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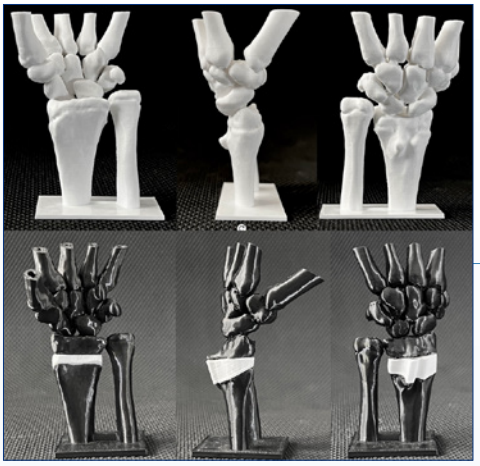

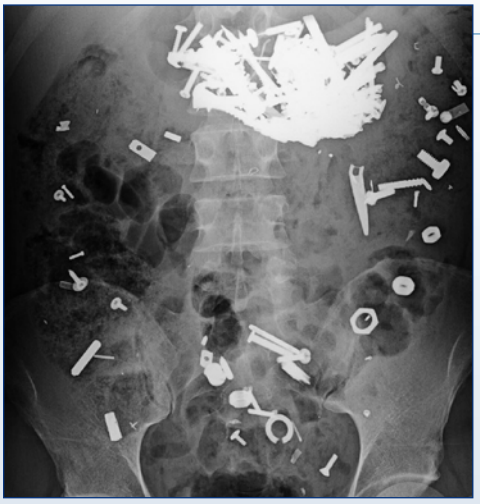

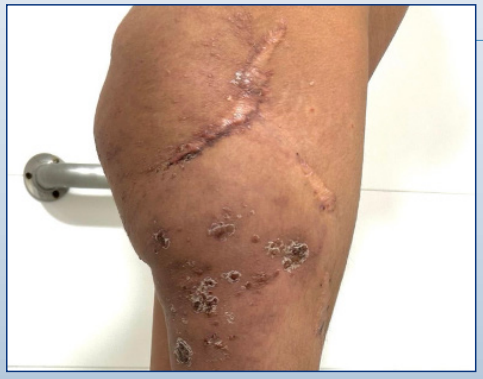

CASE REPORTS

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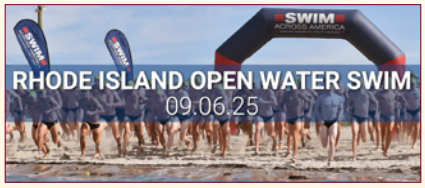

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Is That a Tooth I See? Ovarian Teratoma on POCUS

ABDULLAH ALHAMDAN, MD, EMDM; ALI ALHOJELAN, MD; BAYAN ALAHMADI, MD, MSc; KRISTIN H. DWYER, MD, MPH

ABSTRACT

Ovarian teratomas (OT) are rarely first diagnosed in the emergency department (ED) setting. They are less likely to present with acute symptoms unless associated with more serious pathological conditions, such as ovarian torsion, which is considered a gynecological emergency that patients with OT are at risk of developing. We present a patient who complained of abdominal pain, and was diagnosed with an OT using Point-of-care ultrasound (POCUS).

KEYWORDS: Point-of-care ultrasound; POCUS; Teratoma; Ovarian Torsion

INTRODUCTION

Ovarian teratomas (OT), a germ cell tumor affecting younger women, are notable for their unique composition, containing tissues from all three germ layers. OTs have an estimated incidence between 1.2–14.2 cases per 100,000 people per year in the United States.[1-3] These tumors, while typically benign, have potential for complications such as ovarian torsion and teratoma rupture.[4-6] Malignant transformation is rare, estimated at less than 2%, but those with tumors >10cm or ascites are more likely to have metastatic disease.[7] Generally they are asymptomatic until they become quite large, and then they can be diagnosed on ultrasound, computer tomography or magnetic resonance imaging. Ultrasonographic evidence of OTs is highly variable. "Dots and lines" representing hair in a cystic lesion is the most common findings and echogenic white balls are also very common. They can be either unilocular or multilocular with mixed cystic contents.[8] In this case, we made the diagnosis of an OT using Point-of-care ultrasound (POCUS).

CASE PRESENTATION

A 19-year-old female with no past medical history, presented to the emergency department (ED) with one day of right lower quadrant (RLQ) abdominal pain. The pain progressed throughout the evening and night, and woke her from sleep. She states she had similar pain a month ago, while menstruating, and it resolved spontaneously.

On arrival at the ED, she endorsed 9/10 pain, associated with nausea and vomiting. The pain was stabbing in nature and worse with movement and defecation. In the ED, she received morphine, ketorolac and acetaminophen. She denied fever, chills, chest pain, shortness of breath, constipation, diarrhea, dysuria, or abnormal vaginal discharge.

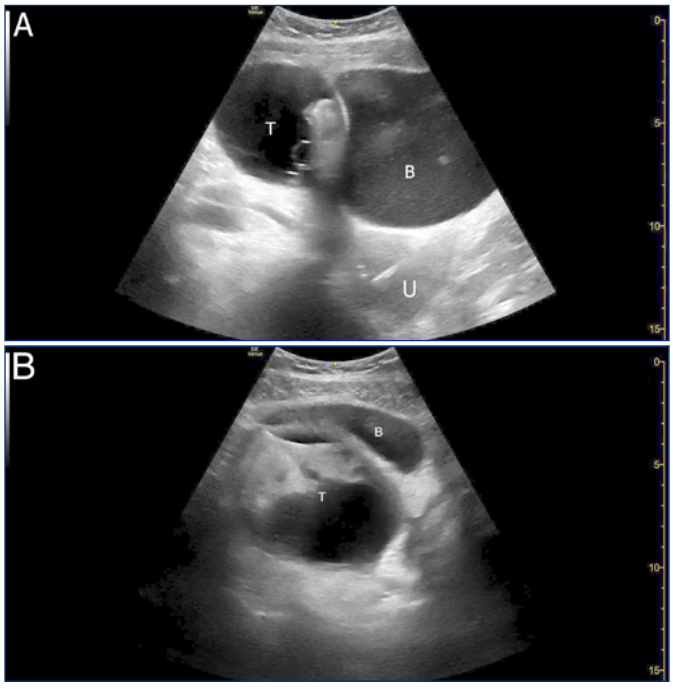
The patient had an intrauterine device placed two years prior to ED presentation and denied any current sexual activity or chance of pregnancy.

Physical examination was significant only for abdominal tenderness in the RLQ. Vital signs were within normal limits, and the patient appeared uncomfortable but not in acute distress.

Laboratory investigations, including beta-human chorionic gonadotropin (b-hCG), complete blood count (CBC), and chemistry panel, were unremarkable except for an elevated white blood cell count of 14.2 x109/L.

Point-of-care ultrasound (POCUS) was performed on the patient to assess for appendicitis. However, the POCUS showed a large cyst-like structure over the bladder with internal echogenicity and septation [**Figure 1**].

Figure 1. Point-of-care ultrasound showing cystic lesion which contains fat and calcifications typical of ovarian teratoma. [**A**] Sagittal view of the pelvis shows the teratoma superior to the bladder and uterus. Intrauterine device also visualized in the endometrium. [**B**] Axial view. [T-Teratoma, B-Urinary bladder, U-Uterus]



A computed tomography (CT) scan was obtained. The CT confirmed the diagnosis of teratoma measuring 7.4 x 8.1 x 9.2 cm with areas of fat and calcification [**Figure 2**].

A comprehensive ultrasound was performed, and revealed a mixed solid and cystic lesion, with fat and calcifications, typical of ovarian teratoma. Doppler imaging revealed that there was no internal blood flow and an apparent twisting of the vascular pedicle along the right pelvic sidewall giving an impression of an ovarian torsion caused by a cystic teratoma [**Figure 3**].

The patient was taken to the operating room and underwent a laparoscopic oophorectomy of the right ovary. The post-operative note reported a 13 cm dermoid cyst with torsion to the right ovary.

DISCUSSION

This case report shows the diagnosis of a right ovarian teratoma with ovarian torsion in a patient undergoing work-up for potential appendicitis. While ovarian teratomas are rare, they can present with abdominal pain from complications such as torsion of the ovary or rupture of the teratoma.

Figure 2. Computed-tomography (CT) scan showing complex pelvic mass of a cystic component (Teratoma) related to the right ovary with areas of fat and calcification. [**A**] Coronal view demonstrating the large sized mass sitting across the midline and superior to the bladder. [**B**] Sagittal view. Calcifications can be seen within the teratoma, anterosuperior to the uterus. Redemonstration of intrauterine device in the uterus.
[T-Teratoma, B-Urinary bladder, U-Uterus]

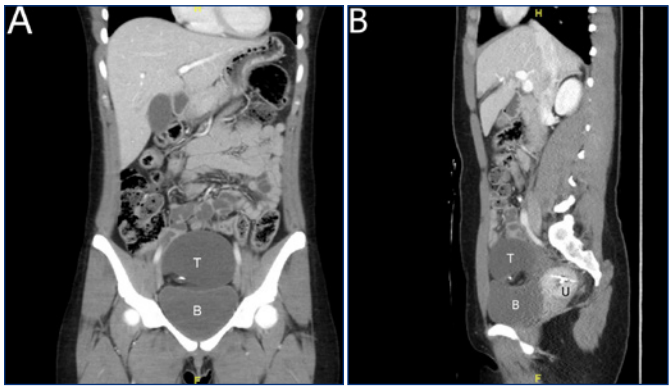
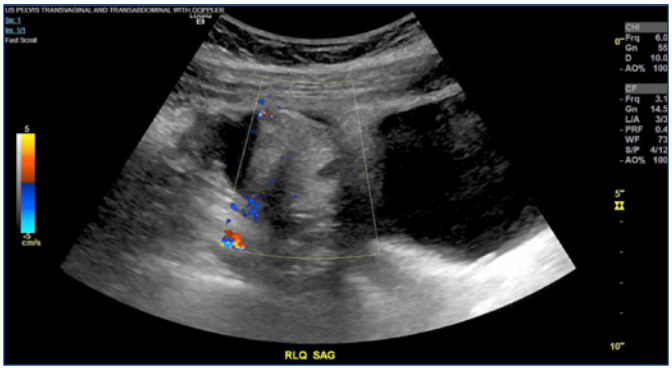


Figure 3. Comprehensive ultrasound (US). No flow is visualized to the right ovary using color doppler.



A teratoma can be identified on bedside ultrasound and appear as a complex mass with both cystic and solid components, including areas of fat, calcifications, and varying echogenicity. In addition, if the ovary is identified on POCUS, ovarian torsion, a surgical emergency, can be identified by lack of color flow with the potential to expedite disposition to the operating room. Early diagnosis encourages the commencement of treatment, which is known to have significant implications for the outcomes of patients.

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Patient-Specific Digital Modeling and 3D Printing for Preoperative Planning in a Pediatric Distal Radius Osteotomy: A Case Report

MICHAEL A. BERGEN, MD; MYLES DWORKIN, MD; CRAIG P. EBERSON, MD

ABSTRACT

INTRODUCTION: This case report describes the utilization of patient-specific 3D modeling for the care of a 13-year-old patient with a distal radius malunion and partial growth arrest.

METHODS: Patient-specific 3D models of the patient's wrist were created using computed tomography scans. Digital modeling software was used to determine the appropriate orientation of the osteotomy, size and shape of bone graft, and final wrist alignment. The 3D models were used to rehearse the osteotomy preoperatively. Intraoperatively, bone graft was harvested to the planned specifications and the osteotomy was successfully performed followed by stabilization.

RESULTS: Radiographs demonstrated appropriate correction of radial length, alignment, and rotation matching the preoperative 3D model. At final follow-up, the patient demonstrated union of the osteotomy and full recovery with excellent function.

DISCUSSION: Patient-specific 3D modeling and printing provide valuable tools for planning complex surgical cases. Further research is warranted to assess the broader applications of this technology in orthopedic surgery.

KEYWORDS: 3D printing; distal radius; malunion

INTRODUCTION

Distal radius fractures are among the most common pediatric injuries.[1] Most of these fractures can be managed conservatively with closed reduction and casting. However, some cases may be complicated by physeal growth arrest, which can result in progressive angular deformity of the distal radius, altered wrist biomechanics, and poor functional outcomes.[1] Surgical intervention is often necessary to correct these complications and precise preoperative planning is crucial to achieving a successful correction.

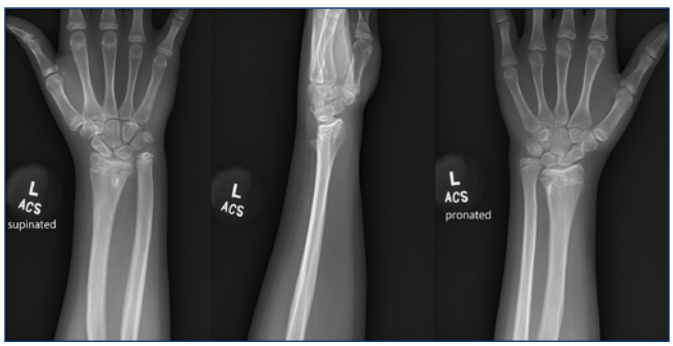
Recent advances in medical imaging and additive manufacturing have enabled the integration of patient-specific digital modeling and 3D printing into orthopedic surgery. These techniques enable the creation of patient-specific anatomical models allowing for improved visualization, enhanced surgical planning, and the opportunity to rehearse complex procedures preoperatively.[2-4] Additionally, the use of 3D-printed osteotomy guides and graft templates can enhance the accuracy of bone cuts and graft placement during surgery.[5,6]

In this case report we present the successful application of patient-specific digital modeling and 3D printing in the preoperative planning and surgical management of a 13-year-old girl with a distal radius malunion and partial physeal arrest due to prior fracture.

CASE SUMMARY

A 10-year-old girl presented to the emergency department with left wrist pain after falling while playing soccer. Imaging revealed a Salter-Harris type II distal radius fracture with volar displacement and an ulnar neck buckle fracture. She underwent conscious sedation with closed reduction and was made non-weight bearing in a long arm cast. Upon subsequent follow-up, imaging revealed recurrent volar angulation of the fracture. She was taken to the operating room for closed reduction and percutaneous pinning of the distal radius. The pins were removed at six weeks, and she went on to heal the fracture with roughly 15 degrees of dorsal angulation. At two years post-injury, she was noted to have worsening dorsal angulation (27°) and positive ulnar variance (6 mm) due to partial arrest of the distal radial physis [**Figure 1**]. Given the significant deformity and worsening symptoms, surgical correction via distal radius osteotomy with iliac crest autograft and distal radial/ulnar epiphysiodesis was planned.

Figure 1. Preoperative left wrist radiographs demonstrating malunion and partial physeal arrest.



The patient underwent a non-contrast CT scan of the left wrist for preoperative planning. The Digital Imaging and Communications in Medicine (DICOM) data from the patient's CT scan were imported into Aquarius iNtuition 3D workstation (TeraRecon Inc., San Mateo, CA). Using the software, the bony structures of the wrist were carefully isolated and distinguished from the surrounding soft tissue based on their radiodensity values. Next, the segmented structures were converted into a 3D digital model where they could be further refined and adjusted to ensure anatomical accuracy. Once the digital model was finalized, it was exported as a Standard Tessellation Language (STL) file [**Figure 2**].

The STL file was imported into Blender, an open-source 3D modeling application, where the deformity could be visualized and measured in three dimensions.[7] An osteotomy plane was defined that would allow for correction of the length, alignment, and rotation of the distal fragment to reasonable parameters (neutral ulnar variance, 10 degrees radial inclination, 5 degrees volar tilt). To ensure reproducibility in the operating room, the osteotomy was oriented parallel to the joint surface. Then, the distal fragment was separated and moved to its desired final position in Blender. Finally, a volumetric body was created from the resultant osteotomy gap; this represents the ideal size and shape of a structural bone graft that would be needed to maintain the correction [**Figure 3**].

The digital models were then exported as STL files and imported into Ultimaker Cura, a slicing application for 3D printers, which allows the models to be sliced into layers and converted into machine instructions for 3D printing.[8] The models were printed at 1:1 scale on the author's own fusion deposition modeling desktop printer (Ender-3 V2, Creality©, Shenzhen, China) using polylactic acid (PLA) filament [**Figure 4**]. Prior to the procedure, the models were used to visualize the deformity in three dimensions. A cast saw was used to rehearse the osteotomy on the model to ensure that the desired correction could be achieved with the planned cut. It was also verified that the interposition bone graft piece fit appropriately to maintain correction [**Figure 4**].

During surgery, the patient was positioned supine and underwent general anesthesia. An appropriately-sized iliac crest bone graft was harvested from the ipsilateral iliac crest. The 3D printed bone graft piece was brought into the operating room and used as a visual reference for appropriate graft sizing. The option to place the graft model into a sterile bag on the operative field was available; however, this was deemed unnecessary. A 1 cm incision was then made over the ulnar neck and a standard lateral approach was used to expose the distal ulnar physis. A distal ulna epiphysiodesis was performed with a 2.5mm drill bit. Next, a 3cm longitudinal incision was made over the dorsal aspect of the wrist. The distal radius was approached dorsally between

Figure 2. Preoperative digital model of the left wrist created by segmenting CT scan data.

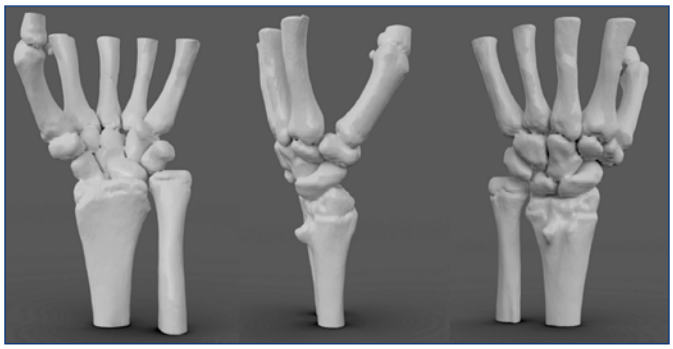


Figure 3. Preoperative digital model of the left wrist demonstrating planned osteotomy orientation, final orientation of the distal segment after planned correction, and the interposition graft needed to achieve the desired correction.

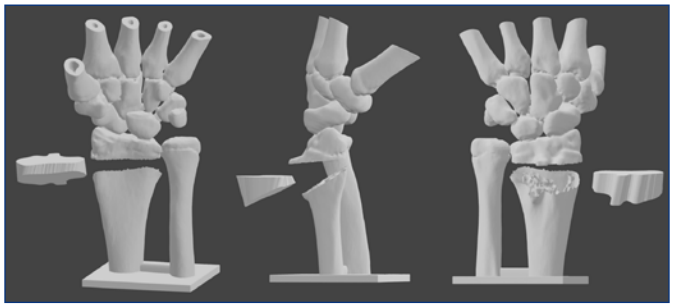


Figure 4. Preoperative 3D printed model of the left wrist before and after simulated osteotomy with insertion of the 3D printed interposition graft model.

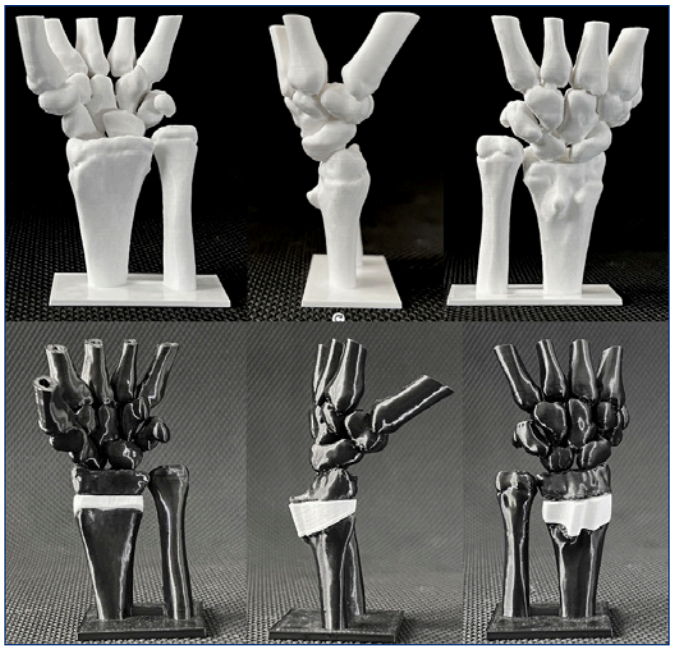


Figure 5. Intraoperative fluoroscopy demonstrating correction of length and alignment of the distal radius after osteotomy and placement of fixation hardware.

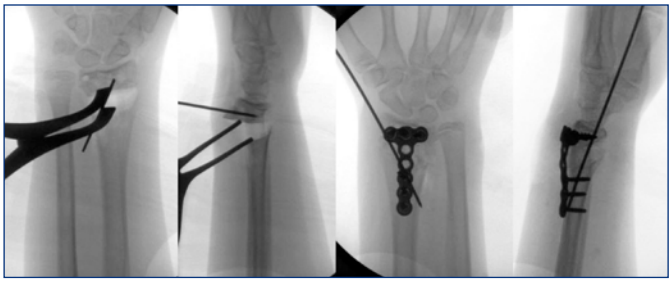
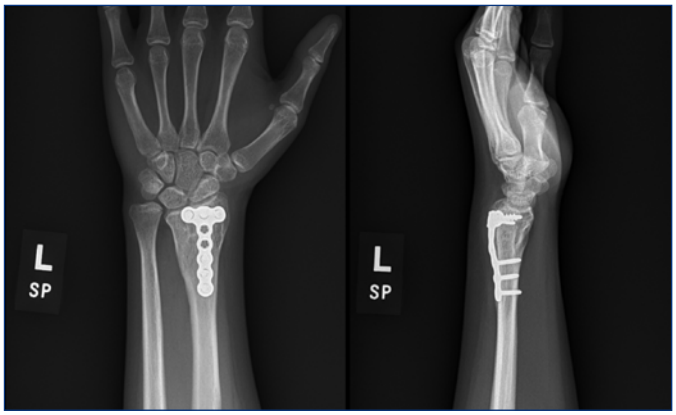


Figure 6. Postoperative left wrist radiographs at final follow-up demonstrating maintained correction of alignment of the distal radius.



the third and fourth extensor compartments. A large malunited Lister's tubercle was excised with a rongeur. A distal radial epiphysiodesis was performed with a 2.5mm drill bit, which was left in the physis to mark its location and orientation. Using the 3D model as a reference, a sagittal saw was used to osteotomize the distal radial metaphysis along the planned orientation. The distal segment was elevated with a laminar spreader and placed into its final position using the drill bit as a joystick. The iliac crest autograft was placed into position and held in place with a radial styloid pin. After confirming that the distal fragment and iliac crest autograft were in appropriate position with fluoroscopy, an eight-hole 2.7 mm T-plate was placed and fixated with 2.7 mm fully threaded screws. Final intraoperative radiographs demonstrated appropriate restoration of alignment parameters (radial length, volar tilt, and radial inclination) [**Figure 5**]. After irrigation and closure, the patient was placed into a long arm cast and discharged on postoperative day one. Her postoperative follow-up duration was 19 months. Upon final follow-up, she had regained full forearm pronosupination, wrist extension, and radial deviation; however, wrist flexion and ulnar deviation both lacked 10 degrees compared to the contralateral wrist. She had no pain with range of motion or functional use of her wrist. Final follow-up imaging demonstrated union of the osteotomy with maintained alignment of the distal radius; however, unintended overgrowth of the distal ulna physis resulted in 5 mm of positive ulnar variance [**Figure 6**].

DISCUSSION

The management of pediatric forearm and wrist deformity requires careful preoperative planning and precise osteotomy orientation to achieve a desirable correction. This case report demonstrates a workflow for patient-specific 3D modeling and 3D printing that can be used to plan and rehearse pediatric wrist deformity correction or other comparable cases. In this case, preoperatively creating the osteotomy in software allowed for optimization of the orientation in order to achieve the desired correction in a way that would be favorable to the surrounding soft tissue. Rehearsing the osteotomy on the 3D printed model allowed for practice to ensure that the planned osteotomy orientation would be easily reproducible at the time of surgery. Finally, the 3D printed interposition graft model allowed for intraoperative sizing of the patient's iliac crest autograft in order to minimize wasted autograft and to properly shape the graft to produce the desired correction. This graft model was kept off of the sterile field and used as a visual reference during surgery; however, the option exists to place the model in a sterile bag on the field if direct interaction with the model is needed intraoperatively.

