Stanford Children's Health | Lucile Packard Children's Hospital Stanford

Stanford Children's Health Hospital Outreach Program (HOP)

Myocarditis and the COVID-19 Vaccine

—Elizabeth Profita, MD, Pediatric Cardiology

Reports of myocarditis or pericarditis following COVID-19 mRNA vaccinations (Pfizer-BioNTech and Moderna) have been increasing, particularly in male adolescents. A recently published case report (Marshall et al., Pediatrics, June 2021) details seven adolescent males who presented with chest pain within a few days of the second dose of the Pfizer vaccine. All presented with chest pain, some had fever, all were negative for SARS-CoV-2 by PCR, and none met criteria for MIS-C. All had cardiac MRIs (CMRIs) consistent with myocarditis. They were treated with NSAIDs, and all resolved symptoms quickly.

Findings of these patients have been consistent across centers and are as listed below:

- Clinical presentation: Chest pain, two to five days following the second vaccine dose, most commonly in previously healthy male adolescents.
- Lab: Significantly elevated troponin values.

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- ECG: Sometimes abnormal with ST changes, T wave inversions, and PR depressions.
- Echo: Commonly normal LV function, occasional mild LV dysfunction, and no effusion.
- Cardiac MRI: Findings consistent with myocarditis.

At Lucile Packard Children's Hospital Stanford, we have developed recommendations to guide the evaluation and management of these patients. For any patient with chest pain, shortness of breath, or palpitations within a week of receiving a COVID-19 mRNA vaccine, we recommend troponin, BNP/NT-proBNP, and CRP tests and an ECG. If the patient is clinically stable with normal lab studies, he or she can be treated symptomatically with NSAIDs and followed as an outpatient. If the troponin is elevated, the patient should be admitted for telemetry, serial troponin monitoring, a pediatric cardiology consult, an echo, and a CMRI. Other etiologies for the patient symptoms and myocarditis should be considered. Treatment consists of supportive care, symptom management, and NSAIDs. Patients with abnormal troponin, ECG, echo, or CMRI will need ongoing follow-up with pediatric cardiology.

As our understanding of vaccine-associated myocarditis is evolving rapidly, recommendations may be updated as new information is obtained.

Pediatric Injury Patterns During COVID-19

—Stephanie Chao, MD, Pediatric Surgery, and Andy Wen, MD, Pediatric Critical Care

Over the past year and a half, there has been no facet of life that has not been touched by COVID-19. Trends in the frequency of pediatric trauma have been affected across the country, but in ways that have been surprising.

Stanford Children's Health (SCH) has participated in several national studies examining the effects of COVID on pediatric injury patterns and child abuse, given the unprecedented social stressors affecting families during the pandemic.

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In a **recent study** led by SCH examining injury patterns across five children's hospitals from coast to coast, researchers found a 13% decrease in trauma volumes in the first half of 2020, with the nadir occurring 16 days following the local implementation of shelter-in-place ordinances. The study, which was led by Stephanie Chao, MD, SCH trauma medical director (Surgery Open Science, June 2021), found that admitted patients had, on average, more-severe injuries.

The incidence of nonmotorized vehicle (i.e., bicycle) accidents and gunshot wounds increased during the periods of shelter-in-place. Surprisingly, reported incidences of child abuse did not increase during this period of time. One hypothesis has been that children were being abused at similar or perhaps even higher rates during the period of shelter-in-place but were not being identified by schools/day care centers/pediatricians because they were being kept at home.

To address this suspicion, Maassel et al. (**Pediatrics, June 2021**) used the Pediatric Health Information System database of 51 children's hospitals in the United States to identify hospitalizations for abusive head trauma (AHT) during a six-month period (March to September 2020) and compared that data with data from the three previous years 2017–2019. This study compared mean hospital admission rates and other admission characteristics for AHT because AHT is a leading cause of traumatic death in infants and young children and is arguably severe enough that seeking out medical care is difficult to avoid when AHT is present. They showed that for children under the age of 5 years, the mean monthly number of AHT hospitalizations had decreased significantly from a range of 29.1–33.5 (for years 2017 to 2019) to just 19.1 in 2020.

