

2022 GME Resident Scholarly Activity Projects



Kaweah Health Medical Center

Foreward

Congratulations Kaweah Health resident and faculty physicians! You continue to meet the rigorous standards of this graduate medical education program and you should be proud of the scholarly achievements showcased in this booklet.

Through these accomplishments, you have learned, measured and applied knowledge in new ways. You are contributing to the collective scientific knowledge of the world.

I am very excited to be able to support this quality work. By participating in the research and publication process, you demonstrate your abilities to make meaningful contributions within your own community, your areas of interest and throughout the world of health care. We are proud of you, and look forward to the differences you will make.

Sincerely,

Lori D. Winston, MD FACEP
Chief Medical Education Officer, Designated Institutional Official



Addressing Discrimination in Medical Education – A Workshop and Evaluation

INTRODUCTION/BACKGROUND:

The U.S. population has grown increasingly diverse; however, the medical field has not reflected this change. Discrimination and other forms of mistreatment are critical issues in academic medical centers. Minority physicians remain underrepresented in medicine despite national efforts to increase diversity in the health care workforce. Specifically, incidents of patient and family discrimination towards medical residents can present intense challenges for trainees as they navigate through their training.

METHODS:

A workshop was created to address discrimination towards medical trainees. It was a single session lasting 2 hours involving GME residents, core faculty, and coordinators. The session was designed with objectives: learn the communication strategies medical trainees can use when faced with discrimination by a patient; apply those communication strategies to actual scenarios with a discriminatory patient; provide institutional resources available when faced with discriminatory patients. A pre- and post-session questionnaire were distributed to evaluate the workshop and assess learning, application, and utility. Several institution wide resources for reporting patient and family discrimination were provided.

RESULTS:

Multiple participants reported the learned strategies to be helpful techniques for dealing with discrimination. Recommendations were provided by workshop participants that involved the creation of similar workshops to include Attending discrimination against medical trainees and advised the incorporation of broader hospital personnel (i.e. nursing), among others.

IMPLICATIONS FOR PRACTICE:

Future workshops would seek to include these recommendations. Despite many institutional policies to broadly counteract discrimination, it is not possible to fully prevent and attention should be placed on equipping trainees with the proper tools to manage these situations when they arise. Recommendations offered included increased proactivity in developing formal methods to monitor and address instances of bias experienced by residents as well as diversity efforts being a function of administration and institutional staff, versus that of trainees.



**Lauren
Bacon, MD**

Emergency Medicine

A Cerebrovascular accident: A study protocol

INTRODUCTION/BACKGROUND:

Vast improvements have been made on the recognition and treatment of strokes since the NINDS-tPA trial in 1995 because patients were being rushed through computed tomography (CT) scanners to differentiate between ischemic and hemorrhagic CVAs as the treatment is vastly different when recognized timely. National guidelines recommend CT scan within 25 minutes of arrival in patients who present with typical stroke symptoms.

Patients without typical stroke symptoms will not activate stroke alert systems, which may cause imaging delays especially in overcrowded emergency departments. Ischemic stroke is by far the most studied stroke type in terms of onset, risk factors, predictors, intervention, morbidity and mortality. Hemorrhagic stroke and ischemic stroke are often compared in studies, however, there have been no studies to date that compare outcomes of hemorrhagic strokes which were identified early and activated stroke protocol versus those who did not and were diagnosed later with delayed imaging. At Kaweah Health, there is a population of about 100 people per year who suffer a delayed diagnosis of hemorrhagic stroke and may benefit from earlier detection.

RESEARCH QUESTION:

The primary aim of this study is to

- 1) identify clinical outcomes of adult patients (age 18 or greater) who presented to Kaweah Health Emergency Department with a hemorrhagic cerebrovascular accident (CVA) who did not activate the stroke alert protocol as compared to adult patients with hemorrhagic CVA and ischemic CVA who did activate the stroke alert protocol.
- 2) Identify patient level indicators, if any, of hemorrhagic CVA with atypical/unspecific presenting symptoms. We believe that there will be a significant association between worse outcomes and delayed identification of hemorrhagic CVAs as compared to patients activating a stroke protocol.

PROPOSED STUDY DESIGN:

The study design is a retrospective cross-sectional study. We plan to obtain data from the existing EHR at Kaweah Health for patients that presented either with an ischemic stroke or hemorrhagic stroke and were activated as a stroke alert as well as patients where hemorrhagic stroke was found but not activated per the stroke protocol.



**Ryan
Bennion, DO**

Transitional Year



**Michelle
Blain, DO**

Family Medicine

Hallucinogen-persisting Perception Disorder after First-Time Psilocybin Mushroom Consumption: Case Report

Hallucinogen-persisting perception disorder (HPPD) is a poorly understood disorder which is characterized by visual disturbances, distortions, and flashbacks after hallucinogen consumption. This disorder is rarely diagnosed in the clinical setting, with very limited literature found; however, can cause significant impairment in patients' lives.

This is a case report of a 22-year-old female patient who developed persistent visual disturbances and distressing traumatic flashbacks after first-time consumption of psilocybin mushrooms. After outpatient treatment with risperidone, her symptoms worsened. She was diagnosed with hallucinogen-persisting perception disorder and treated with anticonvulsant medication.

This report will explore a rare and underdiagnosed disorder, discuss possible etiology of HPPD, as well as elaborate on comorbidities with other psychiatric conditions. Possible pharmacotherapy, such as benzodiazepines, selective serotonin reuptake inhibitors, alpha-2 agonists, and anticonvulsants, will also be discussed.

What was once considered to be a fallacy in the 1960s to deter people from recreational drug use, may in fact carry clinical significance in the psychiatric and primary care domains today.



**Mark
Bozych, DO**

Anesthesiology

Impending Respiratory Collapse in a Patient with Obesity Hypoventilation (Pickwickian) Syndrome

INTRODUCTION/BACKGROUND:

Obesity hypoventilation (Pickwickian) syndrome (OHS) has an estimated incidence of 0.15-0.3% in the general population. Patients with OHS also often exhibit polycythemia, elevated bicarbonate (HCO_3) and inflammatory markers, and decreased blood pH, forced expiratory volume in one second, and forced vital capacity. Obstructive sleep apnea (OSA) is considered to be separate from OHS, though thought to exist concurrently in ~90% of patients with OHS.

METHODS/RESULTS:

A morbidly obese 40-year-old gentleman initially presented for bilateral testicular swelling, was noted to have oxygen saturation of 78-89%, and was started on supplemental oxygen. Venous blood gas (VBG) showed patient to have PaCO_2 of 76 mmHg, PaO_2 of 38 mmHg, and HCO_3 of 39.2 mEq/L, indicating chronic hypercapnia. The initial differential diagnosis included heart failure vs. pulmonary embolism and testicular torsion vs. thrombus. Due to his very large body habitus, computed tomography and ventilation-perfusion scans were not possible to rule out pulmonary embolism, and so he was started on a prophylactic heparin drip. Scrotal ultrasound demonstrated

adequate testicular perfusion, suggesting that the scrotal swelling was due to anasarca. Despite these interventions, his respiratory status slowly deteriorated. Three days after admission on bilevel positive airway pressure, he became increasingly confused, somnolent, and difficult to arouse. Due to his deteriorating status, his airway was secured semi-electively, prior to transfer to the intensive care unit.

IMPLICATIONS FOR PRACTICE:

How should the results affect practice? Such widespread derangements of physiology provide considerable challenge for the management of these patients in both the anesthesia and intensive care settings. Patients with OHS possess a lower functional reserve than their eucapnic counterparts. Even in the setting of regular use noninvasive positive pressure ventilation during sleep, patients with OHS have a 5-year survival rate of only 70.2% [5]. In the presented patient, success in securing the airway was achieved in large part multiple providers to optimize the patient ahead of time.

An inexpensive Phantom model for the teaching of Superficial Cervical Plexus Block

GUIDELINES:

Regional nerve blocks have long been a staple of anesthesiology in the perioperative setting. A recent growing body of research supports the use of nerve blocks in the emergency department for a variety of indications. Superficial cervical plexus block (SCPB) is a regional nerve block that delivers local anesthetic to the sensory nerve roots of C2-C4. The block has historically been used perioperatively for cases involving the neck region. Studies have shown significant reduction in postoperative pain for patients who receive the SCPB for thyroidectomy. Furthermore, data analyzed from patients receiving the SCPB for endarterectomy demonstrate the block to be exceedingly safe. Its usage in the emergency department remains limited although recent publications have demonstrated its efficacy in analgesia for clavicular fracture and central line placement.

With the increased utilization of ultrasound and regional anesthesia in emergency medicine training, it is important to develop appropriate simulation models for learners. Commercially available phantom ultrasound models are often expensive and currently offer limited options

for nerve block training. As such, there is a growing body of work documenting the effectiveness and reproducibility of homemade phantom models. During our study, we created a phantom model to simulate the anatomy involved with the placement of a SCPB. The model was used to teach the SCPB to trainees at our institution



Jeffrey
Castrillon, DO

Emergency Medicine



**Tiffany
Chamberlain, DO**

Anesthesiology

The Impossible Pediatric Airway: Intubation of a Newborn with Pierre Robin Sequence.

INTRODUCTION/BACKGROUND:

Pierre Robin Sequence (PRS) presents airway challenges for anesthesiologists. Perioperative care for a PRS infant involves a multidisciplinary team consisting of pediatric anesthesia, plastic and reconstructive surgery, otolaryngology, speech pathology, nursing, and neonatology. Pierre Robin Sequence occurs in 1/5000 to 1/85,000 births. Pierre Robin Sequence is defined as the physical characteristic triad of micrognathia (small mandible), glossoptosis (abnormal posterior placement of tongue), and airway obstruction. This sequence is often associated with a wide u-shaped cleft soft palate. These clinical features need to be taken into account when considering the anesthetic plan for a PRS neonate or infant.

METHODS/RESULTS:

A case of a full-term male born via cesarean section presenting in respiratory distress at birth is discussed. Physical Exam findings include bilateral hypoplastic mandible, glossoptosis, minimal thyromental distance, cleft palate. The patient was referred for preoperative evaluation for removal of the bilateral mandibular distractors. Adequate thyromental distance and mouth opening were observed, along with normal tongue size and no micrognathia.