The utilization of 3D modeling and 3D printing in orthopedic surgery is expanding and becoming more accessible to surgeons. Several studies have reported on its potential uses, including medical education, surgical training, patient education, surgical planning, instrument guides, and patient-specific implants.[2,6,9-11] In the case of surgical planning, a systematic review by Lee et al included 17 studies involving 889 patients with pelvic and acetabular fractures, 431 of which were randomized to allow the surgical team access to a 3D printed model of the injury for preoperative planning, plate contouring, and screw length estimation.[12] They found that access to the 3D printed model was associated with a significant decrease in surgical duration, blood loss, intraoperative imaging, and postoperative complications, and a significant increase in rates of excellent/good reduction quality. Similarly, a systematic review and meta-analysis by Morgan et al included 17 studies involving 922 patients who underwent orthopedic trauma surgery found that 3D printing for preoperative planning was associated with a significant reduction in operative time, intraoperative blood loss, and fluoroscopy use.[13]

While the benefits of 3D modeling and 3D printing for preoperative planning are evident, the implementation of this technology can involve a financial barrier and/or a technological learning curve. Several publications have outlined specific roadmaps to implementation of this technology.[14,15]

This study adds to the literature by describing a methodology to produce 3D printed models of orthopedic injuries at a low cost.

Furthermore, 3D modeling and 3D printing technology have allowed for creation of custom osteotomy guides. This can significantly improve accuracy and consistency when performing corrective osteotomies.[11] However, this technique can come with significant cost barriers and institutional red tape, as the osteotomy guides must be designed with highly specialized software, and the guide must be fabricated with a material that is suitable for sterilization and intraoperative patient contact. In contrast, this case report demonstrates a much lower-cost and more approachable technique for utilizing 3D modeling and 3D printing for advanced surgical planning in an osteotomy case without the requirement of sterilizability and patient contact.

In conclusion, while distal radius malunion in pediatric patients present formidable challenges, the application of 3D modeling and 3D printing offers an exciting avenue to enhance surgical precision and potentially improve patient outcomes. Our results align with the growing body of literature on this subject. More extensive studies with larger cohorts are warranted to validate these findings and expand upon the broader utility of 3D technologies in orthopedic surgery.

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Disclosures

None

Ethical Statement: Our institution does not require ethical approval for reporting individual case reports.

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Nailed It! A Case Report of Multiple Metallic Foreign Body Ingestion

ANDREW L. PETROU, MD; AUDREY BALLARD, MD; SEAN FINE, MD, FACG

ABSTRACT

Intentional foreign body ingestion is often seen in individuals with psychiatric disorders, particularly mood and personality disorders. This case illustrates the substantial healthcare resources involved in managing foreign body ingestion, which may require multiple endoscopic procedures and intensive care monitoring. Endoscopic removal, while minimally invasive, carries risks such as perforation and bleeding, particularly in the upper gastrointestinal tract. Surgical intervention in psychiatric patients can inadvertently reinforce maladaptive behaviors, complicating management strategies. Therefore, a collaborative approach between psychiatry and gastroenterology is essential to address both the medical and psychological aspects of care.

KEYWORDS: intentional foreign body ingestion; endoscopic removal; healthcare cost; self-injurious behavior

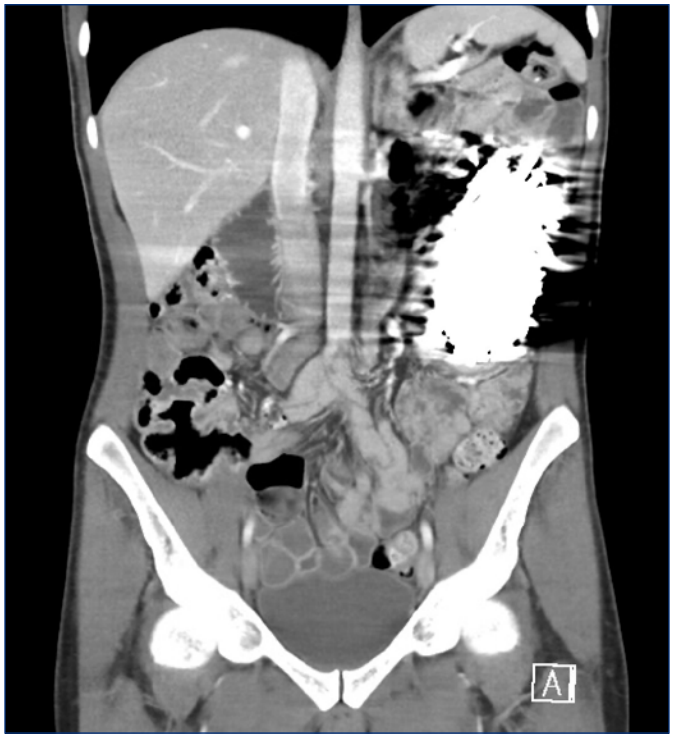
INTRODUCTION

Intentional foreign body ingestion is most often seen in patients with underlying psychiatric disorders. These patients may ingest non-food items impulsively as a means of managing psychological distress, or as a form of self-harm or attention-seeking behavior. The healthcare system faces significant challenges when managing such cases, given the complex interplay between physical and mental health concerns. This case report describes a 30-year-old male who presented with chronic gastrointestinal symptoms and was found to have ingested over 100 foreign objects. Multiple endoscopic procedures were required to safely remove the objects, underscoring the extensive medical resources and potential complications associated with such cases. This particular case highlights the importance of a comprehensive treatment plan involving both psychiatric and gastroenterological interventions to address the physical and psychological aspects of intentional foreign body ingestion.

CASE REPORT

A 30-year-old male with a past medical history of appendectomy presented to the emergency department with epigastric abdominal pain as well as associated intermittent nausea and hematemesis for about six months. He reported the ability to pass flatus, had regular bowel movements, and denied any unintentional weight loss. Vital signs revealed an afebrile, normotensive patient with tachycardia. Physical exam was notable for left upper quadrant and epigastric tenderness without any rebound or guarding. Initial labs were significant for a white blood cell count of 10.7 x 10^9 /L and positive urine toxicology screen for amphetamines and opiates. Initial computed tomography (CT) scan revealed innumerable foreign bodies distributed throughout the stomach, small intestine, and large bowel that appeared to be nails, razors, and bobby pins [**Figure 1**] without evidence of obstruction or perforation.

Figure 1. Computed tomography scan demonstrating numerous metallic objects within the gastrointestinal tract.



Gastroenterology was consulted, initially recommending conservative management with high-dose laxative to aid passage with daily abdominal X-rays to monitor progress. Initial X-ray revealed that the majority of metallic objects were confined to the gastric body [**Figure 2**]. Despite multiple days

Figure 2. Abdominal radiograph demonstrating the metallic foreign bodies outlining the gastric body.

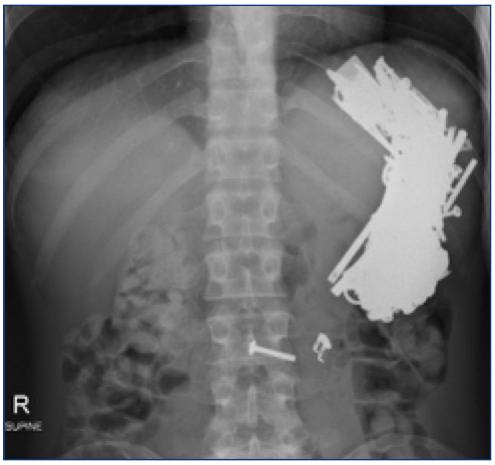


Figure 3. Metallic objects visualized in the stomach on initial esophagogastroduodenoscopy.

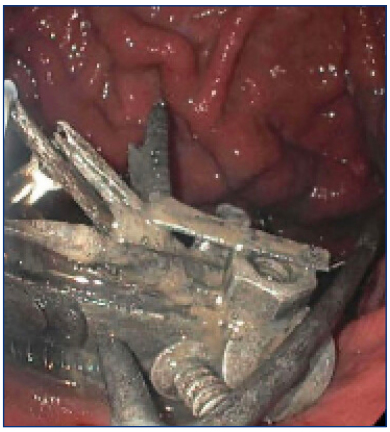


Figure 4. Successful removal of 60 metallic objects including screws, nuts, bolts and keys. Procedure had to be stopped given duration with plan for repeat endoscopy the following day for further removal.

of conservative management, the foreign bodies remained in the stomach and an esophagogastroduodenoscopy(EGD) was planned for removal. Upon intubation of the stomach, over 100 metallic objects were discovered, including magnets, nails, screws, bolts, a switchblade knife, and tweezers [**Figure 3**].

A total of 60 objects were successfully removed on the initial endoscopy [**Figure 4**]; however, the procedure was aborted due to the prolonged duration. Repeat EGD was performed the following day with an additional 20 objects removed using Roth net and snare. The patient required intubation during these procedures and was monitored in the surgical intensive care unit (SICU). Despite a week of conservative management, daily abdominal X-rays [**Figure 5**] continued to demonstrate high foreign object burden in the stomach. Two more EGDs were performed a week later with an additional 30 objects retrieved. At this time, one superficial, non-bleeding gastric ulcer in the incisura was appreciated. Two weeks after the final EGD, abdominal imaging [**Figure 6**] demonstrated clearance of all metallic objects from the gastrointestinal tract. The Psychiatry service evaluated the patient, and he was ultimately diagnosed with stimulant-induced psychosis. Subsequently, he was admitted to the inpatient Psychiatry unit for further care and management of his psychiatric condition.

Figure 5. Abdominal radiograph monitoring the migration of foreign bodies through the gastrointestinal tract.

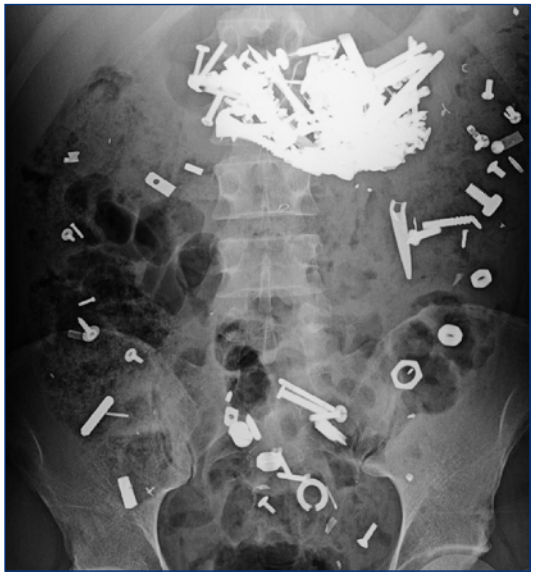
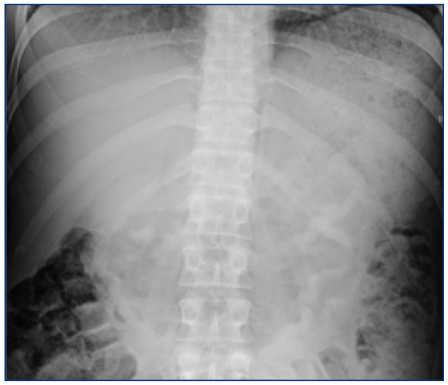


Figure 6. Final inpatient abdominal radiograph 14 days after final endoscopic intervention.



DISCUSSION

Intentional foreign body ingestions are relatively infrequent and typically occur in individuals with psychiatric disorders. In these patients, psychiatric symptoms may contribute to impulsive or maladaptive behaviors that lead to the ingestion of non-food items, either as a form of distress management or a cry for help.[1] The hospital course of this patient underscores the significant resources involved in managing intentional foreign body ingestion. Throughout his 45-day hospitalization, the patient received 37 abdominal X-rays, required SICU level of care and observation for airway protection, four EGDs, as well as consultation of surgery, gastroenterology, and psychiatry. As intentional foreign body ingestion is relatively rare in the adult population, the healthcare system incurs substantial costs for each case, particularly when repeated procedures are indicated. A review of the literature estimates that the cost of managing foreign body ingestion can exceed $5,000 per patient, with added expenses for

diagnostic imaging, endoscopy, and potential surgical interventions.[2] In this case, the cost of the hospitalization was likely over $100,000 given the length of his hospitalization and the multiple procedures required.

Endoscopic removal of foreign bodies is a common technique used in both the gastrointestinal and airway tracts, as it allows for a minimally invasive approach. Studies suggest 20% of foreign body cases require endoscopic removal and account for 4% of urgent endoscopies.[3] Criteria for very high-risk foreign body ingestion that require urgent endoscopic extraction, regardless of full stomach, include foreign body in the upper third part of the esophagus, complete esophageal obstruction, or sharp foreign body, batteries, or magnets. In this case, given initial radiographic findings showed sharp foreign bodies it would have been appropriate for urgent endoscopic intervention. However, if the sharp foreign body has passed into the stomach without perforation of the esophagus, the risk of perforation is decreased and it is recommended for extraction if the foreign body fails to pass the pylorus in 3–4 weeks.[3] Given this patient's unclear ingestion timeline, it was appropriate to start with conservative management and escalate to endoscopic intervention after observation. The risk of complications during removal, such as perforation, bleeding, or mucosal injury, is present, particularly in cases where the object is large, sharp, or impacted.[4] Complications are more likely to occur when attempting removal in the upper gastrointestinal tract, especially when there are prior conditions like strictures or inflammation. To reduce these risks, tools like the Roth Net and Alligator forceps are commonly recommended.[5] The use of a fluoroscopy-guided endoscope or direct visualization techniques can also help in improving accuracy and minimizing injury. Overall, while endoscopic removal is generally safe, it requires appropriate skill and preparation, and the choice of tools depends on the type and location of the foreign body.

In addition to complex interventional management, foreign body ingestion involves multidisciplinary care. Due to considerable artifacts on initial CT imaging, it was unclear on the exact location of the foreign body; the gastric body where gastroenterology could provide intervention or the colon where the patient may need general surgery intervention. The first X-ray provided clarity of the objects' primary location in the stomach. Though in this case the foreign bodies were successfully removed endoscopically, the surgery team needed to remain involved as the endoscopic removal of sharp objects carries high risk. Given most foreign body inciting factors remain psychological, psychiatrists and gastroenterologists often work in tandem to assess the patient's mental health and develop a comprehensive treatment plan that balances both psychological and medical interventions. From a psychological perspective, surgery acts as a form of reward for some patients so it is often preferred to initially attempt endoscopic or non-invasive procedures, which can address the medical issue without reinforcing these behaviors, especially in the case of repeat foreign body ingestion.[6] Gastroenterology and psychiatry should continue to collaborate after discharge to ensure patient stability and reduce repeat episodes.

In conclusion, this case highlights the complex interplay between gastrointestinal and psychiatric disorders in the context of intentional foreign body ingestion. Endoscopic retrieval is achievable in the majority of intentional foreign body cases and able to avoid surgical intervention, in this case, several endoscopies were required to remove over 100 objects. Though endoscopic retrieval was successful, a significant amount of hospital resources were used and it remains of utmost importance for continued efforts to address psychiatric behavior that leads to self-injurious actions to reduce the occurrences and financial burden of such cases.

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Recognition and Treatment of Concurrent Amyotrophic Lateral Sclerosis and Myasthenia Gravis

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KEYWORDS: Amyotrophic Lateral Sclerosis; Myasthenia Gravis; Repetitive Nerve Stimulation

INTRODUCTION

Amyotrophic Lateral Sclerosis (ALS) is a motor neuron disorder presenting with progressive weakness with both lower and upper motor neuron findings. Myasthenia Gravis (MG) is an autoimmune neuromuscular junction (NMJ) disorder, which presents with fatigable weakness, nasal speech, fluctuating ophthalmoparesis and ptosis. Both cause skeletal muscle weakness, although ocular and eyelid weakness is typically not seen early in ALS. Clinical features of both, with appropriate interpretation of serological, electrodiagnostic, and clinical data, may indicate the rare co-occurrence of the two disorders.

CASE PRESENTATION

An 80-year-old patient was referred to our neuromuscular clinic with a three-year history of fatigable dysarthria. The character of the dysarthria was described as fluctuating and "slurred", and modest in severity. It was described as episodic and fatigable, and chewing fatigue was noted. Approximately six months prior, the patient developed dysphagia that progressively worsened, which prompted presentation to a neurologist. Dysphagia was noted to be primarily for liquids, affecting his pharyngeal swallow, without significant aspiration events. Hyponasal speech without nasal regurgitation, with slurring, was noted by speech language pathology. A mild bilateral ptosis was observed. The patient also developed a mild, fatigable (Medical Research Council scale 5/5 to 4/5) proximal upper and lower limb weakness, best in the morning and worsened over course of day. Given the patient's age and clinical presentation with fatigable bulbar and proximal limb weakness, generalized myasthenia gravis was the putative diagnosis and pyridostigmine 60 mg every six hours was trialed for symptom relief; however, this medication provided no benefit. No thymic hyperplasia or other pathology was observed on chest imaging of the patient. The patient subsequently developed symptomatic tachypnea with respiratory compromise and required hospitalization. He had marked improvement with intravenous immune globulin (IVIG) at a dose of 2 g/kg over five days with regards to respiration and dysphagia. He did not require intubation. Acetylcholine receptor (AChR) binding and modulating antibodies, and muscle specific kinase (MUSK) were sent (prior to IVIG administration), with AChR binding antibody resulting as a positive (0.21 nmol/L). MUSK antibody and AChR modulating antibodies resulted as negative. Creatine phosphokinase (CPK) level was normal (171 IU/L). He was discharged from the hospital in an improved state, with normal extraocular movements, improved proximal limb strength without fatigability, and 2+ patellar and biceps deep tendon reflexes with down going toes, although dysarthria remained.

In the subsequent four weeks post-hospitalization, the patient developed a progressive neck extensor weakness, sialorrhea, hyperreflexia including Hoffman signs and upgoing plantar reflexes bilaterally, as well as a jaw jerk reflex, and a worsened, mixed lingual/flaccid more than spastic dysarthria. The observed hyperreflexia and mixed speech dysfunction were not noted upon hospital discharge by the referring physician. Given significant symptom burden, and concern for respiratory compromise in the outpatient setting, he was given additional treatment with IVIG. Unfortunately, this repeat course of IVIG was not helpful.

An electromyogram (EMG), with accompanying nerve conduction study (NCS) with slow Repetitive Nerve Stimulation (RNS) demonstrated diffuse, ongoing and chronic denervation and reinnervation changes, involving the craniobulbar, cervical, thoracic, and lumbosacral bodily segments [**Table 1**], and >10% decrement in both the nasalis and the abductor digiti minimi muscles, more prominently abnormal at the nasalis [**Table 2**].

The patient's age and presenting symptoms of fatigable flaccid dysarthria and proximal bodily weakness prompted the initial putative diagnostic work-up of a generalized myasthenia gravis. The positive acetylcholine receptor binding antibody titer, followed by marked response to immune modulation with IVIG, bolstered this hypothesis. However, as the syndrome progressed, with development of more significant upper and lower motor neuron dysfunction, and lack of response to a second round of IVIG led to a change in diagnostic evaluation. The electrodiagnostic data from EMG met criteria for definite ALS via the El Escorial Criteria, as well a post-synaptic myasthenic syndrome, supporting

Table 1. Electromyogram Results

			Spontaneous					MUAP			Recruitment
Muscle	**Nerve**	**Roots**	**IA**	**Fib**	**PSW**	**Fasc**	**H.F.**	**Amp**	**Dur.**	**PPP**	**Pattern**
L. Biceps brachii	Musculocutaneous	C5-C6	2+	3+	3+	None	None	1+	1+	1+	Reduced
L. Triceps brachii	Radial	C6-C8	N	None	None	2+ (fast)	None	1+	1+	N	Reduced
L. Abductor digiti minimi (manus)	Ulnar	C8-T1	1+	1+	1+	1+	None	1+	1+	N	Reduced
L. First dorsal interosseous	Ulnar	C8-T1	1+	2+	2+	1+	None	2+	2+	N	Discrete
L. Flexor carpi radialis	Median	C6-C7	1+	2+	2+	1+	None	1+	1+	N	Discrete
L. Vastus medialis	Femoral	L2-L4	N	None	None	1+	None	1+	1+	1+	Reduced
L. Tibialis anterior	Deep peroneal (Fibular)	L4-L5	N	None	Few	1+	None	1+	1+	N	Discrete
L. Gastrocnemius (Medial head)	Tibial	S1-S2	1+	2+	2+	1+	None	N	N	N	Reduced
L. Thoracic paraspinals	Spinal	T1-T12	1+	2+	2+	None	None	N	N	N	Reduced
L. Cervical paraspinals	Spinal	C4-C8	1+	2+	2+	None	None	1+	N	2+	Reduced
L. Geniogloss us	Hypoglossal	Medulla-	2+	3+	3+	None	None	N	N	N	N

Electromyogram demonstrating active and chronic denervation in bulbar, cervical, thoracic, and lumbar body regions, consistent with Revised El Escorial criteria for definite ALS.

Table 2. Repetitive Nerve Stimulation Results

Anatomy/Train	Rate Hz	Amp mV	4–1 %	Facilit %
L Nasalis				
Baseline	3	0.8	–4.9	100
Baseline 2	3	0.8	–15.1	106
Post exercise 10sec (technically lim)	3	0.4	57.6	49
Post exercise 10 sec	3	0.9	–10.7	119
1 min	3	0.9	–12.9	121
2 min	3	0.9	–12.3	121
4 min	3	0.9	–37.2	121

Repetitive Nerve Stimulation of the left nasalis muscle with evidence of >10% decrement from baseline, consistent with neuromuscular junction disorder.

co-morbid ALS and MG. He was treated symptomatically with prednisone and dietary modification. He elected not to start riluzole to slow the progression of ALS. He transitioned to hospice care and died two months after dual diagnosis, approximately three years after the onset of the initial myasthenic syndrome.

DISCUSSION

ALS and MG are both rare disorders that have different pathophysiology, prognosis, and treatment. Concurrence is very rare, though should be considered a possibility when clinical features of both are present.[1-3] In one Italian study, approximately 0.75% of incident ALS patients were also affected by MG, although the overall incidence of concurrence in this population was 1.87 per 10 million person-years.[4] Diagnostically, antibody testing against acetylcholine receptors (AChR), fatigable weakness, and significant (>10%) decrement on slow repetitive nerve stimulation (RNS) support a diagnosis of MG. However, significant decrement on slow RNS and/or abnormal jitter may also be seen in ALS sans MG, and up to 5% of ALS patients harbor AChR antibodies and 9.8% harbor LRP4 antibodies, which may suggest a degree of NMJ dysfunction and/or an autoimmune component in ALS; this patient's AChR binding titer was within limits of previously published titers for ALS sans MG.[5,6] As the diagnostic testing and clinical presentation may be similar in both ALS and MG, interpretation within the current clinical context is integral for appropriate diagnosis and subsequent treatment, as treatment and prognosis vary greatly between these two disorders.

Our patient had MG, responsive to immunotherapy, which progressed to a phenotype more consistent with ALS. The somewhat mild, fatigable bulbar symptoms with strong response to IVIG was most supportive of an initial diagnosis of MG, although his clinical phenotype, particularly in the ultimate three months of life, were most consistent with motor neuron disease. While both MG and ALS can present with bulbar weakness, ALS is not expected to respond to IVIG and our patient had a marked improvement of his symptoms following his initial course of IVIG. Subsequently, IVIG proved ineffective and thus required a broadening of the differential diagnosis, to include other diagnoses, such as motor neuron disease.