They also showed that the children hospitalized with AHT had a shorter length of stay but were otherwise similar to those in previous years with regard to percentage needing ICU stay, ventilator use, subdural hemorrhage, retinal hemorrhage, and mortality. The authors hypothesized that the observed decrease in hospitalizations represents a true decrease in AHT incidence; however, they offer two alternative explanations. One is that "mild cases of AHT" may be able to forgo care. The other explanation is that this study relied on diagnostic coding, which may impact the numbers.

These studies demonstrate that it is important to be aware of the shifts in pediatric trauma cases, such as an increase in nonmotorized vehicle accidents and firearm injuries. With the recent spike in gun sales during the pandemic, providers can take this opportunity to educate patients and families about safe gun-storage practices. Providers can also continue to stress the importance of bike safety and wearing helmets. Finally, despite the data on child abuse trends to date during COVID, more studies continue to evaluate cases of child abuse over the longer period of the pandemic. Until that research becomes available, we must continue to remain vigilant when evaluating suspicious injury patterns.

For more information about bicycle safety and safe gun storage, please visit our **website**.

Pediatric Emergency Medicine Fellowship Program

—Cherrelle Smith, MD, Emergency Medicine

The Stanford University School of Medicine is one of the world's leading institutions for health care delivery. As a teaching institution, committed to delivering quality medical education, Stanford University's Department of Emergency Medicine started a Pediatric Emergency Medicine fellowship in 2017.

Each year, this accredited training program admits one physician who has completed his or her Emergency Medicine or Pediatric residency. Under the direction of Pediatric Emergency Medicine faculty, the fellows deliver cutting-edge care to the patients of varying complexity.

As part of the curriculum, each fellow is charged with producing a research paper and a quality improvement project. Throughout the program, fellows are exposed to various specialties in their training, which include orthopedics, toxicology, ophthalmology, critical care, and anesthesia.

The Stanford Pediatric Emergency Department commitment not only is to providing the gold standard of care to the young people of this community, but also is to training the next leaders in emergency medicine.

Our 2021 fellows

Shubi Goyal, MD

Preeti Panda, MD

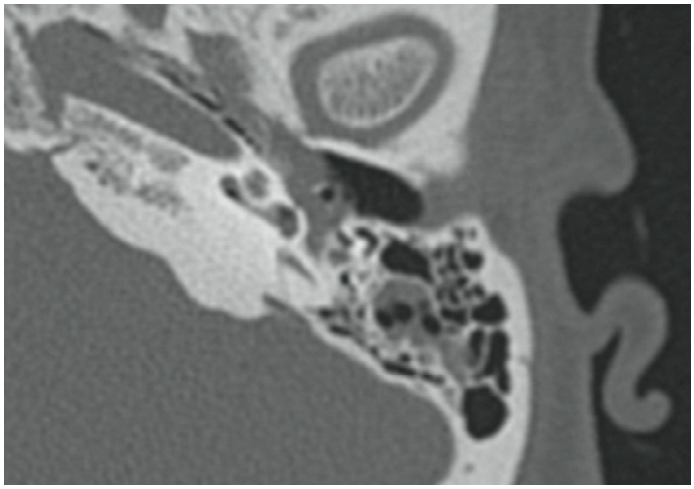
Aneta Pariaszevski, MD

Temporal Bone Fractures in Children —When to Call ENT?

—Kay Chang, MD, Otolaryngology

In children, road traffic accidents and falls are the most common causes of temporal bone fractures, each accounting for 30% to 50%. The most clinically useful classification system for these fractures separates them into otic capsule sparing versus otic capsule disrupting fractures. Patients with otic capsule disrupting fractures are five times more likely to have facial nerve injury, 25 times more likely to have sensorineural hearing loss, and eight times more likely to have cerebrospinal fluid otorrhea.