Combined intravenous and inhalational mask induction was used with an oral pharyngeal airway while maintaining spontaneous ventilation, video laryngoscopy and Miller 1 blade was used by anesthesia for intubation. The patient presented with Grade 1 view and was intubated on the first attempt with a cuffed 3.5mm endotracheal tube.

DISCUSSION AND IMPLICATIONS FOR PRACTICE:

Children with PRS should be monitored and examined for signs of airway obstruction as well as obstructive sleep apnea. PRS patients are at high risk of central and obstructive apnea. Consideration should be made to limit narcotic use in these settings. This case provides a greater appreciation of the factors involved with initial management for newborns with Pierre Robin Sequence.

Kaweah Health Hospital Became #1 in Covid-related hospitalization in the State of California on November 3rd, 2021

INTRODUCTION/BACKGROUND:

Kaweah Health Hospital has been experiencing high Covid inpatient census in the last several weeks that recently peaked to a crisis level on Nov 3rd. On Nov 4th 2021, Kaweah Health Hospital housed 111 patients placing it at number one position out of a total of 500 hospitals in the State of California. Hospitals much larger than Kaweah Health, e.g., the 600-bed Los Angeles County+USC Medical Center, had an average of 27 Covid total patients. This raises questions and is subject for greater public health scrutiny.

METHODS:

Raw patient data was obtained using descriptive statistics from Kaweah Health Hospital, and secondary sources such as Tulare County (HHSA) Health & Human Services Agency, and public media sources.

RESULTS:

Most of the Covid hospitalizations during the months of July-November are patients with comorbid chronic conditions. Notable were higher admissions numbers for patients with primary diagnosis of CHF, hypertension, diabetes, CVA,

obesity, and flu and pneumonia. The high numbers coincide with the flu season, advent of the delta variant, and poor air quality due to wildfires.

CONCLUSION:

The high rate of Covid-19 hospitalization for Kaweah Health Hospital which placed the health institution at position 1 out of 500 hospitals in the state of California are multifactorial. The advent of the delta variant combined with the spread of wildfires in an environment already facing health challenges triggered the worst spike in Covid-related hospitalizations and deaths.



**Tawanda
Charumuka, MD**

Family Medicine



**Kevin
Cowan, MD**

Surgery

Enterocutaneous Fistula

INTRODUCTION/BACKGROUND:

A fistula is an abnormal connection between two epithelized surfaces. Fistulas can form between any two hollow spaces including blood vessels, intestine, vagina, bladder, and skin. There are three different categories used to define a fistula, anatomic, physiologic, and etiologic. Anatomically, fistulas are subdivided into two categories, internal and external. Internal fistulas are connections between two internal structures. A few examples of an internal fistula would be enterocolic, ileosigmoid, and aortoenteric. Alternatively, external fistulas form connections between an internal structure and external structure. Examples of this would be enterocutaneous, enteroatmospheric, and rectovaginal fistulas. Enterocutaneous fistulas most commonly occur as a surgical complication, but can also occur due to trauma, malignancy, inflammatory bowel disease, or ischemia. Enterocutaneous fistula mortality rates vary from 6 to 33 percent. Associated morbidity and complications can also be significant.

METHODS/RESULTS:

The goal of medical management is to decrease fistula output and encourage spontaneous closure. As previously mentioned, the most common cause of an enterocutaneous fistula is iatrogenic and

occurs in the postoperative period. A history of trauma, inflammatory bowel disease, and oncologic surgery places patients at a high risk of developing a fistula.

The following scenario is an example of the events leading up to the development of an enterocutaneous fistula. A patient with a postoperative fever, leukocytosis, ileus, and abdominal tenderness is found to have a wound infection. The next step in treating this patient is to drain the abscess. However, one or two days after draining the abscess, enteric contents are observed in the wound. Finding enteric contents that are continually leaking into the wound establishes a diagnosis of an enterocutaneous fistula.

RESULTS:

Enterocutaneous fistulas are best managed by an interprofessional team that includes a stoma or wound care nurse, dietitian, and therapist. The key is to replace any fluids and electrolytes promptly because these patients can decompensate quickly. The source of sepsis has to be identified. The decision to treat nonsurgically versus surgery requires clinical acumen and good judgment.

The outcomes depend on the cause of the fistula; malignant cases usually have a poor outcome but those in patients with Crohn's disease can take months or years to close.



Tyler Dalton, MD

Transitional Year

Symptom Research by Patients and Hospital Admission at the Kaweah Health Emergency Department: A Protocol for a Prospective Cohort Study

INTRODUCTION/BACKGROUND:

Patient education is an ongoing concern, particularly in areas with low health literacy such as Tulare County in Central California. Patients with inadequate health literacy are twice as likely to be admitted to the hospital compared to patients with adequate health literacy. Patient use of internet health resources has become widespread, with more online information, leading to the phenomenon of self-triage prior to ED visits.

METHODS/EXPECTED RESULTS:

The purpose of this study is to examine potential correlation between emergency department patients who research their symptoms before coming into the department and rate of hospital admissions. We hypothesize that patients who research their symptoms then choose to go to the emergency department will have higher rates of admission compared to patients who do not look up their symptoms ahead of time.

- Eligible populations: Patients between 21 to 65 going to the Kaweah Health emergency department with following chief complaints:
 - Headache, Cough, SOB, Chest Pain, Abdominal Pain
- Exclusion criteria:
- Patients arriving by EMS

Timeframe:

- Initial data collection 6 months (approximately 15000 patients)
- If insufficient number of enrolled patients, increase timeframe
- Enrollment: Patients will be enrolled during registration
- Data collection: A survey including the following details:
- Demographic data (Age, Gender, Race, Education, Housing status, Language)
- Self-reported health literacy (Likert Scale)
- Whether or not they research their symptoms beforehand
- What sources were used (Health Professional, Medical Journal, Research Article, Colleague, Friend, Health Website)
- Endpoint will be patient disposition (Admitted, Discharged, Upgraded to Zone 2, Left AMA)

IMPLICATIONS FOR PRACTICE:

If trends are noted, this can guide our efforts to potential intervention in the form of improved patient education. The ultimate goal is to increase health literacy and improve ED triaging procedure.

** Shared project with Andrew Yu, MD*

Worsening of Emergency Department Length of Stay during the COVID-19 Pandemic

STUDY OBJECTIVE:

Our study sought to determine whether there was a change in Emergency Department (ED) length of stay (LOS) during the Coronavirus disease 2019 (COVID-19) pandemic compared to prior years.

METHODS:

We performed a retrospective analysis using ED performance data 2018-2020 from 56 EDs across the United States. We used a generalized estimating equation (GEE) model to assess differences in ED LOS for admitted (LOS-A) and discharged (LOS-D) patients during the COVID-19 pandemic period compared to prior years.

RESULTS:

GEE modeling showed that LOS-A and LOS-D were significantly higher during the COVID-19 period compared to the pre-COVID-19 period. LOS-A during the COVID-19 period was 10.3% higher compared to the pre-COVID-19 time period, which represents a higher geometric mean of 28 minutes. LOS-D during the COVID-19 period was 2.8% higher compared to the pre-COVID-19 time period, which represents a higher geometric mean of 2 minutes.

CONCLUSIONS:

ED LOS-A and LOS-D were significantly higher in the COVID-19 period compared to the pre-COVID-19 period despite a lower volume of patients in the COVID-19 period.



**Eric
Donn, MD**

Emergency Medicine



**Vineeth
Gangaram, MD**

Transitional Year

Unlocking improvements of a live Artificial Intelligence (AI) algorithm for identifying incidental coronary artery calcium on routine computed tomography scans

INTRODUCTION/BACKGROUND:

Coronary artery calcium (CAC) scores are a useful statistic traditionally generated from EKG gated computed tomography (CT) scans that can help estimate cardiac related morbidity and independently justify medical and procedural intervention. Recent studies demonstrate that a deep learning algorithm could be trained to estimate EKG gated CT coronary artery calcium scores from routine non-gated CT scans with PPV and NPV >85% at multiple sites. In October 2021 this algorithm was deployed at UCSF to make inferences on all CT scans at the institution. With the massive increase in the number and breadth of studies performed it's important to reflect on the algorithm's performance to ensure that it is maintaining the same level of performance as originally published and identify areas for improvement.

METHODS/RESULTS:

A random sampling of predictions from the UCSF live dataset were analyzed to identify the most common classes of algorithm failure and then radiologists at UCSF were surveyed to identify which classes of errors were the most troublesome and

highest priority to address. The most frequent types of studies that caused inaccurate results included 1) low dose CT scans 2) patients with coronary artery stents 3) post-operative patients. On survey of the radiologists it was determined that misclassification of coronary artery stents versus coronary artery calcium was the most troublesome and therefore highest priority for algorithm improvement.

IMPLICATIONS FOR PRACTICE:

The immediate takeaway is to use caution when interpreting the algorithm's predictions for scans that fall under the three most common failure modes described above. However, the longer term takeaway is to use the generated tools to adjudicate the algorithm's predictions so that these cases can be better addressed by the algorithm in the future.



**Puneet
Gill, DO**

Emergency Medicine

George Has My Heart Racing

GUIDELINES:

A previously healthy eight year old female presented to a Children's Emergency Department with palpitations after minor chest trauma. While playing at home she was hit in the chest by her cousin, and subsequently had the sensation of her heart racing with shortness of breath. Mother noticed that she appeared pale and less active. Upon arrival, the patient's initial set of vitals were normal except for a HR of 224. The 12 lead ECG was consistent with supraventricular tachycardia. Given that the patient was hemodynamically stable, vagal maneuvers were attempted, which failed. Ultimately the patient required pharmacological cardioversion with adenosine, which successfully converted her to a normal sinus rhythm.

Labs were remarkable for a slightly elevated troponin at 0.053ng/ml (Ref: <0.029ng/ml) , hypocalcemia at 6.8mg/dL (Ref: 9.2-10.5mg/dL), hyperphosphatemia at 9.3mg/dL (Ref: 4.1-5.9mg/dL), and hypomagnesemia with a magnesium level of 1.87mg/dL (Ref: 2.09-2.84mg/dL). Ionized calcium was 0.83 mmol/L (Ref: 1.15-1.26mmol/L). Given these lab findings, a parathyroid hormone level was added and found to be 4.80pg/ml (Ref: 16.23-63.02pg/mL) concerning for hypoparathyroidism. Patient was

given calcium gluconate 2gm IV and her magnesium was corrected.