Electrodiagnostically, significant decrement was observed on slow RNS when he had begun to develop rapidly progressive upper and lower motor neuron signs. Notably, this finding can be seen in both myasthenic syndromes, such as MG, as well as ALS[5]; unfortunately, there was no prior RNS study with which to compare the results prior to development of upper and lower motor neuron dysfunction, which is a prime limitation in the interpretation of his mixed clinical picture. It is difficult to say if the electrodiagnostic NMJ

dysfunction was related to his MG or his ALS; however, the diffuse denervation changes on EMG would not be expected in MG, and thereby met criteria for definite ALS via the El Escorial Criteria. Given the rarity of this co-morbid combination, one may question if this case was solely bulbar ALS sans MG; however, the prolonged prodrome of fatigable dysarthria and primarily proximal weakness, with marked response to IVIG initially strengthens the interpretation of an inaugural MG followed by ALS. This case highlights the importance of recognition of rare clinical syndromes, the avoidance of anchoring bias to avoid misdiagnosis or under-diagnosis, and to diagnose rare combinations of disorders, when clinical data and supporting data dictate, in order to tailor appropriate treatment regimens for each stage of the overlap syndrome.[7]

Acknowledgment

We thank our patient and his loving family for allowing us to document this challenging and elucidating case. Although our patient's daughter did not wish to write a statement, she allowed me to relay her sentiments. In paraphrase from my discussion with her on 7/31/2024, about 2.5 years after the patient's passing: "We just noticed a few small things creeping up, but were just attributed to old age, like occasional trouble swallowing or occasional speaking issues, but I'm glad that he didn't experience this [referring to his dual diagnosis of ALS and MG] before, because he was living a good life. To see such a strong man deteriorate so fast was very sad."

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Disclosures

None

Disclaimer: The views expressed herein are those of the authors and do not necessarily reflect the views of Southcoast Physicians Group or the Alpert Medical School of Brown University.

Ethical Approval: Our institution does not require ethical approval for reporting individual cases or case series. We attest that we have received consent from the patient's next of kin for this case report.

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Recurrent Cellulitis in the Intergluteal Area in a Pediatric Patient with Klippel-Trenaunay Syndrome

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ABSTRACT

Klippel-Trenaunay syndrome (KTS) is a rare congenital vascular disorder associated with somatic mutations in the PIK3CA gene, characterized classically by a triad of capillary malformations, venous malformations, and soft tissue and bone hypertrophy. While KTS commonly involves a single lower extremity, we present an atypical pediatric case featuring extensive venolymphatic malformation of the intergluteal region. This uncommon anatomical localization predisposed the patient to recurrent episodes of cellulitis, significantly complicating clinical management. This case underscores the importance of recognizing atypical presentations of KTS and the heightened susceptibility to recurrent infections, such as cellulitis, which may significantly impact morbidity and patient care.

KEYWORDS: Klippel-Trenaunay-Weber syndrome; venous malformation; cellulitis

INTRODUCTION

Klippel-Trenaunay syndrome (KTS) is a rare congenital vascular disorder characterized by a classic triad of capillary malformations (port-wine stains), venous malformations (including varicose veins), and hypertrophy of bones and soft tissues. These clinical features typically affect a single limb, most commonly a lower extremity; however, involvement of the upper extremities, gluteal region, or torso has also been reported, albeit rarely.[1,2]

Venous malformations in KTS include abnormalities of both the superficial and deep venous systems, increasing the risk of thrombosis.[2] Additionally, KTS is associated with an increased risk of soft tissue infections, including cellulitis that may induce subsequent ulceration, due to abnormal lymphatic drainage.[3] Although less common, KTS may also affect other organ systems including the gastrointestinal and genitourinary systems.[3]

Epidemiological data suggest that KTS occurs in approximately one in 100,000 people globally.[3] The true incidence is difficult to determine due to the rarity of the condition, although some studies suggest it ranges from two to five cases per 100,000 people. KTS typically presents at birth, during early infancy, or in childhood, and current evidence indicates a slightly higher prevalence in males than in females.[4] Given its low prevalence and incidence, the number of new cases each year remains limited, consistent with the rare nature of the syndrome. Herein, we present the case of a 12-year-old female with KTS involving the intergluteal region, associated with a venolymphatic malformation and complicated by recurrent cellulitis.

CASE REPORT

A 12-year-old patient with KTS and extensive venolymphatic lesions in the intergluteal region presented with pain and serous drainage. Her KTS was initially suspected on prenatal ultrasound, which revealed bilateral cystic muscular abnormalities involving the buttocks and right thigh. Subsequent imaging confirmed abnormal bone development of the lower extremities at age 11 months, dilation of the saphenous and marginal veins at age three years, and progressive inflammatory and vascular malformations involving gluteal and perineal tissues by age 8. Surgical resection was performed, followed by percutaneous bleomycin sclerotherapy at age 11. Over the course of 12 years, the patient had experienced three episodes of cellulitis without systemic symptoms.

At presentation, the patient exhibited vomiting, fever (39°C [102°F]), and a painful, warm, erythematous intergluteal lesion with serous discharge, leading to limited mobility. Multiple varicose veins and scars from previous procedures were evident on the posterior right leg, particularly at the lateral gluteal level. Additionally, several hyperpigmented and lichenified plaques were present. Initial laboratory tests revealed leukocytosis (31,190/mm^3) with neutrophilia (28,200/µL) and lymphocytopenia (1,360/µL), along with an elevated C-reactive protein level (315.71 mg/dL). Arterial blood gas analysis demonstrated partially compensated respiratory alkalosis (pH 7.515, pCO_2 22.7 mmHg, pO_2 73.3 mmHg, HCO_3 17.9 mmol/L, tCO_2 41.7 vol%, EBvt –2.9 mmol/L, and SpO_2 97%).

The Department of Infectious Diseases was consulted and ordered blood cultures which grew *Streptococcus dysgalactiae* ssp. *equisimilis* in one of two sets. To evaluate the extension of the infectious process, a soft tissue ultrasound of the gluteal region was performed, demonstrating skin thickening, increased echogenicity of the subcutaneous tissue, and contour alteration without circumscribed

Figure 1. Multiple pink to violaceous vascular papules and plaques in the intergluteal and upper posterior thigh region.

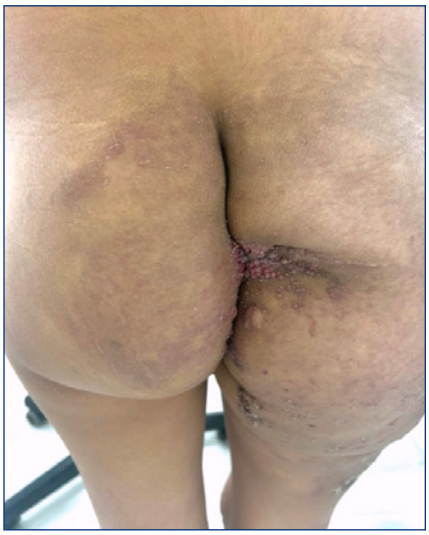


Figure 2. Multiple erosions with crusting and asymmetry in the length and thickness of the left gluteus and lower limb compared to the right.

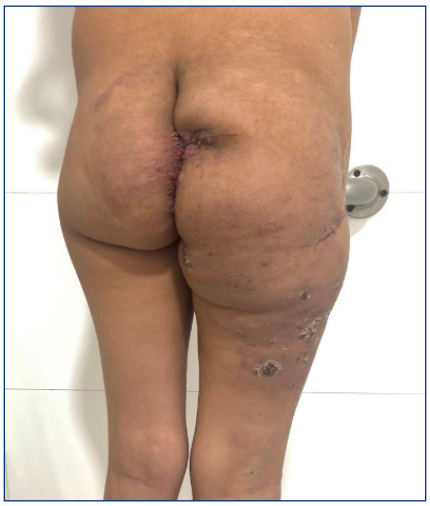
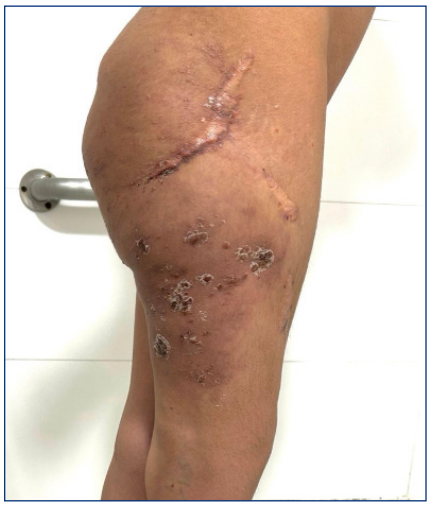


Figure 3. Varicose vein formation and scars from past procedures on the posterior side of the right leg. Surrounding the affected areas, hyperpigmented and lichenified plaques.



collections, findings consistent with gluteal cellulitis. Empiric intravenous antibiotic therapy was initiated with vancomycin (40 mg/kg/day) and cefepime (150 mg/kg/day). Subsequent rectal swab cultures grew *Klebsiella pneumoniae* subsp *pneumoniae*, identified by antibiogram as carbapenemase-producing. However, this isolate was deemed to represent colonization rather than active infection, and the initial antibiotic regimen was continued.

After one week of empiric antibiotic therapy, the lesion demonstrated significant improvement, with a marked reduction in serous discharge. On re-examination, multiple pink-to-violaceous vascular papules and plaques were observed, predominantly in the intergluteal region and upper posterior thigh [**Figure 1**]. The right posterior thigh displayed multiple erosions with overlying crusting, along with noticeable asymmetry in the length and thickness of the left gluteus and lower limb compared to the right [**Figures 2,3**].

Given the lesion's location and the severity of her presentation, the patient received a 21-day course of intravenous antibiotics, resulting in complete resolution of the infection. The patient and her mother were counseled on local hygiene practices and the importance of minimizing excessive moisture in the affected area to prevent recurrence.

DISCUSSION

KTS was first described in 1900 by French physicians Maurice Klippel and Paul Trenaunay. It is now understood to be part of the PIK3CA-related overgrowth spectrum (PROS), a group of syndromes caused by somatic mutations in the *PIK3CA* gene, which plays a central role in regulating cell growth, angiogenesis, and lymphangiogenesis.[5] It is characterized by a triad of capillary malformations, venous varicosities, and hypertrophy of one or more extremities. The condition exhibits a broad phenotypic spectrum, and its progressive nature often leads to complex complications that often require a collaborative and multidisciplinary approach.

KTS is associated with a range of complications, including cellulitis, deep vein thrombosis, pulmonary embolism, chronic venous insufficiency, and hemorrhage, all of which may contribute to limb length discrepancies. Additional complications include lymphedema, neurologic involvement, orthopedic abnormalities, and internal organ complications, such as hematuria or gastrointestinal bleeding, both of which can be life-threatening.[6] Cellulitis is a common consequence of the underlying vascular and lymphatic malformations and may recur, particularly in the lower extremities. Venous hypertension and stasis in the affected limb further increase the risk of cellulitis due to altered hemodynamics.[7]

In the present case, the anatomical location of the venolymphatic malformation presents a significant clinical challenge. The intergluteal area is particularly susceptible to excessive moisture, friction, and hygiene-related issues that may promote bacterial overgrowth and contribute to recurrent cellulitis and delayed wound healing. These factors further exacerbate the risk of chronic inflammation, fibrosis, and long-term scarring. A recent retrospective study evaluating cutaneous complications in KTS reported cellulitis in 74 of 410 patients, including 12 cases involving lesions in the buttocks, perineum, or genitalia.[7] Notably, KTS lesions in this region were identified as a predictor of cutaneous complications (odds ratio 1.92; $P = 0.009$).[7] This finding underscores both the heightened risk in patients with gluteal involvement and the relative rarity of cutaneous manifestations in this anatomical area.

The management of cellulitis in patients with KTS should account for the increased risk of complications, including deep infections and sepsis. Radiologic assessment is strongly recommended to evaluate the extent of infection, and a multidisciplinary approach should be the standard of care. For patients with recurrent lower-extremity cellulitis, prophylactic low-dose daily oral antibiotics may reduce recurrence.[8,9]

The impact of cellulitis on quality of life in patients with KTS should not be underestimated. This patient reported significant pain, consistent with previous research identifying pain as one of the top ten symptoms in individuals with KTS.[10] Moreover, pain in KTS may be associated with an increased risk of future psychiatric diagnoses.[11] Thus, early diagnosis and appropriate treatment of cellulitis are essential not only to minimize physical morbidity but also to mitigate psychological consequences.

Given these multifactorial challenges, a comprehensive and individualized approach is essential to optimize outcomes in patients with KTS and venolymphatic malformations. Exploring adjunctive management strategies, including targeted pharmacologic therapies, advanced wound care modalities, and minimally invasive interventions, may offer additional therapeutic benefits. However, the scarcity of research on optimal treatment approaches for venolymphatic malformations in this anatomical region underscores the need for further investigation. Advancing our clinical understanding of these complex cases will be critical in developing more effective, evidence-based strategies to improve long-term patient outcomes.

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The Critical Role of Spiritual Care in the Emergency Department

LEAH McDONALD, MD; DANA GUYER, MD

ABSTRACT

Patients in the Emergency Department (ED) have a diverse set of spiritual challenges. As part of a clinical initiative to embed palliative care in the ED, our palliative care department looked to provide timely spiritual care (SC) to this population. We worked with three of our chaplains to identify ED-specific spiritual care challenges and benefits. Several themes arose on nuances of SC consults in the ED: quality of consults (less focused on actively dying patients, more upstream support), challenges (physical environment, staff limitations, distractions), benefits (continuity of care, support to the ED staff, high moral/spiritual distress in the ED setting, provider-rewarding care, taking advantage of long ED stays), and ways to improve (embedding SC in the ED, education on scope of service provided by SC). Addressing spiritual and moral distress is a key component of high-quality palliative care and may be a feasible patient-centered outcome to address in future research.

KEYWORDS: ED-embedded palliative care; spiritual care; patient-centered outcomes

BACKGROUND

ED-Embedded Palliative Care (EDPC) is a relatively new model for providing timely supportive care to acutely and chronically ill patients with life-limiting diagnoses in the acute care setting. As of 2024 there were approximately 15 programs providing this type of care nationally,[1] with significant growth anticipated, as data has shown that this type of integrated program provides goal-concordant care, decreases healthcare utilization,[2] and improves ED staff satisfaction.[3] Little has been published on patient-centered outcomes from these programs. To identify potential areas for future investigation of patient-centered outcomes, we wanted to highlight the role spiritual care plays as part of the PC interdisciplinary team in the ED.

Patients in the ED have considerable spiritual care needs. Spiritual care (SC) services are a critical element of holistic, patient-centered palliative care (PC)[4] and should be included in ED-embedded PC programs. Grutzen et al included spiritual needs in their list of palliative care needs of older adults presenting to the ED.[5] In a review of providers in ICUs and Emergency units in Spain during COVID-19, 66.7% considered SC of high importance.[6] ED providers view spiritual care services positively, although it is often equated completely with religiosity.[7] Despite these identified needs, the barriers often cited to providing quality palliative care in the ED also exist for providing spiritual care in this setting, including high acuity diagnoses, lack of services available in "off" hours, fast pace, limited privacy, crowded setting, and limited information on prognosis at time of visit.[8,9] We hoped to better define these barriers as well as specific benefits provided by spiritual care in the ED setting.

FINDINGS

In 2022, Brown University Health implemented an EDPC program at the Miriam Hospital in Providence, RI. The hospital is a 247-bed hospital with 70,000 ED patient visits per year. In the first nine months of this program, 409 patients were seen by the EDPC program.

Patients admitted to the Miriam Hospital have access to spiritual care support from multiple non-denominational chaplains seven days a week. Consultation to the spiritual care service can be triggered by medical providers, nurses, or social workers when they believe the patient would benefit from spiritual support or if a patient or family requests their services. While this is a well-structured, inpatient, support program, the role spiritual care providers fulfill in the ED is less defined.

In developing the EDPC program, we characterized the role of spiritual care in the ED and consequently, we saw parallel growth in the number of patients receiving spiritual care support from our interdisciplinary team after starting the EDPC program. In the nine months before initiation of ED-embedded PC (01/2022–9/2022), there were 29 SC consults performed in the ED. In the nine months after initiation (10/2022–06/2023), there were 94, representing more than a 300 percent increase in consult volume. These consultations were in large part placed by the palliative medicine physician embedded in the ED, after discussion with patients and the treatment team.

To identify how ED-initiated spiritual care consults differ from inpatient-initiated consults, semi-structured interviews were conducted by a physician with three spiritual care providers in our department who spend time seeing

patients both in the ED and in the inpatient settings. Common themes emerged, and a summary of their responses are grouped below.

How do typical ED spiritual care consults differ from inpatient consults?

Acuity and speed: *All three chaplains identified that the patients they see in the ED tend to be sicker and consultations need to occur more quickly than those occurring on the floors.*

- "ED SC consult tends to be very acute, very intense, before they die."
- "The speed is different from the floor. There are nurses and doctors running in and out."
- "Typically, they are more acute."

Actively dying patients: *The chaplains commented that many consults in the ED are for a prayer or last rites before dying. This was especially true prior to embedding a palliative care physician in the ED.*

- "People are usually actively dying. Normally the patient isn't responsive. Family is gathered at the bedside. When the ED puts in a consult, it's really at the last moment. Almost thinking of us in a sacramental manner like someone has to come and say prayers and "do the religious thing.""
- "Very often they are end of life – That was probably 95% of the consults."
- "Not many and only patients in end-of-life situations."

What are the barriers to effective spiritual care consults in the ED?

Physical environment: *Physical space is a well identified barrier to effective GOC discussions in the ED that resonated with the chaplains.*

- "It is so crowded. I don't really have a way to create a calming environment for a chaplain to be there. Very close and only a curtain. Some have a door. Always noise around you."
- "Sometimes the rooms are small, staff are running in and out. We physically feel like a barrier to staff doing work. The nurse comes in, the doctor comes in, and I am physically between them. Timing, business, the physical space."

Staff limitations: *Chaplains encountered difficulty getting information on the patients from providers and nurses given the chaotic environment.*

- "The staff are just so incredibly busy – 'I have so much to do I don't have time to talk to you.' They are really busy."
- "Rounding didn't really work because the staff didn't have time. The urgent nature of it all – you would think we are needed, wanted more. Sometimes people are really stressed out in the midst of what they are going through and staff doesn't think of us, because everything is so urgent. Instead of adding in an added layer of support, we just slip their mind."
- "They are so busy and intense down there, it's just one more thing for them to do."

Distractions: *Chaplains identified that their usual environment for supportive discussions is a calm and quiet area which is different from the ED.*

- "How can I really help support when there are so many distractions."
- "There is a lot of distraction. In the midst of a very important conversation, the doctor needs to talk to them. On the floor, the doctor usually can give me 5–10 minutes."

Implementation of tools to overcome barriers: *Chaplains have found that even brief initial visits are beneficial. Practicing through the isolation barriers of the COVID pandemic gave chaplains tools to implement during ED visits*

- "I try my best. Even a very short time to tell them I'm available for anything, even if it is abbreviated and letting them know I will check back later. They are appreciative."
- "Being able to say a prayer for them, they so appreciate it. Even in a brief visit."
- "Because of my training I have seen people in shared rooms, in halls, during COVID. I make a cocoon around us."

What are the benefits of ED-initiated spiritual care consults?

Support for ED staff: *Just as a palliative care team supports the patients, they often support the staff who are treating complex patients. This concept held true in the ED setting.*

- "There is moral distress on the team that they can't be with all the people suffering. When patients' needs are being met, it lowers the distress of the staff."
- "We are supporting the medical team."

Continuity of care: *The chaplains appreciated being able to see their patients early in their course and help them process right from the start, especially in cases where they may be getting difficult news.*

- "More proactive consulting, earlier in the process, earlier in the disease trajectory. They are not at death's doorstep. People have come to the ED, they have met with palliative care, they have gotten discouraging news and they are kind of adjusting to that news. They are using SC as a way to process. They are better able to process what they are facing but also able to integrate their spirituality to help them to cope, adjust, or even have some well-being even if the news is 'bad.' Ex.: 'I'm going to die but with

my spirituality and my faith I can get through this.' We are called in earlier so are we better able to support."

- "When you say 'I met you last night in the ED,' they say 'oh yes!'"
- "It is such a relief when they are admitted and you see them in the room."
- "They go, 'Oh, someone I know, I can trust you.'"

Providing real time spiritual support: *The chaplains are often physically present for patient deaths in the ED. Being bedside during this final moment for patients, families, and staff allows for more acute support.*

- "These are sudden deaths, so you are dealing with families that are just stunned. If they have any kind of religious background they completely forget [about their religion in the crisis situation]. So, when you say, 'Do you want me to say a prayer?', they [remember and] say 'Yes!'"
- "The last thing they can give to their loved one before they die. Talk about legacy and what meaning they brought and what will you remember about them. It's not closure. Ritual is really important. It's so cold to be like, 'They died, goodbye.'"
- "It is very moving to the family if providers stay for a prayer."

Moral and spiritual distress are particularly high in ED setting: *Chaplains identify a high burden of moral and spiritual distress in patients in the ED, which indicates a particular benefit from spiritual care support in this setting.*

- "When the patient comes into the ED to deal with the illness, they don't know what's going on, the level of anxiety is through the roof. They are worried if they are going to make it…[They are] thinking, 'I need some prayer, some support from the chaplain, the priest, the rabbi.'"
- "To help them in a time of turmoil. Being able to bring the calming presence and help them process. The anxiety level starts to come down. They feel they are not alone."
- "Our ability to sit down and help people and really help is of deep meaning and value to them. Sometimes when they are processing and able to adjust with their values. 'I am in deep grief, what's going to sustain me in the midst of this?' Sometimes it's deeply religious and sometimes it's existential without religious ties."

Bridge to the inpatient team: *Meeting patients in the ED allowed chaplains to inform the inpatient providers, nurses, social workers about the patient's psychosocial situation and level of distress to ease transitions during the hospitalization.*

- "[ED consultation] creates a bridge to the inpatient world. When we have met them in the ED and we had that initial processing conversation, it actually makes it easier when they move to the inpatient; we have that rapport. It has helped with creating long-term relationships."
- "We get to start with them and then there's this continuity. I can inform the team on the floor about the emotional and social dynamics, the spiritual, the relationships. It moves the ball forward so much more quickly rather than someone languishing."
- "Rapport building gets built quickly in those moments."

Work satisfaction: *All three chaplains noted the high need and benefit of providing spiritual support in the ED and found it to be a rewarding part of their practice*

- "It can be busy, but I really enjoy it because I see the need."
- "Sharing the experience and being able to give you the updates about the patient."
- "I always wish we had more consults from the ED. The sooner we're involved the better. Typically, if they are getting admitted because their 'number one person' is often accompanying them. You are able to establish a bond with them because you were there in their moment of crisis, even if they are not unpacking everything."

Takes advantage of long ED stays: *ED-boarding results in prolonged time in the ED during which patients suffer distress.*

- "People are in the ED for 'how long?" We could see them the next day but what if they are still there the next day. What if they are sitting there for 10 hours? We might as well take advantage of those 10 hours."

How can we improve spiritual care consults in the ED?

Embedded spiritual care: *Two chaplains had experience with hospitals where there were chaplains embedded in the ED and enjoyed that experience. They discussed the relationships they formed with the providers and staff and found being embedded overcame many of the systemic barriers to spiritual care to those patients who would benefit.*

- "It's relational. I can go and give education. But if they see you at work and know you and trust you. Because we are not consulting as much, the relationships are harder to build."
- "Showing them the value of what you do."
- "We would embed the interns in the ED, and we got such positive feedback because people understand what we do."
- "The situation of a sudden death that was distressing to family and providers – no chaplain was called. If they were embedded in the ED, they would be there."
- "Round in the ED. Everyone in the ED has spiritual needs: 'What's going on? Who are my people?' It's just simmering there. They just sit there for hours. And to

have someone check in on them. Sometimes it would be a very serious spiritual discussion. 'It would be really great if I had a rosary.' Guided meditation to lower their anxiety."

- "Go across the board and introduce myself. Balancing seeing the most acute with putting it on ED staff to place an order. Out of sight, out of mind. They see us and know us and know our work. It's hard because we are not embedded there."

Is there anything you want the ED staff to know about your role?

Understanding scope of SC practice: *Social workers are routinely part of the ED environment. Our chaplains wanted to highlight that they provide a particular set of skills that differ from social workers. In addition, they have found that most people in the ED only think of them as being able to provide prayer near the time of death and might not realize the benefits they provide for patients who are not in the actively dying phase.*

- "I think that they are so used to leaning on the social workers, and we are not as culturally involved."
- "They misunderstand our role. Hospital chaplain serves a larger role than a priest or a pastor. They pigeonhole us – 'Well it doesn't matter, they aren't dying.'"
- "I wish people understood what that means rather than just bringing me in for a prayer. The benefit to the patient. They can have those discussions early on and its sets them up to cope better and earlier."
- "The biggest hurdle we have to overcome is the concept of what our role is, the training, the scope of our service. They only see us at the end of life when we pray with the family."
- "They don't always want a 'religious' person involved."

