editorial efforts since then.

As an associate editor of RIMJ, I have the opportunity to review countless articles and case reports frequently authored by medical students and residents. Our editorial process is aimed at constructive criticism, suggestions on ways to improve the manuscript, clarify confusing points and focus on the primary message of the paper – lessons I absorbed from mentors and senior authors as a first-year cardiology fellow at The Miriam Hospital. •

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George Bayliss, MD Associate Editor

## Road Less Taken: From Beat Reporter to Editorial Board

GEORGE BAYLISS, MD

I've worked my way up in journalism and medicine to the editorial board of the *Rhode Island Medical Journal* (RIMJ). I started as a reporter for local newspapers, writing obituaries, covering the police beat, courts and school board meetings. I then moved to the wire services and went from rewriting local

news for radio to covering US energy futures markets. At last, I advanced to the international services as a correspondent in Germany, covering currency and government bond markets, central bank policy, and emerging markets east of the Berlin Wall. This was the best job I could imagine in journalism and decided the time was right to switch careers and go to medical school, something I wished I'd done when I was younger.

The thrill of seeing one's byline never dies, and medicine presented opportunities to write. My first articles<sup>1,2</sup> as lead author grew out of presentations as a fellow and appeared in the journals of the European Renal Association after many revisions. Several years ago, I leapt at the chance to help shape RIMJ. As a member of the editorial board, I review submissions with an eye toward helping authors improve their work and encourage colleagues and trainees to turn their presentations into articles and case reports. And while RIMJ has extended its global reach with the addition of a LinkOut free article feature on PubMed several years ago, it has stayed the local journal it has been for all of its 106 years. Our primary responsibility remains to inform the Rhode Island medical community and provide a platform for its members, trainees and attendings to present their work. .

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Mary Korr, MA Managing Editor

# On the Sidewalks of New York...

MARY KORR

My editorial journey began as a young girl in Queens, NY, on my bicycle. On Sundays I would peddle to the stationary store to pick up the *New York Times*, the *New York Post*, the *Daily News*, the *Herald Tribune*, the *Mirror*, the *World Telegram and Sun*, and the *Journal-American*, and navigate home with

my front, side and back baskets filled. I brought them inside and was paid my allowance, 5 cents per paper. I put the coins in my piggy bank and read the comics. Brenda Starr, adventurous reporter, was my favorite.

Fast forward to my first college writing class, given by a *New York Times* editor. He encouraged me to pursue journalism. *New York Times* here I come! Of course, I knew I had to pay my dues first. I decided to go to graduate school for journalism. "Obituaries are the most read part of a newspaper. Never spell a name wrong or it will come back to haunt you," Prof. Taft in J 101 instructed. "And you will fail my class if I find three errors in anything you write."

After working as an editor and reporter for newspapers in New York City, Massachusetts, and Rhode Island for decades, I am now at RIMJ. Ten years have passed in this position very quickly. And as any journalist will attest, sometimes what we have been asked not to report is the most memorable. When I asked the late Stanley Aronson, MD, why he decided to take on the task of RIMJ editor-inchief for a retrospective piece I was writing, his response was unexpected and moving. "But you can't write that down," he said. I wish I could report all the things I have been asked not to, the "back story."

The editorial world (not to mention the bicycle world) has undergone cataclysmic changes since I first peddled to the news stand. The headlines are on all our devices, even our watches. But what has not changed – in the general press and in any publication – are the basics: follow author guidelines, spell names correctly, update research, fact check, and have senior authors review before submission.

Manuscript conception and preparation is a balancing act with all of the above components in sync – something I literally learned wheeling on the sidewalks of New York with basketfuls of newspapers, wondering what adventure Brenda Starr was up to that week. ❖





William Binder, MD Editor-in-Chief

# The ABCs: Accuracy, Brevity, Clarity WILLIAM BINDER, MD

I joined the Department of Emergency Medicine at Brown in 2014, after 16-plus years at a Boston institution. While sitting on a chair at Narragansett Beach I thought it would be a nice addition to publish a CPC from our department in the *Rhode Island Medical Journal* (RIMJ). I contacted Dr. Joseph Fried-

man, the editor-in-chief, and he gave the green light, with the admonishment to keep it short and to the point. We managed to publish about 4 or 5 per year. With each attempt I saw less red track changes, as I began to understand and appreciate Dr. Friedman's decree.

This was not the first time I had been told to keep it brief. As a second-year internal medicine resident, Dr. Michael Stein taught me about efficiency in language. My responsibility was to take those 4-page, intern, handwritten history and physical exams and boil them down to a 2-paragraph note. Hemingway meets the senior resident's H&P!

Several years later, in 2018, I suddenly found myself with more time and I asked Dr. Friedman if I could help out with RIMJ. Little did I know he had other plans, and in 2019 Dr. Edward Feller and I became co-editors-in-chief of the journal. My experience as an editor was nil, although I had certainly reviewed my fair share of manuscripts. I hoped my writing experience as a graduate student in the history of science would make up for my deficits.

As much as I have learned from these mentors mentioned above, I was lucky to have Dr. Leonard Mermel guide me through the process of writing manuscripts. My first paper, a case report about leptospirosis in a patient from South County, was eventually accepted in the *Journal of Emergency Medicine*, with Dr. Mermel as the senior author. I learned that writing is re-writing, a pearl of wisdom I offer to every author. Mostly, however, I marveled at how fortunate I was to live in an age where white-out was no longer imperative!

I have also had the good fortune to have had manuscripts both accepted and rejected. At every juncture I have learned from reviewers and editors. Some reviewers have been brutal – not long ago I had a paper bounce off of a journal and get rejected within hours of submission – and some have been kind and thoughtful. In considering these manuscripts, as well as current submissions to RIMJ, the best ones were those that had focus and did not meander.

Over the past year, we have had over 300 faculty, residents and fellows, and more than 50 students from Brown-related programs author articles for RIMJ. Additionally, authors from our community, the Rhode Island Department of Health, and from around the nation (Stanford, U. of Pittsburgh, Harvard, U. of Massachusetts, and others) have contributed to our increasingly vibrant journal. In an era when the practice of medicine has become increasingly challenging, we continue to provide accessible and reliable information on topics relevant to our community. Happy 106th year to the RIMJ! •

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### **Correction: Acknowledgments to Perspective**

Dr. Binder:

We thank you for publication of our recent Perspective piece, "It's Never the Right Time to Say Goodbye...Until It Is: Transitioning from Pediatric to Adult Primary Care" (Dec. 2022). It's very exciting to have our work with our residency programs celebrated and shared. We regret that we neglected to mention that the project was part of a larger learning collaborative which was designed, structured, and facilitated by The Care Transformation Collaborative of RI (CTC-RI). Funding for the project was secured by CTC-RI from Tufts Health Plan and the Rhode Island Dept. of Health (RIDOH) Title V and the project received technical assistance from The National Alliance to Advance Adolescent Health. Six other pediatric/adult practice dyads in Rhode

Island participated and shared their learning successes and their challenges with the group. Each dyad received coaching from a practice facilitator and a detailed work plan built on the tenets of the National Alliance's "Got Transition" and attended quarterly shared learnings sessions. We are grateful to the entire Learning Collaborative team for the success of this project.

We request publication of this letter to rectify our omission.

Thank you,
Ashley T. Nguyen, MD
Carol Lewis, MD
Meghan Geary, MD





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First session February 9, 2023 "Getting Answers You Need to Succeed in Clinical Care: Health Systems Science and Mixed Methods as Ways Forward"



Dr. Jeffrey Borkan, MD, PhD
Professor, Department of Family Medicine
Assistant Dean for Primary Care-Population Health

can Academy of Family Physicians (AAFP) has reviewed the Primary Care Innovation Series and deemed it acceptable for AAFP credit. Term s from 02/04/2023 to 12/14/2023 for 1.00 Live AAFP prescribed credits per session. Physicians should claim only the credit commensurate

Alpert Medical School of Brown University

### We are read everywhere

In the past year to date, more than **53,000** unique viewers from **115** countries have read articles in the *Rhode Island Medical Journal* or researched topics in its archives.

