

ABSTRACTS for 2022 Colloquium Presentations and Posters

Community Hospital Quality Improvement Programs

Author: Eric Curto, MD (PGY4-Presentation)

The American College of Surgeons has been on the forefront of quality improvement (QI) for decades as its importance to our institutions and our patients is paramount. Their involvement in quality improvement is expansive ranging from pediatrics, to trauma, and bariatric surgery to list a few. It has long been debated what makes up an effective QI program. In our study we evaluated our community hospital's ability during the peak COVID pandemic to remain operating in a safe and effective manner without adding to patient morbidity and mortality. We arranged a prospective collection survey of those that underwent procedures or surgeries in our community hospital. We did this through a 30-day follow up survey and concurrent data collection during the process. We reviewed our patients once per month and performed one total year analysis. We demonstrated 100% follow up in our patients, and evidence supporting safety in our continued procedures during the time of data collection. With this information, we were able to assuredly remain open and continue to provide patient's high quality care in a difficult time during the peak COVID pandemic. QI continues to be an integral part of the medical field especially in surgery. With every changing landscapes of practice that can include pandemics, it is important to continuously evaluate your institutions and their practices to assure yourself and the community that you are providing them safe and effective care.

Does the use of T-fasteners for gastropexy when placing percutaneous endoscopic gastrostomy tubes affect complication rates?

Author: Jonathan Sticca, MD (PGY1-Poster)

Purpose/Background: Percutaneous endoscopic gastrostomy (PEG) tube placement is a commonly performed surgical procedure. Complications are rare, but are associated with significant morbidity and mortality to patients. Performing a gastropexy with T-fasteners is an accepted but not required part of the procedure. Our goal is to review PEG tube placement at Sanford Health in Fargo to see if the use of T-fasteners results in a statistically significant reduction in complications after PEG tube placement.

Method: Retrospective chart review

Results/conclusions: pending...

Does Hand Sewing of the Stapled Common Enterotomy During Bowel Anastomosis Result in Fewer Leaks?

Author: Reid Bartholomew, MD (PGY4-Presentation)

Introduction: Stapled vs handsewn methods of bowel anastomosis have been extensively studied, however no study has compared the handsewn vs stapled technique of closing the common enterotomy generated during a stapled side-to-side anastomosis. Anecdotal concerns of higher leak rates due to crossing staple lines has led some to prefer a handsewn technique for closing the common enterotomy.

Methods: Patients undergoing stapled side-to-side enteroenteric and enterocolonic anastomoses in both emergent and elective settings at one tertiary center from 2016 to 2020 were studied. 758 patients were included in this study. They were divided into 2 cohorts: Stapled-Stapled (SS) and Stapled-Handsewn (SH) depending on the fashion in which their stapled common enterotomy was closed. Association of anastomotic leak rate overall, in the emergent vs elective setting, and within enteroenteric and enterocolonic anastomotic subgroups was evaluated. Association with the closure technique and average operative time was also compared.

Results: Significantly higher enterocolonic leak rates were seen in the SS cohort compared to the SH cohort (SS 9.4% vs SH 3.4%, $p = 0.016$). Overall leak rates (SS 5.9% vs SH 3.7%, $p = 0.23$) and enteroenteric leak rates (SS 2.9 vs SH 4.1, $p = 0.52$) were similar between cohorts. Operative times were significantly shorter in the SS cohort (SS 121.8 min vs SH 138.1 min, $p = 0.049$), with a difference of 16.3 minutes on average.

Conclusions: The SH technique results in fewer enterocolonic anastomotic leaks, therefore we recommend handsewn closure of the common enterotomy for enterocolonic anastomoses, regardless of emergent or elective setting. The SH and SS result in similar anastomotic leak rates overall when including enteroenteric anastomoses, and the stapled-stapled technique is significantly faster than the stapled-handsewn technique. We therefore consider the SS technique to be an acceptable, and in the emergent setting, potentially preferred method of enteroenteric anastomotic technique.

Closed-loop obstruction from multiple trichobezoars in a pregnant patient

Authors: Sam Bloomsburg, MD (PGY1-Poster)

Trichobezoar is a relatively uncommon condition that is usually associated with trichotillomania. This may present as an isolated psychological disorder or in association with other psychological disorders such as obsessive compulsive disorder or schizophrenia. Trichobezoar is most commonly found in the stomach but can occur anywhere within the digestive tract. Here I will describe an unusual case of a closed-loop obstruction caused by the co-occurrence of two trichobezoars – one in the stomach and one in the proximal jejunum. This was further complicated by its' occurrence in a patient who was pregnant in the 2nd trimester. The patient underwent exploratory laparotomy with gastrotomy and enterotomy and recovered well, with no immediate adverse effect on her pregnancy.