CONCLUSIONS

Interviewing three seasoned chaplains gave incredible insight into the unique benefits and challenges they experience in providing spiritual care support to ED patients. Their experiences highlight the important need for spiritual care support for patients presenting to the ED. Given that identifying and addressing spiritual and moral distress is a pillar of high-quality palliative care, it should be a key component of EDPC as well. As we move toward identifying patient-centered outcomes of EDPC, one next step would be to identify from the patient perspective what may be the perceived benefits of receiving spiritual care support in the ED.

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Significantly Lower Serum Ferritin in Apheresis Platelet Donors Compared to Whole Blood Donors

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ABSTRACT

BACKGROUND: Iron deficiency is a recognized risk for frequent blood donors, particularly for platelet apheresis donors due to their increased donation frequency. This retrospective study examines ferritin levels in 31,661 blood donors, encompassing whole blood (n=26,129) and platelet apheresis (n=5,532) donors from 2018 to 2021. It aims to understand the impact of donation type, age, and sex on iron depletion, emphasizing the unique needs of platelet donors.

STUDY DESIGN AND METHODS: We analyzed data from a centralized blood donation database, stratifying donors by age, sex, and donation type. Ferritin levels, measured using a chemiluminescent immunoassay, served as a marker of iron stores. Statistical analyses included t-tests and ANOVA to compare ferritin levels across donation types and demographics, with a significance threshold of $p < 0.05$.

RESULTS: Platelet donors showed consistently lower mean ferritin levels than whole blood donors, with significant differences observed in males and older female donors across most age groups. This trend suggests cumulative iron depletion in platelet donors due to frequent donation, with marked sex and age-based variations in iron reserves.

DISCUSSION: This study highlights that platelet donors are at a considerable risk of iron depletion, with lower ferritin levels observed across most age and sex categories compared to whole blood donors. Despite the known risks associated with frequent apheresis, interventions have primarily focused on whole blood donors, leaving platelet donors without targeted strategies to mitigate iron deficiency. Our findings underscore the need for targeted interventions for platelet donors.

KEYWORDS: Blood donation; apheresis platelets; ferritin; iron deficiency; donor health

INTRODUCTION

Iron is an essential mineral that plays a critical role in numerous physiological processes, including oxygen transport, energy production, and the maintenance of immune function.[1] It is a key component of hemoglobin, the protein in red blood cells responsible for carrying oxygen from the lungs to the rest of the body.[2] Given its pivotal role in maintaining health, adequate iron levels are crucial for overall well-being. However, iron deficiency remains a prevalent concern, particularly among individuals who donate blood regularly.[3] The process of blood donation, whether through whole blood or apheresis, can exacerbate the risk of iron deficiency, leading to a range of health issues that can affect both the donor and the quality of blood products collected.[4,5]

Iron deficiency is a common nutritional disorder worldwide, with significant implications for public health.[6] The loss of iron during blood donation is an important factor contributing to this deficiency. Each time a donor gives blood, a substantial amount of iron is removed from the body. In whole blood donation, approximately 200–250 mg of iron is lost, primarily due to the removal of red blood cells, which contain hemoglobin.[7] Given that the body's iron stores are limited, frequent donations can lead to a gradual depletion of these stores, increasing the risk of iron deficiency.[8]

The consequences of iron deficiency extend beyond simple fatigue or weakness. Insufficient iron levels can impair cognitive function, leading to memory loss and difficulty concentrating. Iron deficiency is also associated with disrupted hair growth, restless leg syndrome, unusual cravings for non-nutritive substances (a condition known as pica), and immune system dysfunction, which can make individuals more susceptible to infections.[9,10] In the context of blood donation, these effects can be particularly concerning, as they may not only compromise the donor's health but also reduce the quality of the blood products collected.[11,12]

Apheresis donation, a process in which specific blood components such as platelets or plasma are collected while the remaining components are returned to the donor, also poses a risk of iron deficiency.[13] While the immediate loss of iron during apheresis is generally lower than in whole blood donation, frequent apheresis can still lead to significant iron depletion over time.[14] This is because apheresis donors often donate more frequently than whole blood donors, sometimes as often as twice a week. Over time, this can result in a gradual decline in iron stores, particularly if the donor's diet does not adequately compensate for the loss.[15]

Moreover, iron deficiency can have specific implications for the quality of blood products collected through

apheresis.[12,16] Platelets, one of the primary components collected during apheresis, play a crucial role in blood clotting and wound healing. Iron deficiency can impair platelet production and function, potentially reducing the therapeutic efficacy of the platelet products collected.[17] This is particularly concerning in apheresis, where the goal is to collect high-quality platelets for transfusion into patients with conditions such as thrombocytopenia or during chemotherapy.

The impact of iron deficiency in blood donors has led to increased awareness and efforts to mitigate its effects.[18] Monitoring ferritin levels, a marker of iron stores, is one approach used to assess the risk of iron deficiency in donors. Studies comparing ferritin levels among different types of blood donors have shown that frequent whole blood donors and apheresis donors are at the highest risk of developing iron deficiency.[15] To address this, some blood donation organizations have implemented measures such as iron supplementation programs and extended donation intervals to help maintain healthy iron levels in donors.[19,20]

MATERIALS AND METHODS

Study Design and Population

This retrospective cross-sectional study was conducted using data from 31,661 blood donors who donated between 2018 and 2021. Donors included in the study had donated whole blood (n=26,129) or platelets via apheresis (n=5,532), at least once during the study period. Donors who had incomplete records or pre-existing health conditions that could affect iron metabolism (hemochromatosis) were excluded from the analysis.

Sample Collection and Preparation

Blood samples were collected prior to donation using standard venipuncture procedures. The whole blood or platelet collection kit is used and there is a sample pouch that the blood is diverted into, and the samples are collected from there. These samples were processed and tested within 48 hours to ensure sample integrity. All samples were handled under strict quality control protocols, with regular participation in external proficiency testing programs to maintain assay accuracy.

Data Collection

Data were collected from a centralized blood donation database, including donor demographic information (age, sex, and ethnicity), donation type and laboratory results. Donors were divided into four age groups: 16–21 years (n=1600), 22–30 years (n=6387), 31–45 years (n=12015), and 46+ years (n=11659). This stratification allowed for analysis of ferritin levels across different life stages and helped identify age-related trends in iron depletion.

Ferritin levels in blood donors were measured using the Beckman Coulter AU Analyzer platform, a high-throughput clinical chemistry system. This assay was performed at one of Creative Testing Solutions' (CTS) accredited laboratories. The ferritin assay employed is a chemiluminescent immunoassay (CLIA), which quantitatively measures serum ferritin concentrations as an indicator of iron stores. The measurable ferritin range in this assay was between 1 and 451 ng/mL, which provides a broad reportable range to capture both severely depleted and high ferritin levels.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics (Version 27) to assess differences in ferritin levels between the donor groups. The primary variable of interest was ferritin concentration, while demographic factors were considered secondary variables. The normality of the data was evaluated using the Shapiro-Wilk test, and ferritin levels were found to follow a non-normal distribution. Therefore, non-parametric tests were used where applicable.

Descriptive Analysis: Descriptive statistics (mean, standard deviation, and median) were computed for ferritin levels, stratified by donation type, sex, and age group.

T-Tests and ANOVA: Independent sample t-tests were employed to compare ferritin levels between two donor groups, while one-way ANOVA was used for multi-group comparisons (e.g., donation type, age group, sex). Welch's t-test was conducted for multiple pairwise comparisons.

Significance Thresholds: A p-value of less than 0.05 was considered statistically significant for all comparisons.

RESULTS

Approximately 51% of the donors were male and 49% were female with mean ferritin values of 111.62 ng/mL and 53.78 ng/mL [**Table 1** and **Table 2**]. The donation frequency differed between the two groups: whole blood donors averaged 1.36 donations per year, whereas platelet donors donated more frequently, with an average of 3.33 times per year. Whole blood donors were overwhelmingly single-time donors (73.9%), whereas platelet donors demonstrated a higher donation frequency – with only 44.9% donating once and 25.5% donating two to three times over the same period as summarized in **Table 3**. The average serum ferritin concentrations for whole blood and Platelet donors, stratified by annual donation frequency, are summarized in **Table 4**. Among one-time donors, mean ferritin levels were virtually identical between whole blood and platelet donors (102.13 ng/mL vs. 103.58 ng/mL, respectively). As donation frequency increased to 2–3 donations per year, whole blood donors exhibited a marked decline in ferritin (66.44 ng/mL), whereas platelet donors showed a more moderate decrease (83.03 ng/mL). In the 4–6 donations category, whole blood donor ferritin fell further to 53.64 ng/mL, while platelet donor ferritin remained comparatively elevated at 83.19 ng/mL. For higher frequency brackets, however, platelet donor ferritin continued to decline, averaging 63.57 ng/mL in the 7–12 group and 53.96 ng/mL in the 12–24 group.

Table 1. Distribution of the Donor Population by Age, Sex, and Donation Type

Age Group	Female (%)	Male (%)	Male and Female (%)
Whole Blood (WB)			
16–21	2.6	2.0	4.6
22–30	13.2	8.1	21.4
31–45	21.6	18.1	39.6
46+	17.0	17.4	34.3
All Ages	54.4	45.6	100.0
Platelets (PLT)			
16–21	0.3	0.3	0.6
22–30	4.8	7.5	12.2
31–45	8.9	21.5	30.4
46+	10.3	46.4	56.8
All Ages	24.3	75.7	100.0
All Donors (WB & PLT)			
16–21	2.2	1.7	3.9
22–30	11.7	8.0	19.7
31–45	19.3	18.7	38.0
46+	15.8	22.5	38.3
All Ages	49.1	50.9	100.0

Table 2. Mean Ferritin (ng/mL) Values Across Age and Sex

Age and Sex	Whole Blood Donation	Platelet Donation	All Donors (WB & PLT)
Male			
16–21	93.82	120.74	94.50
22–30	124.18	63.97	114.48
31–45	133.63	89.17	124.54
46+	117.63	73.89	101.64
All Ages	123.66	77.55	111.78
Female			
16-21	37.84	51.16	38.23
22-30	46.83	43.35	46.57
31-45	48.78	45.88	48.53
46+	70.22	58.54	68.84
All Ages	54.09	50.67	53.78
Male and Female, All Ages	85.87	70.80	83.24

Table 3. Annual Donation Frequency by Donation Type

Donation Count Range	Whole Blood (%)	Platelet (%)
1	73.93	44.90
2–3	20.35	25.49
4–6	4.97	13.14
7–12	0.00	9.02
12–24	0.00	7.45

Table 4. Average Ferritin by Donation Frequency

Frequency Category	Whole Blood (WB) Avg Ferritin (ng/mL)	Platelet Avg Ferritin (ng/mL)
1	102.13	103.58
2–3	66.44	83.03
4–6	53.64	83.19
7–12	N/A	63.57
12–24	N/A	53.96

Comparison of Ferritin Levels Between Whole Blood and Platelet Apheresis Donors

The comparative analysis of ferritin levels between whole blood and platelet apheresis donors demonstrated significant disparities, with platelet donors showing notably lower mean ferritin concentrations across most age and sex categories. Donors were categorized into four age groups: 16–21, 22–30, 31–45, and 46+ years. Platelet donors exhibited consistent patterns of iron depletion across these groups, with significantly lower mean ferritin levels than whole blood donors in all age groups except 16–21 years ($p = 0.11$). In this age group, although mean ferritin concentrations in platelet donors were higher than those in whole blood donors, the difference was not statistically significant [**Figure1**].

Figure 1. Comparison of mean ferritin levels between whole blood donors and platelet apheresis donors across different age groups. Platelet donors exhibited significantly lower ferritin levels in all age groups except for the 16–21-year-old category.

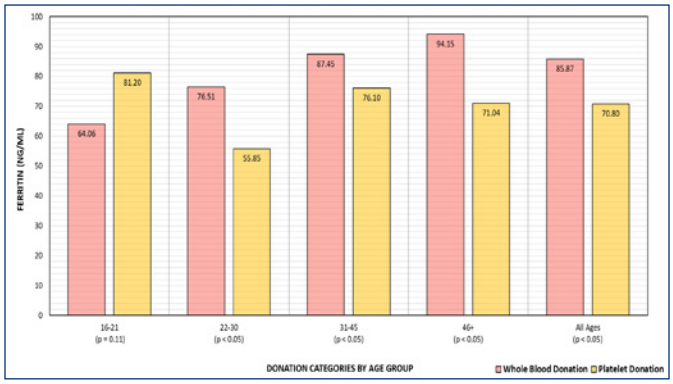
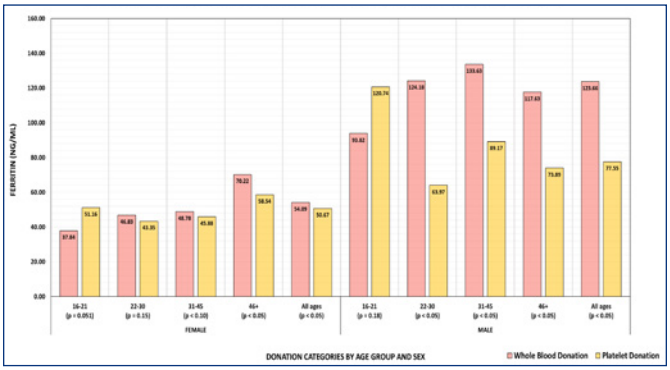


Figure 2. Age- and sex-stratified analysis of ferritin levels in male and female donors. Male platelet donors demonstrated significantly lower ferritin levels than male whole blood donors, while the effect in female donors was more pronounced in older age groups.



Age and Sex-Based Ferritin Level Comparisons in Male Donors

Male platelet donors consistently exhibited lower ferritin levels compared to their whole blood counterparts across most age groups. Specifically, in the 22–30, 31–45, and 46+ age groups, the differences were statistically significant ($p < 0.05$), with mean ferritin concentrations of 63.94, 89.17, and 73.89 ng/mL for platelet donors compared to 124.18, 133.63, and 117.63 ng/mL for whole blood donors, respectively. For the youngest age group (16–21), mean ferritin levels for platelet donors were higher than for whole blood donors (120.74 ng/mL vs 93.82, $p = 0.18$), though not significant. The mean ferritin concentration for male platelet donors across all ages was significantly lower than that for male whole blood donors (77.55 vs. 123.66 ng/mL, $p < 0.05$) [**Figure 2**].

Age and Sex-Based Ferritin Level Comparisons in Female Donors

Female platelet donors generally exhibited lower ferritin levels than female whole blood donors, though most age group comparisons were not statistically significant. Across all age groups, the mean ferritin level for female platelet donors was 50.67 ng/mL, significantly lower than the 54.09 ng/mL observed in female whole blood donors ($p < 0.05$). In the youngest group (16–21 years), female platelet donors had a higher mean ferritin level (51.16 ng/mL) than whole blood donors (37.84 ng/mL), though this difference was not statistically significant ($p = 0.051$). For the 22–30 age group, female platelet donors showed lower mean ferritin levels (43.35 ng/mL) compared to whole blood donors (46.83 ng/mL), but this difference was also not statistically significant ($p = 0.15$). In the 31–45 age group, mean ferritin levels were 45.88 ng/mL for platelet donors versus 48.78 ng/mL for whole blood donors, with the difference remaining statistically insignificant ($p = 0.10$). Only in the 46+ age group, female platelet donors showed significantly lower ferritin levels (58.54 ng/mL) compared to their whole blood counterparts (70.22 ng/mL, $p < 0.05$) [**Figure 2**].

Overall Comparison Across All Ages and Sex

In summary, across all age groups and sexes, mean ferritin levels in platelet donors were significantly lower than in whole blood donors ($p < 0.05$), indicating a higher prevalence of iron depletion among platelet apheresis donors.

DISCUSSION

Iron deficiency remains a critical issue in blood donation, particularly for frequent donors, due to the gradual depletion of iron stores, which can lead to adverse health effects.[21] The present study evaluates ferritin levels in 31,773 donors, encompassing whole blood and platelet apheresis, with the aim of identifying which groups are at highest risk for iron deficiency. Ferritin is a key biomarker used to assess iron stores in the body, and its levels are vital in maintaining donor health and ensuring the quality of blood products.[22] The findings of this study indicate a significantly lower ferritin concentration in platelet apheresis donors compared to whole blood donors, with marked differences seen across age and sex categories. This difference highlights the unique impact of apheresis on iron stores and raises questions about the long-term health implications for these donors. The discussion explores these disparities in relation to previous studies, evaluates the physiological basis for iron depletion in platelet donors, considers the implications for donor health and blood product quality, and proposes possible interventions for mitigating iron deficiency risk among frequent platelet apheresis donors.

The current study's findings align with earlier research showing that apheresis donors are particularly susceptible to iron depletion despite the generally lower immediate iron loss compared to whole blood donation.[23] The mechanism behind this phenomenon, although multifactorial, appears to be related to the frequency of donations rather than the volume of iron lost per session. In apheresis donation, only desired components are removed, and red blood cells (RBCs) are returned to the donor. While this process theoretically preserves hemoglobin and iron levels in the short term, the more frequent donation intervals allowed for apheresis donors (up to twice a week) lead to cumulative iron loss over time. Frequent platelet donations, potentially compounded by lower dietary compensation, can progressively reduce ferritin levels, resulting in chronic iron depletion.

In addition to cumulative iron loss from frequent donations, other mechanisms may contribute to the observed ferritin depletion among blood donors. Gene regulation may play a role, with possible differences in genetic control mechanisms influencing iron absorption rates, particularly when whole blood donors lose iron more quickly than platelet donors.[24] Additionally, the direct removal of ferritin

from the bloodstream during apheresis could contribute to lower ferritin levels in platelet donors, as this process may inadvertently deplete iron stores despite the return of red blood cells. The findings underscore this cumulative effect, with apheresis donors displaying consistently lower ferritin across most age groups and sex, particularly evident in males and older female donors.

While both whole blood and platelet donors experience progressively lower ferritin levels with increasing donation frequency [**Table 4**], the impact is especially marked among platelet donors because a substantial number of these donors give seven or more times per year. Their high-frequency donations disproportionately draw down platelet donor's average ferritin. Thus, although each apheresis session removes less iron than a whole blood donation, the sheer volume of repeated platelet donations drives a significant cumulative decline in iron stores, pulling the overall mean ferritin for platelet donors lower.

The analysis of sex-based differences reveals that male platelet donors show more pronounced iron depletion than their female counterparts, as evidenced by the significantly lower mean ferritin concentrations across most age groups. This discrepancy may relate to the generally higher baseline iron requirements in males due to muscle mass and higher circulating blood volume, factors that increase iron demands.

Age-related trends further emphasize the effect of donation frequency, as older age groups displayed more significant ferritin depletion in both male and female platelet donors. This trend may reflect the cumulative impact of repeated donations over time, compounded by the natural decline in ferritin levels with age. Older adults may also have dietary insufficiencies or reduced gastrointestinal absorption, potentially exacerbating iron deficiency risk.[25,26] These age-related effects are crucial to consider when developing interventions, as tailored strategies might be necessary to address the specific needs of older donors.

Iron deficiency in blood donors can lead to adverse health outcomes, which, as previous studies have shown, include fatigue, cognitive impairments, compromised immune function, and increased susceptibility to infections.[21] In donors, these symptoms could decrease the likelihood of continued donation, thereby impacting the overall blood supply. Given that platelet donors are often among the most frequent donors, managing their health is essential to sustaining the platelet supply chain. Furthermore, suboptimal iron levels in donors may have implications for the quality of the platelet products collected. Iron deficiency can impair thrombopoiesis, leading to potentially compromised platelet function and decreased therapeutic efficacy.[5] While this study did not directly assess platelet quality, the association between ferritin levels and platelet functionality warrants further investigation.

The results underscore the need for targeted measures to mitigate iron deficiency risk in apheresis donors especially for frequent donors. Routine ferritin level monitoring prior to donations could help identify donors at risk for iron depletion, enabling blood centers to proactively adjust donation frequency or defer donations as needed. Setting ferritin thresholds could act as a safeguard, ensuring donors do not dip below a level that risks health complications. Specifically, low-dose, over-the-counter iron supplements can effectively raise ferritin levels, though adherence and potential side effects must be managed. Adjusting the permissible frequency of platelet apheresis donations could help mitigate the cumulative iron loss observed in this study. While less frequent donations may temporarily impact blood product availability, the potential long-term health benefits for donors could support sustainable donation practices. Educating platelet donors on iron-rich diets and the importance of adequate iron intake could help improve dietary compensation for iron loss. Providing resources on iron-rich foods or dietary counseling services could encourage better dietary habits, particularly for high-frequency donors.

The heavy focus on iron loss in whole blood donation may also leave platelet donors overlooked regarding iron deficiency management, as interventions such as iron supplementation and donation interval adjustments are often implemented primarily for whole blood donors. This emphasis may inadvertently overlook the unique needs of frequent apheresis donors, who are also at substantial risk of iron deficiency and would benefit from similar protective measures.

Further research is needed to explore the direct impact of iron deficiency on the quality of platelet products and the physiological mechanisms underlying the observed differences between donor groups. Future studies could assess functional outcomes, such as donor fatigue levels, mental focus, and physical endurance, to capture the broader implications of iron depletion. Additionally, randomized controlled trials examining the efficacy of iron supplementation, interval extension, and dietary interventions for apheresis donors would provide valuable insights into practical solutions. Finally, exploring genetic factors or biomarkers that predispose certain donors to iron deficiency could enable personalized donor care.

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Improving Residents' Comfort with Salpingectomy at Cesarean Delivery Through Surgical Simulation

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ABSTRACT

INTRODUCTION: To study obstetric and gynecologic (OBGYN) resident comfort with performing a salpingectomy at cesarean delivery after a simulation workshop utilizing a low-cost, easy-to-construct model.

METHODS: OBGYN residents were taught how to counsel a patient on a salpingectomy and perform the steps of the procedure utilizing our simulation model. We performed a pre- and post- survey.

RESULTS: Thirty-two OBGYN residents completed the pre-questionnaire (response rate 100%) and 30 completed the post-questionnaire (response rate 94%). After the simulation, OBGYN residents felt more comfortable completing a bilateral salpingectomy at cesarean delivery (pre: 50.0% vs. post: 84.4%, p=0.001) and counseling a patient on the procedure (pre: 59.4% vs. post: 90.6%, p=0.006). After the simulation, 96.7% of residents felt the simulation workshop was useful to clinical practice.

CONCLUSION: We developed an easy-to-construct bilateral salpingectomy at cesarean delivery model to practice preoperative counseling and surgical techniques. The direct impact on surgical competency and outcomes requires further study.

KEYWORDS: medical education; simulation; prophylactic salpingectomy; resident training; risk reduction

INTRODUCTION

Molecular data suggest that a significant portion of serous ovarian cancers originate from the fallopian tubes rather than the ovary.[1-3] Bilateral salpingectomy, or removal of the entire fallopian tubes, can decrease a person's lifetime risk of ovarian cancer by a third when compared to tubal ligation, or removing just a middle segment of tube.[4-6] Due to this potential risk reduction, opportunistic bilateral salpingectomy has been rapidly adopted at both the time of hysterectomy and interval sterilization; however, this trend has not yet been seen at time of cesarean delivery.[7,8] Recent literature has demonstrated the procedure's safety and feasibility.[9-13] The limited published data on perceived barriers to offering salpingectomy at cesarean delivery include concern for increased surgical complications and a lack of equipment.[14-16] Surgical simulation using low-fidelity models has previously been shown to be beneficial in developing technical skills and improving provider comfort with abdominal surgery.[17,18]

We developed an easy-to-construct, low-cost simulation model for obstetric and gynecologic (OBGYN) residents to practice a bilateral salpingectomy at cesarean delivery using suture ligation. Our objective was to assess OBGYN resident comfort with performing a salpingectomy at cesarean delivery after a simulation workshop utilizing the model. Our secondary objective was to assess OBGYN resident comfort with counseling a patient on a salpingectomy at cesarean delivery.

