2023 Summer Research Fellowship Projects

Cleveland Clinic
Akron General

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Project 1

Title: Qualitative Investigation of Pre-Participation History and Physical Examination with Scholastic Athletes, Parents, and Coaches

Number of candidate(s) who will be selected: 1

Overview: Pre-participation examinations (PPE) for athletes are recommended by multiple professional organizations including The American Academy of Family Physicians (AAFP), American Medical Society for Sports Medicine, American College of Sports Medicine, and the American Academy of Pediatrics (AAP) among others. There has been significant debate about the efficacy of PPE screening to identify increased risk in athletes and promote safe participation in sports. A systematic review by Headlee, et. al. (2014) showed the lack of evidence backing the effectiveness of current PPE recommendations in detecting the risk factors and preventing sports injuries. Despite the lack of data on efficacy, and current research demonstrating that PPE has little effect on overall athlete morbidity and mortality, PPE screening is recommended by many sport governing bodies, and state regulatory agencies. There is admittedly little evidence as to the overall health benefit of PPE1–3. There has been some research done by our research group as to the attitudes of school college administrators regarding the PPE, but no evaluation of the patient population, or their parents as to their perceived benefit of the intervention. **Given the lack of demonstrated evidence supporting the effectiveness of PPE referenced above, we seek to understand how athletes, parents, and coaches understand, and value the intervention.**

Specific Research Plan: We plan to perform guided (scripted questions with the ability to move off script) interviews with between 20-30 student athletes/parents and coaches/athletic directors to directly question their perception of the value of pre-participation physical exam for scholastic sport participation. We will then perform qualitative analysis of this data for reporting and publication.

Specific skills/training/education required/desired:

- Patient interviewing as part of medical school
- Skills with use of iPhone/smart phone recording features
- Familiarity with Microsoft office products (including cloud based SharePoint functionality)
- Familiarity with Microsoft Teams for transcription product

Student responsibilities:

1. Fellows will participate in interview process including:
    a. Consenting Subjects for participation
    b. Participating in guided interviews, with the opportunity to perform the interviews after gaining initial experience.
2. Fellow will be responsible for transcribing the recorded interviews to written text (with assistance from automated software)
3. Fellows will participate in early-stage qualitative analysis of data
    a. This will include training on qualitative theory and analysis
4. Fellow will be invited to participate in preparation of conference presentation, as well as manuscripts for publication if timing/desire exist past the time of the fellowship.

This project **includes shadowing** opportunities in Center for Family Medicine at Akron General Medical Center; Akron General Sports Medicine within the Akron General Orthopedics department.

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Project 2

Title: D-dimer and PE in COVID-19

Number of candidate(s) who will be selected: 1

Overview: Globally, there have been more than 360 million confirmed cases of COVID-19 and more than 5.6 million deaths. Many cases of COVID-19 require hospital admission for inpatient medical management of severe disease. Those with severe disease requiring inpatient hospitalization are at increased risk for morbidity and mortality secondary to various complications. One significant complication of hospitalization secondary to COVID-19 is increased rates of pulmonary embolism (PE).

There are several well-validated predictive models utilized by clinicians to determine an individual's likelihood of having a PE. The Pulmonary Embolism Rule-out Criteria (PERC) is a prediction rule that can reliably exclude the presence of a PE in patients believed to be at very low risk. Those that follow the PERC rule are considered low risk for having a PE, and together with a d-dimer concentration <500 ng/ml avoid undergoing computed tomography pulmonary angiography (CTPA). Those who do not follow the PERC rule undergo CTPA to establish a diagnosis.

Incidence of PE in patients diagnosed with COVID-19 who present to the emergency department is about 0.5%. This is approximately ninefold higher than the incidence in the general population. Incidence of PE in individuals hospitalized from COVID-19 approaches twenty-five percent. There have been several prior research articles addressing various aspects of the relationship between PE in COVID-19 patients and d-dimer thresholds. Several articles address the utility of d-dimer thresholds for predicting PE in COVID-19 patients, but not it's utility in excluding it.