Laparoscopic-Assisted Transversus Abdominis Plane Block is Superior to Port Site Infiltration in Reducing Post-Operative Opioid Use in Laparoscopic Surgery: A Retrospective Review

Author: Joclyn Seiler (PGY4-Presentation)

BACKGROUND: The ultrasound-guided transversus abdominis plane (TAP) block can be time-consuming, costly, and technically challenging in the bariatric patient population. Laparoscopic-assisted TAP (L-TAP) block was developed and has been shown to be non-inferior to ultrasound-guided blocks. Post-operative pain can be significant, and pain control in the morbidly obese patients can be challenging. This study aim was to compare L-TAP block to traditional port site infiltration in terms of post-operative opioid requirement for morbidly obese patients after undergone a laparoscopic Roux-en-Y gastric bypass (RYGB) surgery.

METHODS: A retrospective chart review was performed from February 2019 through February 2020. Two study groups: L-TAP block and port site infiltration. Outcomes examined the amount of opioid used at different time segments relative to the operation. All intravenous (IV) and oral opioids used were converted into IV morphine milligram equivalents (MME) for standardization.

RESULTS: 150 patients were included. The patient characteristics were not statistically significant between the two groups. Post-operative opioid use trended lower in the L-TAP block group in all time segments. A significant difference was detected in IV opioid use during post-operative day 0 with the mean MME for the L-TAP block group being 1.1 ± 3.8 and port site infiltration group being 2.8 ± 4.5 ($p=0.02$).

CONCLUSIONS: The L-TAP block more effectively reduces post-operative opioid use in comparison to port site infiltration in laparoscopy Roux-en-Y gastric bypass (RYGB) surgery. Based on these findings, as well as the efficiency and cost-effectiveness of L-TAP blocks, its routine use in laparoscopy should be considered.

Transcatheter aortic valve replacement (TAVR) preoperative vascular injury scoring system

Author: Hunter Row, MD (PGY2-Poster)

Introduction: In 2019 the FDA approved TAVR procedure for treatment of symptomatic aortic stenosis regardless of surgical risk and exceeded the number of open surgical aortic valve replacements (SAVR). Retrograde access through the common femoral artery is the most common approach. Initially vascular complications were high and ranged from 2-30%, even with the advancement of valves and catheters the vascular complication rate is sited at 4%. Standardized endpoint definitions have been developed by The Valve Academic Research Consortium. They are divided into Major

vascular complications, minor vascular complications, and percutaneous closure device failure. Complications correlate to increased hospitalization days, poorer quality of life outcomes and increased morbidity and mortality. In this study we aim to identify patient and clinical risk factors associated with vascular complications and develop a risk scoring system to identify patients at high risk for vascular complications during this procedure.

Study: Systematic retrospective patient data collection will be used to evaluate over 1,400 patients who have undergone TAVR procedure at Sanford Medical Center Fargo. Patient characteristics, pre-operative imaging, complications and clinical events will be collected. Pre-operative imaging analysis will include, but not limited to, patient tortuosity scores, calcium burden, femoral artery area to sheath size ratio. Vascular complications will be defined according to VARC-2 guidelines. By analyzing this data we will develop a scoring system to distinguish patients at increased risk for vascular complications undergoing transfemoral TAVR procedure.

Discussion: By creating a vascular injury scoring system we aim to reduce the number of vascular complications associated with the TAVR procedure. We will be able to better stratify patients at increased risk for complications and determine the best approach to repair or replacement for those with aortic valvular disease. Using multiple surgical and interventional specialist we will increase the power and value of this project. Ultimately, we aim to decrease the morbidity and mortality associated with the TAVR procedure by identifying patients at risk for vascular complications and be able to better optimize interventional/surgical planning.

Pulmonary Artery-Tracheal Fistula after Coil Implantation for Behcet's Disease

Author: Max Hansen, DO (PGY5-Presentation)

Behcet's disease (BD) is a rare autoimmune disorder which results in diffuse full thickness vasculitis. Pulmonary artery aneurysms (PAA) and hemoptysis are known complications of this disease process with high morbidity and mortality for affected patients. Although medical, endovascular, and surgical treatment strategies have all been described in the literature there is little data to describe the long term outcomes of these various treatment modalities and there continues to be a lack of clearly defined algorithms for the management of these patients. We report a case of PAA in the setting of BD who was treated over the course of many years with medical therapy and coil embolization but ultimately failed treatment, sustained a complication of coil erosion and migration into the trachea twice, and required surgical lobectomy for definitive management. We discuss an algorithm for the management of patients with BD who have PAA's.