#### **Top 10 countries**

US
 Canada
 China
 UK
 India
 Spain
 Australia
 Italy



Snoopy and Charlie Brown welcome RIMJ Managing Editor **Mary Korr** to the campus as she checks the December issue of the Journal.



The entrance to the Charles M. Schulz Museum and Research Center in Santa Rosa, CA. In addition to three changing gallery spaces with original comic strips, the museum has a theater, education center, and a café and ice rink adjacent to it.

#### SANTA ROSA, CALIFORNIA

The Charles M. Schulz Museum and Research Center opened in August 2002 to fulfill its mission of preserving, displaying, and interpreting the art of Charles M. 'Sparky' Schulz (1922–2000). A recent visit to the campus during the Centennial celebrations of his life illustrated the cartoonist's interest in medicine, with many of the original *Peanuts* comic

strips focusing on Schulz's careful study of health issues.

The recreation of his studio contained many medical books he used to inform the characters' medical musings. While some of the medical mishaps chronicled in the strips were transferred almost directly from Schulz's own life (a broken foot, knee surgery) or from his experiences raising children (measles vaccination), others, such as amblyopia, took careful research and discussion with medically-trained friends.

Schulz grew up playing baseball, football, and ice hockey, and later took up jogging, tennis, and rollerblading—all pursuits that found themselves playfully depicted in the panels of *Peanuts*. The *Peanuts* Gang can often be found on the links, a rink, or a baseball diamond, and many strips highlight the challenges of recovering from sports-related injuries, and, after his 1981 quadruple bypass heart surgery, dietary adjustments.

The Doctor is In at the Schulz Museum – and the skaters are, too, at the world-class arena on the site, open to the public. For more information on the museum, visit https://schulzmuseum.org.











Above, one of the original four-panel comic strips featured in the gallery inside, with Lucy Van Pelt advising Charlie Brown. The name *Peanuts*, chosen by United Feature Syndicate in 1950, stems from the children's Peanut Gallery featured in the popular Howdy Dowdy Show.





Cover of vintage Time magazine featuring *Peanuts* and the gang.

Right, recreation of the studio Charles M. Schulz worked in, located on the second floor of the museum.



**Kenneth S. Korr, MD**, associate editor of RIMJ, sits behind one of the Doctor is In booths.

[PHOTOS BY MARY KORR AND KENNETH S. KORR, MD]

Wherever you may be, or wherever your travels may take you, check the Journal on your mobile device, and send us a photo: mkorr@rimed.org.







## Working for You: RIMS advocacy activities

#### December 1, Thursday

Meeting with Blue Cross & Blue Shield of Rhode Island (BCBSRI): **Thomas A. Bledsoe, MD**, President; **Elizabeth Lange, MD**, Immediate Past President

Behavioral Health Legislative Advocacy Strategy Meeting with Stakeholders: Robert Dulski, staff

#### December 5, Monday

Rhode Island Health Workforce Planning: Combined Higher Education & Health Career Pathways & Pipelines Workgroup

American Medical Association (AMA) Advocacy Update: RIMS Staff

Meeting with Senator Joshua Miller: American Medical Association – Brown AMS RIMS Student Members; Robert Dulski, staff

RIMS Council meeting:

Thomas A. Bledsoe, MD, President

#### December 6, Tuesday

RIMS Physician Health Committee (PHC): **Herbert Rakatansky, MD**, Chair

Alpert Medical School Student Health Council: **Kathleen Boyd, MSW, LICSW,** Advisor; **Joanna Vaz MacLean, MD**, Advisor

RIMPAC, Senate Majority Leader Fundraiser: Robert Dulski, staff

#### December 7, Wednesday

Protect Our Healthcare Coalition Meeting: Robert Dulski, staff

#### December 8, Thursday

Rhode Island Health Information Technology (HIT) Survey Workgroup meeting: Stacy Paterno, staff

Campaign to Pass the Equality in Abortion Coverage Act (EACA) meeting: Robert Dulski, staff

Rhode Island Medical Society Foundation Physician Health Program Governance Committee: Jerry Fingerut, MD, Chair

#### December 12, Monday

Healthcare Workforce Planning: Workforce Vacancy Discussion RIMS Foundation Meeting:

Elizabeth Lange, MD, Chair

Federation of State Physician Health Programs (FSPHP): **Kathleen Boyd, MSW, LICSW**, Vice-Chair

Performance Enhancement and Review and Effectiveness Review (PEER™)
Committee (PEERC): **Kathleen Boyd, MSW, LICSW**, Vice-Chair

#### December 13, Tuesday

Health Care Capacity and Workforce Shortages Meeting with the RI Speaker's Office: **Michael Migliori, MD**, Public Laws Committee Chair; Stacy Paterno, RIMS staff; Robert Dulski, RIMS staff

Office of the Health Insurance Commissioner (OHIC) Administrative Simplification Task Force meeting: Peter Hollmann, MD, Past President; Elizabeth Lange, MD, Past President

Rhode Island Department of Health (RIDOH) Health Service Council meeting: Robert Dulski, staff

#### December 14, Wednesday

Rhode Island Department of Health (RIDOH) Board of Medical Licensure and Discipline (BMLD): Stacy Paterno, staff Governor's Overdose Intervention and Prevention Task Force: Sarah Fessler, MD, Past President

#### December 15, Thursday

RI House Study Commission on Naturopathy: Robert Dulski, staff

Executive Office of Health and Human Services (EOHHS) Health Information Technology (HIT) Steering Committee meeting: Stacy Paterno, staff

RIMS Climate Change and Health Committee: **Katelyn Moretti, MD**, Co-Chair; **Alison Hayward, MD**, Co-Chair

Federation of State Physician Health Programs Accreditation and Review: Council **Kathleen Boyd, MSW, LICSW**, Vice-Chair PEERC

#### December 19, Monday

RIMPAC Annual Meeting:
Peter Karczmar, MD, Chair
RIMS Public Laws Committee Meeting:
Michael Migliori, MD, Chair

#### December 20, Tuesday

Health Care Capacity and Workforce Shortages Meeting with the RI Governor's Office: Thomas A. Bledsoe, MD, President; Heather Smith, MD, MPH, President-Elect; Elizabeth Lange, MD, Immediate Past President; Michael Migliori, MD, Public Laws Committee Chair; Catherine A. Cummings, MD, Past President; Dina Himelfarb, MD, President, ACEP; Stacy Paterno, RIMS staff; Robert Dulski, RIMS staff

National Government Services (NGS) Key Stakeholder meeting

OHIC Health Insurance Advisory Committee (HIAC): Catherine A. Cummings, MD, Past President

#### December 21, Wednesday

Rhode Island Health Workforce Planning: Health Workforce Data Collection & Analytics Workgroup

OHIC Administrative Simplification Task Force meeting: **Elizabeth Lange, MD**, Immediate Past President

#### December 29, Thursday

Protect our Health Care Policy Group Meeting: Robert Dulski, staff

#### January 5, Thursday

Meeting with Chairman Joshua Miller and Representative Brandon Potter regarding prior authorization: Stacy Paterno and Robert Dulski, staff

American Medical Association (AMA) Federation Health Equity Exchange

#### January 9, Monday

RIMS Board of Directors meeting: **Thomas A. Bledsoe, MD**, President Rhode Island Health Workforce Planning: Behavioral Health Career Ladders





#### January 11, Wednesday

Rhode Island Department of Health (RIDOH) Board of Medical Licensure and Discipline (BMLD): Stacy Paterno, staff Governor's Overdose Intervention and Prevention Task Force: Sarah Fessler, MD, Past President

#### January 12, Thursday

RIDOH Primary Care Physicians Advisory Committee (PCPAC) meeting: **Elizabeth Lange, MD**, Immediate Past President Raising RI Coalition meeting: Stacy

Campaign to Pass the Equality in Abortion Coverage Act (EACA) meeting: Robert Dulski, staff

#### January 16, Monday

Paterno, staff

RIMS Public Laws Committee meeting: **Michael Migliori, MD,** Chair

#### January 17, Tuesday

2023 AMA Advocacy Agenda: Full Steam Ahead: RIMS staff RI House Study Commission on Naturopathy: Robert Dulski, staff

#### January 18, Wednesday

RIDOH Primary Care Physicians Advisory Committee (PCPAC) meeting: **Elizabeth Lange, MD**, Immediate Past President

Rhode Island Health Workforce Planning: Health Workforce Data Collection & Analytics Workgroup

Rhode Island Opioid Settlement Advisory Committee: Robert Dulski, staff

#### January 19, Thursday

Health Information Technology (HIT) Steering Committee meeting: Stacy Paterno, staff

RIMS Climate Change and Health Committee: **Katelyn Moretti, MD**, Co-Chair; **Alison Hayward, MD**, Co-Chair

#### January 23, Monday

Protect Our Healthcare Coalition (POHC): Policy Group: Robert Dulski, staff

#### January 24, Tuesday

CMS Quarterly Stakeholders Call: Stacy Paterno, staff

Rhode Island Foundation Long Term Health Planning Policy Sub-committee: Stacy Paterno, staff

Rhode Island Health Workforce Planning: Loan Repayment

RIMPAC, Speaker Fundraiser: **Thomas A. Bledsoe, MD**, President; Robert Dulski, staff

#### January 26, Thursday

RIMPAC, Senate President Fundraiser: **Thomas A. Bledsoe, MD**, President; Robert Dulski, staff





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### Orthopaedic Associates, Inc.

























