Poster #1

EFFECT OF RESUSCITATION USING PLASMA-DERIVED EXOSOMES IN A MURINE HEMORRHAGIC SHOCK MODEL

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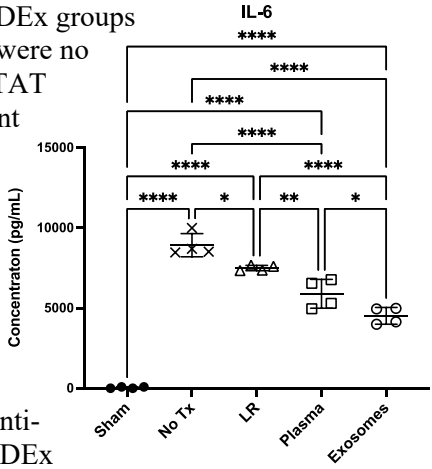
Introduction: Hemorrhagic shock remains the second-leading cause of early trauma-related mortality. Transfusion of plasma products has been shown to increase survival. Exosomes, which are released by all cell types, are a type of extracellular vesicles currently being investigated as potential treatment options in other pathologies. In this study, we aim to investigate the effect of resuscitation using plasma-derived exosomes (PDEx) in a murine hemorrhagic shock model.

Methods: C57BL/6 (WT) mice were subjected to a fixed-pressure hemorrhagic shock model in which 50% of the total blood volume is withdrawn to achieve a mean arterial pressure of 25mmHg for a 3-hour duration. At 90 minutes, resuscitation using 200μL of LR, murine plasma, or $1x10^{10}$ murine PDEx was administrated. At 180 minutes, blood was collected, and TNF-a, IL-6, Syndecan 1 (Sdc 1), and thrombin-antithrombin complex (TAT) concentrations in plasma were measured using ELISA-based kits.

Results: In comparison to the sham group, TNF-a, IL-6 levels, and Sdc 1 levels increased in all treatment groups following hemorrhagic shock, with the highest concentrations being in the no treatment (Tx) group, followed by the lactated Ringer's (LR) treatment group. Alternatively, shock decreased TAT concentrations in the no Tx and LR groups to similar levels, with no significant level changes in the plasma and PDEx groups when compared to sham. Furthermore, there were no significant differences in TNF-a, Sdc 1, and TAT levels between the plasma and PDEx treatment groups. However, mice who received PDEx showed lower post-shock IL-6 values in comparison to mice who received plasma (4519 vs 5895 pg/mL, $p<0.0247$).



Conclusion: In mice, resuscitation using PDEx demonstrated comparable effects to plasma resuscitation. Furthermore, PDEx treatment showed lower IL-6 levels than those of plasma treatment, implying greater anti-inflammatory effects. Our data suggest that PDEx may be a future therapeutic option for traumatic hemorrhagic shock.

Poster #2

IL-1RA AND IL-10 IN ABDOMINAL REACTIVE ASCITES MAY REDUCE MESOTHELIAL ADHESION-LIKE FIBER FORMATION

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Introduction: Postoperative adhesions and subsequent bowel obstruction may occur following abdominal surgery. Appendectomy (appy) is an independent risk factor for adhesion-related rehospitalization. Disrupted during surgery, mesothelial cells (MCs) on the surface of the peritoneum secrete a sugar-rich glycocalyx to ensure a non-adhesive surface. Trauma and inflammation activate MCs to form adhesions, and pathologic adhesions may arise if adhesion fibrinolysis and MC secretion of glycocalyx is disrupted. Proteins disrupting these processes may originate from peritoneal reactive ascites (rA). Here, we analyze inflammatory mediators associated with distinct phenotypes of human MCs treated with rA collected during appy or adhesiolysis for small bowel obstruction (SBO).
Methods: This is a prospective observational IRB-approved study at three Level 1 trauma centers where peritoneal rA is collected prior to surgical intervention for non-perforated appendicitis or SBO. 71 cytokines/chemokines and 14 soluble receptors (HD48, HD23, HDSCR14; EVE Technologies) were quantified in rA. MCs were exposed to 48h of rA stimulation. Cell phenotypes were scored for 47 appy and 12 SBO rA by light, for adhesion-like fibers, and fluorescence microscopy, for glycocalyx, with labeled sugar-binding lectins: Concanavalin A and Wheat Germ Agglutinin. Scores over 3 independent experiments were clustered into 4 "fiber-lectin" (F-L) groups: No F-low L (NF-LL), No F-high-L (NF-HL), high-F-HL (HF-HL), and HF-LL. Prior abdominal surgeries (PAS) was dichotomized into No-PAS/PAS. Analyses were performed in Metaboanalyst 5.0.
Results: With 76 analytes detected in rA, 2-way ANOVA analysis of F-L and PAS showed significant differences in 19 and 10 analytes. Three analytes in common showed higher concentrations in NF-NL/No-PAS rA (adjusted $P<0.001$) and were Interleukin (IL)-1 receptor antagonist (RA), Eotaxin-2, and IL-10. NF-NL-associated rA showed a higher concentration of IL-8 compared to the other phenotypes (adjusted $P<0.001$).
Conclusions: Glycocalyx was associated with decreased proinflammatory IL-8. IL-1RA and IL-10 are anti-inflammatory and may reduce adhesion-like fiber formation in PAS rA-treated MCs, while increasing glycocalyx.

Poster #3

REAL TIME DETECTION OF GLYCOCALYX DEGRADATION FOLLOWING TRAUMA: A CONCEPTUAL USE OF THROMBOELASTOGRAPHY

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Introduction: Endothelial injury and glycocalyx shedding occur early after trauma/hemorrhagic shock (T/HS). It has been demonstrated that endothelial glycocalyx (EG) degradation is associated with increased vascular permeability and barrier dysfunction. It remains controversial as to whether EG components contribute to traumatic coagulopathy and resultant bleeding complications. Viscoelastic tests (VETs) such as thromboelastography (TEG) have been used to characterize hemostasis and coagulation following T/HS. Current VETs use activators to provide quicker results in patients following T/HS and other shock states. We hypothesize that use of these activators such as kaolin and tissue factor may affect TEG coagulation parameters vs. when no activators are used (Native TEG). This may minimize the resultant effect of glycocalyx components such as heparan sulfate (HS) or syndecan-1 (syn-1) on TEG results. This was studied using an *in vitro* model.

Methods: Citrated whole blood (WB) samples were recalcified and spiked with HS and syn-1 at clinically relevant concentrations. Blood samples were subsequently processed using a TEG-5000 or 6s analyzers. Parameters studied included citrated kaolin (CK) R time, R time with heparinase to detect a "heparin" effect (CKHR) and native TEG R time (no activators). Other parameters studied included angle and maximum amplitude (MA); clot dynamics and strength, respectively.

Results: Mean ± SD (N = 5 for each group)
*p<0.05 vs. Whole blood, #p<0.05 vs. Whole blood + HS (35µg/ml).

There was no effect on TEG parameters by syn-1, except for an increase in CK R time at the 200 ng/ml concentration.

	Whole blood	Whole blood + HS (35µg/ml)	Whole blood + HS (100µg/ml)
CK R time	6.0 ± 0.7	7.9 ± 0.3*	11.6 ± 0.5*#
CKH R time	6.4 ± 0.3 (Δ 0.4)	5.4 ± 0.5* (Δ 2.5)	5.5 ± 0.3* (Δ 6.1)
Native TEG R time	9.0 ± 0.5	15.8* ± 1.1	20.5 ± 1.3*#
MA	57.2 ± 3.3	53.9 ± 4.5	49.3 ± 2.8*
Angle	70.1 ± 6.2	65.6 ± 4.2	55.5 ± 4.1*#

*p<0.05 vs. Whole blood, #p<0.05 vs. Whole blood + HS (35µg/ml).

Conclusion: The anticoagulant effect of EG degradation products were associated with HS in this study. The results of our study suggest that the use of activators (Kaolin or tissue factor) may mask the effects of endothelial glycocalyx (EG) degradation products on TEG coagulation parameters. This was evident with native TEG or when comparing TEG R time ± heparinase. The latter comparison may be a novel real time and readily available test to identify "hidden" coagulation effects of EG degradation products.

Poster #4

A COMPARISON OF WHOLE BLOOD WITH TRANEXAMIC ACID TO OTHER RESUSCITATIVE MEASURES IN TRAUMA PATIENTS

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Introduction: Current resuscitative strategies for traumatic hemorrhagic shock include tranexamic acid (TXA) administration and use of whole blood (WB) or packed red blood cells (PRBC). Given the different coagulation properties of WB and PRBC, we aimed to determine if TXA had a significant impact on outcomes in transfused trauma patients.

Methods: Our institutional trauma registry was queried for all injured patients who received any transfusion between 2015 and 2022 within 4 hours of arrival. Patients were divided into three groups: 1) WB+TXA, 2) WB alone, or 3) PRBC+TXA. Demographics, vital signs, injury severity score (ISS), trauma score and injury severity score (TRISS), comorbidities, incidence of massive transfusion (MT), disposition from the Trauma Resuscitation Unit (TRU), 6-hour, 24-hour, and 30-day mortality were compared. We also compared the rates of pulmonary embolism (PE), deep vein thrombosis, unplanned returns to OR, acute kidney injury, and pulmonary complications.

Results: A total of 582 patients met inclusion criteria. There were no differences in ISS or TRISS between the cohorts. When compared to the PRBC+TXA cohort, the WB+TXA and the WB only cohorts were less likely to require MT or need surgical intervention emergently from the TRU. There was no difference in mortality. A higher rate of pulmonary embolism (PE) was noted in the WB+TXA cohort (See Table 1).

Conclusion: While the type of blood product transfused with or without TXA does not appear to affect mortality, trauma patients who receive WB with or without TXA are less likely to require MT or surgical intervention compared to PRBC with TXA. Additionally, WB with TXA may be associated with a higher rate of PE. Additional studies are needed to better assess this potential risk.

Table 1	TXA + WB (n=213)	WB only (n=302)	TXA + pRBC (n=67)	P-value
MT, n (%)	15 (7.0%)	16 (5.3%)	23 (34.3%)	**<0.0001**
OR, n (%)	87 (40.8%)	95 (31.5%)	41 (61.2%)	**<0.0001**
PE, n (%)	14 (6.6%)	8 (2.6%)	1 (1.5%)	**0.0434**

Poster #5

COMPARISON OF CLINICAL JUDGMENT VS THE BLEEDING RISK INDEX IN PREDICTING TRANSFUSION

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Introduction: Significant bleeding after trauma is the most frequent cause of preventable death. The Bleeding Risk Index (BRI) is a "big data" model that predicts the use of transfusion for adult trauma patients, based on automatically collected vital signs. We hypothesized that the BRI would predict blood transfusion with greater sensitivity and specificity compared to clinical judgment.

Methods: Within 10-15 minutes of arrival, a research team member requested paramedics, nurses (RN), and physicians (MD) to complete a survey using clinical judgment to predict a patient's transfusion outcomes, including un-cross matched red blood cell (UnX), or any transfusion within 6 and 24 hours. BRI predictions were calculated during the same timeframe. The areas under the Receiver Operating Curves (AUCs) were calculated for comparison.

Results: A total of 574 trauma patients were prospectively enrolled from August 2021 to June 2022, with mean age of 42.5 years (SD 18.3) and 78% being male. 11.6%, 27.5%, and 30.5% patients received UnX, or any transfusion within 6 and 24 hrs respectively. BRI prediction had AUCs 0.84, 0.85, and 0.81 for UnX, and any transfusion within 6 and 24 hours. Paramedics had AUROCs of 0.66, 0.66, and 0.70. RN had AUROCs of 0.76, 0.79, and 0.76. MD had AUROCs of 0.77, 0.79, and 0.77 respectively. Delong's AUC comparison showed that BRI predictions were significantly more sensitive and specific ($p<0.05$) compared to human experts' predictions, except that the algorithm performed similarly well ($p=0.065$) to MDs in predicting 24-hour blood transfusion.

Conclusions: This study demonstrated that BRI, generated from a large-scale dataset, predicts the urgent use of blood better than human experts during trauma resuscitation, and may be able to enhance decision-making in austere trauma settings by less experienced providers.

Poster #6

PARTIAL REBOA ENABLES CT IMAGING AND INCREASED USE OF ENDOVASCULAR HEMORRHAGE CONTROL

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Introduction: Historically, the use of REBOA was followed by immediate hemorrhage control, often accomplished through damage control techniques in the operating room. Numerous pre-clinical studies have demonstrated the benefits of partial REBOA, including early temporization of non-compressible truncal hemorrhage while mitigating distal ischemia. We hypothesize that the utilization of a REBOA device designed also to provide partial aortic occlusion (pREBOA) shifts Emergency Department (ED) disposition away from the operating room (OR) and towards computed tomography (CT) and endovascular interventions (EVIR) when compared to the previous ER-REBOA.

Methods: Data from the AAST AORTA Registry between 9/26/2013-1/10/2023 were used to compare the methods of hemorrhage control (OR vs EVIR) between patients treated with ER-REBOA and pREBOA. EVIR included any angiography procedure regardless of physical location, such as Interventional Radiology (IR), IR in the OR, or hybrid suite. OR interventions included other abdominopelvic hemorrhage control techniques, such as laparotomy or pre-peritoneal packing. Patients who did not survive to intervention were excluded.

Results: Both ER-REBOA and pREBOA groups were similar in initial demographics (Table 1); however, there was increased use of partial occlusion in the pREBOA group. pREBOA significantly altered the initial disposition of patients from the ED (p=0.03). When evaluating reasons for aortic occlusion, there was a significant increase in the use for stabilization to CT and a decrease in stabilization for OR(p=0.008). There was also a nearly doubled rate of endovascular-only procedures in the pREBOA group at 13.5% from 7.3% (p = 0.03). (Table 2)

Table 1: Demographics, clinical presentation and injury severity among patients with ER-REBOA vs. pREBOA

Variable	ER-REBOA (n=752)	pREBOA (n=110)	P-value
Age	42	33	0.002*
% Penetrating	78.5%	78.5%	0.99
ISS	34	34	0.84
Initial SBP	97	98	0.63
Initial HR	105	110	0.51
Initial GCS	8	6	0.32
Prior CPR	22.3%	21.8%	0.90

Variables shown as median (Q1, Q3) or percentage.
Injury Severity Scale (ISS), Systolic Blood Pressure (SBP), Heart Rate (HR), Glascow Coma Scale (GCS), Cardio-Pulmonary Arrest (CPR)

Table 2: Outcomes between patients with ER-REBOA vs. pREBOA

Variable	ER-REBOA	pREBOA	P-value
% Zone 1 Occlusion	65.9% (740)	74.1% (108)	0.13
% Partial Occlusion	11.2% (170)	84.9% (106)	<0.0001*
REBOA Reason	n = 181	n = 96	0.008*
Stabilization for CT	18%	33%	
Stabilization for OR	46%	26%	
ED Disposition	n = 642	n = 96	0.03*
To OR	75.5%	67.7%	
To EVIR	7.3%	13.5%	

Outcome data between two groups based on available data; (n) specified for each analysis.
Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA), Emergency Department (ED), Operating Room (OR), Endovascular Interventional Radiology (EVIR).

Conclusion: The use of pREBOA was associated with a significant decrease in ED disposition to OR, an increase utilization of CT scan, and an increased use of EVIR as a means of hemorrhage control. While further research is required, these results suggest the use of pREBOA may reshape how providers triage critically ill patients to the OR, EVIR, or CT.

Poster #7

PREDICTING HIGH-INTENSITY RESUSCITATION NEEDS IN INJURED PATIENTS FOLLOWING HEMOSTASIS

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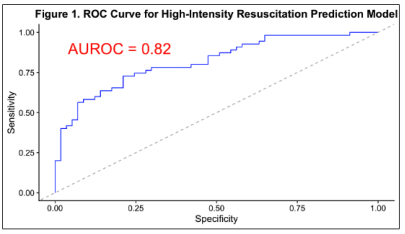
Introduction: Resuscitation needs following hemostasis are heterogeneous and influence outcomes and resource utilization. No predictive capability exists in the post-hemostasis phase of care to anticipate high-intensity resuscitation (HIR) needs. We sought to define HIR and hypothesized that HIR can be predicted from data available at the time of ICU admission.
Methods: Hemodynamic, laboratory, and procedure data for consecutive injured patients (2016-19) admitted to the trauma ICU following an emergent operation or angiographic intervention were reviewed. HIR thresholds were defined as: a) the top decile of blood products or crystalloid provided in the ICU (≥3 units, ≥4 liters, respectively) during hours 0-12 after admission and/or b) persistent vasoactive medication use, between ICU hours 2-12. The primary outcome (HIR) was a composite of *any* of the above criteria. Logistic regression models for HIR with predictor variables selected by LASSO regression were created using 70% of the cohort. Performance of the models was determined by AUROC using the remaining 30%.
Results: Data from six-hundred-and-five (605) subjects were analyzed. The median age was 39 [IQR: 28-52], ISS was 26 [IQR: 17-38], 79% were male and 41% of the cohort suffered penetrating injuries. HIR prevalence is depicted in **Table 1**. LASSO selected predictor variables included ICU admission: shock index, lactate, base deficit, hematocrit, and INR. The predictive model achieved an AUC of 0.82 (**Figure 1**) using only commonly available hemodynamic and laboratory data from the time of ICU admission.
Conclusions: Post-hemostasis, ICU admission data can predict subsequent high-intensity resuscitation. Though prospective model validation is warranted, the ability to predict HIR will help in determining future resource utilization and staffing in critical care environments.