Necrotizing soft tissue infection of the abdominal wall due appendiceal fistula in a large ventral hernia

Author: Elena Danielson, MD (PGY1-Poster)

Background: A 46 year old female presented with necrotizing soft tissue infection of the abdominal wall due appendiceal fistula in a large ventral hernia.

Summary: Our patient is 46 year-old female with past medical history of poorly controlled type II diabetes mellitus and known ventral hernia who presented in septic shock with a necrotic wound of her abdominal wall. The wound was overlying a large ventral hernia and consistent with necrotizing soft tissue infection. She was treated urgently with fluid resuscitation, debridement of the wound, and antibiotics. On the second repeat exploration, an appendiceal fistula was found protruding from the hernia sac. Open appendectomy and primary repair of the ventral hernia was performed. She recovered well post-operatively and her wound has been healing well with ongoing wound cares.

Conclusion: Following the principle of early and repeat surgical debridement in the management of this unique case of an abdominal wall NSTI allowed us to definitively obtain source control upon identification of an appendiceal fistula via an open appendectomy.

Financial literacy of practicing surgeons of North and South Dakota

Author: Dustin Nowotny, DO (PGY5-Presentation)

Most medical professionals, MD/DO, progress through training and many years of education without formal financial teaching. They arrive at the completion of training with little background to navigate the upcoming financial changes. There is also increasing need for financial training with the ever-increasing medical school debt amounts. This study looked at the financial literacy of attending surgeons in the states of North Dakota and South Dakota. A survey was developed to assess baseline financial behaviors and also financial literacy using validated questions. The survey was distributed via the ACS state chapter directories in coordination with the administration assistants. The responses showed that all of the attending obtained at least 3 correct on the Big 5 questions which demonstrates at least a moderate level of financial literacy. So, physicians tend to acquire financial literacy throughout their life that may position them well with financial behaviors. It is apparent that the high level of education and intelligence to progress successfully through the medical training pipeline may also influence the ability to learn the basics of financial planning and literacy.

Do certain combinations of risk factors influence mastectomy complication rates more than others? A look at one breast surgeon's practice over the past 10 years.

AUTHORS: Alessandra Spagnolia, MD (PGY3-Presentation)

BACKGROUND: In women, breast cancer is the most common cancer diagnosis (aside from skin cancer) and the second most common cause of cancer-related death. According to the American Cancer Society, >300,000 women will be diagnosed with breast cancer in 2021. Primary treatment is with surgery and can include removal of most of the breast glandular tissue (mastectomy) or only part of the breast, to include the tumor (breast conserving therapy/BCT). Studies have shown that BCT with radiation is just as effective as mastectomy for early stage cancers. Regardless, ~30% of US women diagnosed with invasive carcinoma or carcinoma in situ still elect to have some form of mastectomy^{Habermann,Kummerow}. That equals roughly 90,000 women undergoing mastectomy each year in the United States.

Mastectomy is a relatively low-risk procedure. The goal is to remove as much breast tissue as possible in order to reduce the risk of a cancer recurrence while leaving an adequate amount of subcutaneous tissue to support the overlying skin. This requires the creation of skin flaps. If the skin flaps do not receive adequate blood supply to meet metabolic demands, they will undergo necrosis. Skin flap necrosis is one of the most common complications following mastectomy and has a reported incidence of 5%–30% in the literature^{Carlson,Robertson}. The other most common complications are infection and hematoma which occur 2-19% of the time^{Carlson,O'Brien}.

Complications after mastectomy can result in significant morbidity such as return to the OR, extra financial burden, psychological and emotional duress, delay in further treatment, and impact overall cosmetic result^{Robertson, Davis}. There are several known risk factors for skin flap necrosis (along with other complications): diabetes^{Matsen}, tobacco use^{Padubri,Matsen}, prior radiation^{Abdedi}, obesity (BMI > 30)^{Abdedi,Matsen,Chen,Huttunen}, and immediate reconstruction^{Abdedi,Matsen}. These risk factors have been well studied individually but, to my knowledge, there is no study looking at these risk factors in combination. Also, yet to be published are the potential negative effects of the newer biologic medications or DMARDs on wound healing following mastectomy. We are interested in determining the correlation of different combinations of risk factors with complications following mastectomy.

METHODS: Clinical chart review of mastectomies from Dr. Bouton's Sanford based practice over the past 10 years.