# Study shows pharmacists can safely, effectively start treatment for patients with opioid use disorder

First-of-its-kind pilot study published in New England Journal of Medicine shows patients can safely start care in community pharmacies without physician visit

KINGSTON (URI) – Researchers at the University of Rhode Island College of Pharmacy, Rhode Island Hospital and Brown University found that pharmacists – not just physicians and clinicians at doctors' offices – can safely and effectively start patients with opioid use disorder on lifesaving treatments without a prior visit to a physician. With more than 100,000 people dying in 2022 from overdose deaths and an ongoing opioid crisis stretching across the country, improving access to medications for opioid use disorder such as buprenorphine through pharmacists is a critical step.

The first-of-its-kind study, described in a letter to the editor in the Jan. 12th edition of the *New England Journal of Medicine*, documents the experience of 100 patients who started on the evidence-based medication buprenorphine by coming to a specially trained pharmacist for their care. Once stabilized on the medication, 58 patients were randomized to receive either continued care in the pharmacy or usual care in a clinic or physician's office. After one month, the patients in the pharmacy group showed dramatically higher rates of retention in care: 25 (89 percent) continued in the pharmacy compared to just 5 (17 percent) in the usual care (physician or clinic) group.

"We have a serious treatment gap. We are missing 90 percent of the people with opioid use disorder who need and want treatment," said **JEFFREY BRATBERG**, a clinical professor of pharmacy practice at the URI College of Pharmacy and an investigator on the study. "Pharmacists are an underutilized partner in the healthcare workforce, especially the behavioral healthcare workforce. There is a pharmacy within 5 miles of where 95 percent of Americans live."

For the study, researchers visited addiction medicine specialists around the state to recruit patients, many of whom; were not being adequately served by the health care community, and were not being treated for their opioid use disorder. Many participants were unemployed, unstably housed, or otherwise lacking access to care. The study gave them the opportunity to receive safe, convenient same-day treatment at times that were convenient for them, helping maintain their adherence to the program.

"This is a population that's not being served that should be served, and this is one way we can help do that," Bratberg said. "A great majority had already been on medication, and for whatever reason, couldn't stay on treatment, largely because of the social determinants of health. Worldwide, this is the first time someone can walk into a pharmacy and get buprenorphine without a physician visit, expanding their access to care. We found patients who get started in the pharmacy really like that care, and they tend to stick with it. Compared to no care, it's a dramatic difference in quality of life for them."

Genoa Healthcare, whose six pharmacies in Rhode Island were involved in the study, supported a team of 21 pharmacists to be trained in how to provide the induction and buprenorphine care. **LINDA ROWE-VARONE**, a clinical pharmacist who participated in the study and earned her doctorate of pharmacy at URI, said one of her patients is a mother who lives near the Genoa Healthcare pharmacy in Providence. This woman finds the pharmacy hours much more convenient than the clinic she previously visited and, in contrast with the clinic, the pharmacy feels so safe that she brings her children to appointments. Rowe-Varone said she loved participating in the study.

"I met people who could be my family members, my neighbors, people I work with, people I pass walking on the street, and they would come into our pharmacy for help," she said. "They wanted to become healthy again. I feel as if we're right there for them."



Six Genoa Pharmacies around Rhode Island, the inside of one depicted here, participated in the study, helping support a team of 21 pharmacists to be trained in how to provide the induction and buprenorphine care.

The unique collaboration between Genoa Healthcare, the researchers, and state leadership at the Rhode Island Department of Health and the Department of Behavioral Health, Developmental Disabilities and Hospitals created the legal and policy infrastructure to support the study and test out the pharmacy care model.

"Treatment with medications can only work if it is available and accessible in the community," explains **DR. JOSIAH D. RICH**, a study physician and professor of medicine at Brown School of Medicine. "This disease kills by stigma and isolation. Our study showed that a diverse patient population could benefit from treatments offered in a community pharmacy."

The opportunity to open up the pharmacy for addiction treatment is set for 2023: Changes President Joe Biden signed into



law eliminate the X waiver, which was previously required to prescribe buprenorphine. Currently, 10 states allow pharmacists to obtain Drug Enforcement Agency authorization to prescribe controlled substances, which means use of the study's findings could be swift.

"Dramatically increasing capacity to provide good, lifesaving treatment for people with opioid use disorder through pharmacies is an approach that could be ramped up today," said **DR. TRACI GREEN**, the study's principal investigator and co-director

of Rhode Island Hospital's Center of Biomedical Research Excellence (COBRE) on Opioids and Overdose. "It's a gamechanger."

Green, who led the study, is an epidemiologist and an adjunct associate professor of emergency medicine and epidemiology at Brown University's Warren Alpert Medical School. She, along with Rich and Bratberg also serve as expert advisors to the Rhode Island Governor's Overdose Prevention and Intervention Task Force. •

# American Lung Association report gives Rhode Island mixed grades for tobacco control policies

PROVIDENCE – Rhode Island's progress on its policies to prevent and reduce tobacco use has slowed, according to the American Lung Association's 21st annual "State of Tobacco Control" report, released January 25th.

The "State of Tobacco Control" report evaluates state and federal policies on actions taken to eliminate tobacco use and recommends proven-effective tobacco control laws and policies to save lives. This is critical, as tobacco use remains the leading cause of preventable death and disease in America and takes the lives of 1,780 Rhode Island residents each year.

"Unlike our neighbors in Massachusetts, Rhode Island is now lagging behind when it comes to tobacco control policies," said Daniel Fitzgerald, Director of Advocacy at the American Lung Association in Rhode Island. "Our legislators have an important opportunity to improve the health of our state through proven policies, such as adequately funding the State's Tobacco Control Program, ending the sale of all flavored tobacco products, and ensuring that casinos are a smokefree workplace and venue for all Rhode Islanders."

#### Rhode Island's Grades

The "State of Tobacco Control" report grades states and the District of Columbia in five areas that have been proven to prevent and reduce tobacco use and save lives. In the 2023 report, Rhode Island received the following grades:

- 1. Funding for State Tobacco Prevention Programs Grade F
- 2. Strength of Smokefree Workplace Laws Grade A
- 3. Level of State Tobacco Taxes Grade B
- 4. Coverage and Access to Services to Quit Tobacco Grade B
- 5. Ending the Sale of All Flavored Tobacco Products Grade D

This year's report noted the need for Rhode Island policy-makers to focus on increasing funding for tobacco prevention and quit smoking programs. An investment in prevention is especially important given the ongoing youth vaping epidemic. Despite Rhode Island receiving \$200 million in tobacco taxes, the state's tobacco control efforts are only funded at 14% of the

level recommended by the Centers for Disease Control and Prevention (CDC). The Lung Association believes the funds should be used to support the health of our communities and to prevent tobacco use and help people quit, and not switch to e-cigarettes. These programs are also critical for helping to end tobacco-related health disparities.

In addition, Rhode Island leaders must act to create tax parity for all tobacco products, comprehensive smokefree workplace legislation that includes casinos, and legislation that established pharmacists prescribing authority for FDA-approved cessation medication.