Table 1. High-Intensity Resuscitation Prevalence

High-Intensity Resuscitation	36% (215/605)
Blood Products (≥3 units)	11% (67/605)
Crystalloid (≥4 liters)	15% (88/605)
Persistent Vasopressors (ICU 2-12h)	24% (143/605)



Poster #8

ROLE OF IONISED CALCIUM IN TRAUMA RESUSCITATION- A PROSPECTIVE STUDY AT A LEVEL I TRAUMA CENTER

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Introduction: Trauma resuscitation aims at early restoration of homeostasis by reversing the metabolic derangements caused predominantly by bleeding. With evolving evidence on trauma-induced hypocalcaemia it remains empirical to consider these perturbations early during trauma resuscitation. Nevertheless, no proper guidelines exist regarding evaluation of these dysregulations and also its supplementation. Hence, we designed a prospective study to analyze the role of ionized calcium in trauma resuscitation in our setting. The objective of this study was to establish the prevalence of hypocalcaemia in trauma patients and to analyse its association with mortality and the need for blood transfusion.
Methods: A prospective study was conducted on trauma patients admitted to a Level 1 trauma center in India between September 2020 and June 2022 who met the inclusion and exclusion criteria. Ionised calcium was analysed using arterial/venous blood gas immediately on arrival, after 6hrs, and on day 2 of injury. The amount of blood transfusion received by the patient was noted along with other demographic and in-hospital details.
Results: Of the 1961 patients eligible for the study 200 patients were recruited and analysed. 72.5% of patients were hypocalcaemic on arrival. There was a significant association between ionised hypocalcaemia and mortality (p-value 0.0085). Ionised calcium was also significantly associated with the need for blood transfusion (p-value <0.01). However, ionised calcium was not a sensitive or specific predictor in itself to predict the need for blood transfusion. Both the univariate and multivariable analysis showed ionised hypocalcaemia to be an independent predictor of mortality.
Conclusions: Ionized hypocalcaemia is widely prevalent among acutely injured. Hypocalcaemia at admission is associated with increased mortality as well as an increased need for blood transfusions.

Poster #9

THE FOG HAS NOT LIFTED: NO REDUCTION IN COMPLICATIONS FOR PARTIAL REBOA IN THE AAST AORTA REGISTRY

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Introduction: Resuscitative Endovascular Balloon Occlusion of the aorta (REBOA) is a potentially lifesaving, but polarizing therapy due to the associated morbidity and uncertainty of who might benefit. Techniques like partial (p)REBOA to provide hemodynamic support while reducing distal ischemia are now captured in the AAST Aortic Resuscitation in Trauma and Acute Care (AORTA) registry. We hypothesized that pREBOA would be associated with improved mortality and fewer adverse outcomes.

Methods: We queried the AAST AORTA registry for patient demographics, clinical characteristics, intervention characteristics, and outcomes between 2020-2022. Adult patients who received complete (c)REBOA or pREBOA were considered for inclusion. Patients were excluded if they had a head AIS ≥3 or an AIS of 6 in any body region.

Results: A total of 164 patients that met inclusion criteria were identified. Partial REBOA was used in 36% of cases. There was no significant difference in patient demographics, injury characteristics, or injury severity between pREBOA and cREBOA. There was no difference in mortality rate (44% vs 45%). After adjusting for potential confounders with Poisson regression analysis, no statistically significant difference in complications was detected between the two different REBOA approaches [adjusted IRR (95% CI): 1.11 (0.54-2.27), p = 0.777]. This association persisted during subgroup analysis of aortic Zone 1 vs. Zone 3 deployment. Notably, metrics on duration of cREBOA or pREBOA were not collected in the AORTA registry and >40% of patient entries were missing time to definitive hemorrhage control data.

Conclusion: Based on this registry analysis, pREBOA did not reduce morbidity or mortality compared to cREBOA. Improving granularity of important clinical metrics in the AORTA registry is essential to understanding whether patients will benefit from pREBOA and how to best guide implementation of this controversial resuscitation adjunct.

Poster #10

ADVANCING AN AGE-FRIENDLY INITIATIVE: INTEGRATING 4Ms INTO GERIATRIC TRAUMA CARE

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Introduction: The "4Ms" is an evidence-based framework integrating principles of what **M**atters most, **M**edication, **M**entation, and **M**obility in caring for older adults. This study aims to compare the effect of 4M's implementation on the outcomes of geriatric trauma patients.

Methods: A pre-post cohort study at a Level I trauma center (2019-2022). Frail geriatric (≥65) trauma patients and those ≥80 yrs, regardless of frailty status, were included. Frailty was measured within 24 hours of admission using the Trauma-Specific Frailty Index. Patients were stratified into PRE and POST implementation of 4Ms. Outcomes were in-hospital mortality, complications, delirium, LOS, discharge to rehabilitation centers or skilled nursing facilities (rehab/SNFs), and 3-month post-discharge readmissions, fall recurrences, and complications among survivors of index admission.

Results: 212 patients were identified (159 PRE, 53 POST). Mean age was 82 ±9 yrs and 52.4% were female. Median ISS was 9 [5-10] and most common mechanism of injury was fall (81%). PRE and POST groups were comparable in terms of demographics, vitals, injury parameters, operative interventions, and TSFI score ($p>0.05$). 61 (29%) patients had a major complication, 106 (50%) were discharged to rehab/SNFs, and 12 (6%) died during the index admission. POST group had increased discharge to rehab/SNFs (aOR 2.057, $p=0.036$), shorter hospital LOS ($\beta= -2.27$, $p=0.047$), lower risk-adjusted odds of delirium (aOR: 0.414, $p=0.037$) and 3-month post-discharge complications (aOR: 0.149, $p=0.043$) and readmissions (aOR: 0.122, $p=0.008$) (**Table**).

Conclusion: Integration of the 4M's framework in the care of older adult trauma patients was associated with improved clinical outcomes on index admission and 3 months post-discharge in this single-center study. Incorporation of the 4Ms may be beneficial for this growing population and should be further investigated in a multi-institutional cohort.

Table: The Risk-adjusted Effect of Geriatric Trauma Clinical Pathway on Outcomes

Index Admission	**aOR**	**95% CI**	***p*-value**
Mortality	0.259	0.03-2.053	0.201
Major Complications	0.948	0.48-2.29	0.906
Delirium	0.414	0.18-0.95	**0.037**
Discharge to SNF/Rehab	2.057	1.05-2.04	**0.036**
3-months Post-discharge	**aOR**	**95% CI**	***p*-value**
Readmissions	0.122	0.03-0.58	**0.008**
Fall Recurrence	2.410	0.79-7.30	0.120
Major Complications	0.149	0.04-0.95	**0.043**
Length of Stay	**β**	**95% CI**	***p*-value**
Hospital LOS (Days)	-2.271	-4.51 to -0.03	**0.047**

Poster #11

GERIATRIC TRAUMA TRANSFER: CURRENT PRACTICE AND PATIENT OUTCOME AFTER TRAUMATIC BRAIN INJURY

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Introduction: Geriatric patients with traumatic brain injury (TBI) are often transferred to higher level trauma centers; however, practice patterns and outcome of these patients have not been examined thoroughly in previous literature. The aim of this study was to evaluate the current practice and outcomes of geriatric patients transferred with TBI.
Methods: This is a retrospective cohort study using the American College of Surgeons Trauma Quality Improvement Program (ACS-TQIP) database 2017-2019. Geriatric patients (age ≥65) with isolated traumatic brain injury treated in Level 1 or 2 trauma centers. Injury characteristics, management of TBI, and outcomes were collected. In patients who were transferred from other hospitals, clinical factors associated with early (≤2 days) withdrawal of life support (EWLS) and overall withdrawal of life support (OWLS) were identified using the lasso regression and included in the final logistic regression models to evaluate the prediction performance.
Results: A total of 105,486 patients were included. Of the 48,606 (46.1%) patients transferred from other hospitals, 90.2% sustained TBI from fall-related injury mechanisms. More than 50% of the transfer patients had severe TBI (head Abbreviated Injury Scale [AIS] >3) and 18.7% had a midline shift on admission. Neurosurgical interventions were performed in 14.6%. The rates of EWLS and OWLS were 3.4% and 7.6%, respectively, and 11.3% with in-mortality or hospice care. Of note, 23.1% of the transfer patients with head AIS 5 underwent OWLS. The logistic regression model including basic clinical factors showed that the areas under receiver operating characteristic curves (AUC) for EWLS and OWLS were 0.932 and 0.905 (**Figure**).
Conclusion: While therapeutic transfers can improve the patient outcomes, our data suggest that the care of severely TBI patients is often withdrawn at tertiary care centers. The use of decision-support tools might be beneficial to provide improved shared decision-making discussion, and possibly avoid the long-distance interhospital transfer that may not change the management and patient outcome.

Poster #12

HOSPICE AND PALLIATIVE CARE UTILIZATION IN 16,004,232 MEDICARE CLAIMS: COMPARING TRAUMA TO SURGICAL AND MEDICAL INPATIENTS

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Introduction: Palliative care encounter (PCE) and hospice use are increasing in the geriatric inpatient population but limited research exists comparing usage rates among Trauma, Medical and Surgical specialties. The goal of this study was to determine if there are differences among these 3 groups in utilization rates of PCE and hospice.
Methods: Patients from CMS Inpatient Standard Analytical Files for 2016-20 aged ≥65 were analyzed. Patients with an NTDS qualifying ICD-10 injury code with AIS ≥2 were classified as "Trauma"; the rest as "Medical" or "Surgical" using DRG definitions. Patients were classified as having a Palliative Care Encounter (PCE) if they had an ICD-10 for PCE (Z51.5) and as Hospice Discharge (HD) if their hospital disposition was "Hospice" (home or inpatient). Proportions of use by specialty were compared by group and by subgroups with increasing risk of poor outcome.
Results: There were 16M hospitalizations from 1024 hospitals (9.3% Trauma, 26.3% Surgical, 64.4% Medical) with 53.7% female, 84.5% white, and 38.7% > 80 years. Overall 6.2% received a PCE and 4.1% a HD. Both rates were higher in Trauma patients (HD: 3.6%, PCE: 6.3%) vs. Surgical patients (HD: 1.5%, PCE: 3.0%), but lower than vs. Medical patients (HD: 5.2%, PCE: 7.5%). PCE rates increased in higher risk patient subgroups (Table) and were highest for inpatient HD.
Conclusion: In this near-population based study, PCE rates and HD rates varied significantly among specialties. Trauma patients had higher PCE and Hospice use rates than Surgical, but lower than Medical. These differences tended to be less pronounced as risk of poor outcome increased. Further studies are needed to inform efficient use of PCE and hospice resources especially as concerns the timing and selection of subgroups of patients at greatest need of these valuable but limited resources.

	Trauma	Surgical	Medical	Overall
	n=1,495,730	n=4,209,243	n=10,299,259	N=16,004,232
HD % Overall	3.6	1.5	5.2	4.1
PCE % Overall	6.3	3.0	7.5	6.2
PCE % by subgroup				
ICU stay	10.7	5.5	11.1	9.4
ICU≥5d	14.5	8.7	15.0	12.8
Ventilator	26.6	19.5	27.0	24.5
Home HD	56.0	53.4	55.7	55.5
Inpatient HD	63.7	60.8	64.2	63.8
Expired	55.9	47.1	57.2	55.0
Expired/HD combined	58.1	50.9	58.6	57.5

* Trauma significantly different from Medical and Surgical for all comparisons (p<.05).

Poster #13

NATIONWIDE IMPLEMENTATION OF GERIATRIC BEST PRACTICE GUIDELINES: ARE WE FALLING SHORT?

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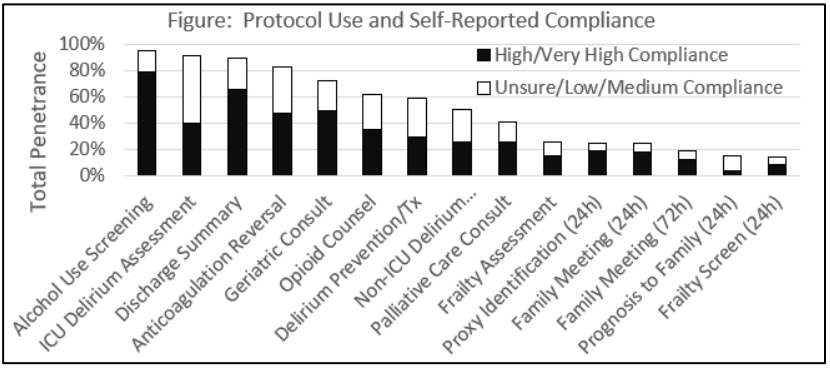
Introduction: Older patients are the fastest growing trauma population and have disproportionately poor outcomes. Despite publication of Geriatric Trauma Best Practice Guidelines (GT-BPG), implementation of these recommendations into practice remains unknown. We hypothesized that national protocol utilization and compliance with GT-BPG would be low.
Methods: TQIP-participating US trauma centers self-reported on protocol usage and compliance on 22 recommended items from the original GT-BPG including alcohol screening, delirium assessment, anticoagulation reversal, frailty assessment, proxy identification, use of family meetings, and others. Penetrance was defined as the proportion of centers with a protocol on a given item. Compliance was self-reported and grouped as high (>60%) or not high (≤60% or unknown).
Results: 156 centers self-reported protocol utilization (36% Level 1, 41% Level 2, 22% Level 3+). 11/22 had >50% penetrance into trauma centers (Figure). 2 of 22 items had both penetrance and high compliance: alcohol screening and use of a discharge summary. BPG recommending specific time frames were infrequently utilized (<30% penetrance).
Conclusion: Utilization of GT-BPG protocols remains low. Items most in use are ones established as best practice for younger trauma patients, while geriatric-focused items have low utilization. Focus on implementation strategies will be key to improve care of the geriatric trauma patient.



Poster #14

SUBSTANCE USE AND PRE-HOSPITAL CRASH INJURY SEVERITY AMONG U.S. OLDER ADULTS: A NATIONAL SURVEY

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Introduction: Every day, 700 US geriatric population (65+ years) sustain motor vehicle injuries. Substance use (alcohol and drugs) is a risk factor for crash involvement. With little known about geriatric substance use and injury outcomes, we assessed the association between substance use and crash injury severity.
Methods: This single-year cross-sectional analysis pooled the 2019 data from the U.S. National Emergency Medical (EM) Service Information System. The outcome variable was injury severity, defined using the EM Model and measured as low acuity, emergent, critical, and fatal injury. Predictor variables included substance use, defined as self or officer-reported alcohol and/or drug use. We controlled for age, sex, anatomical injured region, EM response time, location of the injury, rurality/urbanicity, and the time of the day. We performed a partial proportional ordinal logistic regression and reported the adjusted odds ratio (AOR) (plus 95% confidence interval (CI)) of worse injury outcomes (emergent, critical, and fatal injuries). Also, we assessed, through an interaction model, the predicted probabilities of substance use-related injury severity by rurality/urbanicity.
Results: Our sample consisted of 38,850 older adults, who sustained crash injuries as car occupants. The population was predominantly males (54%), aged between 65 and 74 years (61%). Approximately 69%, 25%, 5%, and 1% sustained low acuity, emergent, critical, and fatal injuries, respectively. Substance use-related case fatality rates were 1% and 8% in urban and rural areas, respectively. After controlling for patient, and crash characteristics, substance use was associated with 78% increased odds of worse injury outcomes compared to low acuity injuries (AOR: 1.78; 95% CI: 1.55 – 2.05). The predicted probability of critical injury was 7.8% (95% CI: 6.13 - 9.38) with the predicted probabilities being 7.4% (95% CI: 5.75 - 9.15) and 10.0% (95% CI: 4.71 - 15.21) in urban and rural areas, respectively.
Conclusion: Substance use is associated with worse geriatric crash injury severity, with the odds higher in rural areas. Routine substance use screening in the primary care setting may reduce motor vehicle crash injury risks among older adults.