The primary objective is to determine how many COVID (+) patients with a d-dimer concentration <500 ng/ml, or age adjusted d-dimer for patients over 50 years of age, went on to have a (+) PE on CT scan. Secondary objectives include determining the percentage of patients with a (-) vs (+) d-dimer who go on to have PE, determining the percentage of patients who had a (-) d-dimer vs total tests, and evaluating any demographic data impact on outcomes.

Specific skills/training/education required/desired:

- All students welcome to apply
- Past clinical research experience
- Clinical experience (e.g. scribing)
- Prior experience with Microsoft Excel/REDCap/EPIC are a plus

Student responsibilities:

1. Completing various components of the research process:
    a) Literature review
    b) Data abstraction
    c) Writing of results
    d) Preparation of presentations/abstracts under the guidance of faculty members

This project **includes shadowing** opportunities in the Emergency Department and in Emergency Medicine resident educational programs.

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Project 3

Title: High Sensitivity Troponin Testing in the Emergency Department Waiting Room

Number of candidate(s) who will be selected: 1

Overview: Overcrowding in the emergency department (ED) is a nationwide concern which has been exacerbated by the Covid-19 pandemic. The ED is tasked with treating patients in a safe and efficient manner. This becomes challenging in conditions in which the patient load creates a workload greater than the institution's staffing capability. In manufacturing environments, workflow can be optimized with organized and pre-planned processes that have minimal variability. This is typically not possible in the ED due to the variability in both acuity and nature of patient presentations. However, there are areas in which the triage process can be utilized to begin diagnostic testing prior to the patient being placed in a room. Laboratory testing can be ordered at triage, with the goal of having the results pending while the patient is waiting.

Past studies have investigated the value of initiating testing while patients are in the waiting room. There is evidence to say early point-of-care testing (POCT) can reduce overall ED length of stay. Specifically, a point-of-care D-dimer test has been shown as a quick method to rule out venous thromboembolism. In patients with abdominal pain, starting diagnostic studies in the ED waiting room has been shown to reduce time spent in an ED bed. A one hour troponin rule-in vs. rule-out algorithm has been studied as a triage tool for patients in the waiting room. No study has looked at the utility of completing a full h0, h1 and h3 high sensitivity troponin in the ED waiting room and the effects this has on ED length of stay.

Chest pain represents over five million visits to the ED in the United States each year. High sensitivity troponin (HST) has been shown to be a valuable triage and risk stratification tool in this population. HST trending, under ideal conditions, can take hours to complete, leading to slow turnover of an ED bed. When bed availability is limited, occupying an active room in the ED becomes especially valuable. One strategy to evaluate is the possibility of keeping low risk chest pain in the waiting room while HST is being trended.

The goal of this study is to evaluate the impact of HST testing that is ordered prior to patient being brought into a room on the patient's length of stay (LOS) in the ED. This will be done by comparing the LOS of patient's with triage ordered HST to those ordered once the patient had been placed in a room.

Specific skills/training/education required/desired:

- All students welcome to apply
- Past clinical research experience
- Clinical experience (e.g. scribing)
- Prior experience with Microsoft Excel/REDCap/EPIC are a plus

Student responsibilities:

1. Completing various components of the research process:
    a) Literature review
    b) Data abstraction
    c) Writing of results
    d) Preparation of presentations/abstracts under the guidance of faculty members

This project **includes shadowing** opportunities in the Emergency Department and in Emergency Medicine resident educational programs.

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Project 4

Title: The Influence of Psychosocial Factors on Patient-Physician Interactions and Adherence to Follow-up Care

Number of candidate(s) who will be selected: 2 KSU students

Overview: Observational study evaluating physician patient interaction, as well as individual level factors (in both clinician and patient) which influence patient adherence to treatment plan/follow up over course of following year.