RESULTS/CONCLUSIONS: Pending statistical review.

COVID 19 Tracheostomy

Author: Matthew Zweerink, MD (PGY4-Presentation)

Background: In the midst of a worldwide pandemic COVID-19 has been catapulted to the forefront of the medical world. Due to its profound pulmonary symptomatology, it has caused providers to question the conventional timing of

tracheostomy. Historically tracheostomy has been performed, at under 14 days in individuals who have been unable to or are unlikely to be able to wean from the ventilator. Of individuals who are intubated with COVID-19 mortality approaches *** and has been shown to be even higher in some studies. Taking into account this high mortality rate and increased risk of provider exposure during aerosolizing procedures determining the appropriate timing of tracheostomy has become important for both patient and provider safety.

Methods: We performed a multi-institutional retrospective study reviewing 8 months of intubated COVID-19 patients. All patients selected were adults (over the age of 18) who ultimately required tracheostomy secondary to failure to complete ventilatory weaning. Timing of tracheostomy was assessed across all patients with primary outcomes being, mortality, successful ventilatory weaning, or discharge to long term care facility. Additionally patients were grouped by age, gender, ethnicity, and comorbid conditions. Pre and post tracheostomy pneumothorax was extracted from the data set for subgroup analysis in addition to tracheostomy related complications.

Results: Between April-2020 and December- 2020, 85 patients were obtained from our institutions database of patients, intubated with COVID-19, who required tracheostomy. Of the 85 patients in the study, 40% (N=34) were female, about one-quarter (23.5%, N=20) were Native American and 58.8% were White (N=50). Mean BMI was 32.7 (SD=7.5, IQR = 27.24-37.23). The most frequent comorbidity was stroke, affecting 88.2% of the patients (N=75), followed by CAD (87.1%, N=74). Within this group time from intubation to tracheostomy varied widely ranging from 5-53 days with average time to tracheostomy being 17.3 days. Of these individuals, thirty-four (40.0%) of the patients expired, 32 (37.6%) patients were discharged to a Long Term Care Hospital (LTCH), and 11 (12.9%) patients were discharged to an inpatient rehabilitation facility. Only three patients were discharged to self-care at home. There were no statistically significant differences between patients who survived (N=51) and patients who expired (N=34) for almost all variables analyzed. The exception being cumulative days requiring ventilation. Those who survived were more likely to have more recorded days on ventilatory support than those who perished. When patients were divided by gender, ethnicity, and comorbid conditions no individual sub group demonstrated superior outcomes related to timing of tracheostomy. Logistic regression modeling of the patient group as a whole demonstrated a 4% increase in mortality for every one year added to age based on odds ratio. *** to include pneumothorax

Conclusion: This study did not demonstrate statistically significant differences in overall mortality or *** to include pneumothorax. In light of this evidence, we cannot conclude a correlation between timing of tracheostomy and COVID-19 mortality. Given our findings we can conclude that tracheostomy in the setting of COVID-19 can be performed at provider discretion based on patient clinical condition. Ongoing analysis in this area is critical as the medical world aggressively attempts to adapt to COVID-19

COVID and Acute Abdomen

Author: Riley Moore, MD (PGY1-Poster)

COVID is typically not thought of as a disease requiring surgical management, but as the pandemic has progressed the need for emergent surgery in this patient population has become clear. Critically ill patients with COVID are twice as likely to develop an acute abdomen as those patients who are critically ill without COVID. The exact pathophysiology of the acute abdomen in critically ill patients with COVID is not completely known, but it is thought to be multi-factorial. Low flow states seen in those requiring hemodynamic support, thrombosis of the large vessels supplying the GI tract, thrombosis of the microvasculature supplying the GI tract and direct infection of cells composing the GI tract are thought to be contributors. In this presentation I will present one of several cases of critically ill COVID positive patients requiring emergent surgery for acute abdomen

Delayed pneumothorax and lead dislodgement after pacemaker insertion in a patient using nightly CPAP

Authors: Tyler J Van De Voort, MD (PGY5-Presentation)

BACKGROUND: A 77 year old male underwent placement of a dual-lead permanent pacemaker via his left subclavian vein. Immediate post-operative chest x-ray (CXR) was negative for pneumothorax (PTX) and pacemaker interrogation studies were adequate, so he was discharged home the same day.