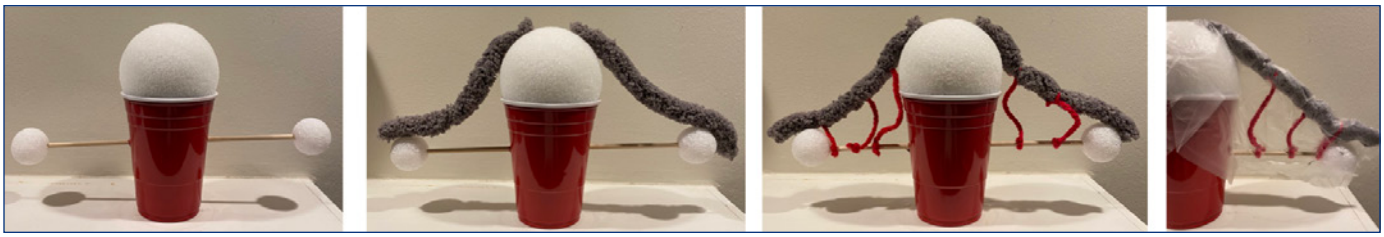
METHODS

We performed a pre- and post-survey study of OBGYN resident physicians before and after completion of a bilateral salpingectomy at cesarean delivery simulation workshop. The workshop was designed for all training years of OBGYN residency. The model was developed to simulate performance of a bilateral salpingectomy using suture ligation, to focus on mastery of foundational surgical skills and ensure comfort in lower resource settings [**Figure 1**].

The paper questionnaire comprised of 5–7 questions on resident experience and comfort with salpingectomy at cesarean delivery. The simulation workshop began with a 15-minute presentation on patient counseling and a stepwise visual depiction of the procedure. Hands-on practice of the steps of a salpingectomy using suture ligation was performed on the models [**Figure 1**]. Supplies for the models can be purchased from a local crafts store. Building eight models can cost less than $100 and be constructed in less than two hours [**Figure 1**].

Ethical approval to perform and report this study was approved by the Care New England Women & Infants Institutional Review Board (#1437846). Statistical analysis included Fischer's exact test to assess baseline categorical data and McNemar's test to assess pre-post differences in comfort counseling about and performing salpingectomy at cesarean delivery.

Figure 1. The low-cost simulation model was constructed through the following steps using materials purchased from a local crafts store.



RESULTS

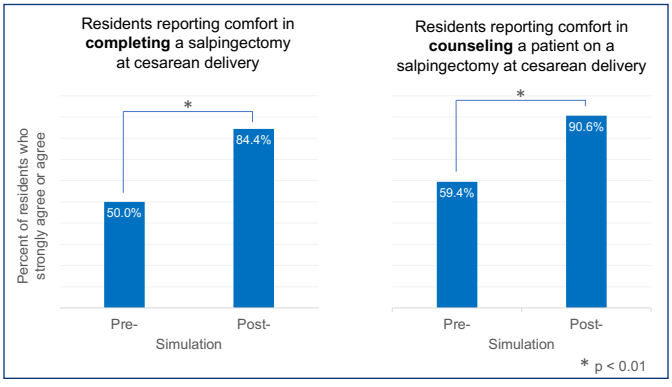
A total of 32 OBGYN residents participated in the simulation workshop. Twenty residents (PGY1-4) participated in the session on October 9th, 2020 and 12 residents (PGY1-2) participated on September 1st, 2022. No resident completed the simulation workshop twice. All 32 residents completed the pre-questionnaire (response rate 100%). Thirty residents completed the post-questionnaire (response rate 94%) as two residents inadvertently completed the pre-simulation survey twice. The pre-questionnaire was completed by 11 PGY-1, 12 PGY-2, 6 PGY-3, and 3 PGY-4 residents.

In the pre-simulation survey, 21 (66%) of residents reported ever having completed a salpingectomy at time of cesarean delivery. They reported experience utilizing suture ligation (86%) and bipolar sealing electrocautery (95%) at similar rates, but more residents reported preferring bipolar sealing electrocautery (80%) over suture ligation (20%).

After the simulation workshop, more residents "strongly agreed" or "agreed" that they felt comfortable completing a salpingectomy at cesarean delivery (pre: 50.0% vs. post: 84.4%, p=0.001) [**Figure 2**]. Similarly, more residents "strongly agreed" or "agreed" that they felt more comfortable counseling a patient on a salpingectomy at cesarean delivery (pre: 59.4% vs. post: 90.6%, p=0.006) [**Figure 2**].

Of the 30 completed post-simulation questionnaires, 29 (96.7%) residents responded that they "strongly agreed" or "agreed" that the simulation was clinically useful. One resident skipped the question.

Figure 2. Obstetric and gynecologic residents reported increased comfort in performing and counseling a patient on a salpingectomy at cesarean delivery after a hands-on simulation workshop.



DISCUSSION

We developed a low-cost, easy-to-construct model to simulate a bilateral salpingectomy at time of cesarean delivery and provide hands on practice for OBGYN residents. Despite the low-fidelity design of the model, residents were able to successfully practice fundamental surgical skills – both tactile and communication-based – that are necessary for performing the procedure. After participating in the simulation workshop, OBGYN residents reported significantly improved comfort with performing the procedure. Furthermore, OBGYN residents felt more comfortable counseling their patients on the option of salpingectomy at cesarean delivery.

A limitation in our analysis is the utilization of resident comfort as a surrogate for comfort with performing the actual surgery. The direct impact on surgical efficiency and outcomes requires further study. Additional evaluation of resident's surgical efficacy or surgical outcomes could further validate the impact of the model. While this workshop has only been implemented thus far at a single institution, we are hopeful it can be replicated at other OBGYN training programs. Future evaluation of the model could investigate its impact on competence with the procedure. Given the low cost and ease with construction of the model, the simulation has the potential to be utilized at regular intervals for trainees to maintain skill proficiency with this important procedure.[19] The supplies are easily to locate at a local craft shop and each item can be easily be substituted if needed. The workshop does require a facilitator who is comfortable with performing the procedure and teaching others the steps.

During implementation of the workshop, we valued the importance of rotating through smaller groups of residents. A higher instructor-to-resident ratio allowed for more direct observation and immediate feedback when residents were practicing on the models. Alternatively, having two or more leaders for the workshop could facilitate this higher instructor-to-resident ratio.

CONCLUSION

Surgical simulation can improve physician skills and comfort with OBGYN procedures. This simulation workshop can be easily replicated at other institutions to increase physician comfort with, and subsequent utilization of, bilateral

salpingectomy at cesarean delivery. Future research should evaluate the impact of this intervention on surgical competency and efficiency. Increasing the performance of opportunistic salpingectomy can potentially reduce rates of future ovarian cancer diagnoses.

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Assessment of Obstetric Providers' Practice Surrounding Vaccine Counseling and Administration for Non-Birthing Partners

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ABSTRACT

INTRODUCTION: Society guidelines recommend caregivers of neonates, including both co-parents, be up to date on Tdap, COVID-19, and influenza vaccines before delivery to prevent primary transmission of vaccine-preventable diseases to the infant. However, only one third of reproductive-age individuals are up to date on recommended vaccinations. Pregnant individuals often receive recommended vaccines during prenatal care, but limited research has investigated if prenatal care can also provide opportunities to increase vaccination rates among non-birthing partners/co-parents.

METHODS: We administered an anonymous survey to outpatient prenatal care providers, including Obstetricians, Family Medicine physicians, Certified Nurse Midwives, and Nurse Practitioners, to assess practice patterns and opinions regarding vaccine counseling and in-office vaccination for the non-birthing partners of pregnant patients.

RESULTS: Of the 200 obstetric providers surveyed, 112 responded (56%). Of these, 42% (n=77) reported counseling non-birthing partners on vaccine recommendations less than half the time. Only 4% (n=4) of respondents report vaccinating non-birthing partners who are not already patients in their practice. Nearly half of providers who do not offer non-birthing partner vaccination had never considered the practice (46%, n=44). The majority of respondents desired more education on non-birthing partner vaccination (58%, n=55). Respondents identified multiple implementation barriers to vaccinating non-birthing partners, including difficulties with registration, staffing, and time constraints. If barriers were addressed, 68% (n=65) of providers expressed willingness to incorporate non-birthing partner vaccination into their practice.

CONCLUSIONS: This study demonstrates willingness of key stakeholders to incorporate non-birthing partner vaccination into prenatal care, a unique mechanism to increase parental vaccination rates and protect neonates from vaccine-preventable illness.

INTRODUCTION

Vaccinations are a critical part of health maintenance and are the mainstay for decreasing infection-related morbidity and mortality for infants, children, and adults.[1] The benefits of maternal vaccination during pregnancy are well known,[2-8] as vaccines offer protection for the pregnant individual as well as passive immunity for the neonate. However, most infants remain inadequately protected from maternal vaccination alone, making them susceptible to vaccine-preventable illness. Many neonatal infections can be traced to direct exposure from a parent.[9-11] Therefore, the Centers for Disease Control and Prevention (CDC), the American College of Obstetricians and Gynecologists (ACOG), and the American Academy of Pediatrics (AAP) recommend all infant caregivers ensure that they are up to date with recommended vaccines, including tetanus, diphtheria, and pertussis (Tdap), COVID-19, and influenza at least two weeks prior to birth of the newborn.[12-15]

Reproductive-aged individuals aged 18–49 years old have the lowest documented vaccination rates in the United States for Tdap (32%), influenza (38%), and COVID-19 (22.3%).[16-19] Furthermore, there are significant racial and ethnic disparities in vaccination uptake, with individuals who identify as Black or Hispanic and those with lower socioeconomic status having the lowest rates of vaccination.[20,21] The reason for the low rates of vaccination uptake in this age group may be due in part to the fact that 50% of reproductive-age individuals do not seek preventative healthcare.[22] Thus, efforts aimed at increasing vaccination during primary care visits are not sufficient to lead to an increase in vaccination rates in this demographic. To address deficits in vaccination compliance, organizations, including the CDC, the Institute of Medicine, and Community Preventative Services Task Force, have called for innovative programs to incorporate young adult vaccination into clinical practice and minimize encounters during which eligible individuals fail to get vaccinated (so called "missed opportunities").[3,17]

The field of obstetrics has demonstrated success in increasing vaccination rates in pregnant patients through counseling and in-office maternal vaccination during prenatal care.[2,3,5] Prior literature has demonstrated that 64–90% of non-birthing partners (i.e., co-parent, hereafter referred to as "partner") interact with obstetric providers while accompanying their pregnant partner to at least one of their prenatal

visits, ultrasounds, delivery, or postpartum hospital stays.[23] Therefore, prenatal care represents a prime opportunity for vaccination engagement for both pregnant individuals and their partners. Specifically, prenatal visits may provide a setting for vaccine education as well as point of care for administration of vaccines for partners who may not otherwise interact with healthcare professionals.[4,24]

Despite society recommendations for counseling on caregiver vaccination, there are few studies regarding vaccinations of non-birthing partners during prenatal care.[24] To address this deficit in the literature, we surveyed obstetric providers on their current practice patterns for vaccine counseling and in-office vaccine administration for non-birthing partners. We hypothesized that the majority of obstetric providers will provide counseling on vaccine recommendations, but will not routinely provide in-office vaccination opportunities for non-birthing partners due to administrative burden.

METHODS

Study Sample

To assess obstetric providers' vaccine counseling and administration practices for pregnant patients and non-birthing partners, we designed the survey with the input of vaccine (EH) and survey design (MAC) experts and pilot-tested the survey in our target population. We administered the final cross-sectional, anonymous electronic survey to a diverse sample of 200 providers who identified as Obstetricians, Family Medicine physicians, Certified Nurse Midwives (CNMs), or Nurse Practitioners (NPs) and who provide outpatient prenatal care in the state of Rhode Island. This sample was derived from a list of active prenatal care providers in the state whose practices admit to one of the five maternity hospitals (four community hospitals and one academic center). The anonymous electronic Qualtrics survey was distributed via hyperlink and QR code to an email listserv of providers. The survey was open from November 2023 through March 2024. This survey was deemed to be exempt by the Women & Infants Hospital of Rhode Island Institutional Review Board (IRB #2052960).

Measures

The electronic link provided a description of the study, a consent form, and the screening questions, "*Do you provide prenatal care to pregnant patients in an outpatient office or clinic?*" and, "*What is your current role?*" to ensure participants identified as the target population of outpatient prenatal care physicians or advanced provider practitioner (i.e., CNM or NP). Consenting, eligible participants were directed to the complete the questionnaire [**Supplementary document available upon request**]. The initial series of multiple choice questions assessed current practice patterns surrounding vaccination. Items were designed to assess how often providers discussed vaccine recommendations with pregnant patients and non-birthing partners using a Likert scale ranging from "Never" to "Always". Non-birthing partners for the purposes of this study were specifically described as "co-parent, spouse, significant other and/or domestic partner of [respondent's] pregnant patient." To assess current vaccination administration practices, providers were asked to whom (i.e., non-pregnant patients, pregnant patients, and/or non-birthing partners) and which specific vaccines they administered within their office or clinic to determine general vaccine availability within practices.

Respondents were then queried to identify the perceived degree of impact specific factors had on administration of vaccines to non-birthing partners. Factors addressed were modified from prior studies assessing barriers to in-office vaccination for pregnant patients in obstetrics and gynecology offices.[25] These factors included administrative burdens, cost, staffing, time, and discomfort in vaccinating a non-patient. Additionally, providers were asked whether they had previously considered vaccinating partners and whether this lack of consideration was a factor in their current practice patterns. The perceived degree of impact of each factor was assessed using a four-point Likert scale of "major factor", "moderate factor", "minor factor", and "not a factor".

Participants who were not currently providing in-office partner vaccination were then asked, "*Is offering vaccination to partners of pregnant patients something you would be interested in offering/incorporating into your practice if the barriers you previously identified were addressed?*" to assess their willingness to incorporate non-birthing partners vaccination into their routine practice. To assess the desirability of educational opportunities and resources regarding vaccination recommendations, providers were asked, "*Would you be interested in receiving more information about formal educational opportunities and resources regarding vaccination recommendations for partners of pregnant patients?*" Participants were asked if they had received at least one vaccine to protect against COVID-19 as a proxy of general vaccine acceptance. Finally, demographic and practice information were solicited to provide context for interpretation of results.

Statistical analysis

Tables for descriptive statistics were generated to explore the distribution of the survey results among participants using IBM SPSS Statistics (Version 27). Given the nature of the survey questions, no responses were considered outliers. Survey responses were also analyzed by provider role (i.e., obstetrician/MFM, Family Medicine physician, or advanced practice provider [i.e., CNM/NP]) to assess for difference in practice patterns based on provider background.

Table 1. Demographics of Provider Participants

	N (%)
All	**111**
Provider type	
Obstetrician	54 (48.6)
Maternal-Fetal Medicine Physician	10 (9.0)
Family Medicine Physician	27 (24.3)
Nurse Practitioner	2 (1.8)
Certified Nurse Midwife	18 (16.2)
Practice type*	
Academic Medical Center	39 (41.5)
Community based clinic	32 (43.0)
Community based hospital	14 (14.9)
Large health system (e.g. Kaiser)	5 (5.3)
Private Practice	23 (24.6)
Total number of providers in office	
1	2 (2.1)
2–5	10 (10.8)
6–10	28 (30.1)
11+	54 (58.1)
Prenatal visits per week	
1–25	51 (55.4)
26–50	30 (32.6)
51–75	8 (8.7)
76+	3 (3.3)
Years in practice	
<1	1 (1)
1–5	35 (37.2)
6–10	19 (20.2)
11–20	16 (17.0)
>20	21 (22.3)
Received ≥ 1 COVID-19 Vaccine	
Yes	93 (98.9)

*Options for practice type were not mutually exclusive; Percentages were calculated based on number of responses received for each question. Some percentages do not add up to 100% due to rounding and/or participant preference to not answer.

Figure 1. Frequency of vaccine counseling for pregnant patients and non-birthing partners.

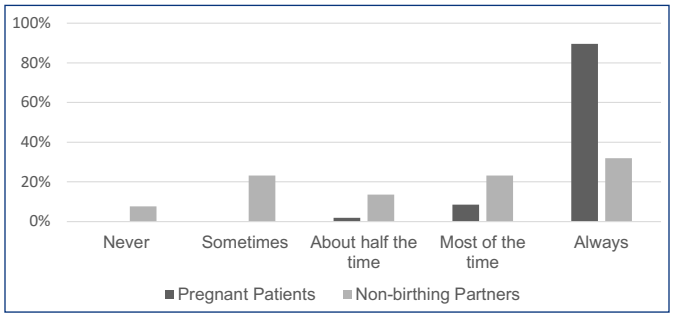
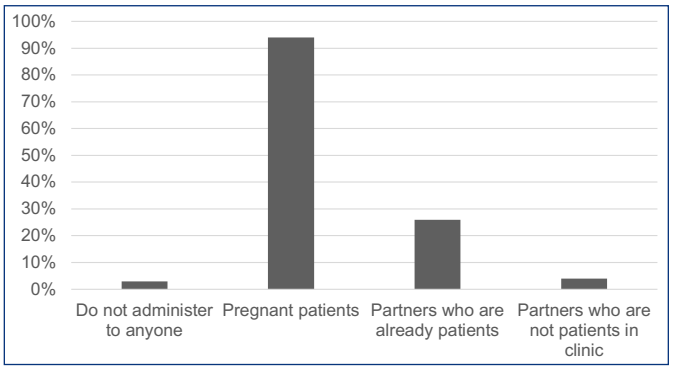


Figure 2. In-office vaccine administration by type of recipient. Survey respondents indicated all categories of vaccine recipients to whom they currently provide in-office vaccinations. Partners were dichotomized as those who were already registered as patients and those who were not already registered as patients in the respondent's practice.



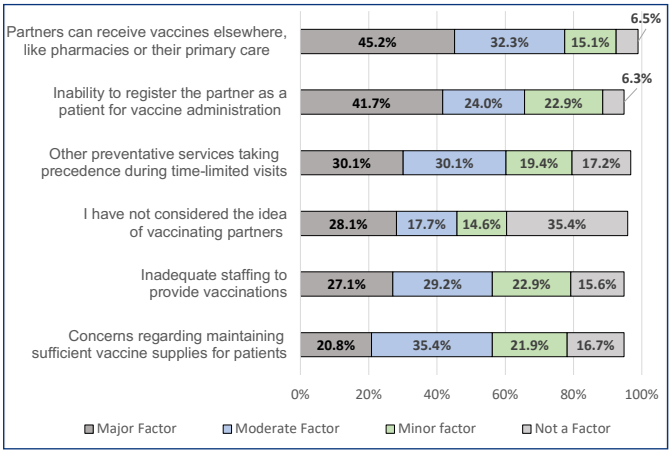
RESULTS

Of the 200 prenatal care providers contacted, 112 (56%) consented and 111 initiated the survey (55.5%). Of these, 97 (87%) completed the entirety of the survey, with the remaining 14 answering all but the last five demographic questions. The majority of respondents were Obstetricians (45.9%) or Family Medicine Physicians (24.3%) who had practiced for 10 to 20 years (74%), in an academic center (41.5%) or community-based clinic (34.0%), and were part of a clinic or office with 11+ providers (58.1%) [**Table 1**]. The majority of respondents saw 1–25 prenatal visits per week (55.4%). Almost all (98.9%) of providers had received at least one vaccine to protect against COVID-19.

When asked how often the respondents explicitly discuss the recommendation for at least one vaccination for non-birthing partners, only 55.3% reported doing so "most of the time" or "always". In contrast, 98.1% of providers reported that they "most of the time" or "always" discuss at least one recommended vaccination for the pregnant patient [**Figure 1**]. The majority of participants (93.1%) reported vaccinating pregnant patients in the office to Tdap (97.7%), influenza (96.5%), and COVID-19 (51.2%). In contrast, only 3.9% (n=4) of respondents vaccinate non-birthing partners who are not already registered as a patient in the office or clinic [**Figure 2**]. Among the four respondents who confirmed vaccination of partners who were not already patients, three out of four were family medicine providers and only one was an obstetrician [**Supplementary tables available on request**].

When asked about factors preventing in-office partner vaccination, the most frequently identified major or moderate factors were, "Partners can receive vaccines elsewhere, like pharmacies or their primary care physicians" (77.4%), "inability to register the partner as a patient for vaccine administration" (65.6%), "other preventative services taking precedence during time-limited visits" (60.2%), "inadequate staffing to provide vaccinations" (56.3%), and "concerns regarding maintaining sufficient vaccine supplies for patients" (56.3%) [**Figure 3**]. Importantly, 45.8% of respondents identified, "I have never considered the idea of vaccinating partners" as a major or moderate factor.

Figure 3. Barriers to in-office administration of vaccines to non-birthing partners. (Some percentages do not add up to 100% due to rounding and preference to not answer.)



The majority of obstetric providers (75.8%) indicated an interest in incorporating vaccination of non-birthing partners into prenatal care if barriers were addressed, compared to only 26.8% who responded "maybe" and 8.2% who responded negatively. The majority of participants (57.9%) reported a desire to receive additional education regarding vaccine recommendations for partners with an additional 23.3% indicating they may be interested. Only 21% (N=20) of providers expressed no interest in further education.

DISCUSSION

This study describes obstetric providers' practice patterns surrounding vaccination of pregnant and non-birthing partners. We found that while obstetric providers consistently provide counseling and vaccination to pregnant individuals, they only provide counseling on recommended vaccinations for partners approximately half the time and rarely provide in-office vaccine administration to partners. Barriers to vaccinating non-birthing partners include both logistical factors such as limited time at visits and difficulty registering partners, as well as attitudinal barriers such as providers believing that partners can receive their vaccines elsewhere or having never considered providing partner vaccination. Importantly, the majority of obstetric providers would be willing to incorporate non-birthing partner vaccination into their practice if identified barriers are assessed. These results suggest prenatal care providers support the incorporation of non-birthing partner vaccination into routine prenatal care, while demonstrating needs to both further efforts to educate obstetric providers on partner vaccination and to address barriers to implementation into routine prenatal practice.

Meghani et al demonstrated that 83% of providers recommended COVID-19 vaccination to pregnant patients,[26] and O'Leary et al found that >90% of obstetric providers provide in-office vaccination to Tdap and influenza to pregnant patients,[25] similar to rates for vaccine counseling of pregnant individuals reported in our study. O'Leary et al also noted that while financial barriers hindered some vaccination, there were also rare reports of attitudinal barriers (i.e., opinions against pregnant patient vaccination) in their study. Regarding obstetric providers' practice regarding partners vaccination, our study not only identified financial factors that inhibited partner vaccination efforts, but also found significant attitudinal barriers (i.e., opinions that partners can receive vaccines elsewhere) as common barriers impeding the implementation of partner vaccination during prenatal care.

Our study demonstrates that nearly half of obstetric providers do not counsel on recommendations for partner vaccination, a missed opportunity to improve vaccination rates in this population. Since vaccine education by a trusted provider is critical to vaccine uptake,[27-30] efforts to increase provider knowledge and vaccination counseling practices is likely critical to increasing vaccine uptake for partners. Furthermore, decreasing barriers to vaccine access for non-birthing partners though vaccination during prenatal care visits has the potential to increase immunization rates for partners. In one prospective acceptability study, Steiner et al demonstrated that in their cohort, 61% of partners who were eligible for Tdap vaccination accepted vaccination in the prenatal office.[24] Increasing partner vaccination will decrease infection risk for the individuals themselves, their pregnant partner, and their neonates while filling a broader public health need by increasing herd immunity and protecting communities as a whole.

In order to incorporate new programs into clinical practice, acceptability, feasibility and efficacy must first be demonstrated.[31,32] To determine acceptability, the necessary stakeholders must be willing to participate. For partner vaccination during obstetric care, both providers and the partners themselves must be amenable. This study provides evidence of acceptability from provider's perspective. However, while preliminary studies have demonstrated partners willingness to be vaccinated,[24,33] the current needs and the desirability of a prenatal vaccine program needs to be more thoroughly explored with a diverse population of non-birthing partners.