During hospitalization the underlying cause of the patient's metabolic abnormalities was attributed to DiGeorge Syndrome. Family later provided collateral history that at birth, the patient required cardiac surgery at an outside facility for a congenital defect.

DiGeorge syndrome is a condition characterized by partial deletion of chromosome 22. DiGeorge syndrome leads to failure and underdevelopment of the pharyngeal pouches during embryogenesis. These pharyngeal pouches give rise to the face, heart, thymus and parathyroid glands. Many children present with all or some features of classic symptoms known as CATCH-22, which are as follows: cardiac anomalies, abnormal facies, thymic hypoplasia thus immunodeficiency, cleft palate, and hypocalcemia secondary to hypoparathyroidism.

Of significance for us in the Emergency Department is that electrolyte abnormalities can cause arrhythmias and thus identifying and correcting these to achieve homeostasis is important.



**Puneet
Gill, DO**

Emergency Medicine

Parental Beliefs and Practices Regarding Childhood Fevers in Tulare County: An Observational Cross Sectional Study of Children Presenting with Fevers At Kaweah Health Emergency Department.

GUIDELINES:

Fevers are one of the most common chief complaints of children presenting to Emergency Departments across the United States, accounting for nearly 20% of all visits. Our goal in this study was to determine parents' knowledge and beliefs regarding fevers.

We performed a cross sectional paper survey based study in the Emergency Department across the span of five months, from November 2021 to April 2022. Any parent that presented with a child aged 0-18 years of age with a fever was asked to participate in our multiple choice based survey. In total, 50 participants completed the survey.

Most of the children presented with their mothers (n=43, 86%). More than 40% of parents were aged 25-34. About another one fourth were under 25 years (26%) and 35-44 years old (24%). Of the patients population that presented with a fever; the highest amount was infants (age <1 year) n=17, 34%, second was preschoolers (n=8, 16%) and older children (age >6 years) (n=3, 6%). About half of the participants (n=23, 46%) knew 100.4 was considered as a fever. Slightly more than half of them reported they used both Ibuprofen and Tylenol to treat their child's fever. The majority of them (n=38, 76%) used more

than one medication to reduce their child's fever. However, only about 20 percent (n=10) and 10 percent (n=5) of them correctly answered the question regarding the side effects of the fever and knowing where to find the guidance of the right dose of medication for their child, respectively. Roughly 40 to 50 percent reported use of multiple approaches (50%), cold bath (42%), ice bag(48%), and sponge(46%) to lower their child's temperature. Only one fifth reported they saw a pediatrician before visiting the ER. 42 % (n=21) thought the child needed antibiotics when having a fever. Compared to 83% of Spanish speaking parents.

There were many limitations in our study; including a small sample size, method of data collection, time period during which surveys were collected. However, some inferences that we were able to make were that most children that come into the ED for evaluation of fevers are infants and they present with their mothers. Most parents do not know which Fahrenheit degree constitutes a fever, its side effects, and most do not see their pediatrician prior to ED visit. Many parents still think their child needs antibiotics every time there is a fever, that percentage was higher amongst Spanish speaking parents. These findings suggest there are many opportunities to educate parents on fevers to assuage fears, decrease ED visits, and improve patient outcomes.

*Shared project with Daniel Khushigian, DO.

Challenges and Disparities in Stroke Rehabilitation in Rural Communities: A Literature Review

INTRODUCTION/BACKGROUND:

Stroke as a condition is a major cause of mortality, morbidity, disability, productivity loss, and poverty. The number of patients with stroke and subsequently requiring rehabilitation is projected to increase. Rehabilitation after stroke is associated with improved outcomes; however, inpatient rehabilitation requires resources and expertise not available at all healthcare centers and are less likely to be located in rural areas.

There is limited knowledge of the discrepancies in the use and outcomes of post-acute stroke rehabilitation between individuals living in rural vs urban areas in the United States. The objective of this review is to highlight discrepancies in rehabilitation for stroke in rural versus urban areas.

METHODS/RESULTS:

The studies focused on post-acute care after stroke in rural areas compared to urban areas. Studies were published 2002 to 2021 in English peer-reviewed journals. A mix of qualitative, quantitative, and review studies were included. Thematic analysis was done. Five research articles were found. Significant findings include differences between rural and urban strokes patients in access to inpatient rehabilitation facilities, type and course

of post-acute care after stroke, and mortality after post-acute care. Study results showed varying amounts of total amount of post-acute care for rural patients compared to urban patients.

IMPLICATIONS FOR PRACTICE:

Multiple studies included in this literature review have findings of a marked differences in post-acute care use between patient discharged from urban and rural hospitals. There may be a significant number of patients in rural areas who would qualify for and benefit from inpatient rehabilitation but have decreased access to these services. The numerous factors discussed in this study should be evaluated on an individual geographical level to comprehend the problems of rural healthcare, support political decisions, and determine resource allocation to provide sufficient delivery of rural health care.

**Harmandeep
Grewal, DO**

Transitional Year

Exercise-Induced Rhabdomyolysis following one High Intensity Interval Training (HIIT) Session: A Case Report

INTRODUCTION/BACKGROUND:

Relatively few cases have been reported of one high intensity interval training session resulting in rhabdomyolysis leading to severe acute kidney injury (AKI) requiring hemodialysis. This case report seeks to add to the literature the effects of exercise-induced rhabdomyolysis (EIR) on function and quality of life.

METHODS:

The patient is a 35 year-old female who presented to our medical center following a high intensity interval training class. She developed leg swelling and pain immediately after the workout, along with fatigue and hematuria for two days. On arrival to the ED, her serum creatinine (Cr) was found to be 7.0 and creatinine kinase (CK) was 87,000. Her urinalysis (UA) showed blood and protein and AST/ALT were elevated. She was admitted to the hospital for acute kidney injury (AKI) due to severe rhabdomyolysis. Of note, she was previously admitted for rhabdomyolysis with a CK of 1000 five years prior.

RESULTS:

During her hospital course, her Cr improved only slightly despite aggressive IV fluid resuscitation, and she was prepared for hemodialysis. After two rounds of hemodialysis, her CK improved to 4552

and Cr remained elevated at 5.07. She required regular outpatient dialysis after discharge.

IMPLICATIONS FOR PRACTICE:

EIR is an uncommon cause of severe rhabdomyolysis and a very rare cause of AKI. Despite denial of medications, steroids, supplementation, alcohol, or recreational drugs, this patient presented in severe renal failure, eventually leading to a permanent tunneled catheter placement and regular hemodialysis. There was a suspicion for glycogen storage diseases such as McArdle's Disease. Genetic testing resulted as negative for glycogen storage diseases. No guidelines are available for the treatment and follow up of EIR. Myalgia, obesity, and the use of medications such as statins and NSAIDs is common in our setting. Providers encourage patients to exercise more, and this case report suggests that the risk factors for rhabdomyolysis exist in our local setting. Therefore, it is paramount that healthcare practitioners in our settings should be made aware of EIR prevention and symptoms

** Shared project with Kevin Nasre, MD*

**Harmandeep
Grewal, DO**

Transitional Year



**Alfredo
Guerrero, DO**

Emergency Medicine

COVID-19: Examining Outcomes & Disparities In California's Central Valley

BACKGROUND

The COVID-19 pandemic has brought to light and renewed the conversation of previously known health disparities in the United States. People of Color in the United States face a multitude of health disparities for many reasons. The Central Valley of California consists of a diverse population unlike the rest of California. The population includes a large percentage of agricultural workers, non-English speakers, a lower educational attainment compared to the rest of the state, a large percentage of people not of Caucasian descent, and a large percentage of people with low or no access to healthcare.

OBJECTIVE:

The purpose of this study was to assess for disparate health outcomes in California's Central Valley with regards to the first 10 months of the COVID-19 pandemic, particularly among the Hispanic population. The pre-study hypothesis assumes that Hispanic patients and Spanish speaking patients with COVID-19 had increased mortality in the first 10 months of the pandemic.

METHODS:

This was a retrospective study at Kaweah Health Medical Center. Data was collected on adult patients who were admitted to any level of care

within the hospital with a primary or secondary diagnosis of COVID-19 between March 1, 2020 and January 31, 2021. 2124 records of individual visits were identified. Individual-level data were used for all the analyses. In total, there were 1,822 unique patients included in the study, including 171 patients who experienced re-admission after initial visits. Descriptive statistics describe the sample characteristics by status of survival vs. death. Chi-square or Fisher's exact test was used to examine whether the association of individuals' characteristics with death or re-admission is statistically significant. For the latter, those who expired during the initial visit were excluded from the sample. Logistic regression was used to examine the association of individuals' characteristics with mortality or re-admission.

CONCLUSIONS:

In a medium sized Central Valley, California hospital, admission rates to the hospital for COVID-19 mirrored the surrounding area population demographics. No difference was seen in mortality rates amongst patients from different racial or ethnic backgrounds. Male patients admitted with COVID-19 had a higher mortality rate than their female counterparts. Male patients, and patients who spoke languages other than English were more likely to be readmitted with a diagnosis of COVID-19.

*Shared project with Diana Trumble, MD.



**Barre
Guillen, MD**

Surgery

Traumatic Open Abdomen

INTRODUCTION/BACKGROUND:

The open abdomen is a validated and widely accepted approach to managing surgical and traumatic pathologies. Traumatic open abdomen involves leaving the fascial layer of the abdomen open after a laparotomy for blunt or penetrating trauma with the intention of going back later for definitive repair and closure. It can be utilized for damage control with later closure, to facilitate re-exploration or enable additional surgical debridement, or to provide definitive surgery once the patient has stabilized.

METHODS:

Damage control laparotomy (DCL), more specifically, prioritizes the control of hemorrhage and contamination as well as the preservation of physiologic reserves. It is useful in patients who cannot tolerate a prolonged operation. The patient's abdomen is left open with a delay in fascial closure until after visceral injuries can be definitively managed. This is a key benefit of the traumatic open abdomen.

RESULTS:

After the initial procedure, the patient is cared for in the intensive care unit (ICU). Patients are assessed on 24 to 48-hour cycles for readiness to return to the

operating room. Washouts are performed as needed during this interval. Signs that a patient is ready to return to the operating room include stabilization of vital signs, urine output, urinary bladder pressure, physiological stabilization, and no signs of abdominal infection.