#### **Federal Grades Overview**

The report also grades the federal government on their efforts to eliminate tobacco use. This year, there were new steps taken by the government to prevent and reduce tobacco use, including proposed rules to end the sale of menthol cigarettes and flavored cigars, Congress passing a law requiring the FDA to regulate tobacco products made with synthetic nicotine, and increased federal enforcement of the Tobacco Control Act. As a result of these steps forward, the federal government's grade for "Federal Regulation of Tobacco Products" improved from a "D" grade last year, to a "C" grade in the 2023 report.

The 2023 "State of Tobacco Control" report grades the federal government in five areas:

- Federal Government Regulation of Tobacco Products Grade C
- Federal Coverage of Quit Smoking Treatments Grade D
- Level of Federal Tobacco Taxes Grade F
- Federal Mass Media Campaigns to Prevent and Reduce Tobacco Use – Grade A
- Federal Minimum Age of Sale for Tobacco Products to 21
   – Incomplete

FDA is overdue in publishing the final Tobacco 21 regulations as required by statute, which is why it earns an "incomplete."

To learn more about this year's "State of Tobacco Control" grades and take action, visit <u>Lung.org/sotc</u>. ❖



# Reed joins Hasbro Children's Hospital & American Cancer Society to celebrate Childhood Cancer STAR Reauthorization Act signed into law

PROVIDENCE – Each year, about 15,000 children in the United States are diagnosed with cancer. Hasbro Children's Hospital treats between 60 and 70 children annually who are newly diagnosed with cancer. And thanks to doctors, hospital staff, and researchers, there have been significant improvements in cancer treatment and pediatric cancer outcomes over the last decade.

To accelerate that progress, boost pediatric cancer research, and expand child-focused cancer treatments and resources for families affected by child-hood cancer, President Biden signed into law U.S. Senator Jack Reed's (D-RI) Childhood Cancer STAR Reauthorization Act (S. 4120) on January 5th, 2023. The STAR stands for: Survivorship, Treatment, Access, and Research.



Senator Reed recently joined leading pediatric cancer doctors at Hasbro Children's Hospital and childhood cancer community advocates to celebrate passage of the Childhood Cancer STAR Reauthorization Act.

Senator Reed recently joined leading pediatric cancer doctors at Hasbro Children's Hospital and childhood cancer community advocates to celebrate passage of the Childhood Cancer STAR Reauthorization Act. This new law expands opportunities for childhood cancer research, improves efforts to identify and track childhood cancer incidences, and enhances the quality of life for childhood cancer survivors.

"The funding that Sen. Reed has worked hard to secure through the STAR Act reauthorization has a very significant impact here at Hasbro Children's Hospital as we strive to fulfill our mission to continue to deliver better care, better cures and longer survival for our patients. I'm proud to say that we have over 50 different clinical trials that are active here at Hasbro Children's at any given time, and this important trial work cannot happen without the STAR Act reauthorization and the people who help make it a reality. The impact of this law and its efforts to make childhood cancer a priority is truly a valued effort that is felt nationally, locally and individually," said RISHI LULLA, MD, MS, chief of pediatric hematology/oncology at Hasbro Children's Hospital.

Since Reed's original Childhood Cancer STAR Act was first introduced in 2015 and was passed and signed into law five years ago, in 2018. Since then, it has helped deliver over \$150 million to fund promising childhood cancer research, assist patients and families battling cancer, and streamline biobanking projects.

Childhood cancer research has progressed in recent years, but after accidents, cancer is still the second leading cause of death in children ages 1 to 14, according to the American Cancer Society. ••

# RI Delegation announces \$2M to boost local vaccination efforts

# Community health centers receive grants from new HRSA imitative

PROVIDENCE – Several Rhode Island community health organizations are getting a boost from a new U.S. Department of Health and Human Services program meant to increase vaccination rates for COVID-19 in underserved populations. In an effort to combat a winter surge of illness, U.S. Senators Jack Reed and Sheldon Whitehouse and Congressmen Jim Langevin and David Cicilline announced that eight Rhode Island community health centers are set to receive \$2,086,664 in federal funding to increase access to vaccines and improve outreach to vulnerable communities. This funding will help get more shots into arms and help lower barriers to care for Rhode Islanders hardest hit by COVID-19.

The funding for these community health centers comes from a new \$350 million initiative administered by the U.S. Department of Health and Human Services (HHS), through the Health Resources and Services Administration (HRSA), that delivers support to community-based organizations in their efforts to increase vaccination rates, with a specific focus on underserved populations. This initiative also encourages health centers to support mobile, drive-up, walk-up, or community-based vaccination events. Furthermore, this HRSA funding will help support health centers implementing extended hours and new off-site vaccination locations.

The community health centers in Rhode Island set to receive federal funds include:

- Blackstone Valley Community Health Care, Inc. (Pawtucket): \$229,180
- Comprehensive Community Action, Inc. (Cranston): \$205,879
- East Bay Community Action Program (Newport): \$137,299
- Northwest Community Health Center (Pascoag): \$195,313
- Providence Community Health Centers, Inc. (Providence): \$576,832
- Thundermist Health Center (Woonsocket): \$517,522
- Tri-County Community Action Agency (Johnston): \$112,513
- Wood River Health Services, Inc. (Hope Valley): \$112,126 ❖



# Encompass Health announces plans to build a 50-bed inpatient rehabilitation hospital in Johnston

BIRMINGHAM, ALA. – Encompass Health Corp. (NYSE: EHC) today announced it plans to build a freestanding, 50-bed inpatient rehabilitation hospital in Johnston, Rhode Island. The hospital will be located at 2109 Hartford Avenue and is expected to begin serving patients in 2024.

"We are excited to expand our rehabilitation services in the Northeast through this project, which will serve as Encompass Health's first hospital in the state of Rhode Island," said PAT TUER, president

of Encompass Health's Northeast region. "We look forward to improving access to high-quality, individualized rehabilitative care and allowing more residents to receive specialized care close to home."

Complementing local acute care services, this hospital will serve patients recovering from debilitating illnesses and injuries, including strokes and other neurological disorders, brain injuries, spinal cord injuries, amputations and complex orthopedic conditions. In addition to

24-hour nursing care, this hospital will offer physical, occupational and speech therapies to restore functional ability and quality of life. Care will be provided by highly specialized nurses, therapists and physicians.

The hospital will feature all private patient rooms, a spacious therapy gym with advanced rehabilitation technologies and an activities of daily living suite, cafeteria, pharmacy and therapy courtyard. •

# Behavioral health organizations announce charity hockey event for summer 2023

Funds raised to support local mental health, suicide prevention & substance use efforts

EAST PROVIDENCE – The seven behavioral health organizations that make up Horizon Healthcare Partners (HHP) announce their upcoming Check the Stigma Hockey Classic Charity Hockey Event to be played in the Summer of 2023.

Child & Family RI, CODAC, Community Care Alliance, Galilee Mission, Newport Mental Health, Tides Family Services and Thrive Behavioral Health are the seven behavioral health and substance use organizations that comprise HHP and serve the mental health and substance use needs of Rhode Islanders across the state.

The Inaugural Check the Stigma Hockey Classic is scheduled for Saturday, July 15, 2023, at Providence College Schneider Arena. Two teams of hockey players and legends will take the ice at Schneider Arena for an action-packed game with exciting activities for fans including chuck-a-puck, 50/50 tickets, meet and greets, and giveaways.

Event Chairman **TOBY O'BRIEN**, President of Overspeed Hockey, will gather a group of former and present professional players, coaches, and hockey luminaries to participate. The Event Committee includes former NHL players Brian Boucher, Bobby Farnham, Brian Flynn and current pros Tommy Cross, Brian Lemos, Ryan Fitzgerald, Tim Schaller, and Janine Webber. Additional members include Tom Fitzgerald GM of the New Jersey Devils, Parker Ford of Providence College, and two-time Olympian Sarah Decosta to name a few!