Poster #15

VALIDATION OF THE ORTHOPEDIC FRAILTY SCORE FOR MEASURING FRAILTY IN HIP FRACTURE PATIENTS: A COHORT BASED ON THE UNITED STATES NATIONAL INPATIENT SAMPLE

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Introduction: The Orthopedic Frailty Score (OFS) has been proposed as a tool for measuring frailty in order to predict short-term postoperative mortality in hip fracture patients. This study therefore aims to validate the OFS using a large national patient register to determine its relationship with adverse outcomes as well as length of stay and cost of hospital stay.
Methods: All adult patients (18 years or older) registered in the 2019 National Inpatient Sample Database who underwent emergency hip fracture surgery following a traumatic fall were eligible for inclusion. The association between the OFS and mortality, complications, and failure-to-rescue (FTR) was determined using Poisson regression models adjusted for potential confounders. The relationship between the OFS and length of stay and cost of hospital stay was instead determined using a quantile regression model.
Results: An estimated 227,850 cases met the study inclusion criteria. There was a stepwise increase in the rate of complications, mortality, and FTR for each additional point on the OFS. After adjusting for confounding, an OFS ≥4 was associated with an over four-fold increase in the risk of in-hospital mortality [adjusted IRR (95% CI): 5.40 (2.37-12.33), p <0.001], a 36% increased risk of complications [adjusted IRR (95% CI): 1.36 (1.14-1.63), p <0.001], and an almost five-fold increase in the risk of FTR [adjusted IRR (95% CI): 5.92 (2.56-13.69), p <0.001], compared to OFS 0. Patients with OFS ≥4 also required half an additional day of care [change in median length of stay (95% CI): 0.51 (0.04-0.99), p = 0.033] as well as cost approximately $2,700 more to manage [change in median cost of stay (95% CI): 2,682 (2,040-3,325), p <0.001], compared to those with OFS 0.
Conclusions: Patients with an elevated OFS display a substantially increased risk of mortality, complications, and failure-to-rescue as well as a prolonged and more costly hospital stay.

Poster #16

HOW TRIAGE OF ELDERLY ANTICOAGULATED FALLS IMPACTS HOSPITAL FLOW

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Introduction: The issue of emergency department (ED) overcrowding and throughput are challenges at many hospitals. Triage algorithms can impact patient flow and are evaluated for overall appropriateness, but the correct trauma activation of anticoagulated patients ≥65 years of age with ground level falls is unknown. We hypothesized that triage category of these patients impacts ED throughput.
Methods: From July 2019 to December 2021, a prospective cohort study was conducted. We activated ground level falls in patients ≥65 years old on anticoagulants as Level 2 (trauma team managing patients) on even months and as Level 3 (emergency medicine managing patients) on odd months. Outcomes included admission rate, time to admit orders, ED length of stay, abdominal CT rate and mortality. Data was compared using Mann Whitney and Chi-squared or Fisher's exact tests for small sample sizes.
Results: 447 trauma activations were captured (Level 2=346, Level 3=101). The median injury severity score was 2 (IQR=1, 5) in Level 2 and 1 (IQR=1, 6) in Level 3 patients. Admission rates were similar for Level 2: 59% (95% CI 54, 64%) and Level 3: 50% (95% 40, 61%), p=0.13. Median time to admit orders was faster for Level 2 at 5.94 hours (95% CI 6.70, 8.16) than Level 3 at 7.33 hours (95% CI 7.47, 11.53) p=0.01. Median ED length of stay was shorter for Level 2 at 8.33 hours (95% CI 9.02, 10.11) than Level 3 at 9.22 hours (95% CI 10.64, 14.87) p=0.05. In admitted patients, the abdominal CT rate was higher for Level 2 (72%, 95% CI 65, 78%) than Level 3 (49%, 95% CI 35, 63%), p=0.002. No difference in the number of deaths was identified with 3 in Level 2 and 2 in Level 3 (p=0.32).
Conclusion: Admission and death rates were similar for anticoagulated, elderly patients with falls regardless of their level of trauma activation. A greater number of abdominal CTs were obtained for Level 2 activations. However, a significant decrease in time to admit orders and ED length of stay was identified in patients triaged as second-tier activations. Triage categories not only mobilize resources but also impact ED patient flow.

Poster #17

INCREASING COMPLEXITY OF ELDERLY INJURED PATIENTS: A NATIONWIDE ANALYSIS

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Introduction: With the aging US population, trauma centers are likely to treat increased numbers of elderly patients. The relative increase in elderly trauma patients and the complexity of these patients relative to the general population and to other inpatient populations remains unclear. We hypothesized that the population of patients in the National Trauma Databank has increased in both age and rate of comorbidities compared to a larger population of hospitalized and non-hospitalized US patients.
Methods: Demographic data were abstracted from three databases: Medical Expenditure Panel Survey (MEPS, general population), National Inpatient Sample (NIS, discharged patients), and National Trauma Databank (NTDB, injured patients). Critical comorbidities were generated from a pragmatic list of high-risk conditions that may confer additional morbidity or mortality using ICD-9 and ICD-10 diagnosis codes (2007 to 2019). Nonparametric two-sample tests were used to compare trends among MEPS, NIS, and NTDB.
Results: The median NTDB patient age increased from 37 (interquartile range [IQR] 21-56) years (2007) to 52 (IQR 28-71) years (2019), representing a significantly greater increase than the MEPS or NIS databases (p=0.026, p=0.002, respectively). The proportion of NTDB patients aged 65 or older experienced a greater increase in the rate of any critical comorbidity (46.1% to 80.8%; average yearly rate of change 2.89%) compared to their MEPS and NIS counterparts (p=0.005, p=0.017, respectively). The proportion of traumatically injured elderly patients in US centers has increased and the proportion of those patients with comorbid conditions has grown more rapidly than in other US patient populations (Figure 1).
Conclusions: Trauma centers are facing a large influx of multimorbid geriatric patients at a steep rate of increase. The need for added resources specific to the care of the elderly and the benefit of focusing injury prevention and comorbid condition mitigation efforts in this population merits specific exploration.

Poster #18

ORTHOPEDIC FRAILTY SCORE AND OUTCOMES IN SURGICALLY MANAGED ISOLATED TRAUMATIC SPINE INJURIES

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Introduction: With an aging global population, the prevalence of frailty in traumatic spinal injury (TSI) patients is steadily increasing. The aim of the current study is to evaluate the utility of the Orthopedic Frailty Score (OFS) in assessing the risk of adverse outcomes in patients with isolated TSI requiring surgery.
Methods: The TQIP database was queried for all adult patients (18 years or older) who suffered an isolated TSI due to blunt force trauma, between 2013-2019, and underwent spine surgery. Patients were categorized as non-frail (OFS 0), pre-frail (OFS 1), or frail (OFS ≥2). The association between the OFS and in-hospital mortality, complications, and failure-to-rescue (FTR) was determined using Poisson regression models, adjusted for potential confounding.
Results: A total of 39,391 patients were included in the current investigation. After adjusting for confounding, frailty was associated with a doubling in the risk of in-hospital mortality [adjusted IRR (95% CI): 2.11 (1.61-2.77), $p < 0.001$], a 39% higher overall risk of complications [adjusted IRR (95% CI): 1.39 (1.06-1.82), $p = 0.018$], and a 125% higher risk of FTR [adjusted IRR (95% CI): 2.25 (1.36-3.72), $p = 0.002$], compared to non-frail patients.
Conclusion: The findings indicate that the Orthopedic Frailty Score could be an effective method for identifying frailty in traumatic spinal injuries patients in need of surgical intervention who are at a disproportionate risk of adverse events.

Poster #19

UNINTENDED EFFECTS OF AUTOMOTIVE INSURANCE POLICIES ON RETRIAGE OF SEVERELY INJURED PATIENTS

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Introduction: States maintain either no-fault or at-fault automotive insurance policies, with no-fault states having lower administrative barriers than at-fault states for clinical care reimbursement of motor vehicle collision injuries. However, it is unknown whether no-fault policies influence patterns in trauma care, including retriage, or same-day emergent transfer of injured patients to higher level care. Timely retriage reduces injury mortality similar to being taken directly to a high-level trauma center. Thus, our objective was to examine whether no-fault policies were associated with differences in retriage of severely injured patients.

Methods: We conducted a retrospective cross-sectional study of patients with severe (injury severity score >15) MVC injuries using the Healthcare Cost and Utilization Project State Emergency Department and Inpatient Databases for five states from 2016-2017. FL, MA, and NY are no-fault states, while MD and WI are at-fault states. Only Medicare patients were included to minimize confounding by other payers. The primary outcome was retriage, and secondary outcome was undertriage. Multivariable logistic regression was used to identify factors associated with both outcomes.

Results: A total of 2,110 patients from 251 hospitals were included. Median age was 70 years (interquartile range: 65-78), traumatic brain injury (35.6%) was most common, and median ISS was 25 (IQR: 17-33). Unadjusted rates of retriage were 2.6% in no-fault states and 9.3% in at-fault states ($p<0.001$). After adjusting for age, sex, race/ethnicity, ISS, Elixhauser, injury, hospital trauma volume, and state, no-fault states were associated with lower odds of retriage (adjusted odds ratio: 0.50, 95% confidence interval: 0.27-0.94) and higher odds of undertriage (aOR: 3.2, 95% CI: 2.2-4.7).

Conclusion: No-fault automotive insurance policies, compared to at-fault policies, were associated with less retriage and more undertriage of patients on Medicare with severe MVC injuries. Further study can better characterize how financial incentives may influence practice patterns for trauma and acute care.

Poster #20

NATIONAL STUDY OF TELETRAUMA USE IN US EMERGENCY DEPARTMENTS

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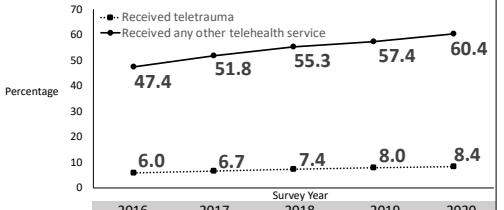
Introduction: Nearly 30 million rural Americans lack timely access to trauma care expertise available at level I/II trauma. Telehealth is an established approach to improve access to healthcare expertise using remote consultation. However, the use of telehealth in trauma (teletrauma) across the US is not known. We describe the prevalence, trends, and factors associated with teletrauma use and adoption among US emergency departments (EDs).

Methods: Data from the National Emergency Department Inventory (NEDI-USA) 2016-2020 were analyzed. NEDI-USA is a nationwide survey of all non-federal/non-specialty US EDs. The proportion of EDs using teletrauma vs any other telehealth service by year was calculated. Multivariable logistic regression was used to describe factors associated with teletrauma use in 2020 and with adoption between 2016-2020.

Results: Among 4,512 EDs with available survey data in 2020 (82% response rate), 379 (8%) reported receiving teletrauma vs 2,726 (60%) receiving any other telehealth service (Fig 1). Teletrauma use ranged between 0% (AL, CT, DC, IN, NJ, NV, OK, OR, RI, SC) to >60% (AR 61% SD 76%, ND 86%). Factors associated with teletrauma use included rural location [odds ratio (95% CI); 2.44 (1.77-3.36)], critical access hospital (CAH) [2.67 (1.83-3.88)] and basic stroke hospital [1.74 (1.32-2.30) vs non-stroke hospital] designations. Factors associated with adoption of teletrauma by 2020 included CAH [1.98(1.35-2.90)] and basic stroke hospital [1.42(1.04-1.94) vs non-stroke hospital] designation.

Conclusion: Teletrauma lags significantly behind other telehealth services in US EDs. We encourage more research on how teletrauma is being used and barriers to its wider implementation.

Fig 1: Proportion of US Emergency Departments using Teletrauma, 2016-2020



	2016	2017	2018	2019	2020
Total responding EDs, N	4,406	4,582	4,707	4,758	4,512
Received teletrauma, n	263	307	347	380	379
Received any other telehealth service, n	2,087	2,374	2,601	2,729	2,726

Poster #21

ANALYSIS OF PUBLICATION RATES OF PRESENTATIONS AT AMERICAN TRAUMA/ACUTE CARE SURGERY CONFERENCES

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Introduction: Trauma/acute care surgery research is presented at four major, annual American conferences: American Association for the Surgery of Trauma (AAST), Eastern Association for the Surgery of Trauma (EAST), Western Trauma Association (WTA), and Pediatric Trauma Society (PTS). We hypothesized that oral/quick shot presentations are published at higher rates than posters, and that publications committees are associated with increased publication rates.
Methods: Conference programs from 2015-2019 were included. Web searches f title, authors, and content determined publication status and citation volume.
Results: A total of 2356 presentations were included, with 1849 (78%) articles published in 166 journals, including 778 (33%) in Journal of Trauma and Acute Care Surgery (JTACS), the official publication of all associations. Presentations from WTA (78%) and EAST (74%) were published at higher rates than AAST (64%) and PTS (47%) ($p<0.001$). Overall, oral/quick shot presentations were published at higher rates (68% vs 32%, $p<0.001$) and in JTACS (84% vs 50%, $p<0.001$), but there was no difference in the impact factor (IF) of publishing journals or papers manuscripts compared to poster presentations. Published oral/quick shot manuscripts from AAST did have a higher IFs compared to posters, and those from EAST went to higher impact journals. Associations with publications committees (EAST and WTA) had highest publication rate overall and in JTACS. While posters are published at lower rates, the eventual impact of a published manuscript presented as a poster is equivalent to that of an oral/quick shot.
Conclusion: Most research presented at trauma conferences is published, with oral/quick shot presentations published at higher rates compared to posters. Publication committees may have value for selecting high-value research and increasing publication rates.

	AAST (1159)			EAST (438)			WTA (219)	PTS (540)		
	Orals & QSs (466)	Posters (693)	P value	Orals & QSs (321)	Posters (117)	P value	Orals (219)	Orals & QSs (348)	Posters (192)	P value
Published, N (%)	396 (85%)	346 (50%)	<0.001	250 (78%)	75 (66%)	<0.001	169 (77%)	348 (55%)	59 (31%)	<0.001
Published in JTACS, N (%)	281 (71%)	95 (28%)	<0.001	186 (74%)	23 (30%)	<0.001	147 (87%)	192 (22%)	4 (7%)	0.009
Years to Publication	1.35 ± 0.83	1.71 ± 1.04	<0.001	0.45 ± 0.80	1.13 ± 1.25	<0.001	0.28 ± 0.57	1.81 ± 1.24	1.61 ± 1.27	0.275
Publishing Journal IF	3.61 ± 1.56	3.69 ± 9.88	0.877	3.64 ± 1.82	2.89 ± 1.52	0.003	3.56 ± 0.82	3.78 ± 13.51	2.61 ± 1.41	0.54
3 year Manuscript IF	6.10 ± 7.48	4.49 ± 12.75	0.033	4.47 ± 4.78	3.52 ± 3.93	0.154	4.76 ± 4.10	2.44 ± 3.05	2.31 ± 2.68	0.376

2015-2019 publication rates for orals and quick shots (QS) combined vs. poster presentations by meeting. Presented as mean ± standard deviation unless noted.

Poster #22

SURGICAL TREATMENT OF COMBINED PELVIC INJURIES USING MATHEMATICAL AND COMPUTER MODELING

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Introduction: The search for new approaches to providing medical care to victims with severe combined pelvic injuries (CPI) using modern diagnostic methods and minimally invasive surgery is scientific and practical interest. The purpose was to refine the treatment results based on the analysis of the CPI structure, the use of optimal approaches to the choice of surgery, using modern hemostasis methods and minimally invasive internal fixation of pelvic ring, taking into biomechanical modeling.
Methods: We analyzed the frequency and structure of CPI in the level I trauma center for 10 years. A comparative analysis of the victims who underwent pelvic packing or angioembolization was carried out. The relationship between the retroperitoneal hemotomas parameters and the blood loss volume in various types of pelvic injuries was studied. Simulation was carried out using the ANSYS 16.1 system. To determine the outcome with high accuracy, predictive logit models were created. A new treatment and diagnostic algorithm for severe CPI and a method for choosing the optimal internal pelvic fixation have been developed. The immediate and long-term results were analyzed.
Results: Most often, CPI were after traffic accidents (55.9%) and falling (37.3%). 84.7% of victims were young people. ISS > 25 was in ½ of the victims. CPI was characterized by shock (55.2%) and significant blood loss volume (56.3%). In the analysis the pelvic hematoma volumes were: in moderate blood loss - 178.3±17.1 cm^3, in severe - 331.6±24.4 cm^3, extremely severe - 461.3±68.5 cm^3; among the victims with extravasation on CT - 517.5 [250; 835] cm3. A positive correlation was found between the blood loss volume and pelvic hemorrhage volume and prevalence. The choice of the surgical hemostasis method depends on the hemodynamics, the bleeding nature and other injuries. The developed algorithm allowed achieving optimal outcome in 79.4% cases. Analysis of thromboelastography allowed correcting the transfusion therapy. Biomechanical modeling of pelvic injuries allowed choosing the optimal method of minimally invasive fixation (MIF) in the first 12 hours. MIF allowed stabilization in 81.7%. The developed predictive logit-models made it possible to determine the outcome and apply MIF safely.
Conclusion: The developed algorithm allowed to reduce the total (from 13.5 to 20.5%) and 24-hours mortality rate (from 5.3 to 10.6%) and complications (from 51.4 to 34.5%).