Several individual-level factors may interfere with effective treatment of chronic diseases and adherence to follow-up care including 1) patients' somatic complaints and emotion regulation, 2) patients' concern over experiencing discomfort related to health information received during their appointment, and 3) quality of doctor-patient communication as well as a shared understanding of physician recommendations for follow-up care between patient and physician. This study will examine how each of these individual level factors contributes to follow-up care for one year following a chronic care visit with Cleveland Clinic Akron General's Center for Family Medicine

Specific skills/training/education required/desired:

- Highly qualified undergraduate/grad student in discipline other than medicine
- Require 2 summer fellows pre=arranged with KSU psychology department
- Familiarity/skill with research subject interviews
- Data collection from medical record
- Familiarity with REDcap data entry
- Familiarity with Microsoft office products (including cloud based SharePoint functionality)
- Familiarity with Microsoft Teams for transcription product

Student responsibilities:

1. Fellows will be present at the Center for Family Medicine during clinic days
2. Enroll/consent both clinicians and patients for enrollment of the study
3. Present patients and clinicians with survey questionnaires
4. Perform pre-and post-visit interviews with the patients while in the family medicine clinic
5. Collect follow up data from electronic health record
6. Analyze data collect via survey and health app which patients will be entering data over the days following the in person visits/enrollment.
    a. Intend to enroll between 100-150 patients over the course of the project

This project **does not include** shadowing opportunities.

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Project 5

Title: Evaluation of Pharmacological Management of Acute Agitation in Trauma Patients

Number of candidate(s) who will be selected: 1

Overview: Acute agitation in injured patients is broadly defined as a state of confusion that follows the initial injury and is characterized by disruptive behaviors. These behaviors potentially risk not only patient safety, but also the safety of family members or healthcare workers. Additionally, these behaviors can interfere with or delay treatment of injuries and negatively impact or exacerbate patient injuries and outcomes.

Acute agitation may be the result of pain, substance use or withdrawal, traumatic brain injury, psychiatric disorders, or a combination of these conditions. There is a paucity of evidence regarding the safety and efficacy of pharmacologic interventions for the management of acute agitation in trauma patients. There is currently no standard regarding which pharmacologic agent should be used for restraint in acutely agitated trauma patients presenting to the emergency department (ED). In the absence of an established standard, physicians may use objective measures to assess agitation, however there is potential for benefit of a standard quantitative practice with specific pharmacologic agents.

The goal of this project is to evaluate the safety and efficacy of medications commonly used for pharmacologic restraint of agitation in trauma patients, including antipsychotics, benzodiazepines, and ketamine. Efficacy will be determined by the need for additional pharmacologic restraint or the need for intubation for control of agitation. Safety will be evaluated by the occurrence of hypotension, respiratory depression, or the need for intubation for loss of respiratory drive.

Specific skills/training/education required/desired:

- All students welcome to apply
- Past clinical research experience
- Clinical experience (e.g. scribing)
- Prior experience with Microsoft Excel/REDCap/EPIC are a plus

Student responsibilities:

1. Completing various components of the research process:
    a) Literature review
    b) Data abstraction
    c) Writing of results
    d) Preparation of presentations/abstracts under the guidance of faculty members
    e) Extensive data has been obtained from the electronic medical record which will reduce the need for manual chart review/data collection.
    f) Will attend didactics and group lectures with resident physicians.

This project **includes shadowing** opportunities in the Emergency Department, Pharmacy and Trauma/General Surgery rounds in Surgical Intensive Care Unit. Shadowing opportunities may be available in the OR and other hospitals/clinical areas as physician schedules permit.

Title 1: Evaluating the Impact of the Fascial Plane Blocks on Complications in the Setting of Traumatic Rib Fracture