SUMMARY: Our facility has been practicing same-day discharges for pacemakers if their post-operative CXR is negative and if pacemaker parameters are acceptable a few hours after surgery. The patient has obstructive sleep apnea and uses a continuous positive airway pressure (CPAP) mask at night. On post-operative day 5, he came back to the emergency department with shortness of breath. CXR at that time showed a large left PTX with mediastinal shift but no tension physiology. A left chest tube was placed and resolved the PTX, but subsequent interrogation of his pacemaker leads suggested that the ventricular lead had become dislodged from the myocardium. We took him back to the operating room for replacement of the ventricular lead. He did well post-operatively, his chest tube was removed, and he was discharged a few days later.

CONCLUSION: Extra caution is needed in CPAP-dependent patients who undergo thoracic procedures such as pacemakers, ports, lung biopsies, and thoracenteses. The positive pressure from the CPAP can turn a small undetectable pneumothorax into a delayed pneumothorax several days later. Mediastinal shift, which is rapidly reversed after chest tube placement, can dislodge pacemaker leads. We suggest observing CPAP patients for a night after any procedure that requires instrumentation of their central venous system to ensure that delayed pneumothorax does not develop.

The Effect of Chronic Anticoagulation Therapy on COVID-19 patients: An unexpected result

Author: Ryan Beard, DO (PGY2-Poster)

Introduction/Hypothesis: Venous macro and micro thromboembolism is a known pathologic occurrence in Covid-19 patients that is thought to negatively impact outcomes. The goal of this study is to describe the impact of chronic anticoagulation therapy (CAT) on outcomes of COVID-19 patients. Studies analyzing the relationship between CAT and COVID-19 patient outcomes have provided conflicting results about CAT's protective effect, ranging from no association between CAT and mortality to indications of dose-response effect.

Methods: A retrospective review of all patients admitted to any one of three American College of Surgeons (ACS) verified rural level one or level two trauma centers in North Dakota with the primary diagnosis of COVID-19. Complications and outcomes of patients who were on CAT prior to admission were compared with those of patients not on CAT prior to admission. The data collected included patient characteristics, length of stay, complications, discharge on oxygen and mortality.

Results: A statistically significant increase in the proportion of discharge on oxygen ($p = 0.02$) and in the proportion of mortality ($p=0.007$) was found among patients on CAT. Length of stay and complications were not statistically significant between the two patient groups.

Conclusions: Patients in our study who were on CAT were more medically complex than those not on CAT, which may have led to higher morbidity and mortality. The population studied is also unique demographically and could have also influenced our findings. This study is significant in that it demonstrates that previous anticoagulation may not be a protective factor in treating COVID-19 in certain populations, as discussed in previous studies. Future studies should investigate the actual medical adherence and dose-response relationship of CAT among COVID-19 patients to further identify the impact of CAT of COVID-19 outcomes.

COVID-19 associated fatality from invasive rhino-sinusitis in a non-immunocompromised patient.

Authors: Conor Roche, MD (PGY3-Presentation)

Intro: COVID 19 infections has been associated with invasive fungal infections, especially in the immunocompromised patients and those treated for COVID 19 with corticosteroids. These fungal infections have a high mortality and often require emergent and extensive surgical debridement.

Case Report: Here we report a 41 year old unvaccinated female with recent history of COVID 19 infection that was treated supportively on the outpatient setting and then developed invasive fungal rhinosinusitis resulting in precipitous clinical decline despite serial surgical debridements and ultimately resulting in her death within days of the diagnosis.

Discussion: This case is significant due to the invasive fungal infection in the setting of no documented immunosuppression in the patient's history and the absence of corticosteroid treated COVID 19. COVID 19 has been shown to increase mucous sloughing and allow fungal infections to seed in the sinus cavities. The infection in our case was likely multifactorial due to our patient's diabetes and recent COVID 19. It is unclear, however, the extent that the COVID 19 or her diabetes contributed to the immunomodulation that allowed for the fungal infection to seed and cause such extensive damage. To the best of the author's knowledge there has not been other documented cases of invasive fungal rhinosinusitis after COVID 19 infection in an otherwise non-immunocompromised patient.

Stoma Siting – where did we come from, and where do we go?

Author: Andrea Gerberding, MD (PGY1-Poster)

Purpose/Background: The practice of exteriorizing bowel, now known as creating an ileostomy or colostomy, has been described in medical literature since the 13th century. However, this practice was both highly morbid and taboo until World War I, when blast injuries forced a wide variety of surgical advancements. Since the mid-20th century, mainstays of stoma siting have included identifying and avoiding external landmarks (such as scars, skin folds, and belt lines) and bringing the stoma up through the rectus muscle. The reason for positioning the stoma within the rectus muscle is to decrease the risk of stomal prolapse and parastomal hernia, though these complications remain prevalent. This project seeks to explore possible alternative placements for stomas to decrease the rate of prolapse and parastomal hernias.