Poster #23

DISTAL NEPHRON ROLE IN LETHAL CRUSH SYNDROME HYPERKALEMIA MAY HAVE TREATMENT IMPLICATIONS

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Introduction: Crush Syndrome causes loss of glomerular filtration rate (GFR) and lethal hyperkalemia. In austere environments, dialysis and intensive care may be unavailable. However, since potassium (K) is secreted by the distal nephron, excretion is not directly dependent on GFR and GFR-supporting therapy. Thus, investigation of the role of the distal nephron in crush syndrome hyperkalemia could yield life-saving intervention.
Methods: 23 female swine were anesthetized, subjected to sham surgery (n=5) or bilateral captive bolt blast injury (n=18) and randomized to treatment 30 minutes later with the proximal tubule protectant cilastatin sodium, cilastatin and calcitriol, or vehicle (untreated group). Blood and urine samples were obtained immediately before treatment (0 hour) and at 2 hours. 6-hour GFR was measured using iohexol clearance. Urine/plasma sodium (Na) and K were determined by flame photometry. Urine and plasma osmolality were quantified. K clearance, fractional excretion, and trans-tubular gradient were calculated. Analysis was completed in R.
Results: Plasma K did not change in shams (n=5, $p=0.7$). In injured, untreated animals (n=7), plasma K increased ($p=0.03$), accompanied by reduced K clearance ($p=0.01$) and creatinine clearance ($p=0.03$). Urine Na was high and was unchanged over time ($p>0.05$). There was no difference in the fractional excretion of K ($p=0.67$) between 0 and 2 hours, while the trans-tubular K gradient (TTKG) decreased ($p=0.05$). K clearance covaried with 2-hour creatinine clearance ($p<0.001$), but not with 6-hour GFR (p-value=0.28). Treated animals did not have significantly different K clearance at 2 hours compared to the untreated group ($p>0.05$).
Conclusion: Crush syndrome caused hyperkalemia accompanied by reduced K clearance which was not changed by cilastatin treatment. Together these data suggest that K excretion in early crush syndrome is decoupled from GFR and proximal tubule injury. Further mechanistic study may yield novel physiologic interventions in lethal hyperkalemia, potentially altering trauma and disaster care.

Poster #24

A COST-UTILITY ANALYSIS OF LAPAROSCOPIC SUBTOTAL CHOLECYSTECTOMY

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Introduction: Safe laparoscopic cholecystectomy requires obtaining a critical view, however in difficult dissections, accomplishing this view can sometimes be unsafe. There is no consensus for the optimal "damage control" strategy when unable to obtain a critical view safely. Several studies have compared the cost-effectiveness of open versus laparoscopic cholecystectomies, but none have compared reconstituted laparoscopic subtotal cholecystectomy (R-LSC) to fenestrated laparoscopic subtotal cholecystectomy (F-LSC). The complications such as bile leak and need for endoscopic retrograde cholangiopancreatography (ERCP) associated with R-LSC, must be weighed against complications of recurrent percutaneous interventions and completion cholecystectomy in F-LSC, while evaluating the cost associated with each procedure. We hypothesize that R-LSC is the more cost-effective strategy.

Methods: We performed a decision-analytic model using TreeAge software to evaluate the cost-effectiveness of a F-LSC versus R-LSC. Our base case was a patient with acute cholecystitis undergoing a LSC. Costs, probability, and Quality-Adjusted Life Years (QALYs) were generated from published literature.

Results: R-LSC was cost-effective at $7755 and 0.89 QALY compared to F-LSC at $7969 and 0.88 QALY. Deterministic analysis identified the probability of a bile leak and cost of ERCP as the most impactful variables in the study. One-way sensitivity analyses demonstrated that F-LSC becomes the cost-effective option over R-LSC when the probability of bile leak decreases to 7% from 18% or when the cost of an ERCP decreases to $642 from $8000.

Conclusion: R-LSC is more cost-effective with improved health utility compared to F-LSC. In R-LCS, the decreased prevalence of bile leak and decreased need for ERCP outweigh the increased need for multiple percutaneous interventions in F-LCS.

Poster #25

AN ESTIMATED BLOOD VOLUME-BASED ENOXAPARIN DOSING PROTOCOL IMPROVES VENOUS THROMBOEMBOLISM PROPHYLAXIS IN EMERGENCY GENERAL SURGERY PATIENTS

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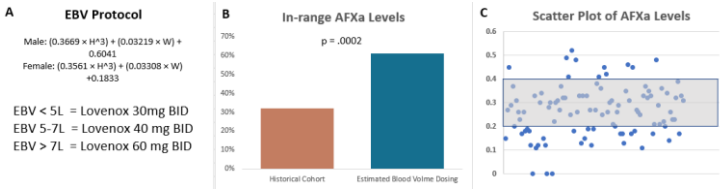
Introduction: Fixed-dose enoxaparin regimens do not provide adequate Xa inhibition in many surgical populations, and low Anti Factor Xa (AFXa) levels are associated with venous thromboembolism. We aimed to assess an individualized, estimated blood volume (EBV) based enoxaparin dosing protocol on AFXa levels in emergency general surgery (EGS) patients.
Methods: We performed a prospective observational trial of EGS patients admitted to an urban tertiary center. Adult patients without end-stage renal disease and who were otherwise eligible for VTE prophylaxis with enoxaparin were dosed with an EBV-based protocol (Fig 1A). The primary outcome was peak AFXa level obtained 2.5-6hrs at enoxaparin steady state. Accepted AFXa range was 0.2-0.4 IU/mL. Dose adjustment and AFXa re-evaluation was performed when appropriate. Secondary outcomes included bleeding and VTE events. The prospective cohort was compared to a historical cohort of EGS patients dosed with a fixed, BMI-based protocol.
Results: 100 consecutive patients with properly timed, steady state AFXa levels were included in the study. The majority of patients were female (55%), the mean age was 57 years, and the most common admission diagnosis was small bowel obstruction (23%). A total of 62% of patients required an operation. Initial AFXa was in-range in 61% of patients on EBV dosing and was significantly more likely to be in-range compared to the historical BMI-based cohort (Fig 1B, 1C, p =.0002). There were four patients who required a blood transfusion. Two of those patients had AFXa levels above 0.4. There were no VTE events on index admission.
Conclusion: An EBV-based enoxaparin dosing protocol improves VTE prophylaxis in EGS patients by increasing rates of in-range initial Anti Factor Xa levels.



Poster #26

CREATION OF A MULTIDISCIPLINARY INPATIENT COMPLEX PROCEDURAL TEAM MAY IMPROVE HOSPITAL EFFICIENCY

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Introduction: Hospitals struggle to perform routine but complex inpatient procedures in a cost-effective, timely and high-quality manner. Limited examples exist of procedural teams created to perform technically complex procedures. We created a multidisciplinary 'Inpatient Procedural Team ' (IPT) to meet the demand of non-vascular, non-enteral access bedside procedures and studied its impact on hospital efficiency.
Methods: IPT was comprised of APP's and sonographers with medical direction from an acute care surgeon, and expert collaboration with other specialties. IPT worked collaboratively with interventional radiology for scheduling of bedside procedures under sonographic guidance. IPT scope of practice included thoracentesis (T), paracentesis (P) and lumbar punctures (LP). We performed a before/after study evaluating consult completion time, case creation to procedure start time, and nursing hours saved.
Result: In five months, IPT performed 1036 procedures, averaging 7.6 ± 0.34 cases per day: 575 P, 466 T (17 including chest tubes) and 30 LP. Complication rates for P = 0.17%, T = 0.21%, LP and chest tube = 0%. We found a 69.2% decrease in consult completion time (9.75hrs vs 3hrs, $p < 0.0001$), a 79.3% decrease in case-creation-to-procedure start time (13.92hrs vs 2.88hrs, $p < 0.0001$). When compared to pre-IPT data, procedures were completed a mean 17.8hrs earlier than historic controls. 350 off-floor nursing hours were saved and 2000 patient transports to radiology and back were eliminated.
Conclusion: The IPT has shown to positively impact time to procedure, off floor nursing time, and patient transports while providing safe, high-quality care. Working collaboratively with IR, acute care surgery can assist APP's with bedside procedures to improve hospital efficiency.

Poster #27

FACTORS ASSOCIATED WITH THE NEED FOR LONG-TERM TOTAL PARENTERAL NUTRITION IN SURVIVORS OF ACUTE SUPERIOR MESENTERIC ARTERY OCCLUSION

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Introduction: Acute superior mesenteric artery (SMA) occlusion is an uncommon condition associated with high mortality. If extensive bowel resection is performed for patients with acute SMA occlusion and the patient survives, long-term total parenteral nutrition (TPN) may be needed due to short bowel syndrome. This study examined factors associated with the need for long-term TPN after the treatment of acute SMA occlusion.
Methods: We retrospectively analyzed 78 patients with acute SMA occlusion. Patients were abstracted from a Japanese database from institutions with at least 10 patients with acute SMA occlusive disease from January 2015 through December 2020
Results: Among the initial cohort there were 41/78 survivors. Of these, 14/41 (34%) required permanent TPN who were compared with those who did not require long-term TPN (27/41, 66%). Compared to patients in the non-TPN group, those in the TPN group had significantly shorter remaining small intestine (90.7 cm vs. 218 cm, $P<0.01$), more patients with time from onset to intervention >6 hours ($P=0.02$), pneumatosis intestinalis on enhanced computed tomography scan ($P=0.04$), ascites (Odds Ratio 11.6, $P<0.01$), and a positive smaller superior mesenteric vein sign ($P= 0.03$). These were considered significant risk factors for needing long-term TPN. Age, gender, underlying disease, presence of peritoneal sign, presence of shock requiring vasopressors, site of obstruction (proximal vs. distal), and initial treatment (surgery vs. interventional radiology vs. thrombolytic therapy) were not significantly different between the two groups. Long-term TPN was significantly associated with longer hospital stay (52 vs. 35 days, $P=0.04$). Multivariate analysis identified the presence of ascites as an independent risk factor for needing long-term TPN.
Conclusion: The need for permanent TPN after treatment of acute SMA occlusion is significantly associated with longer hospital stay, longer time to intervention, and characteristic imaging findings (pneumatosis intestinalis, ascites, Smaller SMV sign). Ascites is an independent risk factor.

Poster #28

PERIOPERATIVE OUTCOMES OF SUPER- AND SUPER-SUPER OBESE PATIENTS WITH NECROTIZING SOFT TISSUE INFECTIONS

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Introduction: Necrotizing soft tissue infections (NSTI) are commonly encountered by the acute care surgeon, often in obese patients. However, little is known about the risk profiles of Class III obesity patients, specifically in the morbidly obese (MO, BMI ≥ 40-49.9), super-obese (SO, BMI ≥ 50-59.9), and super-super obese (SSO, BMI ≥ 60) patients with NSTI. The aim of this study is to investigate the perioperative outcomes of MO, SO, and SSO patients undergoing intervention for NSTI.
Methods: The National Surgical Quality Improvement Program database was queried for patients aged 18-90 years with BMI ≥ 40 undergoing surgery for NSTI from 2011-2021 based on ICD codes for gas gangrene, necrotizing fasciitis, and Fournier's gangrene. Patients were stratified into MO, SO, and SSO categories. The primary and secondary outcomes were 30-days postoperative mortality and morbidities. Descriptive statistics and multivariable logistic regression were performed.
Results: A total of 1,999 patients were included: 1,236 MO (61.8%), 489 SO (24.5%), and 274 SSO (13.7%). Average 30-day mortality for the MO, SO, and SSO cohorts were 8.6%, 6.5%, and 13.5% respectively (p=0.005). In multivariable analysis, both SO and SSO groups had higher odds of suffering from septic shock compared to MO patients (OR 1.42, 95%CI 1.05-1.9, p=0.021; and OR 1.66, 95%CI 1.15-2.41, p=0.007, respectively), and the odds of 30-day mortality for patients with NSTI was nearly doubled in the SSO group compared to MO cohort (OR 1.93, 95%CI 1.13–3.31, p=0.016).
Conclusion: We found that SO and SSO patients undergoing surgery for NSTI had different risk profiles compared to MO patients. Both SO and SSO patients had higher likelihood of developing postoperative septic shock, and the SSO group was also noted to have significantly higher odds of 30-days mortality compared to MO patients. These findings support the need for further stratification amongst Class III obesity patients undergoing surgical intervention for NSTI.

Poster #29

PROSPECTIVE, MULTICENTER EVALUATION OF GUNSHOT DETECTION TECHNOLOGY ON EMS DISPATCH AND TRANSPORT TIMES

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Introduction: Previous single-center research demonstrated that the use of a commercially available, acoustic gunfire detection, location, and notification system (gunshot detection technology=GDT) was associated with more rapid response and shorter prehospital transport times for gunshot wound (GSW) victims transported by both police and emergency medical systems (EMS). Our goal was to determine if these findings could be validated in a broader study of heterogeneous trauma systems.
Methods: We performed a 7-site, prospective, observational cohort study of adult patients who sustained a GSW in cities using GDT from June 2019 through July 2021. Demographics, dispatch time, response time, transport time, and clinical data were collected for patients transported by EMS. We compared shootings where GDT was utilized (GDT) versus those where it was not (nGDT). Exclusion criteria included incidents that did not occur in the confines of the city, non-EMS transport, and patients with incomplete data. Descriptive statistical analysis, t-test, Mann-Whitney U, $\chi 2$ test, as well as linear and logistic regressions were performed.
Results: A total of 1,348 GSW victims were included, GDT=371 (27.5%), nGDT= 977 (72.5%). Patients located by GDT were more likely to be black than white or Hispanic (89.2%/2.2%/6.7% vs. 67%/19.5%/11.3%, p<0.001). [Table 1] Physiologic parameters were similar between cohorts. Patients located by GDT were less likely to have suffered a severe head injury than patients in the nGDT cohort (5.1% vs. 10.0%, p=0.003). Median time for EMS dispatch to scene was not different between cohorts (GDT = 6 min [IQR, 4-8], nGDT = 6 min [IQR 4-8]. We also found no difference in transport time from scene to hospital between groups (GDT=10min [IQR 6-14], nGDT=10min [IQR 7-10]. Mortality was not significantly different between cohorts (15.9% vs. 17.2%, p=0.36).
Conclusions: This large, multicenter study was unable to demonstrate transport time or survival benefits for gunshot detection technology in trauma systems using EMS transport. Given previous work demonstrating improved prehospital transport times in a system that also utilized police transport, it is possible that there still may be a role of GDT in trauma systems, but this will require ongoing and individualized assessment.

Figure 1: Gunshot Detection Technology impact on EMS dispatch and transport times

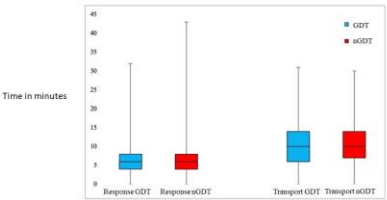

Table 1: Gunshot Detection Technology: demographics, clinical data, & outcomes

	Gunshot Detection Technology (GDT)	No Gunshot Detection Technology (nGDT)	p-value
Age	30.73 (11.04)	31.33 (12.03)	0.40
Male Gender	322 (86.8%)	844 (86.4%)	0.85
Race			<0.001
White	8 (2.2%)	190 (19.5%)	
Black	331(89.2%)	653 (67.0%)	
Hispanic	25 (6.7%)	110 (11.3%)	
Arrival SBP	133 ± 48	117 ± 47	0.17
Arrival HR	83 ± 26	87 ± 34	0.07
ISS	9 [IQR 1-16]	9 [IQR 1-18]	0.11
Severely injured body regions			
Head AIS >4	19 (5.1%)	98 (10.0%)	0.003
Chest AIS >4	31 (8.4%)	107 (11.0%)	0.34
Abdomen AIS >4	33 (8.9%)	88 (9.0%)	0.44
Extremity AIS >4	11 (3.0%)	16 (1.6%)	0.09
EMS dispatch to scene time (minutes)	6 [IQR 4-8]	6 [IQR 4-8]	0.11
EMS transport time to trauma center (minutes)	10 [IQR 6-14]	10 [IQR 7-10]	0.29
Prehospital interventions	19 (5.1%)	79 (8.1%)	0.06
Intubation	29 (7.8%)	60 (6.1%)	0.27
Needle decompression	64 (17.2%)	137 (14.0%)	0.14
Tourniquet	87 (23.5%)	100 (10.2%)	<0.001
Wound packing			
Mortality	59 (15.9%)	168 (17.2%)	0.36

* SBP = systolic blood pressure (mm Hg), HR = heart rate, ISS = injury severity score (scale 1-75, >15 = severe trauma, 75 = fatal), AIS = Abbreviated injury score (scale 1-6, 6 = lethal), EMS = emergency medical services, IQR = interquartile range

Poster #30

A DECADE OF FIREARM INJURIES: HAVE WE IMPROVED?