IMPLICATIONS FOR PRACTICE:

Patients who undergo primary closure during the index hospitalization have shorter intensive care unit (ICU) stays, hospital stays, and quality of life. At least one study found that undergoing more than four operations before primary closure is achieved was significantly associated with failure of the primary fascial closure, while another found that achieving primary closure within eight days of the initial operation was associated with better outcomes. Additionally, providing enteral nutrition to patients with an open abdomen is another factor that increases the likelihood of successful primary closure. It has also been shown to reduce mortality in these patients compared to those who are kept nil per os (NPO or nothing by mouth). After the shock has resolved, enteral nutrition should be considered in all patients with an open abdomen.

Multidisciplinary Approach to Pain Management in Patients with Stiff Person Syndrome in the Perioperative Setting



**Jenny
Man-Yuen Kan, MD**

Anesthesiology

INTRODUCTION/BACKGROUND:

Stiff Person Syndrome (SPS) is a rare neurological disorder characterized by progressive muscle weakness and rigidity associated with extremely painful spasms. These muscle spasms are often set off by emotional stress, sudden movement, or noise. Patients with SPS often have other autoimmune disorders, postural abnormalities, and fear about leaving the home because street noises can trigger spasms and falls. Moreover, SPS patients suffer from chronic pain, requiring unusually high doses of benzodiazepines and narcotics daily for pain control. Our patient is a 27 year-old woman with a history of SPS diagnosed one year prior to presentation for impacted wisdom teeth extraction under monitored anesthesia care. She has intermittent muscle stiffness in the neck and extremities for which she takes multiple medications, including marijuana, hydromorphone and diazepam. Her previous postoperative course was complicated by intense pain and prolonged spasms aggravated by anxiety.

METHODS/RESULTS:

The anesthesia providers ensured clear communication with the patient, supporting anesthesiologists, the perioperative nursing teams, pharmacy and the admitting hospitalist. Teams were educated on the management of this rare disease,

the importance of anxiety management, and the expectation to ensure timely delivery of the appropriate medications. The patient reported excellent pain control throughout surgery and in the PACU.

IMPLICATIONS FOR PRACTICE:

Pain management in patients with SPS requires an understanding of the disease process and special considerations for the amount of medications needed to prevent a catastrophic pain crisis. Their dependence on properly administered benzodiazepines and narcotics is not an addiction but rather within the anticipated treatment needs for this disorder. Even though muscle stiffness may progress over time and patients may still develop complications from the comorbidities associated with SPS, debilitating spasm episodes can be avoided with adequate disease management. Other effective therapeutic options that have been demonstrated by research studies include specific anticonvulsants, muscle relaxants, botox injections, rituximab, plasmapheresis, as well as high-dose intravenous immune globulin, and psychotherapy. Providers should consider the biopsychosocial model when delivering medical care to individuals with this rare disorder.

Therapeutic Paracentesis in cardiac arrest secondary to tense ascites

INTRODUCTION/BACKGROUND:

Abdominal Compartment syndrome (ACS) and intra abdominal hypertension is a rare complication of abdominal trauma, infection or surgery. It is seldom reported in the setting of cirrhosis as the inciting factor. Abdominal Compartment syndrome when reported is known to cause severe morbidity and mortality primarily through limiting vascular circulation but also due to other concomitant conditions.

CASE:

Here we report a case of PEA cardiac arrest suspected to be secondary to abdominal compartment syndrome. After multiple rounds of ACLS failed to attain ROSC, point of care Ultrasound was performed and revealed large volume ascites. 4L of fluid were subsequently removed from the abdominal cavity followed by sustained ROSC. Post ROSC, the patient had a non-reassuring neurological examination. He was started on multiple pressors to maintain a MAP > 65. His workup was notable for Ammonia of 211, AKI, and hyperkalemia, which were also addressed as well as empiric antibiotics for SBP. The patient was cooled for 24 hours, at which time lack of meaningful neurological recovery prompted a goals of care meeting where patient was transitioned to DNR and ultimately expired.

DISCUSSION:

While this case has multiple confounding factors on account of the patient being a chronically ill male, and the cause of his death is likely not attributable to one isolated reason. Hepatic encephalopathy, hypoxia, aspiration, infection, trauma, arrhythmia, may have played a role, were accounted for and intervened upon where appropriate. Regardless, it is still notable that once paracentesis was performed the patient nearly instantaneously attained ROSC. It is hard to discount the role of abdominal compartment syndrome as a major contributing factor to patient's arrest or continued PEA arrest after initial insults had been addressed. While more investigation is clearly needed, ACS should still be considered in the coding patient as early intervention may potentially alter outcome.



Hady
Khalifa, MD

Emergency Medicine



Madeeha Khan, DO

Transitional Year

The Effects of Aerobic Cycling on Locomotor Function in Adults with Stroke: A Systematic Review Protocol

INTRODUCTION/BACKGROUND:

The purpose of this systematic review registered at the International Prospective Register of Systematic Reviews (PROSPERO) is to determine through analysis and synthesis of published literature the effect of an aerobic cycling intervention on locomotor function in individuals with stroke.

METHODS:

Inclusion Criteria will include 1) Individuals with stroke with residual hemiparesis. 2) Participants completing an aerobic cycling intervention. 3) Cycling intervention includes greater than 1 session. 4) Outcomes include measures of walking or gait. 5) Outcomes are assessed at baseline and post-intervention

Exclusion Criteria: 1) Primary etiology of walking limitations was a diagnosis other than stroke. 2) Studies to be included: 1) Cohort studies. 2) Randomized clinical trials. 3) Case series. 4) Prospective observational study

A narrative synthesis of the findings from each study will be provided. The synthesis will include demographic data, relevant details of the intervention(s), in addition to reports of each outcome. Summaries of the intervention effect

will be reported using risk ratios for dichotomous outcomes or standardized mean differences for continuous outcomes.

RESULTS:

Clinical tests that measure walking capacity, locomotion, gait velocity, spatiotemporal characteristics of gait, kinematic characteristics of gait, or kinetic characteristics of gait at baseline and after the cycling intervention are sought as major study endpoints.

The following outcomes are not of primary interest but would be included in the summary of results if provided: 1) cardiovascular outcomes such as peak oxygen consumption; 2) quality of life outcomes; 3) measures of balance

IMPLICATIONS FOR PRACTICE:

Simple interventions may be identified that would have a beneficial effect on functional status in stroke recovery.

Parental Beliefs and Practices Regarding Childhood Fevers in Tulare County: An Observational Cross Sectional Study of Children Presenting with Fevers At Kaweah Health Emergency Department.

GUIDELINES:

Fevers are one of the most common chief complaints of children presenting to Emergency Departments across the United States, accounting for nearly 20% of all visits. Our goal in this study was to determine parents' knowledge and beliefs regarding fevers.

We performed a cross sectional paper survey based study in the Emergency Department across the span of five months, from November 2021 to April 2022. Any parent that presented with a child aged 0-18 years of age with a fever was asked to participate in our multiple choice based survey. In total, 50 participants completed the survey.

Most of the children presented with their mothers (n=43, 86%). More than 40% of parents were aged 25-34. About another one fourth were under 25 years (26%) and 35-44 years old (24%). Of the patients population that presented with a fever; the highest amount was infants (age <1 year) n=17, 34%, second was preschoolers (n=8, 16%) and older children (age >6 years) (n=3, 6%). About half of the participants (n=23, 46%) knew 100.4 was considered as a fever. Slightly more than half of them reported they used both Ibuprofen and Tylenol to treat their child's fever. The majority of them (n=38, 76%) used more

than one medication to reduce their child's fever. However, only about 20 percent (n=10) and 10 percent (n=5) of them correctly answered the question regarding the side effects of the fever and knowing where to find the guidance of the right dose of medication for their child, respectively. Roughly 40 to 50 percent reported use of multiple approaches (50%), cold bath (42%), ice bag(48%), and sponge(46%) to lower their child's temperature. Only one fifth reported they saw a pediatrician before visiting the ER. 42 % (n=21) thought the child needed antibiotics when having a fever. Compared to 83% of Spanish speaking parents.

There were many limitations in our study; including a small sample size, method of data collection, time period during which surveys were collected. However, some inferences that we were able to make were that most children that come into the ED for evaluation of fevers are infants and they present with their mothers. Most parents do not know which Fahrenheit degree constitutes a fever, its side effects, and most do not see their pediatrician prior to ED visit. Many parents still think their child needs antibiotics every time there is a fever, that percentage was higher amongst Spanish speaking parents. These findings suggest there are many opportunities to educate parents on fevers to assuage fears, decrease ED visits, and improve patient outcomes.

*Shared project with Puneet Gill, DO.



**Daniel
Khushigian, DO**

Emergency Medicine

The National Comprehensive Cancer Network's Care Models: Applicability to Patients without Access to Adjunct Therapy

GUIDLINES:

To elicit acceptance, rejection, or alteration of elements of the United States National Comprehensive Cancer Network's (NCCN) 2019 care guidelines for advanced cancers of the head and neck, as applied to patients without access to adjunct therapy.

METHODS:

Experienced public-sector surgeons in Gauteng Province, South Africa participated in semi-structured interviews regarding the NCCN's 2019 care algorithms between December 2019 and March of 2020. Participants accepted, rejected, or proposed alterations to aspects of the algorithms.

RESULTS:

Nine of fifteen eligible surgeons participated in the study. All participants considered the care algorithms to be generally valid, but made substantial alterations when considering patients without access to adjunct therapy. Overall, participants agreed on the relevance of decision-making variables that directly related to treatment efficacy or pathophysiology. Participants generally disagreed on the relevance of variables that related to the "worthiness" of pursuing care or conflicts in values.

IMPLICATIONS FOR PRACTICE:

When considering patients with advanced cancers of the head and neck who lacked access to necessary adjunct treatment, (1) current care models may not apply and (2) information used in these care models' clinical decision-making may be unrepresentative. Further investigation into how best to modify future care guidelines would be of meaningful benefit to both patients and surgeons.

Material alterations to decision-making variables used in future editions of care guidelines may better serve surgeons who manage patients with advanced cancers of the head and neck without access to adjunct therapy.