A special Basin WaterFire will kick off the Check the Stigma Hockey Classic Fundraising Weekend on Friday, July 14th. Tickets for the Hockey Classic will be on sale in early 2023 through www.checkthestigma.org. ❖

# Butler, Brown launch study aimed at developing methods for early, accurate Alzheimer's diagnosis

PROVIDENCE – The Memory and Aging Program at Butler Hospital, with support from the Warren Alpert Foundation and Carney Institute for Brain Science at Brown University, has launched a new research study to evaluate methods for early and accurate Alzheimer's disease (AD) diagnosis. The BioFinder-Brown Study aims to validate new blood tests in individuals who are healthy, yet may have a higher risk for developing AD. The study will also use these and other metrics to better predict the risk and progression of Alzheimer's disease.

"Developing easy-to-use blood tests will lead to early diagnosis and treatment and be a game changer in the fight against Alzheimer's disease," said **DR. STEPHEN SALLOWAY**, Principal Investigator of the BioFinder-Brown site.

The study is being conducted in collaboration with the Swedish BIOFINDER Study based at Lund University under the leadership of **OSKAR HANSSON**, **MD**, **PhD**. BIOFINDER, which stands for BIOmarkers For Identifying Neurodegenerative Disorders Early and Reliably, collaborates with leading scientists, universities, and companies worldwide to discover key pathological mechanisms in Alzheimer's disease.

The BioFinder-Brown study is now enrolling approximately 200 participants of diverse ethnicities who are between the ages of 50 and 80 years old and perform normally and have no significant memory impairment. Four hundred participants will be enrolled in Sweden using the same protocol. Participation in the five-year study will involve procedures such as blood testing, memory, and thinking assessments, Magnetic Resonance Imaging (MRI) scans, Positron Emission Tomography (PET) scan, and Retinal (Eye) Imaging scans. Some procedures such as additional PET scans and learning about the individual risk for AD will be optional for interested individuals. •



# Officials discuss fentanyl crisis to plan effective solutions to stop manufacturing, trafficking & distribution

PROVIDENCE – U.S. Senator JACK REED recently joined Rhode Island Attorney General PETER NERONHA; Chief SIDNEY WORDELL of the Rhode Island Police Chiefs' Association; and leading experts and researchers at the Brown University School of Public Health, including deputy dean DR. MEGAN L. RANNEY, to discuss efforts to combat the crisis and urge strategic, coordinated, urgent action at every level of government to help save lives and prevent these illicit drugs from plaguing communities.

During the discussion, Brown researchers pointed out that a drug used to put animals to sleep is being linked to deadly overdoses in Rhode Island and other states. New research from the Brown University School of Public Health's testRI (Toxicological and Ethnographic Drug Surveillance Testing in Rhode Island) found 44 percent of its samples tested contained xylazine – commonly known by the street names "tranq" or "tranq dope." It's an animal tranquilizer most often used in horses and cattle, and it's being mixed into street drugs.

Medications like naloxone, designed to reverse drug overdoses from opioids, don't work against xylazine. testRI's preliminary results, published in December, covered 90 different samples to analyze Rhode Island's local drug supply. The study also found high amounts of illicit fentanyl in many of the samples, showing more signs of concern for those who use stimulants like crystal meth and cocaine.

"This challenge is clear and urgent. Here at the Brown University School of Public Health, our faculty and researchers are forging new paths with new thinking and new approaches to reduce overdoses, reduce stigma, save lives, and promote recovery," said Dr. Megan L. Ranney, Deputy Dean of Brown University School of Public Health.

According to the U.S. Centers for Disease Control and Prevention (CDC), illicitly manufactured fentanyl is available on the drug market in different forms, including liquid and powder.

The CDC reports that 107,375 people in the United States died of drug overdoses and drug poisonings in the 12-month period ending in January 2022, including 435 Rhode Island residents. The CDC says about two-thirds of those deaths involved synthetic opioids like fentanyl.

As illicit drug manufacturers and traffickers develop evolving methods to flood communities with poison, Senator Reed says the federal government needs to step up and evolve its response, education, outreach, and enforcement strategies.

Reed, the Chairman of the Senate Armed Services Committee

and a senior member of the Appropriations Committee, helped include several provisions in the newly signed 2023 National Defense Authorization Act (NDAA) an omnibus appropriations law to keep fentanyl off our streets, crack down on drug traffickers, and help prevent fentanyl-related overdoses.

"This is a crisis that is trending in the wrong direction and the federal government needs to step up and be a reliable partner," said Senator Reed, noting a pair of provisions in the NDAA law designed to help crack down on fentanyl traffickers:

The Fighting Emerging Narcotics Through Additional Nations to Yield Lasting (FENTANYL) Results Act, which directs the U.S. State Department to build foreign law enforcement capacity to detect synthetic drugs and carry out an international exchange program for drug demand reduction experts.

The Protecting America's Borders Against Fentanyl Act, which requires that the U.S. Department of Homeland Security (DHS) work with other agencies to research additional technologies to target and detect illicit fentanyl, including the chemicals used to make it. The provision also requires the Office of National Drug Control Policy to develop strategies to effectively evaluate region-specific goals to interdict drug trafficking.

Additionally, the omnibus appropriations law Reed supported will boost funding for the CDC to support community-based overdose prevention activities. Overall, the law provides \$4.9 billion to address opioid abuse, an increase of over \$345 million above fiscal year 2022 levels. This funding includes: nearly \$1.6 billion to states to address the opioid epidemic through the State Opioid Response Grant program; a \$100 million increase for the Substance Abuse Prevention and Treatment Block Grant; \$111 million for medication assisted treatment; \$505 million for opioid overdose surveillance and prevention at CDC; and \$80 million to address the needs of children affected by the opioid crisis.

The law also extends the emergency scheduling of fentanyl analogues through December 31, 2024. This extension of the classification of fentanyl as a Schedule 1 substance enables law enforcement to prosecute criminals who make and distribute the drug.

"The Biden Administration is surging more resources to help combat the fentanyl crisis and prevent overdoses. We've got to be smart and strategic. We can't just hand out naloxone kits and call it a day. We've got to get at the root causes of this crisis, strengthen education, outreach, and enforcement, and go hard after the people who are profiting from poisoning our communities," said Reed. \*



### RI leaders, coalition commemorate 50th anniversary of Roe v. Wade

Call for the passage of the Equality in Abortion Coverage Act (EACA)

PROVIDENCE – On January 24th, Governor DAN MCKEE along with Lieutenant Governor SABINA MATOS, Secretary of State GREGG M. AMORE, General Treasurer JAMES DIOSSA and legislative leaders joined the Rhode Island Coalition for Reproductive Freedom to mark the 50th anniversary of the Roe v. Wade Supreme Court decision and made the case for why it is time for the General Assembly to pass the Equality in Abortion Coverage Protection Act (EACA) at an event held at the State House.

The EACA will add coverage of abortion to Rhode Island's state Medicaid program, which covers over 315,000 Rhode Island residents, and eliminate harmful laws that prevent people enrolled in Medicaid and more than 17,000 state employees (and their dependents) from using their insurance to cover abortion. Passing the EACA would impact nearly 80,000 people covered by Medicaid and 6,500 state employees who are of reproductive age.

Governor Dan McKee stated, "After Roe was overturned, Rhode Island stepped up. We added more protections for patients and providers – and now it's time to step up again. We included the Equality in Abortion Coverage Act in our FY24 budget to increase access to critical reproductive services for those who need it. Let's get the EACA passed this session, I'm ready to sign it into law."

Lieutenant Governor Sabina Matos said, "As states across the nation peel back our hard-won right to choose, Rhode Island must lead by example and reckon with our own outdated laws around abortion. The RI Ready budget includes the funding necessary to pass the EACA and dismantle barriers to reproductive health care. This is our year – let's get it done."

Several members of the General Assembly leadership also expressed their support for passing the EACA, including the bill sponsors in both the House and the Senate. House Majority Whip KATHERINE KAZARIAN (District 63) said, "I am grateful that we have codified into Rhode Island state law that protections



that were once guaranteed under Roe v. Wade. However, rights are only as meaningful as they are accessible. Unless an individual is able to pay the costs out of pocket or is on private insurance, these essential healthcare services are still out of reach for too many Rhode Islanders. That's why I was proud to introduce the Equality in Abortion Coverage Act (2023-H 5006) this year along with 42 co-sponsors. This critical policy will provide total equality for everyone in Rhode Island who needs reproductive health services access."