Methods: A literature review of the history of ileostomy and colostomy creation was performed, including the history of and considerations for stoma siting. Additionally, abdominal wall anatomy, physiology, and mechanics were evaluated. A patient case was also reviewed.

Discussion: The practice of siting stomas through the rectus muscle has been a mainstay of surgical practice for the better part of a century. However, recent exploration into abdominal wall mechanics, as well as data about long-term stoma complications, should prompt a further exploration into this practice. While unorthodox, siting the stoma higher on the abdomen and closer to midline may decrease the risk of stomal prolapse and parastomal hernias in select patients.

Rare Thyroid Pathology: A 20 Year Review of a Single Surgeon's Practice

Author: Erin Follman, MD (PGY5-Presentation)

Split-Didactic Format in Surgery Improves Resident Engagement, Satisfaction and Prepares for Oral-Board Questioning

Author: David Ray Velez, MD (PGY4-Presentation)

Modern didactic formats such as flipped classroom and team-based learning have both been associated with improved performance on the ABSITE, although the literature to date is not definitive. There, however, has been no previous report of what we are calling a "split-didactic" format. This approach has the benefit of seeing both traditional lectures as well as questioning in a "flipped classroom" model. By making each of the two sessions only 20-25 minutes, it better aligns with the adult learner attention span. It also benefits residents by giving them increased exposure to oral-board style questioning.

The influence of thromboelastography on blood transfusions in major trauma: a single institution retrospective study

Author: Dana Nielsen, MD (PGY3-Presentation)

Coagulopathy has long been a primary concern for the trauma surgeon. Recently, our institution began introducing thromboelastography (TEG; Hemoscope Corporation, Niles, IL, USA) to promptly evaluate the clotting cascade both quantitatively and qualitatively in these high-risk patients. We looked retrospectively to ascertain whether the

introduction of TEG has guided decisions on blood transfusions, and if it has decreased the amount of empiric blood products given.

Purpose/Background: The severe clinical consequences of coagulopathy in trauma has spurred the search for better methods to diagnose early coagulopathy. Routine screening coagulation tests, composed of activated partial thromboplastin time and prothrombin time, have several shortcomings in diagnosing trauma coagulopathy. These static, quantitative tests are unable to diagnose early coagulopathy or predict the extent of bleeding. Further, a recent review suggests they may be inappropriate in trauma entirely.¹

Thromboelastography as a modality to evaluate the clotting cascade has been described since 1948,² but an expanding understanding of coagulopathy in trauma has increased interest in these assays. TEG provides information on both the process of thrombosis and fibrinolysis, reflecting the quantitative and qualitative properties of clot function. There has been some evidence that TEG can diagnose early trauma coagulopathy, predicting the need for blood product transfusion.³

This finding raises the possibility that the utilization of TEG could protect the limited and valuable resource of blood products. Given that blood costs have been underestimated and consume more resources than previously reported,⁴ it is worthwhile to determine whether this dynamic assay has influenced transfusions. In this retrospective study, we sought to determine whether the advent of TEG at our institution influenced the administration of blood products in trauma.

Methods: The Trauma Thromboelastograph became available at Sanford Medical Center Fargo (SMCF) beginning January 7th, 2020. It was added to the Major Trauma order set and as a stand-alone order in the preference list.

A comprehensive list of all the patients who arrived in the SMCF Emergency Department as traumas was obtained in the two years prior to Trauma TEG (January 7th 2018- January 6th 2020), excluding pediatric patients under 18 years old.

Results: Blood product administration was analyzed in two groups: in the first 24 hours after arrival and in the total hospital stay following the initial 24 hours.

The data generated from 2019-2020 and 2020-2021 were not normally distributed and were analyzed as continuous variables. Wilcoxon was used to compare the blood products before and after TEG. None of the results in this data set were significant, but the packed red blood cells transfused over the length of stay approached significance at $p = 0.07$.

The data from 2018-2019 and from 2021-2022 have been gathered, but have not yet undergone statistical analysis.

Discussion: Ordering TEG has the potential to be a cost-effective and clinically significant way to manage trauma patients; however, the results generated to this point are not statistically significant.

There is a greater difference in the values generated after the first 24 hours of the hospital course which may become significant with the further analysis of the additional year of data before and after TEG initiation.

Future Plans: Finish analysis for the 2018-2019 and 2021-2022 data sets

Has Improved Infrastructure Caused a Decrease in North Dakota Vehicle Deaths?