**Abhinav
Komandur, MD**

Transitional Year



**Kelsey
Kukuza, DO**

Anesthesiology

Subcutaneous Emphysema

INTRODUCTION/BACKGROUND:

Subcutaneous emphysema is the de novo generation or infiltration of air in the subcutaneous layer of skin. Skin is composed of the epidermis and dermis, with the subcutaneous tissue being beneath the dermis. Air expansion can involve subcutaneous and deep tissues, with the non-extensive subcutaneous spread being less concerning for clinical deterioration. However, the development of subcutaneous emphysema may indicate that air is occupying another deeper area within the body not visible to the unaided eye.

METHODS:

Imaging including radiographic (x-ray) and computed tomography (CT) can help identify subcutaneous emphysema. On a radiograph, there are intermittent areas of radiolucency, often representing a fluffy appearance on the exterior borders of the thoracic and abdominal walls. Consultation placed to other specialists is dependent on the source of subcutaneous emphysema identified. For example, if there is a tracheal tear, a thoracic surgeon should be consulted. If bowel perforation is suspected, a general surgery consultation is recommended.

RESULTS:

Treatment of the underlying cause or precipitating factor should be considered first because it usually leads to gradual resolution of the subcutaneous emphysema. For mild cases that do not cause significant patient discomfort, observation is appropriate. Subcutaneous emphysema may be a self-limited process or a medical/surgical emergency requiring intervention. A multidisciplinary and interprofessional approach offers great value when diagnosing and managing patients with subcutaneous emphysema.

IMPLICATIONS FOR PRACTICE:

For patients with limited subcutaneous emphysema, education can help provide significant relief. Care from different members of the health care team including physicians, nurses, pharmacists, and other health care professionals provide different perspectives and skill sets in patient evaluation, management, and treatment of subcutaneous emphysema. In the post-anesthesia care or critical care unit, nurses can outline gaseous spread with a pen, watch vital signs, and monitor the patient more frequently than a physician.



**Rachna
Kumar, MD**

Psychiatry

Dissecting Psychosis

INTRODUCTION/BACKGROUND:

Psychosis occurs when an individual experiences distortion to their perception of reality. Often, the etiology is multifactorial, and researchers continue their attempts to identify the combination of factors that cause psychosis. In this case report, the organic etiology of an acute psychiatric presentation is explored after a patient suffers cerebrovascular compromise. A middle-aged male without any medical or psychiatric history presented for sudden altered mental status with sudden headaches, visual changes, and confusion. He had no substance use history, took no medications, and was adherent with annual check-ups. CT revealed an arterial dissection resulting in an embolic shower to the cerebral cortex. Immediate intervention was provided. Six months later he returned for acute new onset psychosis. He had bizarre paranoid delusions.

METHODS/RESULTS:

The patient was admitted, and his psychosis resolved within days without medication. Afterward, the patient experienced months of remission, but he again returned for another episode of acute psychosis—this time requiring stabilization with psychotropic medication. With good adherence to low dose antipsychotic medication, he was able to sustain remission since initial presentation.

CONCLUSION:

Organic etiology can yield acute psychiatric presentations. Evaluation of new-onset psychosis should include laboratory studies and imaging to consider organic/known etiology. Signs that may indicate this include rapid onset and lack of negative symptoms. Delay in addressing psychiatric symptoms due to etiology may lead to several rehospitalizations, as we saw in this case. Consider initiating treatment with antipsychotics with long term monitoring. Rapid decompensation may occur with cessation of treatment and should be done cautiously.

Due to the incidence of psychosis after CVA, the medical community should consider the possibility of psychiatric sequelae, especially as the incidence of CVA seems to grow due to the possible pro-thrombotic nature of COVID-19. These patients would benefit from treatment, not in spite of, but in fact due to the organic/known etiology of their psychosis.

** Shared project with Gerardo Perez, DO*

An Analysis of the National Cancer Database 2004-2018: Primary Cutaneous Melanoma in Asians

INTRODUCTION/BACKGROUND:

Melanoma affects this population. We evaluated tumor characteristics, treatment patterns, and survival outcomes in Asians with melanoma.

METHODS:

We queried the National Cancer Database for invasive melanoma cases between 2004-2018 in Asians that were histologically confirmed. Overall survival was assessed using univariate Kaplan-Meier curves. Independent predictors of survival were assessed using an extended Cox model.

RESULTS:

Of the 1,179 cases, females comprised 52.6%. Upper body (head/neck/trunk/upper extremities) was the most common location (47.6%), followed by lower extremities (43.6%) and overlapping, other, or not otherwise specified (8.8%). Asians were most commonly diagnosed with stage I (44.4%), followed by stage II (21.4%), III (22.0%), and IV (12.3%). Regional lymph nodes were positive in 21.2%, and distant metastases were present in 11.9%. Malignant melanoma NOS or other melanoma histopathology were the most common histologic subtype (59.9%), followed by superficial spreading melanoma (17.4%), acral lentiginous melanoma (14.1%), and nodular melanoma (8.7%). Overall

survival was 71.7% at 5 years and 64.1% at 10 years. Independent predictors of survival included female gender (reference: male, HR=0.65; 95%CI 0.47-0.91; $p=0.011$) and ulceration (reference: no ulceration, HR 1.54; 95%CI 1.05-2.26; $p=0.026$). Compared to diagnosis at stage I, more advanced stages were associated with a significantly higher hazard of death: stage II (HR 3.39; 95%CI 2.01-5.74; $p<0.001$), stage III (HR 3.31; 95%CI 1.64-6.67; $p<0.001$), stage IV (HR 16.92; 95% CI 9.00-31.78; $p<0.001$).

CONCLUSION:

Female gender, ulceration, and stage were independent predictors of survival in Asians with melanoma.

**Kevin
Kwan, MD**

Transitional Year

Underutilization of the Emergency Department During the COVID-19 Pandemic

INTRODUCTION

The novel coronavirus 2019 (COVID-19) pandemic in the United States (US) prompted widespread containment measures such as shelter-in-place (SIP) orders. The goal of our study was to determine whether there was a significant change in overall volume and proportion of emergency department (ED) encounters since SIP measures began.

METHODS:

This was a retrospective, observational, cross-sectional study using billing data from January 1, 2017-April 20, 2020. We received data from 141 EDs across 16 states, encompassing a convenience sample of 26,223,438 ED encounters. We used a generalized least squares regression approach to ascertain changes for overall ED encounters, hospital admissions, and New York University ED visit algorithm categories.

RESULTS:

ED encounters decreased significantly in the post-SIP period. Overall, there was a 39.6% decrease in ED encounters compared to expected volume in the pre-SIP period. Emergent encounters decreased by 35.8%, while non-emergent encounters decreased by 52.1%. Psychiatric

encounters decreased by 30.2%. Encounters related to drugs and alcohol decreased the least, by 9.3% and 27.5%, respectively.

CONCLUSION:

There was a significant overall reduction in ED utilization in the post-SIP period. There was a greater reduction in lower acuity encounters than higher acuity encounters. Of all subtypes of ED encounters, substance abuse- and alcohol-related encounters reduced the least, and injury-related encounters reduced the most.

**Andre
Lee, MD**

Emergency Medicine

Effect of Telehealth Implementation on No-Show Rate in a Community-Based Family Medicine Residency Clinic

INTRODUCTION/BACKGROUND:

The failure of a patient to present for an appointment with their primary care physician, or a “no-show,” is problematic for both the patient and provider. For residency clinics, a missed appointment is a lost educational opportunity. Telehealth implementation surged during the start of the COVID-19 pandemic. There is a paucity of data comparing total no-show rates between pre- and post-implementation of telehealth. In order to provide access to medical care during stay-at-home orders, a community-based family medicine residency clinic in Central California implemented telehealth in March 2020. The objective of this study was to see if there was a difference in no-show rates between the three months prior to and after telehealth implementation (December 2019 to February 2020 vs. March 2020 to May 2020).

METHODS:

This retrospective study was performed at Sequoia Health and Wellness Centers, a community-based family medicine residency clinic in Central California. Data was collected through scheduling software. A “no-show” is when a patient is not present for check-in by 15 minutes after the start of their scheduled appointment time. A no-show rate is a calculation

of the number of missed appointments (no-shows) divided by the number of possible appointments (total no-shows plus total patients seen). Monthly no-show rates were calculated for each of the six months of the study period.

RESULTS:

In the three months prior to telehealth implementation, the average no-show rate was 18.7%. In the three months post-telehealth, the average no-show rate was 8.3%.

IMPLICATIONS FOR PRACTICE:

The decrease in no-shows after the implementation of telehealth suggests that a virtual visit option increases compliance with visits and broadens access to healthcare. Telehealth should continue to be an option for patients going forward. For the future, it would be interesting to survey patients for their reasons for missing appointments. Then quality improvement projects can be designed with specific interventions to increase patient attendance.

**Stephanie
Lee, MD**

Family Medicine

Patient Care Advocates Impact in the Emergency Department

BACKGROUND:

Kaweah Health's Emergency Department (ED), located in Visalia, California, utilizes patient care advocates (PCA) to help connect patients after their ED visit with their primary care physician. From November 2018-February 2021, 5,464 patients were identified for navigation with an average of 195 patients every month.

OBJECTIVES:

Identify the impact of the patient care advocate program on reducing return ED visits

METHODS:

Three comparison groups with 143 patients each were made from patients visiting the ED between April 2019 and January 2020. Group 1) Patient care advocate made patient's appointment (PCA). Group 2) Patient made appointment themselves (PAT). Group 3) Patient did not make any appointment or did not answer PCA calls (NA). Crosstabulation, chi-square tests, and analysis of variance were used to analyze demographic or outcome variables. Poisson and logistic regression examined associations with return ED visits.

RESULTS:

Patients with a higher number of historic ED visits in the past 6 months had more recurrent visits in 72 hours (5.5 vs. 3.6, $p < .001$) than those without. Those patients with higher prior ED visits also had significantly correlated recurrent visits in the next 30 days (Correlation: 0.5, $p < .001$). Return ED visits within 72 hours of initial visit did not differ across the groups ($p = .573$). The expected count for the PAT group in number of recurrent ED visits was 1.95 (exponentiate $(0.67) = 1.95$) higher than for PCA group. The expected log count for the NA group in the number of recurrent ED visits was 2.89 (exponentiate $(1.06) = 2.89$) higher than for PCA group.