It is essential that the functional status of the facial nerve is documented as soon as possible during evaluation of these patients because whether facial weakness is immediate versus delayed and partial versus complete significantly changes the management. The ear canal should be inspected for CSF otorrhea, brain herniation, fracture of the roof of the EAC, and tympanic membrane perforation. Although bloody otorrhea and hemotympanum are common findings, no attempt should be made to remove this blood by irrigation or instrumentation. More thorough examination with a microscope will mostly likely be eventually performed by an ENT specialist, but only after the patient's condition has been stabilized.



Otic capsule disrupting fracture with air noted inside cochlea.

Both the more benign otic capsule sparing and more severe otic capsule disrupting temporal bone fractures should have ENT consultation in order to fully assess long-term sequelae, although any findings of facial weakness, CSF otorrhea, vertigo, and/or nystagmus warrant immediate urgent ENT evaluation.

For more information, contact Kay W. Chang, MD, professor of otolaryngology, at kaychang@stanford.edu.

> "It is essential that the functional status of the facial nerve is documented as soon as possible during evaluation of these patients."

Reducing Health Disparities for Families With Limited English Proficiency

—Jennie Magana-Soto, MSN, RN, CNS, and Marina Persoglia Bell, MA, Interpreter Services

In the pursuit of health equity for our patients and families of limited English proficiency (LEP), the Pediatric Intensive Care Unit (PICU) at Lucile Packard Children's Hospital Stanford has partnered with Interpreter Services to launch Unit Based Pathways to Reducing Disparities for Limited English Proficient patients/families (UPRISE-LEP). In alignment with the National Standards for Culturally and Linguistically Appropriate Services (CLAS) in Health and Health Care, UPRISE-LEP has developed a process tied to the morning huddles to highlight those patients and families in need of communication in languages other than English.

The PICU highlights the families' preferred language for medical discussions and coordinates in-person interpreters each day during PICU multidisciplinary team meetings to ensure meaningful updates and patient/family participation. Packard Children's Hospital offers medical interpretation and translation services for all non-English-speaking and hard-of-hearing patients and families. Interpretation modalities include in person, by telephone, or in video. To ensure patient and family advocacy and inclusion in their medical care, our inpatient/outpatient and transport team members can access all modalities 24 hours a day, 7 days a week, 365 days a year.

By increasing awareness of the various modalities for language access, updating documentation capabilities, measuring key outcomes against language access, and aligning clinical needs with resources, we foster trust, improve knowledge, and provide quality, safe care for all.

UPRISE-LEP has been possible with support from the Value Improvement Program (VIP) at Stanford Children's Health. To learn more, please contact **Jennie Magana-Soto, MSN, RN, CNS,** at jmagana@stanfordchildrens.org, or **Marina Persoglia Bell, MA,** at MPersogliabell@stanfordchildrens.org. Additional UPRISE-LEP members include: **Daniela Rey-Ardila**; **Felice Su, MD**; **Sunny Anand, MD**; **Monica Ruiz, MD**; **Amrita Sinha, MD**; **Sonia Torres**; **and Marta Moyano**.

"Interpretation modalities include in person, by telephone, or in video. To ensure patient and family advocacy and inclusion in their medical care, our inpatient/outpatient and transport team members can access all modalities 24 hours a day, 7 days a week, 365 days a year."

Initial Management: Drownings

-Kevin Wu Kuo, MD, Pediatric Critical Care

With summer now here and kids spending more time in the water, physicians should be prepared for drowning patients. While prevention, including pool gates and covers, flotation devices, water safety education, and especially adult supervision, is crucial, a few key points can be helpful when caring for patients who have drowned.

Drowning is the leading cause of injury-related death in children 1-4 years of age (CDC 2019). Data suggests that children with even mild symptoms, such as rales in some part of the chest or all lung fields, have a mortality rate of 0.5-5% (Szpilman, Chest 2019). These children should be assessed carefully, given supplemental oxygen, and evaluated in the emergency department.