Author: Jude Barber, MD (PGY2-Poster)

Background: Vehicle deaths in North Dakota have had a significant decline over the last 10 years. Authors evaluated the completion dates of major roadway projects, timeline for the expansion of the oil industry, and the changes in the number of vehicle deaths in selected counties on an annual basis.

Methods: We utilized a retrospective analysis of public data provided by the North Dakota Department of Transportation and through their program Vision Zero that was collected between 2002-2020. This data was utilized to select various counties based on vehicle deaths. We used counties with both an extreme high and an extreme low number of vehicle related deaths on major roadways that were spread across the state. We then compared this timeline against the completion dates of major roadway projects in those areas as well as the expansion of oil industry in the

state of North Dakota in those selected areas to see if there was a correlation between improved infrastructure, increasing presence of oil business, and vehicle deaths.

Results: A work in progress due to delay on critical data from state of North Dakota.

Conclusion: We have been unable to conclude at this time as our research is still ongoing. We are hoping this information could be utilized on a national scale to help attain similar results in other states and ultimately decrease the number of lives lost in vehicle crashes.

Effect of obesity on outcomes in trauma patients with rib fractures.

AUTHORS: Chani Taggart, DO (PGY5-Presentation)

Purpose: It is well known that rib fracture injuries significantly contribute to morbidity and mortality in trauma patients. As the incidence of obesity continues to rise, little is known about the effect of obesity on patient outcomes. The purpose of this study is to examine how BMI class impacts outcomes in trauma patients with rib fractures.

Methods: A retrospective study including trauma patients, ages 18 – 100 years, who were admitted with rib fractures from 2016 to 2021. Patients were categorized by number of rib fractures and BMI class. The primary end points are in-hospital mortality, length of hospital stay, ICU length of stay, and ventilation days. Secondary end points include disposition. Age, sex, comorbidities, and injury severity score were adjusted for.

Results: A total of 1368 patients were evaluated. Final data analysis is pending and will be updated once complete.

Conclusions: Final analysis is pending and will be updated once complete. The hypothesis is that there will be an association between patient BMI class and increased mortality, hospital length of stay, ICU length of stay, and ventilation days.

Timing of Palliative Care Consultation on Trauma Patient Outcomes

Author: Anthony Duncan, MD (PGY2-Poster)

Background: Severely injured trauma patients undergo aggressive, cure-focused care. For these patients the ACS recommends a discussion regarding goals of care is completed within 72 hours of admission. Palliative care consultation (PCC) is often utilized, however, the difference in outcomes for earlier versus later consultation is not established.

Methods: This study is a retrospective chart review of adult trauma patients admitted to a single level II trauma center from January 2012 to March 2021. The included patients must have had an initial ISS of >14 and received PCC during the admission. Differences in outcomes for early PCC (<72 hours) versus late PCC (≥72 hours) were analyzed by chi-square or Kruskal-Wallis as indicated. The outcomes examined were length of stay (LOS), discharge disposition, and receipt of life-sustaining treatment (LST).

Seeking to SINK Narcotic Use in Trauma Patients

AUTHORS: Kristen Reede, MD (PGY3-Presentation)

In the United States of America the number of people dying from opioid overdose is increasing at a significant rate.¹ In 2019, 70,630 drug overdose deaths occurred in the United States; opioids were involved in 70.6% of those overdoses.² In the trauma setting, opioids are often first-line treatment for acute pain and it has been demonstrated that over 50% of trauma patients will receive a narcotic prescription at time of discharge.³ Trauma centers are now taking care of an increasing number of patients that are on chronic narcotic therapy. Cannon et al demonstrated that trauma patients who had a narcotic and/or benzodiazepine prescription at the time of admission had statistically significantly longer ICU length of stay, longer total hospital length of stay and increased requirements for mechanically ventilation.⁵ As medical professionals are confronted with this epidemic, trauma surgeons are searching for potential targets for interventions to

reduce opioid abuse while still managing acute pain. Implementation of Multimodal Analgesia (MMA) guidelines has permitted decreased narcotic use without sacrificing patient comfort.³ Continued investigation to improve MMA has led providers to explore other forms of analgesia, specifically ketamine. Ketamine serves as a dissociative sedative that produces potent analgesia and amnesia while preserving spontaneous respiratory drive.⁶ Intranasal (IN) ketamine is becoming increasingly popular due to its ease of use and has been shown to reduce the amount of narcotic used for acute traumatic pain.¹⁷