CONCLUSIONS:

Patients who frequent the ED are more likely to return to the ED. The patient care advocate program has a positive impact in helping reduce ED return visits.

**Benfie
Liu, DO**

Emergency Medicine

Exercise-Induced Rhabdomyolysis following one High Intensity Interval Training (HIIT) Session: A Case Report

INTRODUCTION/BACKGROUND:

Relatively few cases have been reported of one high intensity interval training session resulting in rhabdomyolysis leading to severe acute kidney injury (AKI) requiring hemodialysis. This case report seeks to add to the literature the effects of exercise-induced rhabdomyolysis (EIR) on function and quality of life.

METHODS:

The patient is a 35 year-old female who presented to our medical center following a high intensity interval training class. She developed leg swelling and pain immediately after the workout, along with fatigue and hematuria for two days. On arrival to the ED, her serum creatinine (Cr) was found to be 7.0 and creatinine kinase (CK) was 87,000. Her urinalysis (UA) showed blood and protein and AST/ALT were elevated. She was admitted to the hospital for acute kidney injury (AKI) due to severe rhabdomyolysis. Of note, she was previously admitted for rhabdomyolysis with a CK of 1000 five years prior.

RESULTS:

During her hospital course, her Cr improved only slightly despite aggressive IV fluid resuscitation, and she was prepared for hemodialysis. After two rounds of hemodialysis, her CK improved to 4552

and Cr remained elevated at 5.07. She required regular outpatient dialysis after discharge.

IMPLICATIONS FOR PRACTICE:

EIR is an uncommon cause of severe rhabdomyolysis and a very rare cause of AKI. Despite denial of medications, steroids, supplementation, alcohol, or recreational drugs, this patient presented in severe renal failure, eventually leading to a permanent tunneled catheter placement and regular hemodialysis. There was a suspicion for glycogen storage diseases such as McArdle's Disease. Genetic testing resulted as negative for glycogen storage diseases. No guidelines are available for the treatment and follow up of EIR. Myalgia, obesity, and the use of medications such as statins and NSAIDs is common in our setting. Providers encourage patients to exercise more, and this case report suggests that the risk factors for rhabdomyolysis exist in our local setting. Therefore, it is paramount that healthcare practitioners in our settings should be made aware of EIR prevention and symptoms

** Shared project with Harmandeep Grewal, DO*



**Kevin
Nasre, DO**

Transitional Year

Outpatient management pathways for patients presenting to the emergency department with transient ischemic attack: A scoping review

BACKGROUND:

The majority of patients presenting to the emergency department (ED) with transient ischemic attack (TIA) have historically undergone hospital admission, though recent research describes possible outpatient management pathways as an alternative to hospital admission.

OBJECTIVE:

To identify the safety and feasibility of outpatient management pathways for patients discharged from the ED after presenting to the ED with TIA.

DESIGN:

PubMed was used to identify primary research articles published in English from 2011 through August 2021, from which 14 studies were selected that describe patients presenting to the ED with a diagnosis of TIA, and who were discharged from the ED with outpatient follow-up. Data was abstracted from each study, including the number of participants, clinical setting, eligibility criteria, risk stratification, outpatient management strategies, and outcome measures.

RESULTS:

14 studies were identified, 12 of which utilized cohort designs, of which 7 were prospective,

and 5 were retrospective. Various outpatient management pathways were utilized by patients being discharged from emergency departments after being discharged with suspected TIA or minor stroke. Risk stratification and pathway eligibility was most frequently determined using a combination of NIH stroke scale, ABCD2 score, and/or other elements of the patient's presenting history. The majority of these studies were conducted at academic tertiary care facilities. No studies concluded that outpatient management of patients presenting to the ED with TIA or minor stroke was unfeasible or unsafe, with no observed worsening of 90-day outcome measures including TIA recurrence and stroke when compared to inpatient management.

CONCLUSION:

Several different outpatient management pathways for patients presenting to the ED have been explored and are described in current literature. Such management strategies appear to be a feasible and safe alternative to inpatient hospital admission for low-risk patients presenting to the ED with TIA.



**Michael
Niechayev, MD**

Emergency Medicine



**Daniela
Rangel Orozco, MD**

Family Medicine

Acute Interstitial Nephritis after Phentermine Use

GUIDELINES:

There is a long list of drugs associated with AIN and one that does not often make the published list is Phentermine. Phentermine is one of the most commonly prescribed weight loss medications in the U.S. and is indicated as a short-term adjunct to a multimodal weight loss plan.

We report a case of Drug-induced AIN in a Latina woman aged 22 years who presented with back and abdominal pain, nausea, vomiting and unable to tolerate oral intake. She took phentermine for two weeks consecutively and then intermittently four months prior to presenting to the emergency department. Renal biopsy pathology results were consistent with pathological findings of AIN including interstitial inflammation, edema, and lymphocytic infiltrates.

Our case adds to the data of two additional reported cases of AIN in the literature resulting from phentermine use alone and a second case resulting from the combination of phentermine and phendimetrazine. This begs the question of whether phentermine induced AIN is more common than previously thought but simply has not been widely identified and reported.

We recommend that primary care providers prescribing phentermine should take a thorough history prior to prescribing the medication to assess for any possible predisposing factors to AKI, personal or family history of any renal dysfunction, obtain baseline renal panels and trend renal function while patients are on phentermine.



**Gerardo
Perez, DO**

Psychiatry

Dissecting Psychosis

INTRODUCTION/BACKGROUND:

Psychosis occurs when an individual experiences distortion to their perception of reality. Often, the etiology is multifactorial, and researchers continue their attempts to identify the combination of factors that cause psychosis. In this case report, the organic etiology of an acute psychiatric presentation is explored after a patient suffers cerebrovascular compromise. A middle-aged male without any medical or psychiatric history presented for sudden altered mental status with sudden headaches, visual changes, and confusion. He had no substance use history, took no medications, and was adherent with annual check-ups. CT revealed an arterial dissection resulting in an embolic shower to the cerebral cortex. Immediate intervention was provided. Six months later he returned for acute new onset psychosis. He had bizarre paranoid delusions.

METHODS/RESULTS:

The patient was admitted, and his psychosis resolved within days without medication. Afterward, the patient experienced months of remission, but he again returned for another episode of acute psychosis—this time requiring stabilization with psychotropic medication. With good adherence to low dose antipsychotic medication, he was able to sustain remission since initial presentation.

CONCLUSION:

Organic etiology can yield acute psychiatric presentations. Evaluation of new-onset psychosis should include laboratory studies and imaging to consider organic/known etiology. Signs that may indicate this include rapid onset and lack of negative symptoms. Delay in addressing psychiatric symptoms due to etiology may lead to several rehospitalizations, as we saw in this case. Consider initiating treatment with antipsychotics with long term monitoring. Rapid decompensation may occur with cessation of treatment and should be done cautiously.

Due to the incidence of psychosis after CVA, the medical community should consider the possibility of psychiatric sequelae, especially as the incidence of CVA seems to grow due to the possible pro-thrombotic nature of COVID-19. These patients would benefit from treatment, not in spite of, but in fact due to the organic/known etiology of their psychosis.

** Shared project with Rachna Kumar, MD*



**Antonieta
Rueda, MD**

Family Medicine

Residents as Teachers Training Sessions

INTRODUCTION/BACKGROUND:

Residents are currently paired with medical students in resident continuity clinic for “on the fly” teaching with no current formal guidance. This concept paper aims to design a curriculum to train interested residents in specific techniques for medical student teaching and feedback. My goal with this is to increase resident confidence in teaching, increase resident interest in post-residency teaching in academic settings and increase medical student satisfaction and learning experience while at our residency clinic.

METHODS:

Multiple past articles with overview of post-workshop teaching outcomes from resident (teacher) and medical student (student) feedback, as well as multiple curricula reviewed to put together a relevant, attainable training session to teach residents of Kaweah Delta Family Medicine Residency Program how to teach residents

RESULTS:

Literature review is promising for building an effective, desired teaching workshop. Previous studies show heavy resident interest in teaching

medical students, and interest in improving one’s teaching skills. Data also shows that providing food as incentive increases resident participation in didactics and workshops, so I will attempt to budget this. Review suggests that while specific teaching methods exist (OME, RIME), establishing rapport with medical students is very important for teaching and feedback to be accepted by the learner, so this will be emphasized in teaching sessions. Further, residents will be equipped with specific, outcome-supported teaching and feedback methods with which to guide their lessons for medical students.

Neuroleptic Malignant Syndrome and Serotonin Syndrome – A Case Study

INTRODUCTION/BACKGROUND:

Improper treatment of psychiatric conditions can have dire consequences. Polypharmacy is dangerous, but remains a common occurrence in the practice of medicine. Differentiating NMS, Serotonin Syndrome, and Malignant Catatonia can be difficult. Interdisciplinary collaboration leads to better outcomes.

This patient is a 71 y/o male with a history of HTN, paroxysmal A. fib on Eliquis, sick sinus syndrome s/p pacemaker, PTSD, urinary bladder carcinoma s/p TURP BT, and recent hospitalization due to Osteomyelitis of the L1-L2 area after having an L1-L2 lumbar vertebral compression fracture. Admitted due to worsening of back pain, severe headache and neck rigidity, inability to ambulate, tremulousness, and altered mental status (A&O x2). The patient's wife reported sudden worsening of mental status and tremulousness in all extremities, prompting Neurology and Psychiatry consultations.

METHODS/CLINICAL APPROACH:

D/C all serotonergic medications including Bupropion, Fentanyl, Lurasidone, Pregabalin, Metaxalone, Trazodone, Ropinirole. Ativan 2 mg IV one time and started on Ativan 2 mg IV TID- for

agitation and tremors. Cyproheptadine 12 mg Loading dose via NG tube stat and started on Cyproheptadine 2 mg TID via NG tube. Patient was discharged to follow-up with the Veterans Administration for management of PTSD.

CONCLUSION:

Make sure treatment correlates with diagnosis! Avoid Polypharmacy if possible. Consider neurotransmitter effects of all medications, not just psychotropics. Our collaborative interdisciplinary approach prevented what could have been a fatal outcome.