While this study highlights new data showing that the majority of providers are interested in considering incorporation of a partner vaccination program within prenatal clinics, it raises many important implementation questions. Specifically, obstetric providers identified both educational and administrative factors that need to be addressed. It is also important to note that 45.8% of providers ranked "I have never considered the idea of vaccinating partners" as a major or moderate barrier in prior vaccination of partners. This highlights that educational initiatives are needed for providers regarding partner vaccination as a first step to incorporation of vaccination of partners into clinical practice.

Our study has many strengths. Our response rate of 56%, with 87% of respondents completing the survey in full – is consistent with recent studies on healthcare provider survey response rates.[34] Furthermore, we surveyed multiple different types of obstetric providers (physicians, CNMs, NPs) with various medical specialty backgrounds (Obstetrics, Maternal-Fetal Medicine, and Family Medicine) in both community and academic settings, allowing our results to be generally applicable to a wide variety of prenatal care providers in different practice settings. Our study also identified gaps in provider counseling and education regarding vaccination as well as barriers to vaccination that will assist with future studies aimed at prenatal partner vaccination to optimize effectiveness of future work.

Nevertheless, our study is not without limitations. First, while the survey was designed with input from vaccine and survey design experts and pilot tested within the target population, the survey has not been externally validated. Secondly, all survey data were anonymized. Though this is considered best practice to promote honest responses from participants on sensitive topics,[35-39] obtaining anonymous data prevented us from contacting individuals to obtain more information about their responses and limits our ability to collect data on non-respondents. Third, although our response rate was to the questions regarding vaccine practices was 56%, 14 out of 111 individuals who participated (14%) did not complete the final five demographic questions indicating potential participant fatigue. These providers were similar in provider type to the whole cohort, as this information was collected upfront during eligibility screening. Nevertheless, efforts to reduce this fatigue and succinctly gather the necessary information must be considered for future iterations of this survey. Lastly, this study focused on Rhode Island obstetric providers and may not reflect attitudes or experiences from providers in other states. A larger nationwide survey is needed to demonstrate different practice patterns nationally.

CONCLUSIONS

This study demonstrates that although non-birthing partner vaccination counseling is not a routine part of a prenatal care for a large portion of surveyed prenatal care providers, there is significant interest in both education and incorporation of non-birthing partner vaccination into prenatal care. Further studies are needed to assess the feasibility and effectiveness of partner vaccination in prenatal clinics.

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Engagement in Medical Care Among People Living with HIV in Rhode Island, 2019–2024

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BACKGROUND

As part of the Paris Declaration on Fast-Track Cities Ending the HIV Epidemic, Rhode Island is committed to achieving the 95-95-95 goal which outlines the following targets: 95% of people living with HIV know their status, 95% of those diagnosed with HIV are receiving treatment, and 95% of HIV cases on treatment have achieved viral suppression.[1] This ambitious goal was set with the intention of ending the HIV epidemic by 2030 and builds off the previously outlined 90-90-90 goal established in 2014 by UNAIDS.[2] HIV treatment significantly improves the overall health outcomes for people living with HIV (PLWH) and generates substantial population-level benefits by disrupting HIV transmission. PLWH who achieve and maintain an undetectable viral load by consistently taking their antiretroviral therapy (ART) cannot transmit HIV to their needle-sharing or sexual partners. Due to this, ensuring individuals diagnosed with HIV are linked to and retained in medical care is instrumental in reducing HIV transmission.

Nationally, among approximately 1.1 million PLWH at the end of 2023, 76% had received HIV treatment, 55% were retained in medical care, and 67% had achieved viral suppression.[3] Rhode Island is currently surpassing these national averages due to its multifaceted approach to engagement and retention in care for PLWH. In Rhode Island, it has previously been estimated that 93% of PLWH know their status, 76% of those that know their status are engaged in care, and 93% of those engaged in care have achieved viral suppression.[4] The high rates of viral suppression among HIV cases engaged with medical care highlight the importance of sustained engagement and suggest that focused efforts on increasing the number of cases linked to care could result in meaningful reductions of HIV transmission in the state.

The Rhode Island Department of Health (RIDOH) conducts three major activities focused on engagement in care: (1) attempting to outreach and link all newly diagnosed cases of HIV in RI to medical care, (2) operating a return-to-care provider referral system that supports HIV medical and non-medical providers in locating and re-engaging cases who have fallen out of care, and (3) using surveillance-based methods to identify PLWH who are potentially not in care. RIDOH also has field staff available to minimize barriers in retention to care, such as scheduling assistance and transportation to appointments for PLWH. Additionally, the work being done by medical providers and AIDS service organizations in RI who conduct case management activities to ensure their patients and clients are engaged in care plays a large role in the high levels of engagement we observe in the state.

The purpose of this paper is to provide a comprehensive snapshot of PLWH who have fallen out of medical care in RI between 2019–2024 and to describe yearly trends in engagement in care of HIV cases.

METHODS

Data were reviewed from the HIV Surveillance database eHARS (Enhanced HIV/AIDS Reporting System) of PLWH and residing in Rhode Island between 2019–2024. Descriptive characteristics including sex at birth, age, race and ethnicity, risk, country of birth, and place of diagnosis were examined. Some demographic categories were collapsed due to RIDOH's small numbers policy which prohibits counts of <5 to be published. Prevalence estimates were generated using surveillance and CD4 data for persons aged ≥13 years old at diagnosis.

PLWH who resided in RI during the specified year were considered to be not in care (NIC) if: (1) they were presumed to be alive when the datasets were updated and exported from eHARS, (2) they have no reported CD4 count or percent, HIV viral load, or HIV-1 genotype test results in eHARS based on a specimen collected during the specified year, and (3) they have no other evidence of receipt of HIV medical care during the specified year. HIV cases who appeared to be out of care for 10 or more years were excluded from this analysis based on the assumption that they moved outside the state or are deceased. It typically takes eight to ten years for HIV to progress to stage three disease (AIDS) and the life expectancy for individuals diagnosed with AIDS who are not on ART is one to three years.[5] Case counts of individuals not in care were further divided into two categories: chronically not in care and newly not in care. Chronically not in care was defined as PLWH who were not in care for two or more consecutive years. Newly not in care was defined as PLWH who were engaged in care in the previous year and had fallen out of care during the specified year. All analyses were performed using SAS (version 9.4).

RESULTS

Between January 2019–December 2024, 1,418 unique PLWH were identified as out of care in RI at some point during the six-year timeframe. The majority of individuals who had fallen out of care were male (76.3%) and most identified as non-Hispanic White (43.3%) followed by Hispanic (27.9%) and non-Hispanic Black (25.5%). Middle-aged PLWH compromised the bulk of those not in care with the 55–64 age group (27.9%) being the most common, followed by the 45–54 (24.5%) and 35–44 age groups (20.1%), respectively. Smaller percentages of young (13–34 years) and elderly (65+ years) PLWH were observed in those who had fallen out of care. The most common risk groups were men who have sex with men (MSM) (45.2%) and heterosexual contact (23.0%). This corresponds with overall risk breakdowns in people diagnosed with HIV in RI where injection drug use (IDU) remains low.[4] More than half of PLWH who were not in care were US-born (59.2%); however, there were a notable number of foreign-born cases not in care as well (27.4%). As expected, many of those not in care were PLWH who had been diagnosed in RI (53.3%), followed by those who had been diagnosed in another US state (28.2%). [**Table 1**]

When excluding cases who have no evidence of residing in RI for 10 or more years, the percent of PLWH who engaged in medical care has been stable between 2019–2024 at approximately 81% or greater, except in 2021 when we saw a decline to 77% engaged in care. The number of PLWH who were chronically not in care has continued to rise over this 6-year timeframe. In addition, out of all PLWH in RI, the percent who fell out of care each year has remained low at 7% between 2019–2024, except in 2020 and 2021 where we saw an increase. This provides evidence that RI has achieved consistently high levels of engagement in care and successfully retains approximately 93% of HIV cases in care every year, with the pandemic years being the exception. **[Figure 1]**

Those not in care were further categorized into chronically not in care and newly not in care to better understand

Table 1. Sociodemographic Characteristics Among PLWH Identified as Not in Care in RI, 2019–2024

Characteristic	Not in Care N=1,418
Sex at Birth	
Male	1,082 (76.3%)
Female	334 (23.6%)
Race/Ethnicity	
Not Hispanic, White	614 (43.3%)
Not Hispanic, Black/African American	362 (25.5%)
Hispanic, any race	396 (27.9%)
Not Hispanic, Other	26 (1.8%)
Age Groups	
13–24	27 (2.0%)
25–34	192 (13.5%)
35–44	285 (20.1%)
45–54	347 (24.5%)
55–64	396 (27.9%)
65+	166 (11.7%)
Risk Factors	
MSM	641 (45.2%)
IDU	178 (12.6%)
MSM & IDU	80 (5.6%)
Heterosexual/Presumed Heterosexual	326 (23.0%)
Perinatal	14 (1.0%)
Country of Birth	
US	840 (59.2%)
Foreign-born	389 (27.4%)
Place of Diagnosis	
RI	756 (53.3%)
Other US State	400 (28.2%)
Other Country	83 (5.9%)

Figure 1. Percent of PLWH in Rhode Island Engaged in Medical Care, 2019–2024

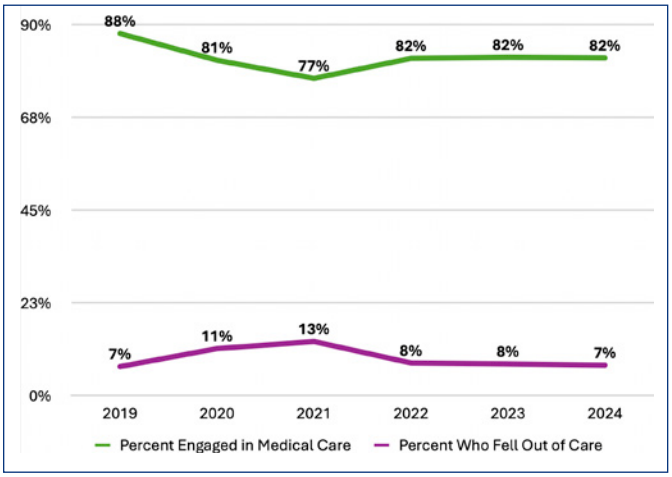
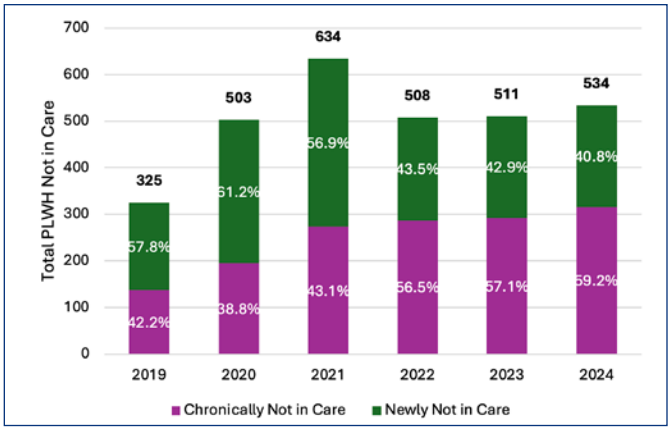


Figure 2. PLWH Not in Care in Rhode Island, 2019–2024



if previous engagement in care estimates in RI were being impacted by individuals repeatedly not in care year after year. In 2019, 42.2% of not in care cases were chronically not in care compared to 59.2% in 2024. Further analysis is required to determine if this is due to cases who we couldn't verify moved out of RI, inflating the chronically not in care counts or if PLWH who fall out of care aren't being successfully re-engaged. [**Figure 2**]

DISCUSSION

Two major activities in RI that can contribute to the engagement in care estimates include locating and re-engaging individuals referred in our return-to-care (RTC) program and investigating cases identified as not in care (NIC) through our surveillance-based methods to verify if they have moved out of state or are deceased. In 2020, our RTC program and NIC investigations were put on pause due staffing capacity during the COVID-19 pandemic. We resumed our RTC program in July 2022; however, NIC investigations have remained paused through 2024. The slight decline in engagement in care in 2021 may be explained by additional barriers to care introduced during the COVID-19 pandemic and the pause of both RIDOH's RTC program and NIC investigations. Given that 2019 had the highest percent of cases engaged in care and smallest count of individuals chronically not in care, it is possible that NIC investigations generated a more accurate number of those truly not in care in RI.

Previous engagement in care estimates for RI were measured with no exclusion of individuals who have been out of care for extended amounts of time, often including PLWH who have been out of care for up to 35 years. Thus, previous engagement in care estimates for RI have been underestimating the level of engagement in care of PLWH in the state. There are many limitations with assessing individuals not in care based on receipt of laboratory documents as a proxy for care. State health departments conduct routine interstate duplicate review twice a year to identify PLWH who have moved outside their jurisdiction, ensuring prevalence estimates are accurate. However, individuals who have moved out of the country will continue to be identified as not in care because there is no way to verify that they are no longer in the US. Additionally, PLWH who move out of state while they are undetectable and remain undetectable may not be identified in other state health department's surveillance databases as a case, making it appear that the individual is out of care in RI. Lastly, individuals who have attended medical appointments but did not get lab work done will also appear as not in care when they have engaged with their medical provider. Therefore, even with the exclusion criteria applied to engagement in care estimates presented in this paper, it is highly probable that engagement in care among PLWH in RI is even higher.

Recently, both Massachusetts and Connecticut have described trends in engagement in care in their jurisdictions, reporting differences by age, race/ethnicity, and risk.[6-8] Further analysis and statistical modeling are required to come to any conclusions about factors associated with engagement in care in RI. This analysis was conducted to broaden our understanding of populations successfully engaged in care in RI and importantly, populations not engaged in care. The results of this paper will be used to improve RIDOH's activities designed to engage or re-engage people in care. Additional analysis will be performed to understand the impact of the RTC program on engagement in care in subsequent publications.

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

VITAL EVENTS	REPORTING PERIOD		
	JANUARY 2025	12 MONTHS ENDING WITH JANUARY 2025	
	Number	Number	Rates
Live Births	912	10,911	10.3*
Deaths	1,057	10,713	10.1*
Infant Deaths	4	43	3.9#
Neonatal Deaths	2	30	2.7#
Marriages	309	6,815	6.4*
Divorces	199	2,507	2.4*

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

Underlying Cause of Death Category	REPORTING PERIOD			
	JULY 2024	12 MONTHS ENDING WITH JULY 2024		
	Number (a)	Number (a)	Rates (b)	YPLL (c)
Diseases of the Heart	199	2,422	220.73	3,092.5
Malignant Neoplasms	184	2,208	201.2	4,351.5
Cerebrovascular Disease	43	450	41.0	602.0
Injuries (Accident/Suicide/Homicide)	90	961	87.6	11,079.5
COPD	41	460	41.9	425.0

(a) Cause of death statistics were derived from the underlying cause of death reported by physicians on death certificates.
(b) Rates per 100,000 estimated population of 1,097,379 for 2020 (www.census.gov)
(c) Years of Potential Life Lost (YPLL).

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

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Bridging Gaps in Medical Toxicology Expertise Via Instant-Messaging Technology: The Experience of Nepal's First Institution-based Poison Information Center

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INTRODUCTION

Nepal, a predominantly agrarian country, with vast topographical variation, faces a significant burden of toxicological exposures due in large part to widespread availability of unregulated hazardous pesticides.[1] In 2018–2019 the country recorded 5,754 (19.18 per 100,000 population) suicides; over 24% of these deaths resulted from poisoning, most of which involved ingestion of highly concentrated agricultural pesticides.[2] Nepal also has a high burden of snakebite mortality, especially amongst socioeconomically disadvantaged groups, with nearly 250 snakebites per 100,000 people in the flat regions.[3] Despite this pressing public health threat, Nepal lacks formal medical toxicology training programs, resulting in a scarcity of trained medical toxicologists.[4] This deficiency has historically impeded development of structured toxicological services and establishment of domestic poison information centers. In response to this critical gap, the Nepal Poison Information Center (Nepal-PIC) was established at an academic institution in Kathmandu, Nepal, employing an innovative, technology-driven model to provide expert support in a low-resource setting.[4] This commentary explores the development and implementation of this innovative support model, highlighting its components, challenges, and lessons learned.

LEVERAGING INSTANT-MESSAGING TECHNOLOGY TO SUPPORT POISON INFORMATION CENTER STAFF

The inception of the Nepal-PIC was a collaborative effort to address the urgent need for accessible toxicological information and expertise across Nepal.[4] This process began with a comprehensive needs assessment, which underscored the high incidence of poisoning cases and concomitant lack of specialized medical toxicology services.[4] Recognizing these challenges, a multilateral international partnership was formed, bringing together a government academic institution (Tribhuvan University Teaching Hospital Clinical Pharmacology Department), a local non-profit organization (ASK Foundation), and an international academic department (Brown University Department of Emergency Medicine) as collaborators in a pilot project.[4] This coalition aimed to create a sustainable infrastructure that delivers real-time, evidence-based toxicological support to healthcare providers nationwide.

A critical component of the center's establishment was the development of a tiered support system designed to compensate for the limited number of local toxicology experts. This system ensures that Specialists in Poison Information (SPIs) have access to a hierarchy of expertise, facilitating effective case management. SPIs selected for the Nepal PIC were licensed medical school graduates who had not yet pursued postgraduate specialty training. Despite baseline medical knowledge commensurate with graduating medical school, SPIs possessed no previous medical toxicology training. Prior to initiation, SPIs underwent training with a database of recorded toxicology lectures, and received synchronous training. In addition, some SPIs received scholarships from NIHR Right 4 to attend training sessions at the Asian Pacific Association of Medical Toxicology (APAMT) and the Middle East and North Africa Clinical Toxicology Association (MENATOX) annual conferences.[5] To independently and safely provide medical advice commensurate with level of training, SPIs utilized a just-in-time toxicology database called TOXBASE.[6] TOXBASE is a clinical toxicology resource developed by the UK National Poisons Information Service, which provides comprehensive information on various toxic substances, aiding SPIs in the initial assessment and management of poisoning cases. As a second line of support to help SPIs with their remote care of poisoned and envenomated patients, a local expert group was formed, comprising clinical and non-clinical experts from Emergency Medicine, Critical Care, Botany and Clinical Pharmacology, as well as snake and plant identification experts. This group was connected with the SPIs through WhatsApp®, a widely used messaging platform in Nepal, allowing SPIs to seek prompt advice when needed. The use of WhatsApp® facilitated rapid communication and decision-making, which is essential in time-sensitive poisoning cases.

Recognizing the need for a third and final line of support in select cases, an international expert group was also established. The international expert group consisted initially of four volunteer medical toxicologists from various countries and time zones, and eventually expanded to 17 medical and clinical toxicologists [**Figure 1**]. This global network ensures 24/7 availability of specialized knowledge in cases for SPIs

Figure 1. Geographic distribution of international experts supporting the Nepal Poison Information Center (PIC). The Nepal-PIC relies on a global network of toxicology experts spanning over eight time zones and enables near 24/7 expert consultation via WhatsApp®. This ensures timely guidance on poisoning cases in a setting with limited in-country toxicologic care capacity.

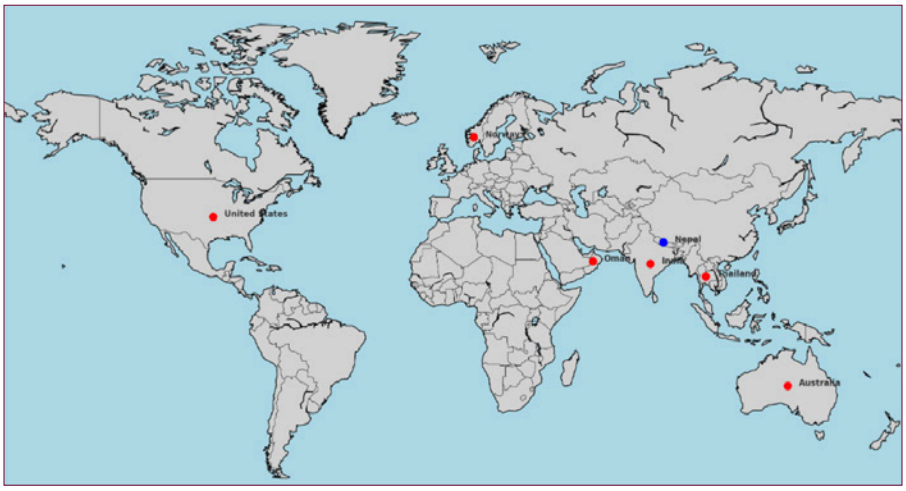
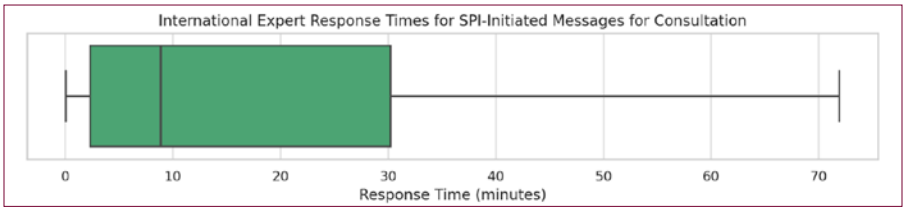


Figure 2: Boxplot showing international expert response times to SPI-initiated messages for consultation via WhatsApp®.



when necessary. During the pilot phase of establishing the Nepal-PIC, approximately 28% of cases needed input from international experts. The average response time from these experts was prompt, with median response time of 8.9 minutes, underscoring the efficacy of this collaborative approach [**Figure 2**].

The integration of WhatsApp® to support SPIs exemplifies how technology can overcome resource limitations. WhatsApp's® features, including encrypted messaging and multimedia sharing, enabled SPIs to securely transmit laboratory test results, de-identified images, electrocardiograms, and case details. This capability facilitated accurate and timely consultations and served as a valuable educational tool, enhancing the SPIs' knowledge and confidence in managing complex cases.

EDUCATION AND CAPACITY BUILDING THROUGH TARGETED TRAINING

Beyond case consultations, structured educational programs designed to build capacity among its SPIs and local providers were conducted by the Nepal-PIC. The selection of topics is driven by real-time data and needs assessments. For example, as snakebite-related inquiries increased during the monsoon season, a lecture on snake identification and envenomation management was prioritized. Similarly, mushroom poisoning lectures were scheduled during peak foraging seasons.

Once a topic is identified, an international expert is approached to deliver the session. Upon confirmation, flyers are designed, and invitations are disseminated across WhatsApp® groups and professional networks through social media. Each session follows a hybrid teaching model that includes both international expertise and a local presenter for local contextualization. Alongside the international expert lecturer, a local physician with experience in managing toxicological cases provides insight into region-specific challenges, treatment availability, and case studies from Nepal.

Following the live sessions, the recorded lectures are uploaded to an open-access platform on YouTube®, ensuring continued availability for future reference. This system has created a repository of high-quality toxicology education tailored to Nepal's unique epidemiological profile.

CHALLENGES AND CONSIDERATIONS

While the model has been successful, several challenges were encountered. Ensuring the confidentiality of patient information shared over WhatsApp® required strict adherence to data protection protocols. Messages were encrypted, and patient identifiers were removed to maintain privacy. Inconsistent internet access, especially in remote areas, occasionally hindered real-time communication. Maintaining the engagement of international experts, all of whom are volunteers, is crucial to the sustainability of this model. Anecdotally, international experts have appreciated the opportunities to participate in toxicology infrastructure building at the Nepal-PIC through teaching, as well as through consultations regarding toxic exposures rarely encountered in their respective countries. Another challenge has been integrating toxicology training into Nepal's medical education system, which will require continued advocacy effort.

LESSONS LEARNED AND GLOBAL RELEVANCE

This innovative experience, which established a system of local and international expert groups providing remote support via a text-based messaging service to the Nepal-PIC, offers valuable insights for similar low-resource settings. Utilizing widely available platforms like WhatsApp® can bridge gaps in SPI knowledge, provide timely backup, and enhance patient care. Engaging both local and international experts fosters a robust support system, combining global expertise with local context. Similar phone-based models have been used previously in Lebanon as well.[7]

The education model of combining international expertise with local perspectives has been particularly effective in making training sessions more relevant and applicable, with the end goal of increasing local toxicology expertise and clinical practice autonomy. This approach can be replicated in other regions with similar resource constraints. The open-access lecture repository serves as a knowledge hub for ongoing medical education, further strengthening the sustainability of this initiative.