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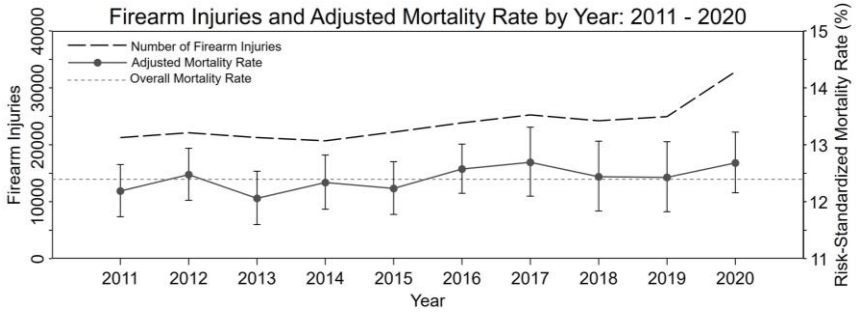
Introduction: Firearms injuries are a growing public health issue, with marked increases coinciding with the onset of the COVID-19 pandemic. This study sought to evaluate temporal trends, hypothesizing that despite a growing number of injuries, mortality would improve over the past decade.
Methods: Patients aged 18 years and older with firearm injuries from 2011-2020 were identified using the National Trauma Data Bank (NTDB). Trauma centers not present the entirety of the study period were excluded to allow for temporal comparison. Joinpoint regression and risk-standardized mortality rates were used to evaluate injury counts and adjusted mortality over time. A subgroup analysis was performed to describe centers with the largest increase in firearm injuries in 2020.
Results: A total of 238,674 patients met inclusion criteria. Firearm injuries increased by 31.1% in 2020, compared to an annual percent change of 2.4% from 2011-2019 (p=0.01). Unadjusted mortality declined by 0.9% from 2011-2020, but after controlling for demographics, injury characteristics and physiology, adjusted mortality increased from 12.2% to 12.7% for the same period. Subset analysis of centers with the largest change in firearm injuries in 2020 found that they were more often level I centers, with higher historical trauma volumes and percentage of firearm injuries ($p < 0.001$).
Conclusions: Firearm injuries pose an increasing burden to our trauma systems, with level I and high-volume centers seeing the largest growth in 2020. Despite centers seeing an increase in firearm injuries, mortality has remained unchanged over the past decade.



Poster #31

BENCHMARKING OF TRAUMA CENTER PERFORMANCE IN BLUNT MULTISYSTEM VERSUS PENETRATING TRUNCAL INJURY

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Introduction: Trauma center (TC) benchmarking seeks to identify and disseminate best practices used at high performing centers. However, the resources and care processes required to achieve optimal outcomes can varies between different mechanisms of injury. We hypothesized that there is poor agreement in TC risk-adjusted performance in the care of patients with blunt multisystem (BMS) and penetrating truncal (PT) injuries.

Methods: This was a retrospective cohort study using data derived from the National Trauma Databank (2017-2018). BMS (blunt trauma with AIS ≥ 3 in two or more body regions) and PT (penetrating trauma with AIS ≥ 3 in neck, chest, or abdomen) groups were defined. Patients with prehospital cardiac arrest or dead-on-arrival (HR=0, SBP=0, GCSmotor=1) were excluded. The cohort was further limited to hospitals treating at least 10 of each patient types over the study period. Mixed-effects multivariable logistic regression was used to calculate the observed-to-expected mortality ratio for each TC in both patient groups, adjusting for patient baseline and injury characteristics. TCs were identified as high, average, or low performers in both BMS and PT patient cohorts based on hospital outlier status derived from the regression models. The concordance between the performance of centers for BMS and PT patients was evaluated using the Kappa statistic.

Results: 93,890 cases were identified across 370 trauma centers, with 73,115 (75%) patients having blunt multisystem injuries and 25,774 (26.39%) having penetrating torso injuries were included. After adjustment, 46 centers were identified to be high performers for penetrating torso injuries, and 150 centers were found to be above performers for blunt multisystem trauma. The concordance between the performance of trauma centers for both injury types was found to be low (Kappa =0.118, p-value = 0.00053).

Conclusion: This study highlights the importance of considering injury type in benchmarking and quality improvement efforts in trauma care. The low concordance between performance for both injury types highlights the need for a more thoughtful approach to initiatives aimed at improving individual center level care.

Performance	Penetrating Truncal		
Multi-system Blunt	High n=46	Average n= 296	Low n=28
High, n=150	29	114	7
Average, n=193	11	165	17
Low, n=27	6	17	4

Poster #32

EPIDEMIOLOGY OF TRAUMATIC INJURY BASED ON TRAUMA QUALITY IMPROVEMENT PROGRAM DATA 2011-2020

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Introduction: Trauma remains a leading cause of morbidity and mortality across all age groups. The objective of this study was to assess inpatient trauma epidemiology, trends, injury mechanisms, severity, and outcomes in the United States over the last decade.
Methods: We merged annual data from the Trauma Quality Improvement Program (TQIP) database from 2011-2020. Analyses consisted of descriptive statistics for overall and yearly frequencies, proportions and means stratified by race/ethnicity, mechanism, and injury severity score (ISS). The statistical significance of trends was assessed with a linear regression term for year.
Results: There were 2,441,780 observations from 2011 to 2020. The mean age of injured patients increased from 44.4 in 2011 to 55.0 in 2020 ($p < 0.001$). The most common injury mechanism was falls (47.9%), followed by motor-vehicle collisions (21.72%), and firearms (8.16%). Throughout the decade, there were increases in falls (49.8% to 53.5%; $p < 0.001$), firearms (8.0% to 11.0%; $p <0.001$), and bicycle collisions (1% to 2.9%; $p <0.001$). The percentage of motor vehicle, motorcycle, and pedestrian-related injuries all decreased ($p <0.001$). Over the study period, 25.5% of patients were classified as severely injured (ISS 16-24), while 15.8% were critically injured (ISS>/=25); the number of patients who were severely or critically injured decreased over time from 47.8% in 2011 to 35.9% in 2020 ($p<0.001$). The number of patients treated at Level 1 trauma centers increased from 55.7% in 2011 to 62.2% in 2020 ($p < 0.001$). The number of patients who died from their injuries decreased from 5.6% in 2011 to 5.1% in 2020 ($p < 0.001$). Pedestrian collisions (9.9%) and firearms (9.1%) had the highest case fatality rates.
Conclusion: TQIP-participating hospitals have seen a dramatic increase in the mean age of the patients they treat, primarily driven by falls in an aging population. Gun violence hospitalizations saw a steady increase over the last decade.

Poster #33

RELEASED INTRACELLULAR CONTENTS MAY CONTRIBUTE TO PRESENTING HYPOCALCEMIA IN TRAUMA

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Introduction: Multiple studies have reported severely injured trauma patients presenting with low pre-transfusion ionized calcium (iCa, normal range 1.2-1.4mM) levels. iCa is necessary for coagulation, cardiac contractility, and vascular tone. The mechanisms by which iCa levels decrease remain unclear. We hypothesized that intracellular contents such as negatively charged phosphate ions and proteins released from damaged tissue bind calcium and contribute to low presenting iCa levels.
Methods: Blood was collected from 5 healthy donors into heparin vacutainer tubes. Liver, lung, kidney, and skeletal muscle from male C57BL/6 mice who had undergone laparotomy were flash frozen and ground with a mortar and pestle. The homogenized tissue was added to heparinized blood in amounts to simulate relative physiologic differences in mass. iStat CG8+ cartridges were used for measurement.
Results: Mean baseline iCa was 1.24mM±0.05. All tissue demonstrated a dose-dependent relationship with iCa. iCa in blood with liver tissue ranged from 1.09mM±0.06 (liver 15mg/mL, $p=0.01$) to 0.91mM±0.04 (60mg/mL, $p<0.001$). Blood with skeletal muscle iCa ranged from 0.94mM±0.03 (62.5mg/mL, $p=0.002$) to 0.62mM±0.07 (250mg/mL, $p<0.001$). Kidney ranged from 1.18mM±0.04 (2mg/mL, p=ns) to 1.13±0.02 (8mg/mL, $p=0.03$). Lung ranged from 1.16mM±0.03 (3mg/mL, p=ns) to 1.11mM±0.02 (12mg/mL, $p=0.03$). K demonstrated dose-dependent increase with all tissue types, with skeletal muscle and liver having the largest impact.
Conclusion: Damaged tissue contributes to presenting hypocalcemia by releasing intracellular contents. Elevated K represents release of intracellular contents. Calcium regulation in trauma is complex and involves renal losses, intracellular movement following cellular activation, and binding by circulating contents released by damaged tissue. Further work is needed to determine relative quantitative contribution of these mechanisms and how they evolve in order to guide optimal calcium management therapy.

Poster #34

TIME TO SURGERY STABILIZATION OF RIB FRACTURES: DOES IT IMPACT OUTCOMES?

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Introduction: Rib fractures are common, morbid and potentially lethal. Intuitively, if interventions to mitigate downstream effects of rib fractures can be implemented early, likelihood of developing these complications should be reduced. Surgical stabilization of rib fractures (SSRF) is one therapeutic intervention shown to be useful for mitigating complications of these common fractures. Our aim was to investigate the association between time to SSRF and complications among patients with isolated rib fractures undergoing SSRF.

Methods: The 2013-2019 ACS TQIP database was queried to identify those >18 with isolated thoracic injury undergoing SSRF. Patients were divided into three groups: SSRF≤2d, SSRF>2d but ≤3d, and SSRF >3d. Poisson regression, adjusting for demographic and clinical covariates, was used to evaluate the association between time to SSRF and the primary endpoint, in-hospital complications. Quantile regression was used to evaluate the effects of time to SSRF on the secondary endpoints, hospital and ICU length of stay (LOS).

Results: Out of 2,185 patients, 918(42%) underwent SSRF ≤2d, 432(20%) underwent SSRF>2d but ≤3d, and 835(38%) underwent SSRF >3d. Hemothorax was more common among patient undergoing SSRF >3d, otherwise all demographic and clinical variables were similar between groups. After adjusting for potential confounding, SSRF >3d was associated a with three-fold risk of composite in-hospital complications [adjusted incidence rate ratio (IRR): 3.15, 95% confidence interval (CI): (1.76-5.62); p<0.001], a 4-day increase in total hospital LOS [change in median LOS (95%CI):4.09(3.69-4.49), p<0.001], and a nearly 2-day increase in median ICU LOS [change in median LOS (95%CI): 1.70 (1.32-2.08), p<0.001] compared to SSRF≤2d.

Conclusion: Among patients undergoing SSRF in TQIP, earlier SSRF is associated with less in-hospital complications and shorter hospital stays. Standardization of time to SSRF as a trauma quality metric should be considered.

Poster #35

SEVERE ISOLATED CHEST TRAUMA AND PULMONARY CONTUSION: A CONTROVERSIAL CONTRAINDICATION TO RIB FIXATION

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Introduction: Pulmonary contusion (PC) is currently considered a relative contraindication to surgical stabilization of rib fractures (SSRF), but the data underlying this practice is scant. This study aimed to compare outcomes in patients undergoing SSRF vs. non-operative management (NOM) in PC.

Methods: The ACS-TQIP 2017-2020 was queried to identify patients with PC, three or more rib fractures, and with or without flail chest. Patients with severe extra-thoracic injuries were excluded. The outcomes evaluated were in-hospital mortality, ventilator-associated pneumonia (VAP), hospital and intensive care unit (ICU) length of stay (LOS), unplanned ICU admission, ventilator days, and tracheostomy rate. Propensity score matching (PSM) was performed to account for patient demographics, injury- and hospital-related characteristics. After matching, patients undergoing SSRF vs. NOM were compared. A subgroup analysis stratifying patients into major and minor PC was performed.

Results: Of the 48,757 patients included in the analysis, 3,271 (6.7%) underwent SSRF. Following PSM, 2,448 matched pairs of patients with PC were analyzed. SSRF was associated with lower in-hospital mortality (1.9% vs. 5.1%, p<.001), higher rates of unplanned ICU admission (6.7% vs. 4.2%, p<.001), and tracheostomy (10.7% vs. 8.4%, p=.006) compared to NOM. In the subgroup analyses, SSRF was associated with reduced mortality compared to NOM. Regardless of PC severity, SSRF was associated with longer hospital LOS, ICU LOS, and prolonged ventilator days compared to the NOM cohort (Table 1).

Conclusion: In patients with severe chest wall injury and PC, SSRF is associated with lower mortality despite PC severity, but at the expense of longer ICU and hospital stays. These findings indicate that SSRF may benefit patients with PC.

Table 1. Outcomes following propensity score matching of the non-operative versus SSRF treatment group according to pulmonary contusion severity.

Outcomes	All-severity pulmonary contusion (n=2,448 pairs)			Minor pulmonary contusion (n=673 pairs)			Major pulmonary contusion (n=590 pairs)		
In-hospital outcomes	Non-operative	SSRF	p-value	Non-operative	SSRF	p-value	Non-operative	SSRF	p-value
Mortality	126 (5.1%)	47 (1.9%)	**<0.001**	29 (4.3%)	11 (1.6%)	**0.004**	38 (6.4%)	15 (2.5%)	**0.001**
Ventilator Associated Pneumonia	72 (2.9%)	91 (3.7%)	0.13	14 (2.1%)	17 (2.5%)	0.59	25 (4.2%)	26 (4.4%)	0.89
Tracheostomy	205 (8.4%)	262 (10.7%)	**0.006**	33 (4.9%)	49 (7.3%)	0.068	59 (10.0%)	80 (13.6%)	0.058
Hospital length of stay	6 (2-12)	11 (6-17)	**<0.001**	6 (2-11)	10 (6-16)	**<0.001**	7 (3-14)	12 (7-19)	**<0.001**
Unplanned ICU admission	104 (4.2%)	165 (6.7%)	**<0.001**	34 (5.1%)	48 (7.1%)	0.11	26 (4.4%)	38 (6.4%)	0.12
ICU length of stay	3 (0-8)	6 (3-11)	**<0.001**	2 (0-6)	5 (2-9)	**<0.001**	3 (0-8)	7 (3-13)	**<0.001**
Ventilator Days	0 (0-3)	0 (0-6)	**<0.001**	0 (0-0)	0 (0-4)	**<0.001**	0 (0-4)	2 (0-8)	**<0.001**

Patients matched by age, sex, Body Mass Index (BMI), Injury Severity Score (ISS), Glasgow Coma Scale (GCS), flail chest, lung laceration, pneumothorax, hemothorax, and American College of Surgeons (ACS) designated level. Data are presented as median (IQR) for continuous measures, and n (%) for categorical measures. SSRF, Surgical stabilization of rib fractures; ICU, Intensive Care Unit.

Poster #36

PLANNED AND UNPLANNED REOPERATIONS AFTER THORACOTOMY FOR PENETRATING TRAUMA. LESSONS LEARNED AFTER 15 YEARS.