Title 2: Prevalence of Vitamin D Deficiency in Trauma Patients

Number of candidate(s) who will be selected: 1

Overview Title 1: Rib fractures are common and can result from blunt trauma as well as the underlying pathology. These injuries frequently present with concomitant thoraco-abdominal trauma such as pneumothoraces, liver lacerations, and splenic lacerations. Atelectasis and pneumonia are common sequelae due to inadequate pain control, impaired pulmonary toilet, and impaired inspiratory effort. Without adequate pain control and medical management, pneumonia and atelectasis can quickly occur. For single rib fractures, NSAIDs are often sufficient alone or as an adjunct to opioids. However, when more than one rib is fractured, intercostal nerve blocks (INBs) are integrated into the standard of care for pain control, which includes a combination of opioids, muscle relaxants, NSAIDs, and GABA analogues such as pregabalin. In addition to analgesia, trauma management of these patients includes early mobility, pulmonary toilet, and bronchodilators. Elderly patients can be difficult to treat due to a high predisposition to infection and other complications. This patient group is also difficult to treat with opioids because analgesia and respiratory drive must be balanced. Finding an alternative analgesic that accommodates the challenges of caring for the elderly patient should be a clinical priority. Exploring the efficacy of nerve blocks may lead to decreased patient pain, earlier discharges, and increased patient satisfaction. One such tool that may provide effective analgesia is the serratus anterior plane block (SAPB). First described in 2013 by Blanco et al., SAPBs have been growing in popularity due to their helpful analgesic effect after major thoracic wall operations. 2 They have been used after many operations such as mastectomies, thoracotomies, and VATS procedures. 3, 4 SAPBs have also been of special interest in light of the ever-growing opioid addiction crisis.

While other forms of nerve blocks have been reported as effective, they are not without drawbacks. If SAPBs were shown to have a high degree of both efficacy and safety, complications from other analgesics could be avoided. Unfortunately, case-controlled, double-blinded studies about SAPB are not frequently seen in the literature. Still, some studies do point to the efficacy of SAPBs. The largest type of research regarding SAPBs have been case studies. Those these are more anecdotal than experimental, these studies uniformly suggest that SAPBs decrease the use of opioids and decrease pain in the post-operative period. Taken in light of the opioid pandemic, hesitation of opioid use in the elderly, and general complication of INB, SAPB seems to be a promising alternative for pain control, specifically in rib fractures. This study seeks to evaluate the impact of SAPB on pain management in patients presenting with rib fractures.

Overview Title 2: A cross-sectional study of healthy volunteers between ages 18-65 showed 64% prevalence of Vitamin D deficiency. Normal serum 25-OH Vitamin D level is 30 ng/ml or above. Serum

Project 6 Continued (page 2 of 2)

25-hydroxy Vitamin D level of <20 ng/ml is defined as deficiency whereas levels between 21-29 ng/ml is defined as insufficiency. Predictors of lower 25-Hydroxy (25-OH Vit D) Vitamin D levels included male sex, African American or Asian race, and lack of multivitamin use. The *National Health and Nutrition Examination Survey* (*NHANES*) III population-based survey among community-dwelling men and women showed a positive correlation between serum 25-OH Vitamin D level and bone mineral density. A systematic review reported that low Vitamin D level is associated with an increased risk of falls and fractures, muscular weakness, and poor physical functioning and balance. A meta-analysis suggests that low serum 25-OH Vit D level is associated with increased risks of total and hip fractures. The high prevalence of Vitamin D deficiency, its association with muscular weakness and poor physical function, predisposition to sustain falls and fractures lead to recommendations for supplemental Vitamin D for the prevention of falls. The primary objective is to identify the prevalence of Vitamin D deficiency among trauma patients with falls. Additionally, we seek to identify the prevalence of Vitamin D deficiency among patients based on injury type. Patients will be approached following admission and the study, including risks and benefits, will be discussed with them. At this time, they may choose to deny consent or participate in this study. Should they choose to participate, remaining blood from their ED trauma panel will be used for this assay. No further patient intervention will occur.

Specific skills/training/education required/desired:

- All students welcome to apply
- Past clinical research experience
- Clinical experience (e.g. scribing)
- Prior experience with Microsoft Excel/REDCap/EPIC are a plus

Student responsibilities:

1. Completing various components of the research process:
    a) Literature review
    b) Data abstraction
    c) Writing of results
    d) Preparation of presentations/abstracts under the guidance of faculty members

This project **includes shadowing** opportunities in the Emergency Department and Trauma/Surgical Intensive Care Unit including resident educational programs for Emergency Medicine and General Surgery. Shadowing experiences will be limited to a total of 16 hours over the course of the fellowship. Should fellows decide to do additional shadowing, this will be done on their own time outside of fellowship hours.