As with other emergencies, the initial management focuses on the ABCs: airway, breathing, and circulation, including high-quality CPR, endotracheal intubation, and mechanical ventilation if needed. With a final common pathway of acute respiratory distress syndrome (ARDS), lung protective strategies targeting tidal volumes of 6 cc/kg, FiO2 <60%, and plateau pressures <30 cm H2O can be helpful. One caveat may be patients with cerebral edema, in which case one might be more aggressive with CO2 clearance versus more typical permissive hypercapnia strategies.

Targeted temperature management is important, with recent evidence indicating no outcome differences when targeting 32 versus 36 degrees C (Moler F et al., PCCM 2016). Other therapies such as steroids, iNO, surfactant, and antibiotics are generally not efficacious. However, in refractory cases, ECMO can be effective.

While drownings will hopefully be rare, understanding key guidelines for treatment can improve outcomes. Of course, we at Lucile Packard Children's Hospital Stanford are also always available to help partner in whatever ways we can in the care of these patients.

"As with other emergencies, the initial management focuses on the ABCs: airway, breathing, and circulation, including high-quality CPR, endotracheal intubation, and mechanical ventilation if needed."

Recognition and Management of Nonaccidental Trauma

Child abuse cases bring stress to even the most experienced practitioners. Stanford has a strong SCAN (Suspected Child Abuse and Neglect) team featuring two board-certified child abuse pediatricians, social workers, and specialists in multiple disciplines who can help evaluate cases. As an academic program, we focus on clinical, education, research, and service/advocacy aspects of child abuse.

We have implemented screening programs for our hospitalized patients, which we are studying, as well as conducting research on a number of child abuse–related topics. We also are active in service and advocacy roles in regional community agencies, such as child death reviews, child abuse councils, and child abuse prevention organizations.

Clinical Tips

Reporting

Most child abuse cases are neglect related. Sometimes deciding when to report can be difficult. If you have "reasonable suspicion," you are mandated to report. If you are not sure, discuss it with others, and if you are still unsure, you can email us at scan@stanfordchildrens.org.

When making a Child Protective Services (CPS) report, we recommend the following:

1. Using simple language that nonmedical people can understand.
2. Making clear the harm or potential harm that has occurred or can occur to the child.
3. Listing efforts made so far to understand/educate/support the caretakers.

Physical abuse tips

Fractures:

Get skeletal surveys done by experienced pediatric radiologists. Skeletal surveys are part of most physical abuse workups of children under 2 years of age (see clinical pathway). High-quality studies are important to prevent errors.

Most fractures are more highly associated with abuse in nonambulatory children. For example, spiral fracture does not equal abusive fracture. Yes, a spiral fracture in a nonambulatory child is concerning and highly associated with abuse. But a spiral fracture in the tibia or femur of an ambulatory child with a fall or twisting mechanism is not strongly associated with abuse.

Concerning injuries in children less than 2 years of age usually require a skeletal survey as part of the workup. Fractures, bruising, burns, or oral injuries in nonambulatory children are usually concerning.

Marks on the body:

Remember the TEN4-FACESp mnemonic for locations and types of concerning skin findings:

TEN-4: Injuries to the Torso, Ears, and Neck and bruising in patients less than 4 months old.

FACESp: Frenulum tear, Angle of the jaw, Cheek and Eyelid bruises, Subconjunctival hemorrhage, patterned injuries.

Concerning burns are patterned, widely separated (especially bilateral), or in different stages of healing, in unusual areas such as the backs of hands, torso, or buttocks.

Photo-documentation and accurate descriptions in the chart are important.

Head trauma:

In cases of possible abusive head trauma, strongly consider transferring, as these cases are complicated and require multiple specialists, including experienced pediatric ophthalmologists, neurosurgeons, hematologists, geneticists, and

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Evaluation of Suspected Child Abuse Pathway

Pathway Purpose: Provide guidance on the evaluation of suspected nonaccidental trauma/physical abuse.

Inclusion Criteria:
- Any patient <18 years of age admitted to Packard Children's with injuries suspicious for abuse.
- Injuries include burns, head trauma, bruising, and fractures.