Senator **BRIDGET VALVERDE** (District 35) said, "For the fourth year in a row, I introduced the Equality in Abortion Coverage Act (2023-S0032) because we have more work to do in Rhode Island to ensure all people are able to access the health care they need. People who rely on Medicaid or a state health plan are still prevented from using their health coverage to pay for abortion. That's wrong and we have a responsibility to end these discriminatory bans that overwhelmingly

affect low-income communities and people with disabilities."

Speaking on behalf of the Rhode Island Coalition for Reproductive Freedom, Chair **NICOLE JELLINEK** said that, "The overturning of Roe with last year's Dobbs decision, six months shy of its 50th anniversary, is not only a travesty for reproductive freedom everywhere, it is also a portent of what's to come. We must take action. In Rhode Island, we must use the momentum generated by this national outrage make all reproductive health care services, including abortion, available to those who seek them; we must ensure that private and public health care covers the full range of reproductive health care services. Our Coalition of 24 members will continue to work to protect and advance access to all reproductive health care through advocacy and legislative activism."

Other members of the coalition, including **DR. BETH CRONIN**, RI Section Chair of The American College of Obstetricians and Gynecologists (ACOG), spoke at the



event. Dr. Cronin said: "We are fortunate, living in Rhode Island, as abortion was codified into state law." She added, however, "that the cost of an abortion without insurance coverage is significant," and said "the average cost of an abortion, surgical or medical, at approximately 10 weeks of pregnancy is about \$650. In addition, patients often must pay out of pocket for additional non-medical costs, such as transportation and child care."

Coalition member and Vice President of Public Policy, Advocacy, and Organizing for Planned Parenthood Votes! Rhode Island **GRETCHEN RAFFA** stated that, "While the anniversary marks a reminder of what we've lost, this is also a reminder that Roe was always the floor – not the ceiling. Roe never actually guaranteed that people could get an abortion. And as our General Assembly gets back to work this session we are excited to

work alongside our reproductive rights champions in the legislature and the administration and finally pass the Equality in Abortion Coverage Act, which we also know that two thirds of Rhode Island voters support and want. The fight for reproductive freedom will take all of us. Passing the EACA this year is a critical step towards a future where every individual's personal decision about their pregnancy is respected and valued."

### BCBSRI expands access to urgent and pediatric behavioral healthcare services

PROVIDENCE – Blue Cross & Blue Shield of Rhode Island (BCBSRI) has substantially expanded access to behavioral healthcare for its members in response to a critical shortage of mental health services in Rhode Island and across the country.

Thanks to its collaborative relationships with a comprehensive network of providers and health systems, BCBSRI has finalized agreements to enhance access for an array of behavioral health services, including pediatric and urgent appointments.

"We have to take action now, as we face a nationwide and statewide mental healthcare crisis," said **ROSALY CUEVAS**, BCBSRI manager of behavioral health quality. "As we grapple with unprecedented demand for these services amid the ongoing pandemic, BCBSRI is expanding access to care when it's most critical – when children and families urgently need professional help."

The expanded access, which became effective in late 2022, is available at the following:

- Providence Behavioral Health: With locations in Providence and East Greenwich, this provider offers appointments for children, adolescents, and adults in urgent need of child psychiatry, adult psychiatry, or therapy. Staff is comprised of psychiatrists, psychiatric nurses, psychologists, social workers, mental health counselors and wellness practitioners. Appointments are available for BCBSRI commercial and Medicare members.
- Rhode Island Center for Cognitive Behavioral Therapy
   (RICBT): Urgent pediatric and adolescent appointments
   available through its Rapid Respond Program, with locations
   in East Providence, North Kingstown, Barrington, Lincoln,
   and Warwick. Staff includes psychologists, psychiatrists,
   psychiatric nurse practitioners, physician assistants, social
   workers, and mental health counselors.

Since 2019, BCBSRI has also collaborated with JAMES ANDRIOTIS, MD, of Child and Family Psychiatry Inc. dba LifeStance Health, to provide increased access to psychiatry services for children and adolescents. The practice provides urgent appointments for BCBSRI pediatric members in need of an evaluation with a child and adolescent psychiatrist.

Each of these three practices can provide urgent appointments for BCBSRI members.

#### Access to Butler Hospital's HealthPath expanded

BCBSRI has also expanded access to HealthPath, an innovative program through Butler Hospital offering comprehensive behavioral health services. Previously available to BCBSRI commercial members, it is now also available to Medicare Advantage members.

HealthPath is designed to serve adults in Rhode Island, who have experienced one or more instances of greater than outpatient level of care in the last three years and could benefit from intensive, community-based, wrap-around services, care, and support. HealthPath provides individualized office, home, or community-based services depending on the patient's identified needs. HealthPath offers access to psychiatric care, counseling, case management, health and wellness care, life skills support (including vocational and educational training), medication management, transportation to and from medical appointments as needed, flexible appointment dates and times as well as weekend and holiday emergency care.

HealthPath Connect offers members the same array of services as HealthPath but is intended for members who may need less intensive or less frequent services. HealthPath Connect also serves as a step-down from full HealthPath intervention for those who have completed full HealthPath, but still need additional support. ❖



# Women and Infants Hospital, General Biomics form collaborative clinical agreement to study the role of the human microbiome in diseases of infants in the NICU

PROVIDENCE – Women and Infants Hospital (WIHRI) and General Biomics, Inc., recently announced a collaborative agreement to study the role of the human microbiome in diseases found in neonatal intensive care units (NICUs).

The study will be co-managed by DR. GEORGE WEINSTOCK, EVP & CSO of General Biomics, and DR. JILL MARON, Pediatrician-in-Chief at WIHRI and the William and Mary A. Oh/Anna Elsa Zopfi Professorship in Pediatrics for Perinatal Research, Warren Alpert Medical School of Brown University. Under the terms of the agreement, WIHRI will collect samples from NICU patients, which will be transferred to General Biomics for analysis, and develop novel tests to predict major maladies affecting neonates. General Biomics will fund the effort at WIHRI and obtain commercial rights to the output of the study.

General Biomics, located in the University of Connecticut Technology Incubator Program in Farmington, was founded in 2020 by Dr. Weinstock and DR. YANJIAO ZHOU, assistant professor at UConn Health researching human disease relations to the microbiome. The company's vision is to deliver multi-omic solutions to human health with information from the microbiome.

"The microbiome is a crucial key in our understanding of human disease. Our work showed many ties between the microbiome and disease," said Dr. Weinstock. "General Biomics is pleased to be able to collaborate with Dr. Maron and WIHRI. This joint project is an outstanding opportunity to move this toward clinical application, enabling us to develop novel, patentable tests, which will greatly reduce the costs of hospitalization and dramatically reduce the mortality and morbidity in these patients."

Dr. Maron, has, for the past sixteen years, been researching integrating innovative diagnostic platforms into newborn care. Specifically, she has explored salivary protein and gene expression in premature newborns to better understand development and infection risk in this vulnerable population. She also oversees a national multi-site trial for the integration of rapid genomic sequencing for critically ill neonates.

She is a member of the American Pediatric Society, the Pediatric Research Society, and the Perinatal Research Society. Dr. Maron is also the Co-Editorin-Chief of Clinical Therapeutics, an international peer-reviewed journal that publishes emerging therapies and diagnostics across the field of medicine and is the current Chair of the Pregnancy & Neonatology Study Section of NIH and has been funded by NIH for her research since 2009. •



## **Appointments**



### Gyan Pareek, MD, named Chief of Urology at Lifespan, Brown

PROVIDENCE – Longtime Lifespan surgeon and Brown University faculty member GYAN PAREEK, MD, FACS, has undertaken a new appointment as Chief of Urology in the Department of Surgery at Brown/

Lifespan Hospitals and President of Brown Urology, Inc.

"I'm humbled and honored to be appointed as Chief of Urology at an academic institution where I have spent my entire career," Dr. Pareek remarked upon receiving the news. "We're also lucky because we have the greatest faculty and staff in Urology. I look forward to building on our excellence in patient care, research, and education and continuing to represent a program that has been recognized as one of the best in the country."