Title 1: Evaluation of the Impact of Thromboelastography on the Duration of Massive Transfusion Protocol for Patients in Hemorrhagic Shock When Used as an Adjunct to Traditional Laboratory Tests

Title 2: Evaluation of the Incidence of Additional Findings on Repeat Head Computed Tomography in Patients Sustaining Traumatic Brain Injury and Admitted to the Intensive Care Unit

Number of candidate(s) who will be selected: 1

Overview Title 1: Bleeding control is necessary for many patients presenting to the emergency department (ED), including those with traumatic injuries, upper and lower gastrointestinal (GI) bleeds, nose bleeds, or clinically low platelet counts. Unmanaged blood loss can lead to hemorrhage and potential hemodynamic instability, resulting in end-organ failure and death. Many laboratory tests are used to assess the severity of a bleed, including (but not limited to) PT/ INR, platelet count, aPTT, and fibrinogen levels. While effective, the time to result can potentially delay patient care. Further, these tests do not provide a complete picture of hemostasis as they don't assess certain coagulation factors (like Factor XIII), platelet function, or the activity of the fibrinolytic system. This information is clinically useful as it can indicate whether or not the system is properly functioning. Premature or incorrect diagnosis of coagulopathy can lead to improper transfusion of blood products.

Early identification of bleed severity is critical. Patients who experience massive bleeding often become hypotensive and have other physiologic derangements, including acidosis and decreased blood supply to vital organs. As time progresses, correction of these derangements becomes more difficult. Controlling massive bleeding and supplementing with blood products is critical to preventing the irreversible results of hemorrhagic shock. The long-term effects on morbidity and mortality that early massive blood transfusion has on patients with presumed massive bleeding are still unknown. Thromboelastography (TEG) is a procedure that detects the quality of the clot and whether or not it is likely to stop the bleeding. It does this by evaluating the elasticity and the dynamics of the different stages of clot formation. This allows for early detection and confirmation that a bleed may not be manageable via clot formation and thus requires management with blood products.

The objective of this study is to evaluate the use of TEG at CCF facilities. Specifically, the goal is to assess whether the use of TEG leads to a decreased duration of MTP. The primary outcome will be the average duration of MTP in patients who have TEG versus the average duration of MTP in patients who have traditional laboratory testing (defined below). We hypothesize that by using TEG to evaluate hemorrhagic shock patients they will have an average reduced duration of MTP than following traditional testing. Secondary objectives include evaluating differences between the etiology of the bleed, the amount/type of blood products used, demographics, and inpatient hospital course.

Overview Title 2: Patients with non-penetrating head injury and a Glasgow Coma Scale (GCS) of greater than or equal to 13 are considered to have mild traumatic brain injury (TBI).Management of patients with mild TBI with initial computed tomography (CT) revealing evidence of intracranial hemorrhage (ICH) varies across healthcare institutions. While it common is to observe patients for progression until repeat head CT is obtained, there is a lack of consensus on the disposition of this patient population. As such, the necessity of both intensive care unit (ICU) observation and

of repeat head CT imaging are actively questioned.

Several studies suggest routine repeat head CT may be unnecessary and should instead be reserved for select patients as indicated clinically. A review of the literature revealed many of the studied objectives were tailored toward the goals of the institution. As such, specific protocols and guidelines produced by these studies limit generalizability. Furthermore, one study revealed dissimilar results which calls into question the data supporting the safety of not following up with repeat head CT in this patient population. Additionally, when comparing long term neurological outcomes for patients who were admitted to the floor and those to the ICU, one author concluded that outcomes were not markedly different, however failed to demonstrate non-inferiority. To date, there are no publications which evaluate the specific assessment intervals needed for detecting the progression of mild TBI in the setting of ICH, and thus the necessity for higher level ICU care.

At our institution, patients with mild ICH and evidence of ICH based upon initial head CT are admitted to the neurosurgical intensive care unit (NSICU) for hourly neurological assessments and are transferred once a repeat head CT is completed at 6-24 hours. Clarification of this practice, and evaluating whether such measures alter the course of care of this patient population is paramount. Not only help resource distribution, patient comfort, and reduce LOS; it may also reduce unnecessary adversity to patients due to CT imaging radiation and sleep deprivation from prolonged, unnecessary hourly neurological assessment.
The primary objective of this study is to identify the necessity of ICU observation in patients with mild TBI and evidence of intracranial hemorrhage until repeat CT is completed. This will be evaluated by examining the need for clinical interventions following the repeat CT including craniotomy, craniectomy, intracranial pressure monitoring, external ventricular catheter, and intubation in this patient population.