Exclusion Criteria:
- Verifiable, witnessed events such as MVA (unless signs of abuse/neglect—e.g., lack of seatbelt).
- Obvious nonabusive cause of injury or explained by plausible developmentally appropriate mechanism.

Is the **primary** reason for admission suspected nonaccidental trauma or injuries suspicious for abuse?

NO → Admit to appropriate service based on primary reason for admission and consult pediatric surgery.

YES ↓

Admit to pediatric surgery with pediatric hospitalist consultation (admission to another service dependent on discussion with peds surgery/trauma surgery attending).

Upon Admission:
- Review any workup already completed by the ED or OSH (upload outside images).
- Obtain detailed medical history and physical exam with specific focus on indicators and injuries suggestive of abuse.
- Place following consults:
  - Trauma surgery
  - Hospitalist
  - Social work
  - Suspected Child Abuse and Neglect (SCAN)—via Epic consult order or page 27226 (2SCAN) for urgent needs
- Screen for Occult Injury and review Skeletal Survey Recommendations
- Screen for Medical Conditions
  - Use Non-Accidental Trauma Order set in Epic for initial diagnostic workup.

Documentation and Photo Documentation Tips

Findings With Low Concern for Abuse:
- Single injury with likely accidental mechanism.
- No occult injuries on skeletal survey.

Recommendations:
- Discuss possible CPS report with social work and SCAN team.

Discharge Criteria:
- Medically stable.
- CPS disposition is clarified, if they are involved.
- If unable to reach CPS and unsure about discharge, contact SCAN to discuss.
- F/U skeletal survey is scheduled, if indicated.
- Primary care physician has been contacted.

Findings Suggestive of Abuse:
- Witnessed or disclosed abuse.
- Injury pathognomonic of abuse.
- Injuries not explained by plausible mechanism.
- Occult injuries identified on skeletal survey.

Recommendations:
- Additional screen for occult injury per SCAN recommendations.
- Work with SW/most informed staff member to file CPS report.
- Recommend to investigators evaluation of other children in the home.

Definitions, Provider Education, and References

Owners: Betsy A'Neals, Melissa Egge, Chris Stewart **Pathway Team:** Melanie Stroud, Lauren Destino, Cherrelle Smith **Last Updated:** October 2020 **Associated Order Set:** Non-Accidental Trauma **Associated Policies:** Abuse & Neglect Reporting and Management

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radiologists. See the clinical guideline on the previous page for initial management.

Sexual abuse

Report to police in the county where the alleged abuse took place. They will usually arrange for a forensic exam if appropriate. Report to CPS in the county where the child lives.

Lucile Packard Children's Hospital Stanford's SCAN team is available for consults and questions. We also provide education on a variety of child abuse topics. Contact us if your organization is interested in child abuse training. The best way to reach the SCAN team is by emailing us at scan@stanfordchildrens.org.

We will be organizing and sponsoring an annual child abuse conference to be held this year on Nov. 5, 2021. See details below!

2021 Stanford Regional Child Abuse Conference

The conference will address the need of medical practitioners treating pediatric patients to increase and improve the fund of knowledge regarding child abuse and neglect, increase awareness of this medical and public health issue, increase comfort level in screening and treating these patients and to consider all available resources from a multidisciplinary team approach. This course will offer practical strategies on implementing these skills in clinical practice.

Objectives

At the conclusion of this activity, learners should be able to:

- Develop skills to recognize and treat child abuse in clinical practice according to evidence-based and best practice guidelines.
- Develop skills and strategies to consistently and timely document and report suspected child abuse.
- Apply a multi-disciplinary collaborative approach to diagnose, provide care for and protect abused children.