**Arul
Sangani, MD**

Psychiatry

Comparing the effectiveness of blood flow restriction vs. traditional heavy load resistance training in rehabilitation of ACL reconstruction patients – A review protocol



**Navjot
Singh, MD**

Transitional Year

INTRODUCTION/BACKGROUND:

BFR is a method of increasing strength and muscle mass while using lighter weights than in traditional high load resistance training - The American College of Sports Medicine recommends using resistances of 70% of one repetition maximum (RM) to elicit strength and hypertrophy - BFR uses 20-50% of 1 RM. Tourniquet returns venous outflow while allowing arterial inflow to the muscle - The resulting anaerobic environment seems to promote muscle hypertrophy

METHODS:

To determine if blood flow resistance (BFR) training, which utilizes much lower resistances than traditional strength training, and is therefore ostensibly safer and often more tolerable, can be used effectively as an alternative to traditional strength training for anterior cruciate ligament reconstruction rehabilitation.

RESULTS:

Multiple recent studies have demonstrated efficacy and safety of BFR. Outcomes of interest included effectiveness in producing muscular hypertrophy, muscle thickness and strength gains.

IMPLICATIONS FOR PRACTICE:

If the results of the present studies show that BFR is inferior to standard care, understanding the differences between the results of the RTC and this study could shed new light on BFR protocol. This would contribute to the literature for future systematic reviews/meta-analyses. To my knowledge, this is the first retrospective study to examine this particular question.



**Chang
Sung Shin, DO**

Family Medicine

Male Osteoporosis in Alcohol Consumption-A Case Report

INTRODUCTION/BACKGROUND:

Current osteoporosis guidelines recommend dual energy x-ray absorptiometry of the hip and lumbar spine (DEXA) screening for all women age 65 years and older. However, there is a lack of literature regarding the relative risk of drinking habits, including heavy, light, and binge drinking, on bone strength, mineralization, and remodeling. More studies are needed to quantify the relative contribution of risk factors in an attempt to screen young adults, male or female regardless of race, for osteoporosis if they meet a certain criteria of amount of drinking.

METHODS:

This report describes a case of osteoporosis in a Caucasian male under age 40 with a history of heavy alcohol consumption of 2 liters of hard liquor daily, withdrawal seizures, and frequent ground level falls resulting in multiple vertebral and rib fractures. His medical history includes multiple hospital admission due to alcohol and related problems. He established care with outpatient clinic and his work up revealed severe osteoporosis.

RESULTS:

Given the patient's history of multiple fractures after ground level falls and the neurosurgeon's findings of soft bones, DEXA scan was ordered

and revealed lumbar spine T score of -2.9, indicative for diagnosis of osteoporosis. The patient was worked up further by his primary care physician to evaluate for secondary causes of osteoporosis, including hypogonadism, hyperthyroidism, vitamin D deficiency, diabetes mellitus, rheumatologic disorders, and renal disease, all of which were unremarkable. Based on the DEXA screening with T score of -2.9, the patient was appropriately diagnosed with osteoporosis and treatment was initially started with bisphosphonates weekly. The patient was also referred to a local rheumatologist in town for further recommendations.

IMPLICATIONS FOR PRACTICE:

This case demonstrates the detrimental effects of heavy alcohol consumption on bone health and highlights the need to for more thorough, in depth, screenings and preventative measures for severe alcoholics. These measures should not only include routine screenings such as drug screens, colonoscopies, and depression screens, but also DEXA scans at an earlier age than normally recommended. Current USPSTF guidelines do not say they are for or against screening men, not even men with risk factors for osteoporosis. Based on this case report, men with risk factors should be screened regardless of age.



**Clayton
Starnes, DO**

Emergency Medicine

Intravenous Tdap Administration as a Potential Cause of Hypotension in a Trauma Patient: Diagnostic and Management Uncertainty

INTRODUCTION:

Tdap vaccination is routinely administered prophylactically in patients sustaining open wounds in the emergency department and is paramount in disease prevention. A PubMed, Google Scholar, and MEDLINE search using the terms “intravenous Tdap” “intravenous DTAP” “intravenous tetanus” yielded no case reports, series, or other pertinent publications on this topic. Thus, the case presented is the first to describe this potential phenomenon along with the ensuing diagnostic and treatment uncertainty.

CASE PRESENTATION:

In this case, an 89-year-old male pedestrian was brought to the emergency department after being struck by a motor vehicle with injury to his face with negligible blood loss. His injuries included Lefort II facial fracture and a small subdural hemorrhage. This patient received the Tdap vaccination and shortly after an improper administration intravenously, developed shock. Immediate IgE-mediated anaphylaxis to tetanus toxoid has been previously reported in the literature. The anaphylaxis to tetanus toxoid is rare and occurs at an estimated rate of 0.001%. On further

investigation, hypotension and encephalopathy occurred precipitously after Tdap administration. Given the improper administration of the Tdap vaccine in this case, it is possible the high systemic exposure to the Tdap vaccine when given intravenously triggered an immediate and severe IgE-mediated anaphylaxis reaction. Fortunately, this patient was taken to the CT scanner prior to the Trauma team intervening surgically as the patient had presented with concerns for persistent hypotension with traumatic injuries, despite significant resuscitation. 2 hours after the patient was struck by the vehicle, his blood pressure spontaneously improved to 120/66, and within 5 minutes repeat blood pressure showed 179/96 at a HR of 70. While it cannot be said for certain as the patient did not undergo skin testing, it is rather obvious that the most likely causal agent for the patient’s precipitous decline was the improper administration of Tdap vaccination.

Atypical radiographic findings of leptomeningeal metastases in cauda equina syndrome: a case report



**Anup
Sonti, MD**

Transitional Year

INTRODUCTION/BACKGROUND:

35-year-old man with past medical history of HIV, meth use, thyroid cancer s/p resection with subsequent hypothyroidism, cholecystectomy, and lymphoma with metastases s/p chemotherapy was brought to the ED by ambulance for two weeks of worsening bilateral LE weakness that progressed to a complete inability to move his legs. The patient's symptoms began with progressively worsening lower back pain one month prior to admission.

METHODS/RESULTS:

The patient was alert on mental status evaluation. Cranial nerves were intact. On motor exam, he had appropriate bulk for age, normal tone, and 5/5 strength in bilateral upper extremities. However, there was decreased lower extremity tone and 0/5 strength bilaterally. Rectal tone was absent. There were no tremors or pronator drift noted on exam. An MRI lumbar spine with and without contrast was obtained on 12/30/21. Initial read appeared to demonstrate no abnormal enhancement due to the subtle nature of the findings, but subsequent re-read showed masslike soft tissue thickening and homogeneous enhancement consistent with CNS lymphoma. To further correlate these findings,

prior imaging was reviewed, including a PET/CT that was recently obtained three weeks prior to patient's presentation (12/8/21). This showed subtle speckled focal areas of increased metabolic activity on PET within the central canal of the lumbar spine with a maximum SUV measuring 4.0 up to 8.0. On the CT, subtle soft tissue density filled the spinal canal from the conus to the sacrum, indicating extensive tumor infiltration.

IMPLICATIONS FOR PRACTICE:

Leptomeningeal carcinomatosis confers a poor prognosis in patients with cancer. It is commonly observed as "Zuckerguss" on imaging. We present here a unique case of cauda equina syndrome that presented with such a highly dense and extensive leptomeningeal spread that it appeared as part of the normal spinal column and required more subtle imaging interpretations to delineate normal vs. abnormal anatomy. An understanding of the subtle imaging findings and the use of different sequences to delineate pathology will aid future diagnosticians in identifying rare cases of extensive leptomeningeal spread.



**Sandra
Tomlinson-
Hansen, MD**

Surgery

Atypical Ductal Hyperplasia

INTRODUCTION/BACKGROUND:

Atypical ductal hyperplasia (ADH) is a pathology finding, usually found incidentally on biopsy of the breast. ADH is associated with an increased risk of breast cancer and therefore classified as “high risk” lesion but not precursor lesion - the distinction being the increased risk of breast cancer can be anywhere in the breasts and not limited to the area of the ADH. It is important that practitioners be aware of the subtleties in the diagnosis in order to appropriately provide patient care and avoid both under and over-treatment of atypical ductal hyperplasia.

METHODS/RESULTS:

It is important to know the type of specimen in which the ADH is identified because the lesion’s management depends on it. If atypical ductal hyperplasia is found on core needle biopsy, additional tissue is necessary by excisional biopsy. A wire or seed localization technique should be used at the time of the core biopsy to later identify the area potentially requiring excision. The reason for re-excision is that with a more extensive tissue specimen, there is a chance the lesion will be upgraded to carcinoma in situ or invasive carcinoma. Once identifying atypical ductal

hyperplasia as the diagnosis and ruling out breast carcinoma, it is essential to address risk reduction strategies. One such measure is treating these patients with tamoxifen, as the vast majority of lesions are ER+. Tamoxifen is known to increase the risk of endometrial cancer, stroke, DVT, and PE - particularly in patients over the age of 50. Therefore the risk-benefit discussion starting tamoxifen would need to include consideration of these risks and the decision to begin tamoxifen be patient dependent. Additionally, it is important to increase surveillance and awareness in the patient.

IMPLICATIONS FOR PRACTICE:

Patients should receive education on the meaning of the diagnosis as well as the actual risk conferred by the diagnosis of atypical ductal hyperplasia. Patients diagnosed with ADH should be followed closely by a clinician, given a higher risk of breast carcinoma in the future. Additionally, standard cancer risk-reducing guidelines are recommended, such as normalizing BMI and smoking cessation.

COVID-19: Examining Outcomes & Disparities In California's Central Valley

BACKGROUND

The COVID-19 pandemic has brought to light and renewed the conversation of previously known health disparities in the United States. People of Color in the United States face a multitude of health disparities for many reasons. The Central Valley of California consists of a diverse population unlike the rest of California. The population includes a large percentage of agricultural workers, non-English speakers, a lower educational attainment compared to the rest of the state, a large percentage of people not of Caucasian descent, and a large percentage of people with low or no access to healthcare.

OBJECTIVE:

The purpose of this study was to assess for disparate health outcomes in California's Central Valley with regards to the first 10 months of the COVID-19 pandemic, particularly among the Hispanic population. The pre-study hypothesis assumes that Hispanic patients and Spanish speaking patients with COVID-19 had increased mortality in the first 10 months of the pandemic.