In 2005, Dr. Pareek joined Lifespan and the Brown faculty as a Professor of Surgery (Urology) and Medicine at Brown's Warren Alpert Medical School. A year later, he led the team that performed the first robotic surgery in Southeastern New England. In addition, he runs The Miriam Hospital's Kidney Stone Center and developed the Minimally Invasive Urology Institute at The Miriam Hospital in 2014, helping Miriam achieve national status as one of the top 50 ranked urology programs in the United States.

Dr. Pareek oversees New England's only Endourological-Society-recognized fellowship program. His previous distinctions include president of the Rhode Island Urological Society, board member of the New England American Urological Association, and member of the Rhode Island Health Commissioner's Advisory Committee on Health Care Cost. An established researcher, Dr Pareek has published more than 100 peer-reviewed publications and was principal investigator on numerous clinical trials. In 2021, he received a grant from The Miriam Hospital Foundation to establish iCURE, the Innovation Center for Urologic Research and Education.

After earning his medical degree from St. George's University School of Medicine, Dr. Pareek completed his residency at New York's Lenox Hill Hospital and his Minimally Invasive Urology fellowship at the University of Wisconsin. An alumnus of Harvard University's Surgical Leadership program, Dr. Pareek has also received an honorary master's degree from Brown. ❖

# Thomas D. Wold, DO, joins Kent Hospital as Chief Medical Officer

WARWICK – Thomas D. Wold, DO, MS, joins Kent Hospital as Chief Medical Officer (CMO), effective December 12, 2022.

Dr. Wold graduated from the University of New England College of Osteopathic Medicine and trained in Internal Medicine and Critical Care at Dartmouth Hitchcock Medical Center in Lebanon, New



Hampshire. He earned a master's degree in Physiology at Georgetown University and is currently completing his Master of Business Administration degree at the University of Massachusetts' Isenberg School of Management (expecting to graduate May 2023).

He most recently served as the Division Vice President of Graduate Medical Education (GME), Capital Division, at the Healthcare Corporation of America in Nashville, Tennessee. Previously, he spent six years as the Chief Medical Officer (CMO) at Portsmouth Regional Hospital in Portsmouth, New Hampshire, after serving as the hospital's Intensivist and Medical Director of the Intensive Care Unit (ICU). Dr. Wold was also responsible for the management of medical intensive care education at the Lahey Clinic Hospital in Massachusetts and served as core faculty in their Pulmonary and Critical Care fellowship.

In 2012, Dr. Wold received the Critical Care Teaching Attending of the Year award from the Lahey Hospital and Medical Center. He also holds multiple certifications, including ABIM Specialty Board Certification in Critical Care Medicine and Internal Medicine, as well as the EPIC Physician Builder Certification. ❖



### CPA Peter Markell named Executive Vice President & Chief Financial Officer for Lifespan

PROVIDENCE – Peter Markell has been named the executive vice president and chief financial officer for Lifespan, effective January 30th, 2023. He will lead Lifespan's key financial and operational initiatives and will work closely with John Fernandez, the newly appointed presi-

dent and chief executive officer for Lifespan, to create and lead the execution of Lifespan's strategic plan.

Markell previously served as executive vice president of administration and finance, and chief financial officer and treasurer at the Mass General Brigham, where he was a leading executive from 1999 until his retirement in 2021. He was responsible for financial oversight of \$14 billion in operations with assets of approximately \$21 billion, and managed teams within the areas of corporate finance, research management, information systems, real estate, treasury, and human resources.

He is a certified public accountant (CPA) and holds a Bachelor of Science with concentrations in accounting and finance from Boston College. ❖



## Appointments



Eric B. Newton, MD, named University Gastroenterology's next president

PROVIDENCE – University Gastroenterology recently announced today that it has named **ERIC B. NEWTON, MD**, as the practice's next president.

Dr. Newton has been with UGI for more than 13 years. He assumes the role held by multiple UGI physicians over the years, most recently by Dr. Eric P. Berthiaume.

Dr. Newton said the practice will be focused on continuing several key initiatives, including:

- Increasing capacity and services offered at UGI's Infusion Center.
- Incorporating the newest technology, such as AI, to provide cutting-edge patient care.
- Expanding UGI's Centers of Excellence, particularly Inflammatory Bowel Disease.
- Growing UGI's participation in clinical research trials to provide patients with the newest pharmaceutical developments often before they come to market.
- Collaborating with our primary care colleagues to achieve our shared goals of improving both access to and quality of care while decreasing the cost.



### Nejat Zeyneloglu, MD, named Chief Medical Officer at W&I

PROVIDENCE – **NEJAT ZEYNELOGLU, MD, MBA, FHM**, will join Women & Infants Hospital as Chief Medical Officer the first week of March.

Dr. Zeyneloglu most recently served as Chief Medical Officer at the University of Vermont Health Network-Central Vermont Medical Center where he led mul-

tiple performance improvement initiatives and achieved significant improvements in operational and financial KPIs. Prior to Central Vermont Medical Center, Dr. Zeyneloglu held various senior leadership positions, including as department chair of medicine and chief medical/quality officer at hospitals in New York.

He earned his medical degree from Ege University School of Medicine in Izmir, Turkey, and completed his residency in internal medicine and pediatrics at Yale University/Bridgeport Hospital in Bridgeport, Connecticut.

With specific interests in quality, safety, and performance improvement, Dr. Zeyneloglu completed a quality and safety fellowship by the Greater New York Hospital Association/United Hospital Fund in 2014 and graduated from Columbia Business School's Executive MBA program in 2016. He currently serves as a mentor in the Columbia Business School Healthcare Management Alumni Mentor Program. ❖



### Michael Lee, MD, named Medical Director of Kent Hospital at Home

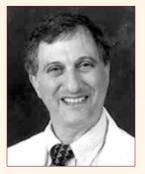
WARWICK – **DR. MICHAEL LEE** has been named medical director of Kent Hospital at Home. Dr. Lee is a graduate of The Warren Alpert Medical School of Brown University and completed his residency in Emergency Medicine at Brown. He has been with Kent Hospital as an attending physician and

teaching faculty in the Department of Emergency Medicine since 2018 and has been a provider with Kent Hospital at Home since November 2022. He has an extensive background in health services and health economics, having previously been an assistant professor at Alpert Medical School conducting research on the cost of emergency care and co-leading their Health Policy Scholarly Concentration.

Dr. Lee has long been a champion of patient-centered care while at Kent, having been recognized by the hospital as a "Gold Level" Patient Experience provider. His dedication to patient care, along with his expertise in health systems was instrumental in Kent's fast-growing Hospital at Home program which has achieved exceptional results in patient satisfaction. •



### Recognition



# Alan A. Wartenberg, MD, recognized by Continental Who's Who

MD, is being recognized by Continental Who's Who as a Distinguished Professional in the Healthcare Industry and in acknowledgment of his outstanding work as an addiction medicine specialist at

MAP Health Management and Zinnia Health Systems.

Dr. Wartenberg received his Bachelor of Arts degree at New York University and his medical degree at the Medical College of Wisconsin. He completed his rotating internship at Harbor-UCLA Medical Center and his residency in internal medicine at Milwaukee County Medical Center.

Dr. Wartenberg is an experienced addiction medicine specialist and is currently a medical director at MAP Health Management in Rhode Island. He served as the medical director of the Addiction Recovery Program at Faulkner Hospital in Boston for 14 years and was the corporate medical director of Discovery House, a group of outpatient opioid treatment programs, for ten years. He recently retired from the private practice of addiction medicine at the Meadows Edge Recovery Center in Rhode Island and also retired as a consulting physician in the DVA Providence Medical Center Opioid Treatment Program.

He is a Fellow of the American College of Physicians (FACP) and a Distinguished Fellow of the American Society of Addiction Medicine (DFASAM). He is also an affiliated faculty member at the Center for Alcohol and Addiction Studies at Brown University in Providence. ❖

# Westerly Hospital's medical laboratory awarded re-accreditation by CAP

WESTERLY – The Accreditation Committee of the College of American Pathologists (CAP) has awarded re-accreditation to Westerly Hospital based on results of a recent on-site inspection of the hospital's medical laboratory as part of the CAP's Accreditation Programs.