Friday, November 5, 2021 | 9:00 a.m. – 4:15 p.m. | Webinar

Registration: Physicians $50 | Allied Health $30 | **Register**

Credits: AMA PRA Category 1 Credits™ (6.25 hrs), Non-Physician Participation Credit (6.25 hrs), ANCC Contact Hours (6.25 hrs), ASWB Approved Continuing Education (ACE) credits (6.25 hrs)

Pediatric Neurological Care Team

Lucile Packard Children's Hospital Stanford is proud to offer one of the nation's few comprehensive neurocritical care programs for children in the ICU. Building upon collaborations across neurology, neurosurgery, and pediatric critical care, the program allows focused care by nurses with advanced neurocritical care training and multidisciplinary, family-centered rounds daily. The team recently welcomed a clinical specialist pharmacist, a research data analyst, and a clinical nurse specialist. Our program utilizes state-of-the-art neuro-monitoring equipment and advanced neurocritical care capabilities, such as:

- Six dedicated Neuro ICU beds.
- 24/7 ICU EEG.
- Pupillometers.
- Near-infrared spectroscopy.
- Intracranial pressure and oxygenation monitors.
- Transcranial Doppler ultrasound.
- Urgent thrombectomy for pediatric stroke.
- ROSA robotic surgical assistant for pediatric neurosurgery.

Pediatric Neurocritical Care Clinician Team

Lindsey Rasmussen, MD, FAAP
Assistant Professor Pediatric Critical Care Medicine and by courtesy Neurology and Neurological Sciences, Director of Pediatric Neurocritical Care

Courtney Wusthoff, MD
Neurology Director, Lucile Packard Children's Hospital Stanford NeuroNICU Director of Neurocritical Care, Associate Professor of Neurology and Neurological Sciences and by courtesy Pediatrics–Neonatal and Developmental Medicine

May Casazza, MSN, RN, PNP-AC, CNRN
Pediatric Neurosurgery and Pediatric Neurocritical Care

Nathan Chang, MSN, RN, CPNP-AC, CCRN
Pediatric Critical Care Medicine and Pediatric Neurocritical Care

Jeff Moss, PharmD, BCCCP
Clinical Specialist Pharmacist, Pediatric Neurocritical Care Pharmacist

How to refer inpatient consults and transfers

The Transfer Center at Lucile Packard Children's Hospital Stanford is standing by to help with inpatient consultations and interfacility transfers. After helping with transfers, we are available to help with fast and easy access to transport by ground or air. Our team of communication specialists and transfer center RNs are available 24/7 to assist in expediting neonatal, pediatric, and obstetrical consultations and transfers through one efficient point of access.

To request assistance with a patient transfer and/or to speak directly to a physician regarding the patient you are referring, please call **(650) 723-7342**. If you would like additional information about our program or follow-up on a patient, email us at DL-PNCCProviders@stanfordchildrens.org.

Pediatric Neurocritical Care (PNCC) – Critical Care, With the Young Brain in Mind

2020: A Year in Review

One of the nation's few **comprehensive neurocritical care programs** for children in the PICU

Monitored over **150 neurocritical care patients** with continuous EEG

Captured over **300 brain images** in critically ill children

Provided specialty care for over **600 neurocritical care patients**

350 neurosurgical interventions

5 most frequent diagnoses

treated in neurocritical care patients

- traumatic brain injury
- brain tumor
- status epilepticus
- acute intracranial hemorrhage
- post cardiac arrest

Inpatient Consults and Transfers

The Transfer Center at Lucile Packard Children's Hospital Stanford is standing by to help with inpatient consultations and interfacility transfers. Our team of transfer center specialists are available 24/7 to assist in coordinating neonatal, pediatric, and obstetrical transfers, as well as inpatient consultation needs.

To initiate a patient transfer and/or to consult with a Packard Children's specialist, please call **(650) 723-7342.**

Please have the following information available with the initial request:

- Patient's name and location
- Date of birth
- Chief complaint or diagnosis
- Referring physician's full name and best contact number
- Face sheet ready and available for faxing upon request to **(650) 498-6229**

Questions or concerns about the Lucile Packard Children's Hospital Stanford Transfer Center? Please contact:

Kat Cueto, MSN, RN-BC, CNS
Director of Clinical Access
(650) 721-5770
kcueto@stanfordchildrens.org

For questions or concerns related to our COVID-19 plan, please see our web page. Information is updated daily and includes content for families and providers. Covid.stanfordchildrens.org