Furthermore, this PIC's tiered support system – leveraging databases like TOXBASE, local specialists, and international experts – demonstrates a scalable solution for addressing medical/clinical toxicology gaps in low- and middle-income countries. This model could be adapted for other subspecialties, such as infectious diseases and trauma care, where specialist availability remains limited.

CONCLUSION

The innovative model implemented by Nepal-PIC demonstrates how leveraging technology and fostering international collaboration can effectively address the shortage of toxicology expertise in low-resource settings. By integrating platforms like WhatsApp® for real-time consultations and education, the center has bridged the gap in the availability of expert support for poisoning cases in Nepal. This approach serves as a replicable model for other regions facing similar challenges, highlighting the potential of technology to transform healthcare delivery in resource-limited environments.

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Disclosures

None.

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A Look Back: The *Rhode Island Medical Journal* in 1925, 1950, 1975

MARY KORR
RIMJ MANAGING EDITOR

Looking back in time through the *Rhode Island Medical Journal's* (RIMJ) archival editions(https://guides.library.harvard.edu/c.php?g=947422&p=7661408), the following is a snapshot of medical issues and pivotal events reported 100, 75 and 50 years ago.

1925: Diphtheria Immunization

The September 1925 edition featured an article by **DR. CLARENCE L. SCAMMON**, Deputy Supt. of Health, titled "Diphtheria Immunization in Providence: A Progress Report." He reported that New York City was the first city in the world to offer immunization to school children in the spring of 1921, after the development of the Schick test and toxin-antitoxin mixtures [**Figures 1,2**].

Figure 1. The cover of the September 1925 issue of RIMJ.

"Since then, over 600,000 school children have been tested for immunity to diphtheria and nearly half of this number have received the protective injections," he wrote. In 1919, there were 1239 deaths from diphtheria in New York City, but in 1924, there were 714, a 43 percent drop, which he attributed to the immunization.

In Providence, **DR. H.J. CONNOR** was in charge of a clinic at the Atwells Avenue School, and began the immunization program there in 1921. The program continued and in the following years expanded to four other sites in the city

"Considerable publicity of this work has been given by the press, the radio broadcasting stations and the moving picture houses," Dr. Scammon wrote. Talks were given to parent-teacher associations and other organizations, and circulars sent to physicians, suggesting testing and treatment to babies and children aged six months to six years. The article stated immunity is usually achieved at six months, after three treatments given a week apart. If immunity was demonstrated, a certificate was given.

Figure 2. Posters such as this one were created by health departments nationwide. [LIBRARY OF CONGRESS]

A health audit showed that in the fall of 1924 testing and immunizations were administered to over 10,000 students who were shown to be susceptible, of the approximately 40,000 students in every public and parochial school in the state, excepting high school students.

The results were conclusive. Dr. Scammon reported that, in 1924, "we have had no diphtheria in any child who, six months after being immunized, showed a negative Schick test."

1950: Crippled Children and Easter Seals campaign

The March 1950 cover image is of the Easter Seals stamp, depicting a child, crutches, and the iconic words, "Help Crippled Children." There is also a reminder of a rehabilitation seminar the following month, not only to address polio, but also the rehab issues facing post-World War ll veterans [**Figure 3**].

The history of the Easter Seals stamp is rooted in a tragic case of an Ohio businessman, **EDGAR ALLEN**, [**Figure 4**], who lost his son in a streetcar accident. A lack of medical services in his hometown of Elyria, Ohio, led him to launch a fundraising campaign to build a hospital there. After the hospital opened, he noticed how children with disabilities were isolated from public view. This led him to found the National Society for Crippled Children in 1919, later to become Easter Seals, and now Easterseals.

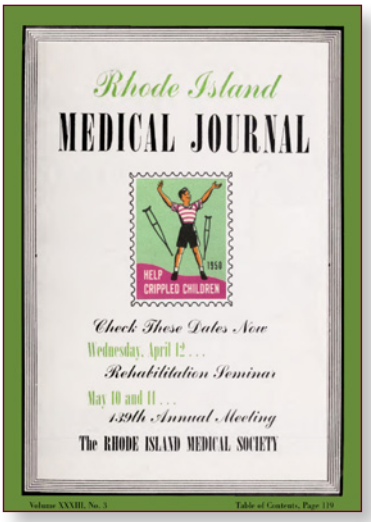
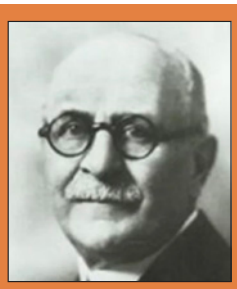


Figure 3. The cover of the March 1950 issue of RIMJ.



"Your life and mine shall be valued not by what we take but by what we give."
—Edgar Allen

Figure 4. Edgar Allen, Easterseals founder. [EASTERSEALS WEBSITE, HTTPS://WWW.EASTERSEALS.COM/ABOUT-US/HISTORY]

According to the Easterseals website, in the spring of 1934, the organization launched its first Easter "seals" fundraising campaign. Donors showed their support by placing these seals on envelopes and letters. **J.H. DONAHEY**, a cartoonist at the *Cleveland Plain Dealer*, designed the first seal, inspired by the right to live a "normal" life [**Figure 5**].

Figure 5. The first Easter Seals stamp, created in 1934. [EASTERSEALS WEBSITE]

Following World War II, The National Society for Crippled Children expanded its mission to provide services for adults and veterans re-entering civilian life. "These programs addressed employment opportunities, physical rehabilitation, and community reintegration, offering critical support to people who had dedicated themselves to the nation's service. This expansion not only highlighted the organization's adaptability but also underscored its commitment to fostering independence and dignity for all individuals during a pivotal moment in American history."

This sentiment is clearly reflected in the March 1950 issue of RIMJ, which dealt with many of these same issues.

Figure 8. Stanley M. Aronson, MD, inaugural dean of Brown Medical School.

Figure 6. The first White Coat ceremony of the 1975 Brown Medical School class.

1975: Medical School Graduation

The May 1975 issue was devoted to the graduating class of Brown Medical School, the first class to receive a medical degree since 1827 [**Figure 6**]. It was conceived and compiled by guest editors who were members of the graduating class. They included: **ANTHONY CALDAMONE**, **ARTHUR HORWICH**, **PETER LEWITT**, **GLENN MITCHELL**, as well as **JEANNE ELAINE MAGUIRE**, coordinator for Medical Alumni Affairs. Within the issue are photos of the graduating class, articles by its members, and original cartoons depicting their journey.

The cover image [**Figure 7**] and Letter from the Dean, **STANLEY M. ARONSON, MD**, [**Figure 8**] captures the hopes and aspirations for these medical students during this pivotal and highly personal event.

Figure 7. The cover of the May 1975 issue of RIMJ.

Letter from the Dean

We have shared in the birth of a new medical school founded in the belief that competency in the fundamental sciences, humane behavior, and skill in the arts of health care delivery are not antagonistic goals; and as a class you are indeed unique in both aiding the gestation of our medical program as well as being its first conception.

In the years ahead I hope that each of you will achieve a personal covenant with medicine, practicing your profession in a climate of commitment and responsibility, giving to your patients your most authentic abilities. The beauty of our profession is not so much that it classifies and records, or even predicts, but that it cherishes this commitment while encouraging insight and heightened sensitivity in both its practitioners and patients.

Buber tells the story of Susya who lamented shortly before his death, saying, "When I get to heaven they will not ask me, 'Why were you not Moses?' but they will ask, 'Why were you not Susya? Why did you not become that which only you could become?'" I pray that each of you will reach your genuine destiny. Be well and go well.

Stanley M. Aronson, MD
Dean of Medical Affairs

Westerly Hospital celebrates its 100th anniversary

WESTERLY — On Aug. 18th, Westerly Hospital celebrated its 100th anniversary with the unveiling of a timeline in its main lobby that chronicles a century of compassionate community care that today includes access to world-class care through its affiliation with Yale New Haven Health. The hospital opened its doors on Aug. 17, 1925.

The timeline includes more than 20 entries all under the heading of "100 Years of Milestones." One, for example, chronicles the hospital staff's heroic care of more than 70 patients from the Hurricane of 1938, even as the hospital lost electricity and roads were impassable. Other highlights include the opening of a new wing in 1954 – a response to the "Baby Boom" – and additional expansion during the 1960s that increased bed capacity to 140.

Leadership, staff and providers at Westerly Hospital view the timeline of the hospital's 100-year history.

The timeline unveiling included proclamations from both the state of Rhode Island House of Representatives and the Westerly Town Council, both praising the hospital's century of excellence, innovation and growth of services over the decades.

Today "is a huge tribute to the community," said **SHAWN M. LACEY**, town manager of Westerly and the town's former police chief. "One hundred years! Who would have thought that a hundred years ago the forefathers of the town would get together and build a hospital? It's a staple in the community, and I can tell you that in my 35 years prior experience in police work, this is a major asset. We relied on this facility throughout my career… This is a huge happy birthday to the hospital and we thank you for all you do for the community."

State Sen. **VICTORIA GU**, D-38, reflecting on the timeline, called it a testament to how the community and the hospital have worked together to ensure patient care. "I really want to thank all of the staff, from the nurses and physicians to everyone."

RICH LISITANO, president of Westerly Hospital and Lawrence + Memorial Hospital (L+M) in New London, CT, said the timeline serves as a tribute to the long succession of caregivers who served the community over the decades, and also as a reminder that Westerly Hospital continues to provide care focused on quality and safety.

"Westerly Hospital holds a unique position in town history," Lisitano said. "Since 1925 it has been a bedrock employer where skilled caregivers have provided care to families, friends and neighbors. As the new timeline depicts, the hospital's story is one of recurring themes – of expansions, technological advances, outstanding physicians, skilled and compassionate nurses, and an overall team that has always put patients first."

Looking to the future, Lisitano said: "I'm not a futurist, but I do believe whatever form health care takes it is going to be delivered through community members, to their own community. So, just like the tradition that started here 100 years ago, I believe the future is going to be about community members delivering tremendous care, quality and safety, and we're looking forward to being a part of that for the next 100 years."

In 2013, Westerly Hospital was acquired by Lawrence + Memorial Healthcare, parent of L+M, a move that began a new era of care; only three years later, in 2016, both L+M and Westerly hospitals further strengthened their clinical programs and physician recruitment through affiliation with Yale New Haven Health.

With the support of Yale New Haven Health, the hospital expanded key services, including an inpatient Geriatric Psychiatry unit, a 2,600-square-foot pharmacy, a da Vinci Xi Surgical System which enables surgeons to perform minimal invasive robotic surgeries for certain conditions, and an MRI unit that has enhanced diagnostic imaging capabilities for the hospital.

Westerly Hospital has been serving the community for a century. During that time, the hospital has been steadfast in its commitment to providing compassionate care to everyone who comes through the door. ❖

NSF announces $100M investment in National Artificial Intelligence Research Institutes awards

ALEXANDRIA, VA — The U.S. National Science Foundation, in partnership with Capital One and Intel, recently announced a $100 million investment to support National Artificial Intelligence Research Institutes and a central community hub. These institutes will drive breakthroughs in high-impact areas such as mental health, materials discovery, science, technology, engineering and mathematics education, human-AI collaboration and drug development.

"Artificial intelligence is key to strengthening our workforce and boosting U.S. competitiveness," said **BRIAN STONE**, performing the duties of the NSF director. "Through the National AI Research Institutes, we are turning cutting-edge ideas and research into real-world solutions and preparing Americans to lead in the technologies and jobs of the future."

The institutes will also help build a national infrastructure for AI education and workforce development, training the next generation of researchers and practitioners, empowering educators and reaching into communities.

With this latest round of awards, NSF continues to grow a nationwide network of AI research institutes dedicated to advancing open innovation, strengthening U.S. competitiveness and ensuring that AI serves the public good – today and for decades to come.

Each institute brings a unique interdisciplinary approach that connects AI research to tangible public benefit:

NSF AI Research Institute on Interaction for AI Assistants (NSF ARIA)

Led by **Brown University**, NSF ARIA will accelerate the development of next-generation AI assistants that are safer, more effective, and better able to adapt to individual user needs.

NSF AI-Materials Institute (NSF AI-MI)

Led by **Cornell University**, NSF AI-MI is accelerating the discovery of next-generation materials essential to energy, sustainability and quantum technologies. It will create the AI Materials Science Ecosystem, a cloud-based portal that integrates large language models with experimental data, simulations, images and scientific literature. Through partnerships with high schools, universities and industry, NSF AI-MI will educate and train students at all levels, opening new career pathways at the intersection of AI and physical sciences.

NSF AI Institute for Foundations of Machine Learning (NSF IFML)

NSF IFML is part of the first cohort of AI Institutes announced in 2020. Led by **The University of Texas at Austin**, the new award will build on the trajectory of the past five years and develop new foundational tools to advance generative AI. NSF IFML's work on diffusion models is a key technology behind major Google products, powering widely used generative models such as Stable Diffusion 3 and Flux. In its next phase, NSF IFML will expand generative AI to new domains, including protein engineering and clinical imaging. It also plans to develop new methods to handle noisy data and improve model reliability, key challenges for deploying AI in health contexts.

NSF Institute for Student AI-Teaming (NSF iSAT)

Led by the **University of Colorado at Boulder** NSF iSAT – part of the first cohort of AI Institutes announced in 2020 – is transforming how AI is used to enhance STEM learning in the classroom. The institute developed two AI partners that help student groups learn together by facilitating discussion, exploration and reasoning, in close collaboration with teachers. More than 6,000 middle-school students and educators have benefited from these tools and new AI curricula.

In its next phase, NSF iSAT will address the urgent national need to build an AI-ready workforce. It will continue to advance AI support for group learning and co-develop a semester-long curriculum to build AI literacy.

NSF Molecule Maker Lab Institute (NSF MMLI)

Led by the **University of Illinois Urbana-Champaign**, NSF MMLI is part of the first cohort of AI Institutes announced in 2020. The institute has been developing cutting-edge AI and machine learning to dramatically speed up molecule discovery and creation for applications in medicine, materials and clean energy. In its next phase, the institute will develop advanced AI tools – including new types of language models and intelligent agents – that can reason, predict and help design useful molecules such as drugs, catalysts and new materials.

NSF AI Institutes Virtual Organization (NSF AIVO)

Led by the **University of California, Davis**, NSF AIVO serves as a national hub for the entire AI Institutes network. Expanding on a successful pilot launched in 2022, it connects federally funded AI Institutes, government stakeholders and the public to create a cohesive and collaborative innovation ecosystem. Through events, networking tools and collaboration support, NSF AIVO fosters communication across the network and helps form new public-private partnerships. It also promotes public engagement by amplifying the work of the AI Institutes and raising awareness of how AI can help address real-world challenges.

Learn more about the AI Institutes by visiting nsf.gov. ❖

Brown announces latest funding for innovations in biomedicine

PROVIDENCE — Five faculty members at Brown were awarded grants this year through the Brown Biomedical Innovations to Impact accelerator fund.

Out of 16 submitted proposals to the BBII Proof of Concept program, four received $100,000 grants each. A fifth proposal received $250,000 via the Brown Innovation Fund-Life Sciences Impact Award, established by Preetha Basaviah, MD, and Venky Ganasan. This year marks the second round of funding for the award, which provides advising and mentorship to one or two recipients each year. Recipients are expected to generate licensable technology, with the potential to establish a start-up.

JONATHAN KURTIS, MD, PhD, chair of pathology and laboratory medicine and executive director of the MD-PhD Program, received this year's Life Sciences Impact Award for his malaria treatment project. He proposes developing a small molecule therapeutic that targets PfGARP, a highly conserved protein essential for *Plasmodium falciparum* parasite survival. His team has identified several lead compounds that demonstrate potent efficacy in vitro against both sensitive and multi-drug resistant *P. falciparum* malaria strains, indicating a novel mechanism. Kurtis will use the funding to carry out further preclinical work to nominate a development candidate to be tested in clinical trials.

The $100,000 awards, funded either by BBII or by a gift from the Steven J. Massarsky Trust, help faculty inventors to develop important data showing the promise of their technology. An advisory committee made up of venture capitalists and experts in the pharmaceutical and medical device fields review proposals for commercialization potential.

This year's awardees are:

JUSTIN FALLON, PhD, professor of medical science and of psychiatry and human behavior, is developing a novel monoclonal antibody therapy designed to activate endogenous muscle stem cells. The molecular target is the MuSK Ig3 domain, which recent published work from Fallon's lab identified as a regulator of satellite cell activation, muscle growth, and accelerated regeneration. No approved therapies exist for muscle regeneration, and Fallon's therapy aims to promote muscle growth by actively stimulating the proliferation of new muscle cells. Fallon will use his award to support the generation of this antibody, its functional testing in vitro, and some initial bioengineering as a first step toward a novel therapeutic to increase muscle function and repair.

ALVIN HUANG, PhD, MD, James and Dorothy Goodman Assistant Professor of Molecular Biology, Cell Biology, and Biochemistry, aims to support tau-targeting therapies for late-onset Alzheimer's disease (LOAD) by introducing a novel therapeutic strategy leveraging an exon-skipping antisense oligonucleotide (ASO) to target BIN1, the second-greatest genetic risk factor for LOAD. Huang's ASO is designed to reduce extracellular tau protein secretion and limit the spread of tau pathology throughout the brain, which is the main determinant of cognitive decline. This therapy aims to detoxify tau spread rather than directly targeting tau, offering a potentially superior and more cost-effective solution. His development plan includes in-vitro screening of ASO candidates for efficient exon skipping and reduction in tau secretion, and ultimately, seeking regulatory approval to bring this innovation to patients.

WENLIANG SONG, MD, assistant professor of medicine, is developing a novel approach to detoxify elevated lipoprotein(a) without lowering its levels. Lp(a) is a major, yet untreatable, contributor to cardiovascular disease, but eradicating Lp(a) entirely may carry potential long-term risks as it also plays physiological roles in wound healing and tissue regeneration. Song's proposed lead compound targets oxidized phospholipids (OxPLs), which are increasingly recognized as the primary drivers of Lp(a)'s pathogenicity, and neutralizes them. Song says this strategy is not only safer by preserving Lp(a)'s beneficial functions but potentially more effective, as it also neutralizes harmful OxPLs on other lipoproteins. Song will use the award to optimize lead compounds for enhanced efficacy and druggability, paving the way for a novel, safer Lp(a) therapeutic.

STEPHANIE JONES, PhD, professor of neuroscience, received follow-up funding to continue the development of brain simulation tools to uncover the mechanisms underlying neurological diseases and model the effects of neurotherapeutics on brain circuits. The core technology provides a biophysical interpretation of brain activity that translates from animals to humans. In the second year, the initiative will focus on establishing proof-of-concept through human and mouse data analysis, alongside the development of predictive neural models. The resulting software will provide evidence for critical decision-making in preclinical and clinical drug development, ultimately increasing success rates in the drug development pipeline. ❖

16th Annual Swim Across America

RI Open Water Swim raising funds to support crucial cancer research at Women & Infants Hospital

PROVIDENCE — On Saturday, September 6, 2025, Swim Across America – Rhode Island Open Water Swim (SAA-RI) will hold its 16th annual charity swim at scenic Scarborough North State Beach at 870 Ocean Road, Narragansett, Rhode Island. Proceeds from this event will directly support crucial and often life-saving cancer research at Women & Infants Hospital (WIH). Established in 2010, SAA-RI has raised over $2.5 million to fund cancer research at one of the nation's leading specialty hospitals for women and newborns, Rhode Island's Women & Infants Hospital.

Each year, the Rhode Island charity swim attracts over 700 swimmers and volunteers who enthusiastically show up to support this worthy cause. This year's open water swim includes various swim options and one virtual option: a 1-mile, 0.5-mile, or 0.25-mile open water swim, or SAA My Way (virtual).

Funding from SAA-RI has supported researchers at WIH in discovering a new biomarker for ovarian cancer and helped establish a clinical algorithm that enhances the ability to estimate the risk of ovarian cancer in women with a pelvic mass.

"There's something incredibly powerful about coming together as a community, right here on our beautiful Rhode Island coast, to swim with purpose. Every stroke taken during this event fuels the groundbreaking cancer research happening at Women & Infants Hospital. This year, it's not just a swim, it's a celebration of hope, resilience, and families making a difference together," said **SHANNON R. SULLIVAN**, president and COO of Women & Infants Hospital.

Founded in 1987, Swim Across America is a national nonprofit organization that holds 24 open water swims and hundreds of pool swims across the country, from Boston to under the Golden Gate Bridge. The organization has an interesting history as it started with a sunken boat in Long Island Sound at its first-ever open water swim and has turned its passion for swimming and fighting cancer into $100 million that supports cancer research throughout the country.

Over several decades, Swim Across America funding has contributed to four FDA-approved life-saving immunotherapy treatments: Yervoy, Opdivo, Tecentriq, and Keytruda, and supports research with more than 60 scientific grants funded each year.

While hundreds of local swimmers and water and land volunteers join in the swim, the Rhode Island event is known for having more college swim teams participate than any other swim in the country.

To learn more about Swim Across America or to register to swim, volunteer, or donate, please visit swimacrossamerica.org/rhodeisland. ❖

VA offers yearlong community care authorizations for 30 services

WASHINGTON, DC — The Department of Veterans Affairs recently announced it will improve Veterans' access to health care by extending the length of new VA community care authorizations to one year for 30 standardized types of care.

The change means Veterans referred by VA to community care for eligible standardized types of care will receive 12 full months of uninterrupted treatment at VA expense before having to obtain a VA reauthorization.

Veterans will benefit from uninterrupted access to essential specialty services, allowing them to focus more on their health and less on navigating administrative requirements. Community providers will be empowered to manage care with fewer administrative barriers and greater flexibility.

Prior to the change announced today, some VA community care specialty referrals were reevaluated every 90 to 180 days, increasing the likelihood of interrupted or delayed care.

With the announcement, VA is now offering year-long community care authorizations for the following standardized types of care:

- Cardiology
- Dermatology
- Endocrinology
- Neurology and Otology
- Otolaryngology or ENT
- Gastroenterology
- Urogynecology
- Addiction Psychiatry Outpatient
- Family & Couples Psychotherapy Outpatient
- Mental Health Outpatient
- Nephrology
- Neurology
- Nutrition Intervention Services
- Oncology and Hematology
- Neuro-Ophthalmology
- Oculoplastic
- Eye Care Examination
- Optometry Routine
- Orthopedic Hand
- Orthopedic General
- Orthopedic Spine
- Pain Management
- Podiatry
- Podiatry DS
- Addiction Medicine Outpatient
- Pulmonary
- Physical Medicine & Rehabilitation (Physiatry)
- Rheumatology
- Sleep Medicine
- Urology

Rhode Island Commerce opens Wavemaker Fellowship application with designated funding for primary care providers

STATE HOUSE – Recently, Speaker **K. JOSEPH SHEKARCHI** (D-Dist. 23, Warwick), Senate President **VALARIE J. LAWSON** (D-Dist. 14, East Providence), Secretary of Commerce **STEFAN PRYOR** and Commerce Corporation President & CEO **JIM BENNETT** announce the start of a new application period for the Wavemaker Fellowship [mf94itmab.cc.rs6.net], a competitive student loan reimbursement program for professionals working in S.T.E.M. (Science, Technology, Engineering, and Mathematics), certain design fields, healthcare and education. The purpose is to retain their talents in Rhode Island.

The Wavemaker Fellowship awards recent college graduates in the above fields refundable tax credits of up to $6,000 per year for up to four years.

Last year, the General Assembly added $500,000 to the Wavemaker program reserved specifically for primary care providers (PCPs – helping address Rhode Island's shortage.

"The Wavemaker Fellowship program has been extremely successful in covering the cost of student loans to encourage the pursuit of careers in several fields. The General Assembly has had a major focus on addressing the primary care crisis and we were proud to expand the Wavemaker program for primary care physicians, nurse practitioners and physician's assistants. Few issues are as important as health care, and we know that many providers are feeling enormous strain. Extending financial incentives for graduates pursuing these fields is another step toward addressing the primary care crisis," said Speaker Shekarchi and Senate President Lawson.