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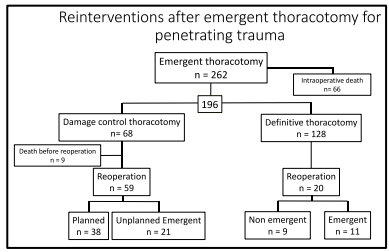
Fundacion Valle del Lili

Introduction: Specific information regarding reoperation after trauma thoracotomies (TT) is scarce. We analyzed the causes, treatment, and outcomes in patients managed in a high-complexity hospital in an upper-middle-income country, searching for strategies to reduce **unplanned reoperations** (UR) after penetrating chest trauma (PTT).
Methods: Patients ≥15 years treated with a TT for PTT between 2006 and 2020 were retrospectively reviewed. Trauma characteristics, surgical treatment, causes of reoperation, and outcomes were registered.
Results: Two-hundred-sixty-two TTs were performed. Intraoperative deaths occurred in 66 patients leaving 196 cases for analysis. Median (IQR) age was 26 (20 - 35) years; 95.9% were male. Gunshot wounds occurred in 59.6%. Resuscitative thoracotomy was required in 40 cases (20.1%), aortic occlusion in 55 (28.1%), and damage control thoracotomy (DCT) in 68 (34.7%), A "definitive" thoracotomy (DT) was performed in 128 (65.3%).
Nine DCT patients died before a reoperation. Seventy-nine subjects (40.3%) were reoperated. Twenty after a DT and 59 after a DCT. Thirty-two emergent UR were performed. Eleven after DT and 21 after a DCT. Nine DTs and 38 DCTs had non-emergent reoperations.
The most frequent causes of emergent UR were bleeding due to coagulopathy in 9 patients, surgical bleeding in 7, and missed injuries in 6 patients.
Planned reoperations for definitive repair included closure of the thoracic incision in 51 cases, unpacking (thoracic wall in 51, lung in 34, perivascular in 17), deferred major lung resections (four lobectomies, three pneumonectomies), and three vascular reconstructions.
DCT patients who survived until a scheduled reoperation had a similar mortality to non-DCT (8.5%). Mortality after an emergent (UR) was higher, (50%).
Conclusion: Technical errors leading to post-op bleeding were the most common cause of UR. Timely bleeding control, an a more systematic/selective post-op completion diagnostic work-up (CT angio, endoscopy, and/or angio-embolization) may reduce the need for emergent reoperations and their negative impact.



Poster #37

IMPACT OF LOW-PRESSURE NEGATIVE SUCTION WITH INTERCOSTAL TUBE DRAINAGE IN PATIENTS WITH THORACIC TRAUMA: A RANDOMISED CONTROLLED TRIAL

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Introduction: Thoracic trauma frequently includes a pneumothorax, haemothorax, or mixed hemopneumothorax, which may necessitate an intercostal drainage (ICD) for evacuation of air and fluid to improve breathing and circulatory functions. However, thoracic trauma-related problems such persistent /constant air leak, retained haemothorax, and empyema still happen in some patients even with ICDs. This study was designed to evaluate the benefits of using negative pleural suction with ICD tube in patients with thoracic trauma in terms of the duration of ICD, length of hospital stays, incidence of complications of thoracic trauma and need for additional interventions.

Methods: Patients with thoracic trauma who underwent tube thoracostomy for pneumothorax, haemothorax, or hemopneumothorax were randomised into two groups: Group I in which under water seal drainage system was connected to a low-pressure negative suction (-20 cm H_2O) and Group II where no suction was applied. Patients who required mechanical ventilation or emergency surgery at the time of admission to the emergency department (ED), patients with a past history of chronic pulmonary diseases and patients with severe traumatic brain injury were excluded from the study. Duration of ICD, length of hospital stays, the incidence of complications like recurrent pneumothorax, retained haemothorax, persistent air leak, etc and secondary interventions such as reinsertion of ICD, intrapleural streptokinase instillation (IPSI), video assisted thoracoscopic surgery (VATS) and thoracotomy were compared. This study was registered with Clinical Trial Registry of India (CTRI) (REF/2020/11/038403).

Results: A total of 654 patients with thoracic trauma who required ICD were assessed for their eligibility and 584 were excluded. Finally, 70 patients were randomised into two groups (35 in each group). Both the groups were comparable in terms of demographics, mechanism of injuries, primary survey findings etc. There were no statistically significant differences between both the groups in terms of duration of ICD (median of 4 days in each group; $p = 0.82$), hospital stay ($p = 0.47$) and ICD or injury related complications.

Conclusions: The use of negative pleural suction with under-water seal drainage system did not show any advantage in patients with traumatic pneumothorax, haemothorax, or hemopneumothorax in terms of duration of ICD, hospital stays, and other complications. A multicentre study with large sample size is required to reach a consensus.

Poster #38

A TALE OF SIZE IN TRAUMA: A MULTICENTER ANALYSIS OF SUREON PLACED SMALL-BORE THORACOSTOMY TUBES

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Introduction: Surgical dogma that larger chest tubes are better for thoracic drainage has been challenged in recent years with the introduction of surgeon-placed percutaneous catheters. The purpose of the study is to evaluate outcomes between small-bore (SB) and large-bore (LB) chest tubes with the hypothesis that SB catheters will have comparable complication rates including retained HTX and need for VATS.
Methods: A retrospective review was performed on all patients with a thoracostomy tube for traumatic PTX or HTX between 7/1/21-6/30/22 at 3 level-1 trauma centers. Exclusion criteria included ISS 75, tube placement at an outside hospital, in the operating room, or by a radiologist. SB catheters were defined as ≤14 Fr and LB tubes were ≥24 Fr. All other sizes were excluded. SB and LB chest tubes were compared.
Results: A total of 621 patients were included over the 24-month study period with 264 (42.5%) in the SB group and 357 (57.5%) in the LB group. Patients in the SB group were older (50.7 vs 43.6 years, $p<0.001$), had a higher rate of blunt injury (91.3% vs 73.1%, $p<0.001$), and a lower ISS (19.0 vs 26.5, $p<0.001$). The SB group had higher rates of COPD (8.7% vs 4.2%, $p=0.020$) and tobacco use (34.5% vs 21.0%, $p<0.001$). The SB group were more likely to have PTX (71.6% vs 43.1%, $p<0.001$) and less likely to have HTX (11.4% vs 17.4%, $p=0.011$) and HPTX (12.9% vs 37.8%, $p<0.001$) as an indication. The rates of retained HTX (3.8% vs 13.2%, $p<0.001$) and VATS (0.4% vs 6.7%, $p<0.001$) were lower in the SB group. No differences were seen in rates of ARDS, VAP, empyema, and unplanned intubation between the groups. Hospital LOS (6 vs 8 days, $p=0.005$) was shorter and mortality was lower in the SB group (8.0% vs 19.1%, $p<0.001$). Adjusted analysis identified that SB tubes were protective from retained HTX and mortality. A subgroup analysis was performed on HTX/HPTX, significant difference persisted in this higher risk group and adjusted analysis showed that SB chest tubes did not predict mortality.
Conclusion: SB catheters for traumatic PTX and HTX are safe and effective without increasing the rate of VATS for retained HTX. These catheters are an effective alternative to large bore drains.

Poster #39

ANTIPLATELET MEDICATIONS: MAYBE NO BIG DEAL?

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Introduction: Brain Injury Guidelines (BIG), using clinical presentation, computed tomographic imaging of the brain (CT), and preinjury medications, are meant to assist in the management of traumatic brain injury (TBI) patients with a goal of determining who would benefit from repeat CT (RCT), admission, and neurosurgery involvement (NSi). The use of antiplatelet medication (AP) or anticoagulants (AC) was classified as BIG3 regardless of CT findings. The goal of this study was to determine the natural progression of lesions that would have been classified as BIG1 based upon imaging but were upgraded to BIG3 based solely on AP +/- AC usage.

Methods: This is an IRB exempt, retrospective study of all blunt TBI patients presenting from 1/2020-12/2021 to a Level II Trauma Center. All patients had a normal neurological exam, lacked intoxication, and had a positive initial CT consistent with BIG1 criteria. Patients were then stratified based upon usage of AP, AC, or BOTH medications. Primary outcome was need for NSi. Secondary outcome was injury progression on RCT. Independent t-tests were performed with statistical significance defined as $p < 0.05$.

Results: 223 patients met inclusion criteria. Mechanism of injury was most commonly fall in all groups. RCT was obtained in 206 patients (92%). Platelet function screens (PFS) were performed on 49 of the BIG1+AP patients (77%). Of those screened, 27 patients (55%) had an abnormal PFS of which 70% were treated with DDAVP +/- platelets. Within the BIG1+AC group, warfarin (n=11) was utilized with an average INR 2.4 (1.8-3.3). Warfarin reversal (PCC +/- Vitamin K) was performed in 82% (n=9). Novel oral ACs comprised the remainder of BIG1+AC patients (n=16) which were treated with PCC in 56% (n=9). No patient in the BIG1+BOTH received any reversal agents. No BIG1, BIG1+AP, or BIG1+BOTH patient required NSi but RCT did reveal clinically insignificant injury progression in 5%, 3% and 0%, respectively. However, 4 patients (15%) in the BIG1+AC group worsened radiographically and 2 (7%) required surgery for evacuation of increasing intracranial hemorrhage (ICH). All BIG1+AC patients with worsening RCT had received reversal agents. (PCC 4/4; Vit K 1/4).

Conclusions: While the use of AC emerged as a statistically significant risk factor for ICH progression when compared to BIG1 alone and resulted in the need for NSi in 7% of patients, AP usage did not appear to confer the same risk. We believe the need for reflex admission and NSi in BIG 1+AP patients would benefit from future multicenter study.

SDH (subdural hematoma); SAH (subarachnoid hemorrhage); IPC (intraparenchymal contusion) *statistically significant difference compared to BIG1

	BIG1	BIG1+ AP	BIG1+AC	BIG1+BOTH
Total Patients	128	64	27	4
Initial CT findings (%)	SDH(58); SAH(51); IPC(5); >1(14)	SDH(55); SAH(52); IPC(6); >1(14)	SDH(58); SAH(53); IPC(5); >1(16)	SAH(100)
Reimaged	115 (89.8%)	60 (93.8%)	27 (100%)	4 (100%)
Stable	82 (71.3%)	41 (68.3%)	20 (74.1%)	2 (50%)
Improved	27 (23.5%)	17 (28.3%)	3 (11.1%)	2 (50%)
Worsened	6 (5.2%)	2 (3.3%)	4 (14.8%) *	0 (0%)
Intervention	0 (0%)	0 (0%)	2 (7.4%)	0 (0%)

Poster #40

APPLICATION OF THE MODIFIED BRAIN INJURY GUIDELINES MAY REDUCE LOW VALUE TRAUMA TRANSFERS

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Introduction: Traditional management of traumatic brain injury (TBI) has required substantial resource utilization including ICU admission, repeat CT imaging, and neurosurgical consultation. The modified Brain Injury Guidelines (mBIG) can be used to risk stratify patients with mild TBIs. These guidelines have the potential to reduce low value transfers in patients who would otherwise not require a higher level of care. This study is unique from prior validation studies in examining transferred patients as a pre-specified subgroup.

Methods: The primary objective was to retrospectively validate the mBIG and secondarily examine the safety of mBIG 1 for transfer patients. A 1-year retrospective analysis of adult trauma patients with a diagnosis of mild TBI evaluated at an urban level 1 trauma center with a large rural catchment area was performed. Primary outcome measures were rates of neurosurgical intervention, unplanned ICU admission, and in-hospital mortality. A subgroup analysis of mBIG 1 patients was performed based on transfer status.

Results: Among 230 patients identified, 37, 51, and 142 were classified into the mBIG 1, 2, and 3 categories respectively. Neurosurgical intervention was performed in 8.45% of mBIG 3 patients and no mBIG 1 or 2 patients. There was 1 unplanned ICU admission in the mBIG 2 and 3 groups. There were no neurosurgical interventions, unplanned ICU admissions, or in-hospital mortality in the mBIG 1 group regardless of transfer status. 92% of mBIG 1 patients transferred from other facilities were discharged home.

Conclusion: Application of the mBIG may help safely avoid low value transfers. In our study, mBIG 1 transfer patients suffered no adverse outcomes related to their TBI and could have potentially avoided transfer. As the vast majority of mild TBI patients with low-risk features return home from the hospital, allowing patients to safely remain within their community for care may be beneficial from a patient and resource-utilization perspective.

Poster #41

GCC INTUBATION THRESHOLDS AND OUTCOMES OF PATIENTS WITH TRAUMATIC BRAIN INJURY: THE NEED FOR TAILORED PRACTICE MANAGEMENT GUIDELINES

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Introduction: Intubation of patients with a Glasgow Coma Scale score (GCS) of 8 or below remains a standard practice across U.S. healthcare institutions. This study aims to re-evaluate the GCS threshold for intubation in patients presenting to the ED with a traumatic brain injury to optimize outcomes and provide evidence for future practice management guidelines.
Methods: We retrospectively reviewed the ACS-TQIP-Participant Use File (PUF) 2015-2019 for adult trauma patients 18 years and older who experienced blunt traumatic head injury and received computerized tomography. Multivariable regressions were performed to assess associations between outcomes and GCS intubation thresholds of 5, 8, and 10.
Results: In patients with a GCS ≤5, there were no differences in mortality (GCS ≤5: 26.3% vs GCS >5: 28.3%, adjusted p=0.08), complication rates (GCS ≤5: 9.1% vs GCS >5: 10.3%, adjusted p=0.91), or ICU length of stay (GCS ≤5: 5.4 vs GCS >5: 4.7, adjusted p=0.36) between intubated and non-intubated patients. Intubated patients at GCS thresholds ≤8 (26.2% vs. 19.1%, adjusted p<0.0001) and ≤10 (25.6% vs. 15.8%, adjusted p<0.0001) had significantly higher mortality rates than non-intubated patients. Intubation at all GCS thresholds >5 resulted in higher rates of complications, H-LOS, and ICU-LOS when compared to non-intubated patients with the same GCS score.
Conclusion: A GCS ≤5 was the threshold at which intubation in TBI patients conferred an additional benefit in disposition without worsened outcomes of mortality, H-LOS, or ICU-LOS. Trauma societies and hospital institutions should revisit existing guidelines & protocols concerning the GCS threshold as an indicator of when intubation is necessary and safe.

Poster #42

IS MAGNETIC RESONACE ANGIORGRPHY (MRA) EQUIVALENT TO CT ANGIOGRAPHY (CTA) FOR DETECTING BLUNT CEREBROVACULAR INJURY (BCVI)?

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Introduction: Magnetic resonance angiography (MRA) screening for blunt cerebrovascular injury (BCVI) is considered to have decreased accuracy compared to CT angiography (CTA). However, MRA may be a more convenient test if other magnetic resonance imaging (MRI) is also ordered. There have been few studies directly comparing MRA and CTA for the diagnosis of BCVI. We hypothesized that with modern high field MRA imaging CTA and MRA would be equivalent.
Methods: All trauma patients with blunt injury who underwent both CTA and MRA from 6/2013 through 6/2022 were identified using the trauma registry and medical record data. Imaging findings were reviewed, and grade of injury assigned if not graded on the initial imaging report. Additional data collected included time between studies, vessels injured and if a stroke referable to an injured vessel was present. Grade of injury was compared between the imaging modalities and interrater reliability between MRA and CTA was assessed with intraclass correlation coefficient.
Results: 127 patients underwent both CTA and MRA to screen for, confirm or follow up a BCVI. With respect to image grading the table demonstrates high grade correlation for BCVI between MRA and CTA (table, highlighted boxes). Median time between studies was 1 day IQR (1,2). There were seven injuries (6 grade I, 1 grade II) present on CTA not detected by MRA. There was one grade I injury by MRA not detected by CTA. The intraclass correlation coefficient across all grades demonstrated excellent agreement [0.981, 95% CI (0.973 – 0.987), $p<0.001$]. There were 22 strokes with 19 occurring in patients with BCVI of which 12 were potentially referable to the injured vessel. There were no strokes in the patients where CTA and MRA were discordant on the presence of an injury. The only stroke that occurred with discordant studies occurred where the MRA grade was II and the CTA grade was I.
Conclusions: Using modern MRA imaging there appears to be a high degree of agreement between MRA and CTA for BCVI. MRA could be considered an acceptable screening alternative to CTA when MRA is a more convenient imaging modality. Additional larger studies comparing high field strength MRA to CTA should be done to validate these findings.

Poster #43

IT'S ALL IN YOUR HEAD: SAFETY OF WEIGHT-BASED, TARGETED ENOXAPARIN PROPHYLAXIS IN TBI PATIENTS

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Introduction: Standard enoxaparin (LVX) dosing is inferior to weight-based, anti-Xa targeted dosing regimens for venous thromboembolism (VTE) prophylaxis in trauma patients. Despite this, many trauma guidelines support standard low-dose LVX (30mg BID) in patients with traumatic brain injury (TBI) for fear of expansion of intracranial hemorrhage (ICH) and adverse neurological outcomes. We hypothesized that weight-based, anti-Xa targeted dosing is safe and effective in trauma patients with TBI.

Methods: We retrospectively reviewed TBI patients admitted to a Level I trauma center from 2015-2022. Patients were cleared to start LVX 48 hours after stable CT head. TBI patients who received weight-based LVX (50-59kg, 30mg BID; 60-99kg, 40mg BID; ≥100kg, 50mg BID) and had a peak anti-Xa level assessed (3-5 hours after ≥3rd dose, goal 0.2-0.4 IU/mL) were included. Charts were reviewed to assess for ICH expansion after initiation of LVX.