METHODS:

This was a retrospective study at Kaweah Health Medical Center. Data was collected on adult patients who were admitted to any level of care

within the hospital with a primary or secondary diagnosis of COVID-19 between March 1, 2020 and January 31, 2021. 2124 records of individual visits were identified. Individual-level data were used for all the analyses. In total, there were 1,822 unique patients included in the study, including 171 patients who experienced re-admission after initial visits. Descriptive statistics describe the sample characteristics by status of survival vs. death. Chi-square or Fisher's exact test was used to examine whether the association of individuals' characteristics with death or re-admission is statistically significant. For the latter, those who expired during the initial visit were excluded from the sample. Logistic regression was used to examine the association of individuals' characteristics with mortality or re-admission.

CONCLUSIONS:

In a medium sized Central Valley, California hospital, admission rates to the hospital for COVID-19 mirrored the surrounding area population demographics. No difference was seen in mortality rates amongst patients from different racial or ethnic backgrounds. Male patients admitted with COVID-19 had a higher mortality rate than their female counterparts. Male patients, and patients who spoke languages other than English were more likely to be readmitted with a diagnosis of COVID-19.

*Shared project with Alfredo Guerrero, DO.



**Diana
Trumble, MD**

Emergency Medicine

Acute Psychosis with COVID-19 Infection vs. Steroid Administration

INTRODUCTION/BACKGROUND:

Glucocorticoids are known to induce variable psychiatric symptoms, which are typically dependent on dose and duration of therapy. Although usually relatively mild, more severe symptoms and psychosis can occur with high dose steroids for a prolonged period. COVID-19 infection also appears to be associated with psychiatric symptoms, particularly in the acute phase of illness. Psychosis has been observed in a small percentage of hospitalized COVID-19 patients; of these, almost none of these patients had a pre-existing psychiatric disorder.

METHODS:

Our family medicine inpatient service care for a 56-year-old female who presented to the emergency department with shortness of breath and cough. She had a past medical history notable for asthma and COPD. Her symptoms had been worsening despite home medications and home oxygen (which was typically only used as needed). She was found to be COVID-19 positive, and admitted for acute hypoxic respiratory failure due to COVID-19 pneumonia. She was initiated on therapeutic measures based on up-to-date treatment guidelines available at that time, including steroid administration, Remdesivir, and convalescent plasma. She had a prolonged hospital course of five weeks. During this time, she received extended courses of steroids due to her worsening respiratory status in efforts to avoid intubation. She developed symptoms of acute psychosis, including aggression, agitation, mood lability, paranoia, delusions, sleep disturbances, and other abnormal behaviors. Over the course of her hospitalization, she

required multiple psychiatric medications, up to and including PRN IV medications and briefly continuous IV sedation. Oral psychiatric medications were continued at discharge and gradually weaned off in the months following hospitalization.

RESULTS:

This case report joins a small number of additional reports of COVID-19 associated psychosis. Given the known association of prolonged high-dose glucocorticoid use and psychotic symptoms, it raises the question of whether this patient's symptoms could be attributed to medication, COVID-19 infection and illness, or was a cumulative result of both conditions.

IMPLICATIONS FOR PRACTICE:

We recommend that inpatient providers caring for COVID-19 patients remain aware of the risks of steroid-induced psychosis and the possibility of higher risk and/or more severe symptoms due to the neuropsychiatric effects of COVID-19 infection alone. Limiting the administration of steroids to the minimum recommended dosage and duration of therapy is of course recommended, though we are cognizant of the limitations of other treatment options in severe COVID-19 illness with persistent respiratory decline. Delirium prevention protocols are of vital importance in these patients to attempt to limit the development of acute psychiatric and behavioral symptoms. We recommend further study on the relationship between COVID-19 infection and the development of acute neuropsychiatric disorders.

Lilly
Varner, MD

Family Medicine



**Joseph
Vega, DO**

Emergency Medicine

Overdrive Pacing and Dual Sequential Defibrillation for Refractory Torsades de Pointes

INTRODUCTION/BACKGROUND:

Patients presenting with unstable cardiac rhythms are common in the emergency department. Cardiac rhythms that are most concerning include ventricular tachycardia, torsades de pointes (TdP), and ventricular fibrillation. These rhythms are conventionally treated by electrical cardioversion and defibrillation. Described are interventions that extend beyond advanced cardiac life support (ACLS) algorithms used to achieve return of spontaneous circulation which include overdrive transcutaneous pacing and dual sequential defibrillation (DSD).

METHODS:

A 36-year-old woman presented to the emergency department with nausea and vomiting. The patient then experienced an episode of syncope with TdP identified and no pulses. Initial ACLS interventions including defibrillation and epinephrine administration were completed without success. The patient then underwent DSD without successful conversion of TdP. Overdrive pacing was then initiated with subsequent DSD. This resulted in return of spontaneous circulation with conversion to sinus rhythm.

RESULTS:

This case demonstrates critical actions that should be considered in the cardiac arrest of a healthy young patient. The patient suffered losses of

magnesium and potassium secondary to vomiting which lead to cardiac arrest. ACLS was initiated for cardiac arrest with concomitant TdP and defibrillation was performed. In TdP, the treatment is magnesium as this stabilizes the cardiac membrane and magnesium was administered. After defibrillation and administration of both epinephrine and magnesium, deviation from the ACLS algorithm must be made. The ACLS algorithm recommends administration of amiodarone which would have exacerbated TdP. DSD, should be considered when 3 or more defibrillations are ineffective. Knowledge of these concepts were a driving factor to perform DSD. In refractory TdP, overdrive pacing works by increasing the ventricular depolarization rate which decreases the ventricular refractory period, thus reducing R on T phenomenon. When DSD was ineffective, we performed overdrive pacing before the administration of DSD. This resulted in the resolution of TdP with conversion to sinus rhythm. The patient was ultimately discharged from the hospital neurologically intact.

IMPLICATIONS FOR PRACTICE:

Emergency physicians need to be aware of refractory TdP and alternative methods to treat TdP. While standard defibrillation may be used as a first-line treatment approach to TdP, consideration of DSD and overdrive pacing should be made to increase likelihood of conversion to a stable cardiac rhythm.



**Jason
Wei, MD**

Transitional Year

Hemorrhagic Conversion of Ischemic Stroke is Associated with Hematoma Expansion

INTRODUCTION/BACKGROUND:

Hemorrhagic conversion of ischemic stroke (HCIS) is a common complication of cerebral ischemia and is associated with worse stroke outcomes. Differentiation between HCIS and other causes of intracerebral hemorrhage (ICH) can, however, be challenging in practice. We sought to determine whether imaging features of hematoma expansion can be used to discriminate HCIS from other etiologies of ICH.

METHODS:

We performed a retrospective review of patients admitted to two large urban hospitals between 2015-2020 with non-traumatic ICH and at least two head CTs within the initial 24 hours and brain MRI prior to discharge to assist with etiology identification. ICH etiology was determined by expert consensus. Hematoma expansion was defined as ≥ 6 mL and/or $\geq 33\%$ growth between the first and second scan. We subsequently evaluated whether hematoma expansion was associated with functional status on discharge.

RESULTS:

258 patients (median age 66 [51-76], 43% female) that met our inclusion criteria including 37 (14%) with HCIS as the presumed cause of hemorrhage.

Etiology for ICH was hypertensive in 29%, vascular in 27%, and cerebral amyloid angiopathy in 13%. Hematoma expansion occurred in 11/37 (30%) patients with HCIS, and in 33/221 (15%) patients with ICH of other causes ($p=0.04$). There was no difference in age, admission systolic blood pressure, admission hematoma size or ICH score between groups. HCIS was significantly associated with hematoma expansion (OR 2.4, CI 1.08-5.34, $p=0.03$) on univariable analysis. When controlling for hematoma size and anticoagulant use, the relationship between HCIS and hemorrhagic expansion remained significant (aOR 2.68, CI 1.17-6.13, $p=0.02$). Patients with HCIS had a higher modified Rankin scale on discharge when compared to those with ICH due to other causes ((mRS 5 [4-5.5] vs. mRS 4 [2-4], $p<0.001$).

IMPLICATIONS FOR PRACTICE:

Hematoma expansion within the first 24 hours is more common in HCIS than in other etiologies of ICH. Imaging signatures of hematoma expansion may be contributory towards determining ICH etiology.



**Andrew
Yu, MD**

Transitional Year

Symptom Research by Patients and Hospital Admission at the Kaweah Health Emergency Department: A Protocol for a Prospective Cohort Study

INTRODUCTION/BACKGROUND:

Patient education is an ongoing concern, particularly in areas with low health literacy such as Tulare County in Central California. Patients with inadequate health literacy are twice as likely to be admitted to the hospital compared to patients with adequate health literacy. Patient use of internet health resources has become widespread, with more online information, leading to the phenomenon of self-triage prior to ED visits.

METHODS/EXPECTED RESULTS:

The purpose of this study is to examine potential correlation between emergency department patients who research their symptoms before coming into the department and rate of hospital admissions. We hypothesize that patients who research their symptoms then choose to go to the emergency department will have higher rates of admission compared to patients who do not look up their symptoms ahead of time.

- Eligible populations: Patients between 21 to 65 going to the Kaweah Health emergency department with following chief complaints:
 - Headache, Cough, SOB, Chest Pain, Abdominal Pain
- Exclusion criteria:
- Patients arriving by EMS

Timeframe:

- Initial data collection 6 months (approximately 15000 patients)
- If insufficient number of enrolled patients, increase timeframe
- Enrollment: Patients will be enrolled during registration
- Data collection: A survey including the following details:
- Demographic data (Age, Gender, Race, Education, Housing status, Language)
- Self-reported health literacy (Likert Scale)
- Whether or not they research their symptoms beforehand
- What sources were used (Health Professional, Medical Journal, Research Article, Colleague, Friend, Health Website)
- Endpoint will be patient disposition (Admitted, Discharged, Upgraded to Zone 2, Left AMA)

IMPLICATIONS FOR PRACTICE:

If trends are noted, this can guide our efforts to potential intervention in the form of improved patient education. The ultimate goal is to increase health literacy and improve ED triage procedure.

** Shared project with Tyler Dalton, MD*