Specific skills/training/education required/desired:

- All students welcome to apply
- Past clinical research experience
- Clinical experience (e.g. scribing)
- Prior experience with Microsoft Excel/REDCap/EPIC are a plus

Student responsibilities:

1. Completing various components of the research process:
    a) Literature review
    b) Data abstraction
    c) Writing of results
    d) Preparation of presentations/abstracts under the guidance of faculty members

This project **includes shadowing** opportunities in the Emergency Department and Trauma/Surgical Intensive Care Unit including resident educational programs for Emergency Medicine and General Surgery. Shadowing experiences will be limited to a total of 16 hours over the course of the fellowship. Should fellows decide to do additional shadowing, this will be done on their own time outside of fellowship hours.

Title: Early Addition of Vasopressin to Norepinephrine in Hemorrhagic Shock

Number of candidate(s) who will be selected: 1

Overview: Historically, the role of vasopressors in trauma related hemorrhagic shock was uncertain but recent studies have shown benefit with early use in patients requiring additional hemodynamic support despite resuscitation with gold standard blood products and fluids. There are guideline recommendations for the use of vasopressors in the presence of life threatening hypotension despite appropriate administration of blood products and fluids. There are few controlled human studies on this subject and even fewer on the preferred vasopressor regimens in hemorrhagic shock. Selection of vasopressor is varied in this situation/patient population, with two common options being norepinephrine and vasopressin. Norepinephrine is the preferred vasopressor for many shock states and commonly the first vasopressor started. It is unknown if the addition of vasopressin to norepinephrine results in better patient outcomes for hemorrhagic shock.

Objectives: To determine if there is an association between timing of vasopressin addition to norepinephrine and vasopressor free days in trauma patients admitted for hemorrhagic shock

Outcomes:

Primary

- Alive and vasopressor free days in the first 28 days from admission

Secondary

- Time to shock resolution
- Amount of blood products administered
- Hospital length of stay
- ICU length of stay
- 28 day mortality
- Requirement of renal replacement therapy

References:

1.)Sims CA, Holena D, Kim P, et al. Effect of Low-Dose Supplementation of Arginine Vasopressin on Need for Blood Product Transfusions in Patients With Trauma and Hemorrhagic Shock: A Randomized Clinical Trial. JAMA Surg. 2019;154(11):994-1003. doi:10.1001/jamasurg.2019.2884

2.)Cohn SM, McCarthy J, Stewart RM, Jonas RB, Dent DL, Michalek JE. Impact of low-dose vasopressin on trauma outcome: prospective randomized study. World J Surg. 2011;35(2):430-439. doi:10.1007/s00268-010-0875-8

3.)Gauss T, Gayat E, Harrois A, et al. Effect of early use of noradrenaline on in-hospital mortality in haemorrhagic shock after major trauma: a propensity-score analysis. Br J Anaesth. 2018;120(6):1237-1244. doi:10.1016/j.bja.2018.02.032

4.)Sperry JL, Minei JP, Frankel HL, et al. Early use of vasopressors after injury: caution before constriction. J Trauma. 2008;64(1):9-14. doi:10.1097/TA.0b013e31815dd029

5.)Van Haren RM, Thorson CM, Valle EJ, et al. Vasopressor use during emergency trauma surgery. Am Surg. 2014;80(5):472-478.

Project 8 Continued (page 2 of 2)

Specific skills/training/education required/desired:

- Good communication and time management skills
- No pre-requisite research skills are necessary prior to this research experience

Student responsibilities:

1. Completing various components of the research process:
    a) Literature review
    b) Data collection using REDCap
    c) Data analysis and statistics
    d) Manuscript writing of study design/methods

This project **includes shadowing** opportunities to round on the Surgical Critical Care Unit with the clinical pharmacist or pharmacy resident. Educational experiences would be available, including trauma grand rounds, general surgery resident didactics and pharmacy didactics, which will be limited up to .5 a day per week.