Results: Of the 557 TBI patients included, 434 (77.9%) received 40mg BID and 58 (10.4%) received 50mg BID. There were eight instances (1.4% of total patients) of ICH expansion. One patient (1.5%) in the 30mg cohort developed ICH expansion; they also had a supra-prophylactic anti-Xa level. Seven patients (1.6%) in the 40mg cohort developed expansion (OR 1.05, 95% CI [0.13, 8.67], p=0.48); none of these patients were supra-prophylactic. No patients in the 50mg cohort developed ICH expansion after LVX initiation.

	30mg BID	40mg BID	50mg BID	p-value
Number (% total)	65 (11.7%)	434 (77.9%)	58 (10.4%)	
Anti-Xa Results				
Anti-Xa [median (IQR)]	0.28 (0.21–0.36)	0.28 (0.22–0.35)	0.24 (0.20–0.33)	0.207
% Anti-Xa in-range	70.8%	68.9%	72.4%	0.837
ICH Expansion				
Expansion of ICH on Enoxaparin	1 (1.5%)	7 (1.6%)	0 (0%)	0.623

Conclusion: In this single center pilot study, weight-based LVX dosing did not result in significant ICH expansion, directly challenging current VTE prophylaxis guidelines for patients with TBI. These results should serve as a platform for multi-center prospective data collection to ultimately determine the safety and efficacy of weight-based LVX prophylaxis regimens in TBI patients.

Poster #44

DEVELOPING A NATIONAL TRAUMA RESEARCH ACTION PLAN: RESULTS FROM THE VASCULAR RESEARCH GAP DELPHI SURVEY

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Introduction: The recent National Trauma Research Action Plan (NTRAP) was designed to identify high-priority research questions in trauma care. The objective of this study was to review vascular specific research questions within the NTRAP review.
Methods: Experts in trauma care were recruited to identify current gaps in research and use a consensus-driven Delphi survey approach to determine the priority of unanswered research questions. Participants ranked each question as low, medium, or high priority with consensus defined as ≥60% of participants in agreement. Priority level was determined based on the arithmetic mean Delphi score.
Results: 7,345 research questions were generated by NTRAP. Of those questions, 247 vascular-specific research questions were identified via a validated Search Strategy of which 167 (68%) questions met consensus. Of the questions meeting consensus, 24 (14%) questions were high priority, 141 (84%) were medium priority, and 2 (1%) were low priority.
Conclusion: 24 high priority vascular trauma research questions were generated by the NTRAP Research Priority Panel. Future research funding should be focused towards addressing these important questions.

Table 1. Top Five High-Priority Vascular Trauma Research Questions with the Highest Arithmetic Mean of the Delphi Scores

1) Pediatric Trauma: For pediatric trauma patients with possible neck injury, is there an optimal screening tool for determining which patients require a CT angiogram to rule out vascular injury?
2) Personnel/Staffing: Does a surgical team lead by a broadly trained General Trauma/ACS surgeon have equivalent limb salvage rates as compared to a specialty team with vascular/orthopedics/plastics specialists for major extremity trauma?
3) Open Pelvic Fractures: In adult patients with open pelvis fractures, does routine use of angio embolization versus OR exploration and fixation improve outcomes in patients with evidence of pelvic fracture associated bleeding?
4) Impact of Hybrid Trauma Bay: Does the use of a hybrid OR improve outcomes in trauma patients with pelvic fractures?
5) Endovascular: What is the long-term success rate of endovascular treatment for traumatic injury? What are the long-term outcomes of endovascular interventions on young trauma patients?

Poster #45

EMERGENCY VASCULAR REPAIRS IN TRAUMA: PREDICTORS OF POOR PROGNOSIS AND A NOVEL SCORING SYSTEM

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Introduction: Vascular injuries comprise 1-2% of all trauma patients and predictors of morbidity or mortality are unclear. The purpose of this study was to establish predictors of revascularization failures, and compare repairs performed by trauma- and vascular-trained surgeons.
Methods: We performed a single-institution, case-control study of consecutive patients with traumatic arterial injuries who underwent open repair between 2016 and 2021. Multivariable logistic regression was used to investigate covariates impacting the primary composite outcome of repair failure/revision, amputation, or in-hospital mortality.
Results: Among 165 patients, median age was 34 (IQR 23-46), 149 (90%) were male, 67 (41%) were African American, and 99 (60%) suffered penetrating injury. Popliteal (46%) and superficial femoral (44%) arterial injuries were most common. Interposition graft/bypass was the most frequent repair (n=107, 65%). Primary outcome was observed in 24 (15%) patients, including 7 (4%) repair failures/revisions, 13 (8%) amputations, and 10 (6%) in-hospital mortalities. Cases were more likely to have blunt injury (67% vs. 36%, p=0.006), higher median mangled extremity severity score (MESS; 9 vs. 6, p<0.001), same-day laparotomy (33% vs. 12%, p=0.013), same-day orthopedic procedure (67% vs. 43%, p=0.028), and anterior tibial (29% vs. 10%, p=0.017) or tibioperoneal (42% vs. 12%, p=0.001) injuries. Two independent predictors of the outcome were identified using multivariable analysis – MESS > 8 (OR: 19.4, 95%CI: 5.82 - 64.5, p<0.001) and same day laparotomy or orthopedic procedure (OR: 6.81, 95%CI: 1.70 - 27.2, p=0.007). Of note, repair outcomes were similar between operating surgeon specialties. A novel composite scoring system was developed by combining MESS score, same-day procedure, mechanism of injury, and injury location. This system demonstrated a sensitivity of 100% with a score of 0 and a specificity of 95% with a score > 3.
Conclusions: We have demonstrated that surgical outcomes following traumatic lower extremity arterial repairs are similar between trauma- and vascular-trained surgeons. Additionally, we have developed a novel predictive scoring system that may be used to counsel patients and their families as well as guide future management.

Poster #46

GETTING TO THE HEART OF BLUNT CARDIAC INJURY

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Introduction: In 2012, guidelines were published establishing screening criteria for blunt cardiac injury (BCI). However, these criteria (abnormal EKG or elevated troponin) may be overly broad, resulting in unnecessary testing. Additionally, the impact of EKG abnormalities and troponin elevation on clinical outcomes remains undefined.
Methods: Five-year (2016-2020) retrospective study of BCI in consecutive sternal fracture patients surviving >24h. Mechanism of injury (MOI), demographic, and outcome data were collected from the trauma registry. 12-lead electrocardiogram and cardiac enzyme data were also collected. Patients screened positive for BCI if they had an abnormal EKG or troponin within the first 24h. Patients were then dichotomized by BCI screening status, and multivariable logistic regression was used to determine the association between EKG changes, troponin elevation, and mortality. Zero-inflated and negative binomial generalized linear models were used to model the effect of BCI on hospital and ICU lengths of stay (LOS).
Results: Of 959 sternal fracture patients, 464 (48%) screened positive for BCI. Demographics and MOI were similar between groups. Patients screening positive experienced more ventilator days (0[0-2] vs 0[0-0]), longer ICU LOS (0[0-7] vs 0[0-2] days) and hospital LOS (7[3-17] vs 4[2-9] days), and greater mortality (40[9%] vs 10[2%]; all $p<0.0001$). After controlling for confounders, screening positive for BCI remained associated with increased mortality. However, only ST segment abnormalities were associated with this risk (OR 3.1, 95%CI 1.4-6.7, $p=0.004$). Troponin elevation was not associated with an increased risk of mortality, but initial and 48h peak troponin were both associated with increased ICU LOS (RR 1.19, 95%CI 1.06-1.34, $p=0.004$) and hospital LOS (RR 1.14, 95%CI 1.06-1.23, $p<0.0001$) (FIGURE).
Conclusion: In patients with sternal fracture, nearly half screened positive for BCI. Increased mortality was primarily associated with ST segment abnormalities, while troponin elevations were associated with increased ICU and hospital LOS. Revised screening criteria, including a consideration of specific EKG abnormalities, may help physicians better focus treatment efforts.

Poster #47

THE 59TH TEMPORARY INTRAVASCULAR SHUNT OFFERS SURGEONS AN UPGRADE FROM CURRENTLY AVAILABLE VASCULAR SHUNTS

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Introduction: In the context of extremity trauma, the use of Temporary Intravascular Shunts (TIVS) has become more commonplace because of the flexibility it provides surgeons in emergency environments. Since their inception, the design of these devices has not changed significantly. The aim of this study was to test a novel TIVS designed by the 59th Medical Wing against industry standard to evaluate patency and the value of new modifications in a large animal model.
Methods: Twelve female anesthetized swine (60kg - 80kg) underwent a 20% controlled hemorrhage and administration of heparinized saline to undergo hemodilution. All swine underwent an open retroperitoneal approach to access the left iliac artery. The left iliac was opened as the intended site for placement of the shunt devices. Six swine received a standard Sundt shunt, and six swine received the 59th TIVS shunt which included an additional side port. Quantitative flow data from a distal artery was collected for twelve-hours. At completion, an angiogram was performed to confirm patency of the shunt and distal flow.
Results: Out of the twelve animals in the study, all animals survived shunt placement and the twelve-hour ICU period. The 59th TIVS group had 100% patency by flow analysis and angiography. The average flow rate among the six novel intravascular shunts was 145.67 ± 45.62 ml/min. In comparison, all six Sundt shunts also maintained patency, with an average flow rate of 91.50 ± 26.51 ml/min. Analysis was performed on the distal flow data using an unpaired t-test, which calculated the p value as 0.03.
Conclusion: Using this swine model, the 59th TIVS proved comparable in terms of patency compared to the standard Sundt shunt. The addition of the side port to the novel intravascular shunt provides additional utility including immediate angiography, pressure measurement, and medication infusion. The 59th TIVS offers surgeons more flexibility to manage vascular injury with similar durability to current shunts.

Poster #48

OPERATING THEATER VERSUS EMERGENCY ROOM RESUSCITATION – AN ANALYSIS OF A FLY-BY PROTOCOL EFFECTS ON MORTALITY

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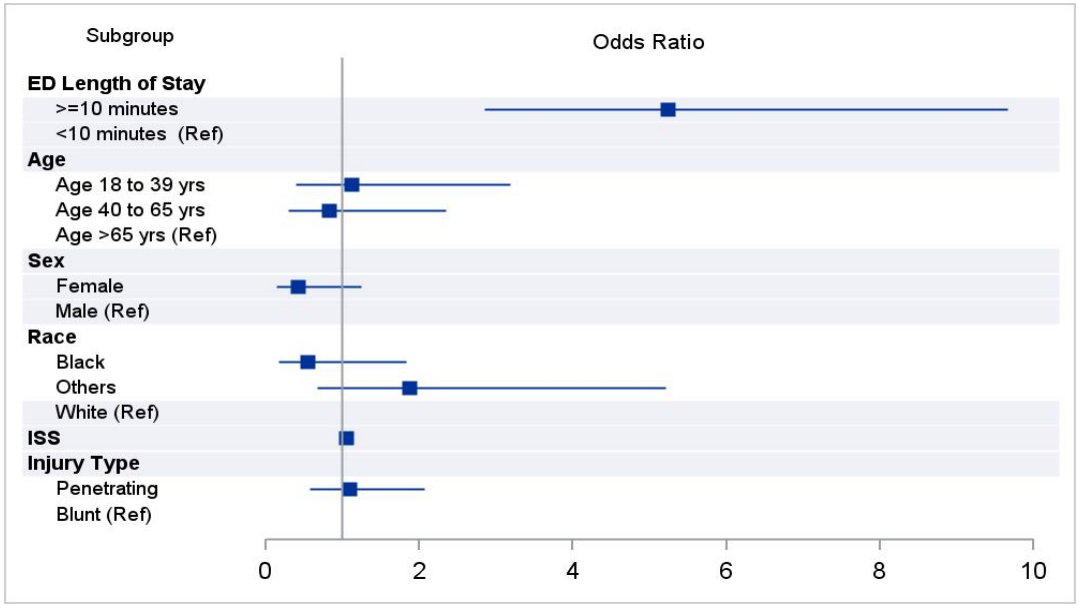
Introduction:The prompt initiation of resuscitation and control of hemorrhage leads to improved survival but optimal methods to achieve rapid treatment remains elusive. We, therefore, sought to determine if bypassing the trauma bay to perform resuscitative measures in the operating room were associated with improved outcomes in critically injured patients compared to those patients initially managed in the trauma bay.
Methods: Trauma patients admitted from 2017 to 2022 at a level 1 trauma center serving a rural population who spent less than 10 minutes in the ER (Fly-by) were propensity score matched to those who spent 10 or more minutes in the ER (Delay). The two groups were matched on injury mechanism, ISS, age and sex. Regression analysis was then performed to provide the odds of death based on whether patients were actually treated as Fly-by patients or not.
Results: After matching there were 131 patients in each group. Delay patients were more than 5 times more likely to die compared to Fly-by patients (OR= 5.24, $p<0.001$). Among the control variables, we found that patients who had higher mortality had a higher ISS score (OR = 1.057, $p<0.001$).
Conclusion: In the setting of rural trauma and prolonged transport times, a “fly-by” protocol maybe still be useful in reducing mortality. Further studies are needed to identify which treatment elements delivered in the operating room resuscitation are associated with these improved outcomes.



Poster #49

TRAUMA OUTCOME AND INJURY DISTRIBUTION IN CHILDREN AND ADULTS WITH PROTECTIVE DEVICES

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Introduction: Using protective devices can be lifesaving in motor vehicle accidents. There are differences in outcomes between children and adults who use these protective devices. This study investigates the trauma outcome and injury distribution in children and adults using protective devices.
Methods: We reviewed TQIP data from 2017-2019 for pediatric (1 month to 8 years) and adults (≥18 years) who had moderate to severe traumatic events (Injury severity score (ISS)> 9). Data were evaluated for cases that used child restraint devices or seat belt. Outcomes were mortality, cardiac arrest prior to hospitalization, injured region, hospital and ICU length of stay, and related complications.
Results: 158,432 patients were evaluated, including 2,509 pediatric patients and 155,923 adult patients. The mortality rate was 4.4% (6,928 patients). The majority of the traumatic injuries were soft tissue and skin injuries (33.5%), followed by head and neck injuries (30.8%) and thoracic injuries (23.6%). Pediatric patients were at risk of traumatic brain injuries compared to adults, while adults had higher rates of thoracic and abdominal injuries ($P< 0.001$). Overall Pediatric patients had higher trauma severity ($P< 0.001$) and lower initial total GCS ($P< 0.001$). Pediatric patients were also at higher risk for mortality, cardiac arrest prior to hospital, and requiring respiratory assistance ($P< 0.001$, for all). Adults had higher risk for unplanned admission to ICU ($P< 0.001$), unplanned intubation ($P< 0.001$) and ventilator-associated pneumonia ($P= 0.006$) as well as longer hospitalization ($P< 0.001$) and total days of ventilator support ($P= 0.001$).
Conclusion: There was a significant difference in the distribution of injury sites between adults and children that used protective devices. Brain injuries are more common in children while adults mainly sustain abdominal and thoracic injuries. Adults are better protected against traumatic brain injuries; however, pediatric protective devices demand further development and careful application to prevent traumatic brain injuries.

Poster #50

STATE-LEVEL ANALYSIS OF INTIMATE PARTNER VIOLENCE AND PERIPARTUM HOMICIDE: A CALL FOR UNIVERSAL SCREENING OF PREGNANT TRAUMA PATIENTS

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Introduction: Despite representing only 4% of the global population, the United States has the 5th highest number of intentional homicides in the world. Peripartum women represent a unique and vulnerable subset of homicide victims. This study aims to understand the risk factors for peripartum homicide.
Methods: This study evaluated homicides of peripartum women and a comparison population of women 12-50 years of age in the 2018-2020 National Violent Death Reporting System. Peripartum was defined as currently pregnant or within one year postpartum. A secondary analysis was performed to compare the peripartum homicide rates between states categorized as restrictive, neutral, or protective to abortion access based on recently publish data. Pearson's chi-squared and Wilcoxon rank-sum tests were used.
Results: There were 496 peripartum homicide victims compared to 8,644 non-peripartum victims. The peripartum group was younger (27.4 ± 71 vs 33.0 ± 9.6, $p<0.001$). Intimate partner violence (IPV) was more common in the peripartum homicide group (39.9% vs. 26.4%, $p<0.001$). Firearms were used in 63.4% of homicides among the peripartum group compared to 49.5% of homicides in the comparison population ($p<0.001$). Peripartum deaths per-capita were highest overall in Louisiana, Missouri, and Nevada. There was a significant difference in mortality rates between states based on policies regarding abortion access (protective: 0.110 vs. neutral: 0.134 vs. restrictive: 0.169 ($p<0.01$)).
Conclusion: Compared to non-peripartum peers, peripartum females are at increased risk for homicide due to IPV, specifically due to firearm violence. The rates of peripartum homicide increase as state policies become more restrictive to abortion access. There is a dire need for universal screening of peripartum trauma patients for IPV, firearm violence, and access to care. Identification of this population may help protect this vulnerable population.