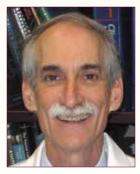
Westerly Hospital's medical laboratory is one of more than 8,000 CAP-accredited facilities worldwide. Re-accreditation occurs every two years and provides assurance to patients that the hospital's labs meet or exceed the CAP standards.

"CAP accreditation is a reflection of laboratory excellence and sets Westerly Hospital apart in its pursuit of excellence," said **VICTORIA REYES, MD**, chair of Pathology at Westerly Hospital. "Our clinical and anatomic pathology laboratory provides timely, quality and accurate test results that are important to patients and physicians and inform clinical decision-making."

Westerly Hospital's clinical laboratories are equipped with state-of-the-art instrumentation and information management technology and employ a skilled and highly qualified team of managers, medical technologists, technicians and phlebotomists.

The U.S. federal government recognizes the CAP Laboratory Accreditation Program, begun in the early 1960s, as being equal-to or more-stringent-than the government's own inspection program.

During the CAP accreditation process, designed to ensure the highest standard of care for all laboratory patients, inspectors examine the laboratory's records and quality control of procedures for the preceding two years. CAP inspectors also examine laboratory staff qualifications, equipment, facilities, safety program and record, and overall management. •



#### Stephen Salloway, MD, receives Leon Thal award for Alzheimer's Research

PROVIDENCE – Butler Hospital's **DR. STEPHEN SALLOWAY** is this year's recipient of the Leon Thal Award for Alzheimer's Research from the Cleveland Clinic Lou Ruvo Center for Brain Health. This award is named in honor of the memory of Dr. Leon Thal, a pioneering neurologist and neuroscientist, and influential leader in the field of AD research.

Dr. Salloway received his MD from Stanford Medical School and completed residencies in neurology and psychiatry at Yale University. He is the founding Director of the Memory and Aging Program (MAP) at Butler Hospital, Associate Director of the Brown Center for Alzheimer's Disease Research, a Professor of Neurology, and the Martin M. Zucker Professor of Psychiatry and Human Behavior at the Warren Alpert Medical School of Brown University.

The award was presented to Dr. Salloway on Jan. 19th at the Leon Thal Symposium. ❖



### **Obituaries**



**FRANCES PHILLIPS CONKLIN, MD**, of Cranston, died at home surrounded by her family on December 20th, 2022.

Born July 8, 1924, she and the late J. Wallace Conklin, MD, had four children: Suzanne Conklin, PhD, and her children Nina and Amy of Providence; Elizabeth Conklin, MD, of Narragansett; Jennifer

Conklin and her husband Vincent Pera, Jr., MD, of Cranston; and Jonathan Conklin of East Greenwich.

Dr. Conklin attended schools in Port Jervis, New York, and then went to the University of Wisconsin-Madison where she received her degree in zoology. With a polio epidemic afflicting the country, she obtained a degree in physical therapy from Harvard University, and then spent a year in Cape Girardeau, Missouri, treating polio patients. Following her year doing PT, she enrolled at the University of Vermont College of Medicine, from which she graduated in 1951. She completed her internship at Santa Barbara Cottage Hospital and her residency in radiology at the University of Minnesota. She then did a fellowship at Temple University in radiation therapy (oncology), which at the time was a branch of medicine in its infancy.

Dr. Conklin moved to Cranston in 1956 and began her medical career at The Miriam Hospital and then Rhode Island Hospital, where she started the radiation therapy department. She later transitioned to private practice.

Dr. Conklin was a charter member of the RI State Board of Licensure and Discipline, and she was the first woman president of the Providence Medical Association. She was named Woman Physician of the Year in 1989 by the RI Medical Women's Association, of which she was a founding member, and she was inducted into the RI Heritage Hall of Fame in 1991. In 1990, the Rhode Island Medical Society presented Dr. Conklin with the Charles L. Hill Award for leadership and service in the medical profession. In 1985, the RI Division of the American Cancer Society awarded her the Terese Lasser award in recognition of outstanding service. She was a Fellow of the American College of Radiology.

The family gives its most sincere thanks to Drs. Troise, Donat, and Lucas, who provided extraordinary care and counsel, particularly in recent years. The family also thanks the home care providers: Fatuma, Irma, Beatrice, Louise, Robin, Lydia, Ophelia, Yanick, Nyia, and Fatou, who offered care, compassion, and understanding.

A celebration will be planned for a future date. In her memory, please consider donating to the Erik R. Laisi Memorial Scholarship Fund at St. Andrew's School, 63 Federal Road, Barrington, RI 02806. ❖



MARY DESPINA LEKAS, MD, DSc, a pioneer in Rhode Island's medical community, passed away on January 24, 2023 at the age of 94. She was the beloved wife of the late Harold W. Picozzi. Dr. Mary, as she was fondly called by all who knew her, and Harold were married for 31 years.

She was the first woman to head the

Otolaryngology Department at Rhode Island Hospital, as Surgeon-in-Chief from 1983 until she retired in 1996. She was also the first woman to be Professor of Clinical Otolaryngology at Brown University's medical school. Dr. Mary was the first woman on the East Coast to become a Fellow in the Triological Society, the most prestigious society of her specialty. In 1980, she was named the first woman to be elected President of the New England Otolaryngological Society. In 1992, Dr. Mary was named Rhode Island's Woman Physician of the Year and was awarded the President's citation from the Triological Society in 1993. Honors continued during 1996, the year of her retirement, by the American Academy of Otolaryngology-Head & Neck Foundation and the American Broncho-Esophagological Association.

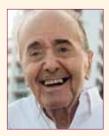
She received a Bachelor of Arts degree from Clark University, Worcester, MA, in 1949, and earned a graduate degree at Boston University and an MD degree with honors at the University of Athens Medical School. She received a Master's Degree in Science from Brown University and was Clinical Professor Emerita of Surgery at Brown University School of Medicine.

Her professional career included private practice with privileges at Rhode Island Hospital, St. Joseph's Hospital, the Veterans Administration Hospital and Miriam Hospital. She was past president of the Providence Medical Association and was recipient of the Providence Medical Association's Distinguished Service Award.

In 1997, Dr. Mary and Harold established the Dr. Mary Despina Lekas, MD, DSc Endowed Chair in Biology at Clark University. That same year, Dr. Mary received an Honorary Doctorate Degree (Doctor of Science) from Clark University that recognized her remarkable professional career. In 2007, she established "The Mary D. Lekas Fund for the Advancement of Women in Medicine" at Brown University Medical School.

Contributions in Dr. Mary's memory may be made to the Annunciation Greek Orthodox Church Dr. Mary Despina Lekas Endowment Fund, 175 Oaklawn Avenue, Cranston, RI 02905 or online at www.annunciationri.org. •





CHAFIC SEBASTIAN RAAD, MD, 87, of Fort Lauderdale, Florida, formerly of Barrrington, passed away on December 14th, 2022 peacefully at home. Dr. Raad was born on May 21st, 1935 in Taiuva, State of Sao Paulo, Brazil.

He graduated from medical school at the University of Brazil in Rio de Janeiro

in 1959 and was an anesthesiologist at Pawtucket Memorial Hospital in Pawtucket for 38 years.

In 2012, he received the Distinguished Service Award in recognition and appreciation of his exemplary contributions to the Rhode Island Society of Anesthesiologists and to the people of Rhode Island. He was an insightful leader, clinician, mentor and caring physician.

Aside from his work, his family and children were the most important aspects of his life. He loved them all so much and would always sacrifice his needs for them. He was simultaneously brilliant, caring, kind and hilarious. His quirky and random humor and unique, gigantic smile would always brighten people's days.

He loved reading, studying, boating and soccer, and never missed a chance to run up and down the field alongside one of his children playing a game, even after a long night at work.

Dr. Raad leaves behind his loving wife, Margaret-Anne, of 60 years, and his children, Marco Antonio, Luciana Alyssa, Roberto Salim and Carlos Eduardo and his adoring grandchildren Alexander, Nathaniel, Sebastian and Andres, as well as his son and daughter-in-laws Matthew, Laura, Mabel and Diana.

In his memory, donations may be made to St. Jude Hospital at https://www.stjude.org/  $\diamondsuit$ 