Ketamine has been frequently studied in the Emergency department and in the pediatric population; however, there are no studies to our knowledge that investigate the use of scheduled intra-nasal ketamine in adult trauma patients who are admitted for their injuries. The aim with this study is to determine if schedule intranasal ketamine reduces use of narcotics in inpatient adult trauma patients. This trial will be a prospective, randomized controlled, double-blind trial comparing the use of intranasal ketamine to intranasal distilled water placebo in trauma patients. Effects of opioid requirements between the groups will be compared. If our study demonstrates that scheduled ketamine leads to less narcotic use, this could possibly mitigate the risk for chronic narcotic use, tolerance, dependence and abuse and therefore assist with combatting the opioid crisis. If this study shows statistically significant differences, it could change our standard of care for pain control.

CHANGES IN PATTERNS OF RURAL TRAUMA CENTER ADMISSIONS DURING THE COVID-19 PANDEMIC

Author: Adrian Sarli, MD (PGY2-Poster)

Background: The focus of this study was to identify changes in trauma patterns in North and South Dakota during the COVID-19 pandemic. Several studies have looked at changes in trauma volumes and admissions at other trauma centers, but to date little is known about change in patterns of traumatic injury from rural areas of the U.S. during the COVID-19 pandemic.

Methods: We compared trauma volume, mechanism of injury and demographics during the COVID-19 pandemic with prior years from three trauma centers that have a rural catchment area in North and South Dakota. We conducted a retrospective chart review comparing trauma admissions from March to December of 2020 with the same months in 2014-2019. Chi-square and Kruskal-Wallis tests were used. A P value of <0.05 was considered statistically significant. Analyses were conducted using R Studio.

Results: Overall trauma admissions in 2020 increased by 19% over 2019 admissions and by 28% over 2018 admissions. Figure 1 illustrates the increase in trauma admissions by month and year. This increase in trauma admissions represents increase in volumes of nearly every mechanism of trauma, with the largest relative increases being in abuse and assault.

The number of patients with a mechanism of injury as abuse was 63.8% higher in 2020, with 36 abuse cases in 2019 versus 59 in 2020 ($X^2(36, N = 22,408) = 87.60, p < .001$). When analyzed separately, pediatric abuse increased by 64.5% over the same time period. Admissions increased significantly for patients in the 66-76 age group ($X^2(36, N = 22,408) = 78, p < .001$).

Conclusion: While many other trauma centers reported decreased trauma volumes, the centers in our study reported an increase in overall trauma volume. This is in contrast to Berg, et al, who report a 32% decrease in overall trauma volume in a large multistate hospital system comprising 85 trauma centers. We also identified statistically significant increases in abuse and assault, which is similar to findings described by Salottolo et al. These difference in findings is possibly due to the rural nature of our catchment area, and the differences in local response to the pandemic compared to the national average.

Our study demonstrates the impact the COVID-19 pandemic has had, increasing traumatic center admissions in the rural setting. More study is needed to determine the causes of this increase, and whether rural health systems need to be prepared for similar rises in trauma patients during any future waves of this or other pandemics.

Farm Trauma Characterization and Comparative Analysis

Author: Zachery Staskywicz, MD (PGY3-Presentation)

Objectives: To determine if injury patterns on agricultural workplaces have changed over time.

Methods: Retrospective chart review of farm trauma in Fargo, ND from 2006-2020. Results were compared to historical results from La Crosse, WI from 1978-1983. Patient charts with ICD location and external cause code relating to "farm" were included in the study. Frequencies and relative percentages were computed for each categorical variable. Chi-square tests were performed to determine which categories were significantly different from one another.

Results: Injuries on farms from 395 patients from 2006-2020 were compared to injuries from 375 patients from 1978-1983. Average age of patients in 2006-2020 was 48 compared to 36 for 1978-1983. There were fewer ISS 1-9, more ISS 10-24, and similar ISS >25 from 2006-2020 compared to 1978-1983. Falls doubled in 2006-2020, 132 compared to 67 in 1978-1983. Injuries from tractors were fewer in 2006-2020, 63 compared to 89 in 1978-1983. Neurological injuries almost doubled in 2006-2020 compared to 1978 to 1883, 126 and 61, respectively. All the aforementioned temporal differences were statistically significant with P value < .0001. There were 9 deaths from 2006-2020 and 8 deaths from 1978 to 1983.

Conclusion: Injuries on farms today occur in older patients with higher injury severity scores and are more likely to have neurological injuries compared to data from 1978-1983. These changing patterns in injuries can help to provide education, direct farm safety programs, and help triage resources to critical access hospitals that care for this patient population.