To be eligible, PCPs must be medical doctors, physician assistants or nurse practitioners who work in the following primary care specialties:

- Family medicine (adolescent, adult or geriatric)
- Pediatrics
- Internal medicine (adolescent, adult or geriatric)
- Community health

"Reimbursing student loan costs for those working in critical fields not only helps ease the financial burden on talented professionals but also strengthens important industries that help to keep our state's economy moving," said Secretary of Commerce Stefan Pryor. "We thank the General Assembly for the additional funding to support primary care providers – which helps to ensure that every Rhode Islander has access to the care they need."

"Having a strong foundation for primary care means we can prevent more illnesses and help more Rhode Islanders have overall positive health outcomes," said Rhode Island Executive Office of Health and Human Services' Secretary **RICHARD CHAREST**. "That's why this opportunity to support a robust primary care workforce, paired with the infusion of millions of dollars into the state's primary care system [mf94itmab.cc.rs6.net], are critical to the overall health and wellbeing of all Rhode Islanders."

Applications are due by October 13.

More information, including frequently asked questions and the application, are available online at:
wavemaker.commerceri.com [mf94itmab.cc.rs6.net]. ❖

AMA advocacy delivers modernized e-prescribing (eRx) standard

CHICAGO — In a significant victory for physician-led advocacy, the Department of Health and Human Services (HHS) has adopted new electronic prescribing (eRx) standards that reflect key recommendations from the American Medical Association (AMA).

This modernization is poised to enhance patient safety, reduce administrative burdens, and streamline physician workflows. The updated regulations governing e-prescribing technology, including electronic health records (EHRs), introduce a single, modernized system designed to reduce medication errors, expedite prior authorization responses, and free physicians from outdated administrative tasks – freeing up more time for direct patient care.

"This is exactly the kind of smart policy that emerges when physician experience with their patients informs government regulation," said AMA President **BOBBY MUKKAMALA, MD**. "These upgrades will significantly reduce friction in the prescribing process, helping physicians deliver safer, faster, and more effective care of our patients."

HHS's new policy closely follows AMA's comprehensive recommendations, incorporating critical features such as updated prescribing directions, precise product identifiers, and real-time access to current prescription data. These enhancements support more accurate dispensing, reduce the potential for error, and improve patient outcomes.

Importantly, the new standards integrate electronic prior authorization directly into the prescribing workflow – addressing a longstanding pain point for physicians and patients alike. The rules also reduce redundant or inefficient transactions, such as pharmacy-to-pharmacy transfers, ensuring technology serves clinical needs rather than adding complexity. Together, these changes mark a major step toward true interoperability of critical patient records, enabling physicians to access and exchange essential information more seamlessly across the care continuum.

To ensure a smooth transition, HHS has aligned its 2028 compliance deadline with that of the Centers for Medicare & Medicaid Services (CMS) – another milestone the AMA championed. EHR developers can begin adopting and integrating the new technology immediately, ensuring they are on track for the 2028 compliance deadline. By retiring the old eRx technology on that same date, HHS gives physicians and electronic health record developers a clear, synchronized roadmap, eliminating the risk of dueling federal timelines.

"Electronic prescribing has improved health care efficiency and patient safety. We need to continuously update the regulations to make sure we are taking advantage of the quickly advancing technology while removing the clutter of earlier regulations. HHS and the AMA have done just that," Mukkamala said. ❖

New AHA/ACC high blood pressure guideline emphasizes prevention, early treatment to reduce CVD risk

DALLAS AND WASHINGTON — Preventing and managing high blood pressure with healthy lifestyle behaviors, such as following a heart-healthy diet including reducing salt intake, staying physically active, maintaining a healthy weight and managing stress – combined with early treatment with medication to lower blood pressure if necessary – are recommended to reduce the risk of heart attack, stroke, heart failure, kidney disease, cognitive decline and dementia, according to a new clinical guideline published August 14th in the American Heart Association's journals *Circulation* and *Hypertension*, and in JACC, the flagship journal of the American College of Cardiology.

The guidelines replaces the 2017 guideline and includes new or updated recommendations for blood pressure management based on the latest scientific evidence to achieve the best health outcomes for patients.

The new guideline reflects several major changes since 2017, including use of the American Heart Association's PREVENTTM (Predicting Risk of cardiovascular disease EVENTs) risk calculator to estimate cardiovascular disease risk. It also provides updated guidance on medication options, including the early treatment for high blood pressure to reduce the risk of cognitive decline and dementia; use of specific medications including the possible addition of newer therapies such as GLP-1 medications for some patients with high blood pressure and overweight or obesity, and recommendations for managing high blood pressure before, during and after pregnancy.

In addition to the use of the PREVENTTM risk assessment tool, the new guideline recommends two important changes to laboratory testing for initial evaluation.

The ratio of urine albumin and creatinine (a test that assesses kidney health) is now recommended for all patients with high blood pressure. It was recommended as an optional test in the 2017 guideline.

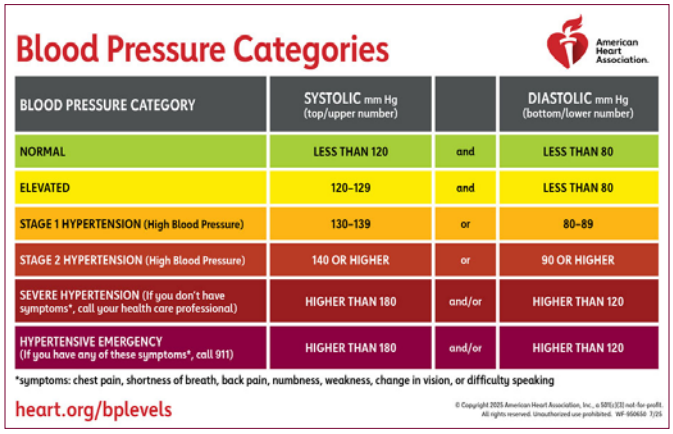
The guideline also expands the indication for use of the plasma aldosterone-to-renin ratio test as a screening tool for primary aldosteronism in more patients including those with obstructive sleep apnea. (Primary aldosteronism is a condition that occurs when the adrenal glands make too much aldosterone, leading to high blood pressure and low potassium levels.)

Screening for primary aldosteronism may also be considered in adults with stage 2 hypertension to increase rates of detection, diagnosis and targeted treatment.

BP criteria

The blood pressure criteria remain the same as the 2017 guideline [**Figure 1**]:

- normal blood pressure is less than 120/80 mm Hg;
- elevated blood pressure is 120–129 mm Hg and <80 mm Hg;
- stage 1 hypertension is 130–139 mm Hg or 80–89 mm Hg; and
- stage 2 hypertension is ≥140 mm Hg or ≥90 mm Hg.



Importance of healthy lifestyle

The new guideline reaffirms the critical role healthy lifestyle behaviors play in preventing and managing high blood pressure, and it encourages health care professionals to work with patients to set realistic, achievable goals. Healthy behaviors such as those in Life's Essential 8, the American Heart Association's metrics for heart health, remain the first line of care for all adults.

Specific blood pressure-related guidance includes:

- limiting sodium intake to less than 2,300 mg per day, moving toward an ideal limit of 1,500 mg per day by checking food labels (most adults in the U.S. get their sodium from eating packaged and restaurant foods, not the salt shaker);
- ideally, consuming no alcohol or for those who choose to drink, consuming no more than two drinks per day for men and no more than one drink per day for women;
- managing stress with exercise, as well as incorporating stress-reduction techniques like meditation, breathing control or yoga;
- maintaining or achieving a healthy weight, with a goal of at least a 5% reduction in body weight in adults who have overweight or obesity;
- following a heart healthy eating pattern, for example the DASH eating plan, which emphasizes reduced sodium intake and a diet high in vegetables, fruits, whole grains, legumes, nuts and seeds, and low-fat or nonfat dairy, and includes lean meats and poultry, fish and non-tropical oils;
- increasing physical activity to at least 75–150 minutes each week including aerobic exercise (such as cardio) and/or resistance training (such as weight training); and
- home blood pressure monitoring is recommended for patients to help confirm office diagnosis of high blood pressure and to monitor, track progress and tailor care as part of an integrated care plan.

Association of high blood pressure with cognitive decline and dementia

While high blood pressure is a leading cause of heart attack and stroke, the new guideline highlights other serious risks. More recent research confirms that blood pressure affects brain health, including cognitive function and dementia. High blood pressure can damage small blood vessels in the brain, which is linked to memory problems and long-term cognitive decline. The guideline recommends early treatment for people diagnosed with high blood pressure with a goal of systolic blood pressure (top number) goal of <130 mm Hg for adults with high blood pressure to prevent cognitive impairment and dementia.

Tailored approaches to medication for high blood pressure

For many people with high blood pressure, especially those who have Type 2 diabetes, obesity or kidney disease, more than one medication may be needed to lower blood pressure to meet the <130/80 mm Hg criteria. The guideline highlights several types of blood pressure medications to initiate treatment, including angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs), long-acting dihydropyridine calcium channel blockers and thiazide-type diuretics. If blood pressure remains high after one medication, clinicians may individualize treatment to either increase the dose or add a second medication from a different medication class.

The guideline maintains the recommendation to begin treatment with two medications at once – preferably in a single combination pill – for people with blood pressure levels 140/90 mm Hg or higher (stage 2 hypertension). The guideline also suggests possible addition of newer therapies such as GLP-1 medications for some patients with high blood pressure and overweight or obesity.

High blood pressure and pregnancy

High blood pressure during pregnancy can have lasting effects on the mother's health, including an increased risk of future high blood pressure and cardiovascular conditions. Without treatment, high blood pressure during pregnancy can lead to serious complications, such as preeclampsia, eclampsia, stroke, kidney problems and/or premature delivery. Women with high blood pressure who are planning a pregnancy or are pregnant should be counseled about the potential benefits of low-dose aspirin (81 mg/day) to reduce the risk of preeclampsia.

For pregnant women with chronic hypertension (high blood pressure before pregnancy or diagnosed before 20 weeks of pregnancy), the new guideline recommends treatment with certain medications when systolic blood pressure reaches 140 mm Hg or higher and/or diastolic blood pressure reaches 90 mm Hg or higher. This change reflects growing evidence that tighter blood pressure control for some individuals during pregnancy may help to reduce the risk of serious complications.

In addition, postpartum care is especially important because high blood pressure can begin or persist after delivery. The guideline urges continued blood pressure monitoring and timely treatment during the postpartum period to help prevent complications. Patients with a history of pregnancy-associated high blood pressure are encouraged to have their blood pressure measured at least annually. ❖

American Academy of Pediatrics publishes evidence-based immunization schedule

ITASCA, IL— As respiratory virus season approaches, the American Academy of Pediatrics has published an evidence-based immunization schedule that includes updated guidance for influenza, RSV, and COVID-19 immunizations for children and adolescents from birth to age 18. The schedule, "Recommended Childhood and Adolescent Immunization Schedule: United States, 2025," was published Aug. 19, 2025 in the AAP Red Book Online, the Academy's clinical guidebook for infectious diseases prevention and treatment.

It differs from recent recommendations of the Advisory Committee on Immunization Practices of the CDC, which was overhauled this year.

"The AAP will continue to provide recommendations for immunizations that are rooted in science and are in the best interest of the health of infants, children and adolescents," said AAP President **SUSAN J. KRESSLY, MD, FAAP**. "Pediatricians know how important routine childhood immunizations are in keeping children, families and their communities healthy and thriving."

The schedule represents formal recommendations from the AAP for routine immunizations for infants, children and adolescents against 18 diseases. The schedule published Aug. 19 includes updated recommendations for RSV, influenza, and COVID-19 immunizations for pediatric populations.

In addition to the updated recommendations for the three respiratory viruses, the schedule incorporates recent updates regarding pentavalent meningococcal vaccine, the starting age of the Human Papilloma Virus vaccine, and removal of a hepatitis vaccine that is no longer available.

"The AAP urges every insurer to cover all the vaccines that are included in this immunization schedule," Dr. Kressly said. "AAP is committed to working with our partners at the local, state and federal levels to make sure every child, in every community has access to vaccines."

AAP will also publish parent-friendly immunization schedule on HealthyChildren.org.

RSV

RSV (Respiratory Syncytial Virus) is the leading cause of hospitalization for babies before their first birthday. It is a virus that affects the lungs and airways and spreads easily through the air and by physical contact with the germs. Immunizations for

pregnant mothers and newborns provide antibodies that offer necessary protection.

"Babies who become infected with RSV can get much sicker than older kids because their lungs and airways are so tiny," said **KRISTINA BRYANT, MD, FAAP**, a member of the AAP Committee on Infectious Diseases. "There are two ways to help your baby get ahead of this serious respiratory illness. Moms who get the RSV vaccine during their pregnancy can pass important antibodies to their developing baby through the placenta. Or new babies can get an RSV shot for RSV season. Well-timed RSV immunizations help babies stay healthy."

Nirsevimab and clesrovimab are the recommended immunizations to prevent RSV. Both are monoclonal antibody products, which are given to babies for instant protection. Another monoclonal antibody, palivizumab, is a shorter-acting product that is no longer recommended for use.

The AAP recommends:

- Immunization for infants younger than 8 months who are born during or entering their first RSV season if the pregnant parent did not receive vaccine during pregnancy, if the vaccination status is unknown, or if the infant was born less than 14 days after the pregnant parent received the vaccine.
- Immunization for infants and children 8 through 19 months of age at high risk of severe RSV disease and entering their second RSV season. High-risk infants include children with chronic lung disease, immunocompromise, or cystic fibrosis, as well as other groups.

The Academy's recommendations for RSV immunizations are published online here and will be published in the November issue of *Pediatrics* (online Aug. 19).

Influenza

AAP recommends annual flu vaccines for all children starting at 6 months old, unless they have a medical reason not to be immunized. This helps protect not only the child but also the community – especially during seasons when other viruses like RSV and COVID-19 are also circulating. The Academy's flu vaccine recommendations and an accompanying technical report were pre-published July 28 in *Pediatrics* and will be published in the October 2025 print issue.

"The flu can be much more serious than just a cold or run-of-the-mill viral infection, especially for children under the age of 5 or those with conditions like asthma or diabetes. It is also something that kids can catch – and spread – easily. An annual influenza immunization helps your child's immune system recognize and resist the virus so they can stay in school, go on playdates and do the things kids love doing," Dr. Bryant said.

Children who are hospitalized, have serious or worsening flu symptoms, or have health conditions that put them at higher risk for complications should start antiviral treatment for the flu as soon as possible, even if they've been sick for a few days.

The 2024–2025 influenza season was a high-severity season for persons of all ages, according to the Centers for Disease Control and Prevention. The CDC reported 267 influenza-related pediatric deaths through August 2, 2025. Of those, 43.6% occurred in children without a high-risk medical condition.

Historically, up to 80% of influenza-associated pediatric deaths have occurred in unvaccinated or incompletely vaccinated children. Children younger than five years, especially those less than two years, are especially vulnerable to severe illness and hospitalizations or death due to influenza.

COVID

COVID-19 continues to result in hospitalization and death in the pediatric population. Infants and children six through 23 months of age are at the highest risk for severe COVID-19. Given this, the AAP recommends a COVID-19 vaccine for all children ages six through 23 months old to help protect against serious illness. Children younger than two years old are especially vulnerable to severe COVID-19 and should be prioritized for vaccination unless they have a known allergy to the vaccine or its ingredients.

In addition to the recommendation for all children younger than two years, the AAP recommends a single dose of age-appropriate COVID-19 vaccine for all children and adolescents two through 18 years of age in the following risk groups:

- Persons at high risk of severe COVID-19
- Residents of long-term care facilities or other congregate settings
- Persons who have never been vaccinated against COVID-19
- Persons whose household contacts are at high risk for severe COVID-19

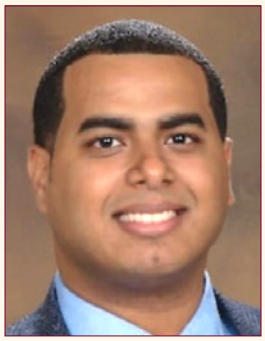
The AAP also recommends the vaccine be available for children ages 2–18 who do not fall into these risk groups, but whose parent or guardian desires them to have the protection of the vaccine. The most updated version of the COVID-19 vaccine that is available should be used. The Academy's recommendations for COVID-19 vaccines are published online here and will be published in the November issue of *Pediatrics* (online Aug. 19).

"We extensively reviewed the most recently available data about COVID-19 risks in kids, as well as safety and effectiveness of available COVID-19 vaccines. It's clear they are very safe for all populations. Among the reasons we decided to move to a risk-based recommendation for healthy older children is the fact that the hospitalization rate for young children and children with underlying medical conditions remains high, in line with rates for many of the other vaccine-preventable diseases for which we vaccinate," said **SEAN O'LEARY, MD, FAAP**, chair of the AAP Committee on Infectious Diseases. ❖

Appointments

CharterCARE welcomes pulmonologist, Leandro Ramirez, MD, MHA

PROVIDENCE — CharterCARE Medical Associates announced that **LEANDRO RAMIREZ, MD, MHA**, has joined the team of specialists in pulmonary and critical care medicine.



Dr. Ramirez completed a fellowship in Critical Care at Tufts Medical Center and a Pulmonary Medicine fellowship at Roger Williams Medical Center, where he also completed his residency in Internal Medicine. He has served as a Hospitalist at Newport Hospital/Brown University Health and at Landmark Medical Center, and worked as Associate Director of Health Information Management and Clinical Documentation at NYC Health & Hospitals Lincoln.

A graduate of Univesidad Iberoamericana in the Dominican Republic, Dr. Ramirez also earned a Master's in Healthcare Administration at Walden University. His clinical interests include advanced bronchoscopy procedures that enhance diagnostic accuracy and outcomes. ❖

Recognition

Rhode Island Hospital's Burn Center earns reverification from American Burn Association

PROVIDENCE — Rhode Island Hospital been reverified as a Burn Center by the American Burn Association (ABA), reaffirming its position as the only hospital in New England verified as a burn center, a comprehensive stroke center, and a Level 1 Trauma Center for both adults and children.

"This marks Rhode Island Hospital's 15th consecutive year as a verified burn center," said **SARAH FROST**, Chief of Hospital Operations and President of Rhode Island Hospital and Hasbro Children's. "The ABA's verification process is rigorous, and consistently meeting its standards speaks to our team's dedication to best serving our patients. We are honored to continue to be a vital resource for our community."

ABA verification is a prestigious designation awarded only to burn centers that meet the highest standards of care, from initial treatment through long-term rehabilitation. It signals to patients, families, payers, and accrediting bodies that the center delivers high-quality, comprehensive burn care.

"Our burn center is more than a facility – it's a team," said **DAVID HARRINGTON, MD**, Director of the Rhode Island Hospital Burn Center. "Our nurses, therapists, and physicians are deeply committed to guiding patients through every stage of their recovery, including reconstruction and rehabilitation. We take great pride in the care we provide."

Rhode Island Hospital's Adult and Pediatric Burn Center is verified through January 2028. ❖

Recognition

Roger Williams Medical Center ranked in top 38% of nation's hospitals

PROVIDENCE — Roger Williams Medical Center, an affiliate of CharterCARE Health Partners, has earned the "High Performing" ratings in two clinical areas, placing itself in the top 38% of hospitals nationally according to data collected by *US News and World Report*.

The two High Performing areas are Leukemia, Lymphoma and Myeloma, and Diabetes.

Of the over 4,400 U.S. hospitals that U.S. News Report evaluated, Roger Williams is among only 38% that earned a "High Performing" rating. *U.S. News*' analyses measured patient outcomes using data from over 800 million patient care records.

The records reviewed covered more than 67 million Medicare beneficiaries (nearly 1 in 4 Americans) and 1.5 billion medical claims over a 5–7-year period in 12 medical specialties and 22 unique surgical procedures or medical treatments.

Eligible hospitals were assessed on three key areas:

- **Outcomes**: how well patients survived or recovered.
- **Process**: how well the hospital follows the best standards of care.
- **Structure**: hospital resources and technologies.

CharterCARE CEO **JEFFEY LIEBMAN** stated, "We are extremely proud of Roger Williams' performance in this national study of hospital clinical performance. This demonstrates that while we are a low-cost provider, we can also deliver nationally recognized quality care to the patients we serve." ❖

South County Health and Ortho Rhode Island achieve repeat Joint Commission Advanced Certification

WAKEFIELD — This summer, the Center for Advanced Orthopedic Surgery – a collaboration between South County Health and Ortho Rhode Island – once again earned the Joint Commission Advanced Certification for Total Hip and Total Knee Replacement.

The Joint Commission's rigorous evaluation process measures programs against evidence-based clinical quality standards. The Center was commended for best practices, including its comprehensive patient education and prehabilitation program, designed to prepare patients physically and mentally for surgery, and to support faster, safer recoveries.

"This certification reflects our unwavering commitment to delivering the highest standard of orthopedic care," said South County Health CEO & President **AARON ROBINSON**. "From pre-surgery education to post-surgery recovery, every step is designed to put patients on the best path to mobility and quality of life." ❖

Obituary

GUY ADRIEN ERNEST GEFFROY, MD, 93, passed peacefully on July 28, 2025. As a child, he lived in France, and Senegal (then part of France's colonial empire). In June 1940, Guy, his mother, and two sisters made their way to Bordeaux to embark on the SS Washington, the last passenger ship to leave France at the onset of World War II. On the morning of June 11, a German submarine surfaced and stopped the SS Washington and signaled "10 minutes to abandon ship." After a tense hour of negotiations conducted via signal light, the submarine commander finally signaled "Thought you were another ship; please go on, go on!"

The ship arrived in New York 10 days later. Guy and his family traveled north to join his mother's family in Rhode Island. He attended Moses Brown School, and graduated from Coventry High School, Providence College, and the University of Ottawa Medical School.

Following medical school, Dr. Geffroy served in the U.S. Navy as a medical officer with the Third Marine Division in the Philippines and Japan.

After his military service, Dr. Geffroy moved to Massachusetts and completed his residency in neurology at the Boston University Program, including the Boston Veteran Administration Hospital. He met his future wife Margaret Mary Frates, a teacher who was also studying neuropsychology in Boston. They married in 1960 and moved to Providence in 1963 where he began his neurology private practice and long affiliation with Rhode Island Hospital, Our Lady of Fatima Hospital, and St. Joseph's Hospital where he served as Chief of Neurology.

When Brown University established its Academic Department of Neurology at RI Hospital, Dr. Geffroy became a Clinical Associate Professor of Neurology. He was regarded as a wonderful clinician and teacher. He had tremendous impact on the training of residents when the program was in its infancy, and his involvement continued for decades. He was known for his attention to detail, excellent listening, and compassion in caring for his patients. Always in pursuit of the latest medical knowledge, he developed a special interest in cutting edge treatments for multiple sclerosis patients. Above all, he was known for his kind nature and always being the consummate gentleman. Dr. Geffroy cared deeply for all his patients over five decades as a physician and was grateful for his role as an educator. He retired in 2008 at the age of 77.

In retirement, he enjoyed walks on the beach, choral singing, and international travel. Guy was an accomplished piano player who could play melodies by ear. He had a beautiful baritone voice. He and his wife, retired District Court Judge Patricia Moore, were active members of the choirs at St. Francis of Assisi Church in Wakefield as well as at St. Joseph Church in Providence.

Guy was the husband for 38 years of the late Margaret Frates Geffroy, PhD, and Judge Moore for 23 years. He was a long-time resident of Providence, Narragansett, and Matunuck. He enjoyed memberships at the Dunes Club, the Brown Faculty Club, and formerly of the Point Judith Country Club and the Saunderstown Yacht Club. He served as a member of the Moses Brown School Board of Trustees, and as the longtime Medical Advisor to the City of Providence Retirement Board.

He is survived by his wife, Pat, his four children: Marc A. Geffroy (Mary Hughes), Dr. Margot A. Geffroy (Dr. John Dashe), Michael G. Geffroy, USMCR (ret.) (Sarah Roland), and Carolanne M. Geffroy, MSW, and his ten grandchildren.

Donations in Dr. Geffroy's name may be made to:
Brown Neurology
Attention: Resident's Educational Fund
Department of Neurology
RI Hospital
593 Eddy St. – APC Building, 5th Floor
Providence, RI 02903

Memorial arrangements have been entrusted to Monaghan Drabble Sherman Funeral Home of East Providence, RI. www.mkds.com ❖