Table 1: Rates of peripartum homicide in US states from 2018-2020 with varying access to abortion.

State Abortion Policy	Total Homicides	Total Population	Rate per 100,000	
Restrictive to Abortion Access	329	195,238,307	0.169	p<0.01
Neutral to Abortion Access	90	67,345,534	0.134	
Protective to Abortion Access	76	68,865,679	0.110	

Poster #51

THE ASSOCIATION BETWEEN FIREARM INJURY INTENT AND LETHALITY: THE NEED FOR TAILORED INTERVENTIONS

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Introduction: While the US has high quality data on firearm-related deaths, less information is available on those who arrive at trauma centers alive, especially those discharged from the ED. We sought to determine dominant causes of firearm-related in-hospital deaths, postulating that among those who survive to a trauma center, non-assault factors alone or in combination, might be important risk factors for in-hospital firearm-related deaths.
Methods: We conducted a large multi-center prospective cohort study of patients treated for firearm injuries at trauma centers participating in an ACS TQIP study from 3/2021-2/2022. Exposures included patient demographics, clinical injury-related factors, context of injury, and pre-existing mental health diagnoses. The primary outcome of interest was injury intent in order to determine factors associated with self-inflicted injuries and assaults. Measures of urbanicity and community distress (Distressed Communities Index) were utilized to better understand risk factors for lethal injury.
Results: There were 17,395 firearm-related injury encounters across 130 centers in 41 states. Overall, 10% of patients died. Assault and self-inflicted injury accounted for 77% of deaths, the latter being far more lethal than assaults. Using logistic regression, age ≥65, a history of military experience, mental illness, and living in a prosperous zip-code were risk factors associated with self-inflicted injury as compared to assaults.
Conclusion: The risk factors for firearm-related injuries differ by intent. With the goal of reducing firearm-related deaths, strategies and interventions need to be tailored, with a greater focus on mental health interventions and accessibility of firearms and services given the high lethality of self-inflicted injury.

Table 1. In-hospital Lethality of Firearm Injury by Intent

	Lethality, n (%)			
Injury Intent	**N (%)**	**Non-Lethal**	**Lethal**	**p-value**
Assault	12247 (70.4)	11239 (91.8)	1007 (8.2)	<0.0001
Self-Inflicted	758 (4.4)	380 (50.1)	379 (49.9)	
Unintentional	2122 (12.2)	2079 (98.0)	43 (2.0)	
Law Enforcement	160 (1.0)	129 (80.6)	31 (19.4)	
Missing	2108 (12.1)	1775 (84.2)	333 (15.8)	

Table 2. Predictors of Self-Inflicted Firearm Injury (Self-inflicted vs. Assault)

Variable	OR	95% Confidence Interval
Elderly (age ≥65)	8.53	(5.84-12.47)
Mental Illness	9.93	(7.86-12.55)
Military History	4.67	(2.81-7.74)
Prosperous zip-code	1.65	(1.20-2.27)

Poster #52

LONG GUN VIOLENCE IN CALIFORNIA VERSUS TEXAS: DOES LEGISLATION HELP REDUCE FIREARM VIOLENCE?

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Introduction: Long guns (LGs) (i.e., rifles or shotguns) are uniquely implicated in firearm violence and mass shootings. On 1/1/2019 California (CA) raised the minimum age to purchase LGs from 18 to 21. This study aimed to evaluate the incidence of LG violence in CA vs. Texas (TX), a state with rising firearm usage and fewer LG regulations, hypothesizing decreased LG firearm incidents in CA vs increased rates in TX after CA LG legislation.
Methods: A retrospective analysis of the Gun Violence Archive (2015-2021) was performed. An additional analysis of all firearm incidents within TX and CA was performed. CA and TX census data were used to calculate incidents of LG violence per 10,000,000 people. The primary outcome was the number of LG-related firearm incidents. Median yearly rates of LG violence per 10,000,000 people were compared for pre (2015-2018) vs post (2019-2021) CA LG legislation (Senate Bill 1100 (SB1100).
Results: Median LG incidents per 10,000,000 people decreased in CA post-SB1100 (4.21 vs 1.52, $p< 0.001$) by nearly 64%, whereas any gun firearm violence was similar pre vs post-SB1100 (77.0 vs 74.5 median incidents, $p=0.89$). In contrast, median LG incidents per 10,000,000 increased after SB1100 (4.34 vs 5.17 median incidents, $p=0.011$) by nearly 35% in TX, with any gun incidents also increasing by nearly 53% (83.48 vs 127.46, $p<.001$).
Conclusion: CA LG firearm incidents decreased following SB 1100 legislation whereas the incidence in TX increased during this same time. Meanwhile, the incidence of any firearm violence remained similar in CA but increased in TX. This suggests the sharp decline in CA LG incidents may be related to SB1100. Accordingly, increasing the age to purchase a LG from 18 to 21 at a federal level may help curtail LG violence nationally.

Poster #53

HOSPITAL-BASED VIOLENCE INTERVENTION PROGRAMS: A SYSTEMATIC REVIEW AND META-ANALYSIS OF THEIR EFFECT ON REINJURY AND VIOLENCE PERPETRATION

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Introduction: Levels of interpersonal violence in the United States have risen over the past decade despite the widespread use of criminalization strategies. Hospital-based violence intervention programs (HVIPs) represent an increasingly popular strategy to mitigate downstream effects of structural violence by addressing social determinants of health. The objective of this study is to perform an updated systematic review and quantitative synthesis to better assess the effectiveness of core programmatic elements of HVIPs.
Methods: We searched PubMed and six other databases using terms for hospital setting, violent injury, program, and reinjury/violence outcomes to identify studies assessing HVIPs that provide ≥3 months of intensive case management services to survivors of interpersonal violence. We assessed the primary outcome of reinjury and secondary outcome of violence perpetration and based our analysis on randomized controlled trials (RCTs) and moderate- to high-quality observational studies. For reinjury, we quantitatively pooled results using a random effects meta-analysis model. Given substantial heterogeneity in outcome measures for violence perpetration, we restricted our secondary analysis to qualitative review.
Results: Out of 9,576 studies identified in our search, 10 studies (n=2,447) met inclusion criteria for primary analysis, of which 7 were RCTs (n=701). Pooled data demonstrated an 8.2% (n=81/986) reinjury rate in HVIP vs. 11.9% (n=174/1,461) in comparison participants. Preliminary meta-analysis using available case analyses demonstrated a synthesized odds ratio of 0.55 (95% Confidence Interval [CI]: 0.33-0.91; $I^2 = 53.5\%$) for reinjury in the HVIP group compared to the control group and average risk ratio of 0.55 (95% CI: 0.25-1.19; $I^2 = 64.5\%$) when only including RCTs. Three of four (75%) RCTs showed reduced violence perpetration in HVIP participants.
Conclusion: HVIPs were associated with a ~45% reduction of reinjury and appear to be associated with reduced violence perpetration. The available literature suggests that increased funding for HVIPs is justified and should also be considered in the context of addressing structural drivers of violence.

Poster #54

CAN WE DISCHARGE CHILDREN WITH LOW-GRADE BLUNT LIVER OR SPLEEN INJURIES FROM THE ED

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Introduction: Recent studies suggest children with low-grade isolated blunt liver or spleen injuries (BLSI) are unlikely to require intervention and could be safely discharged from the emergency department (ED). Prior studies excluded patients retrospectively found to have other injuries, but clinical practice would need to identify children safe for discharge based on clinical presentation.
Methods: A secondary analysis of a prospective study of BLSI was performed. All patients with grade I or II liver or spleen injuries were evaluated for need for transfusion, laparotomy, laparoscopy, or angiography. Excel was used to model different scenarios to optimize safe discharge of low grade BLSI.
Results: Of 1004 patients in the prospective study, 433 (43%) had BLSI of grade I or II. By excluding patients with high grade pancreatic injury on CT scan (2), clinical signs of bleeding or Shock Index >1.5 (160), a GCS <10 (20), pelvic fractures (10), or femur fractures (5), a subset of 133 (31%) of low grade BLSI were identified. Of the 133, none had an intestinal injury requiring surgery for trauma. No patient required surgery for bleeding, or angiography. No patients required a blood transfusion, although 1 patient did receive an unindicated transfusion prior to arrival. 1 patient underwent a laparoscopic appendectomy at 96 hours post injury.
Conclusions: Among 1004 patients with blunt liver or spleen injury, 43% were low grade BLSI injuries. After excluding those with clinical signs of bleeding on arrival, associated injuries, fluid around the liver or spleen on CT, or elevated shock index, 31% of patients could have potentially been discharged from the ED. None of the 133 would have needed to return within 24 hours for an intestinal injury. Until safety is prospectively proven, reliable access to return care would still be mandatory to allow safe ED discharge.

Poster #55

EMERGENCY DEPARTMENT PEDIATRIC READINESS OF US TRAUMA CENTERS: ASSOCIATIONS WITH TRAUMA CENTER TYPE AND FACILITY CHARACTERISTICS

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Introduction: Emergency department (ED) pediatric readiness has been associated with lower mortality for injured children. Over the past decade, resources have been invested in improving pediatric readiness. This study aimed to quantify current levels of trauma center pediatric readiness and define associations between pediatric readiness and facility characteristics.

Methods: The study cohort included all centers contributing to the National Trauma Databank (NTDB) in 2021. Center characteristics and pediatric (0-15y) volume from the NTDB were linked to weighted pediatric readiness scores (wPRS) obtained from the National Pediatric Readiness Project 2021 national assessment. Univariate and multivariable analyses were used to determine associations between wPRS and facility characteristics.

Results: wPRS was reported for 77% (749/973) of NTDB centers, and was highest in ACS level 1 pediatric trauma centers (PTCs, Table). Annual pediatric volume, PTC designation, association with a pediatric hospital, and presence of a pediatric ward or intensive care unit (PICU) were all associated with higher wPRS on univariate analysis. Independent predictors of high wPRS included: ACS level 1 PTC verification, affiliation with a pediatric hospital, and presence of a PICU.

Conclusion: ED pediatric readiness in trauma centers remains variable and is associated with inpatient resources. Ongoing efforts to improve pediatric readiness at non-pediatric centers are needed, particularly in centers that routinely transfer children to higher level of care.

Weighted Pediatric Readiness Scores (wPRS) by Trauma Center Type

Center Type	N	Median (IQR) wPRS
ACS-verified level 1 pediatric trauma center (PTC)	59	98 (97, 100)
Freestanding PTC, not ACS level 1	21	96 (90-98)
Mixed adult/pediatric trauma center, not ACS level 1	68	92 (76-96)
Adult-only level 1 or level 2 trauma center	320	78 (66-92)
Level 3 or level 4 trauma center	251	72 (61-84)
Non-designated trauma center	30	79 (66-93)

Poster #56

FOLLOW-UP CT AND UNEXPECTED HEMOSTASIS DURING NOM FOR PEDIATRIC BLUNT LIVER AND SPLEEN INJURY

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Introduction: Non-operative management (NOM) for blunt liver and spleen injury (BLSI) has been widely accepted in pediatric populations. As pseudoaneurysm and its rupture are major complications in NOM, follow-up CT and prophylactic embolization with angiography are often conducted during NOM. However, results are conflicting regarding the utility of repeated CT for preventing unexpected hemorrhage. To elucidate whether early follow-up CT would decrease unexpected hemostatic procedure, we examined the data of a nationwide study on pediatric BLSI.
Methods: A post-hoc analysis of a multicenter observational cohort study on patients ≤ 16 years who had BLSI at 83 hospitals in 2008-2019 was conducted, and those who underwent NOM were included. Indications and timing of follow-up CT and treatment for pseudoaneurysm are decided by treating physicians without any predefined protocols. Incidence of unexpected hemostasis (laparotomy and/or emergency angiography for ruptured pseudoaneurysm), complications related to BLSI, and mortality were compared between patients with and without early follow-up CT ≤ 7 days after admission. Inverse probability weighting with propensity scores was conducted to adjust patient demographics, comorbidities, mechanism and severity of injury, vital signs, AAST grade for BLSI, angiography on the day of admission, and institutional characteristics.
Results: Among 1320 included patients, 552 underwent early follow-up CT imaging and the median duration to repeated CT was 3 days. The median AAST grades for liver/spleen injury were 3 and 2, and one fourth of patients underwent angiography on the day of admission. The incidence of unexpected hemostasis was rare and comparable between patients with and without early repeated CT (8 [1.4%] vs. 6 [0.8%]; adjusted OR, 1.44 [0.62-3.34]; p = 0.40). While 30-day mortality was 0.3% in both groups, patients with repeated CT scans more frequently underwent multiple angiographies (OR, 2.79 [1.32-5.88]) and had more complications related to BLSI, particularly bile leak (OR, 1.73 [1.04-2.87]).
Conclusion: Follow-up CT scans within one week after admission was not associated with reduced unexpected hemostasis in NOM for pediatric BLSI. Possible adverse events following early repeated CT were concerned.

Poster #57

PEDIATRIC TRAUMA PATIENT LEAVING AGAINST MEDICAL ADVICE: AN EXPLORATION OF CONTRIBUTING FACTORS

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Introduction: Leaving Against Medical Advice (AMA) has been on the rise in recent years, accounting for 1-2% of all hospital discharges with an average annual increase of 1.9%, leading to worse patient outcomes, disrupted patient care, and higher healthcare costs. However, AMA discharge has received limited studies, particularly in pediatric trauma patients. Although there is evidence of African American race and insurance status being associated with AMA in adult trauma patients, this relationship has yet to be explored in the pediatric trauma population. Our objective was to explore the demographic, socioeconomic, and clinical factors associated with leaving AMA in pediatric trauma patients.
Methods: We performed a retrospective analysis on pediatric trauma patients from 2017 to 2019 using the National Trauma Data Bank. Of the 2,24,196 patients included, 238 left AMA (0.1%). We examined patient characteristics, including age less than 18 years old, race, sex, Glasgow Coma Scale score, trauma type, primary payment methods, and Abbreviated Injury Scale. Multiple Logistic Regression models were utilized to determine the characteristics associated with leaving AMA.
Results: Black pediatric trauma patients were significantly more likely to leave AMA than nonblack patients (OR 1.99, 95% CI 1.50 to 2.63). Patients with self-pay coverage were more likely to leave AMA than those with other insurance coverage types (OR 1.76, 95% CI 1.18 to 2.61). Blunt trauma patients were more likely to leave AMA than those with penetrating trauma (OR 1.68, 95% CI 1.22 to 2.33). Older age was found to increase the odds of AMA discharge (OR 1.15, 95% CI 1.15 to 1.19). Pediatric patients with severe abdominal injuries and severe lower extremity injuries were less likely to leave AMA (OR 0.271, 95% CI 0.11 to 0.66 (OR 0.26, 95% CI 0.13 to 0.52).
Conclusion: Race, insurance, injury type, and age play a role in the AMA discharge of pediatric trauma patients. Black pediatric trauma patients exhibit a rate of AMA discharge that is twice that of nonblack patients. The issue of AMA discharge remains relevant, and addressing racial and socioeconomic factors may provide opportunities for future interventions in the pediatric trauma population.

Poster #58

RECENT CHANGES IN THE MANAGEMENT OF HIGH-GRADE BLUNT PANCREATIC INJURT IN CHILDREN: A NATIONWIDE TREND ANALYSIS, 2011-2021

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Introduction: The ideal management of pediatric patients with high-grade blunt pancreatic injury (BPI) involving pancreatic duct destruction remains controversial, while non-operative management (NOM) is widely adopted for low-grade BPI. The aim of this study was to assess the nationwide trends of the practice patterns and outcomes following high-grade BPI in children across pediatric (PTC), mixed (MTC), and adult trauma centers (ATC).
Methods: This is a retrospective analysis of the National Trauma Data Bank (NTDB) dataset. Our study cohort included pediatric patients (age ≤16 years) sustaining high-grade BPI (Abbreviated Injury Scale ≥ 3) from 2011 to 2021. Patients who did not undergo any pancreatic operation were categorized into the NOM group. Trauma centers were defined as PTC (level I/II pediatric only), MTC (level I/II adult and pediatric), and ATC (level I/II adult only). The primary outcome was the proportion of patients undergoing NOM, and the secondary outcomes included the use of endoscopic retrograde cholangiopancreatography (ERCP) and in-hospital mortality. A Cochran–Armitage test was used to examine whether a significant linear trend exists.
Results: A total of 812 children were analyzed. The median age was 9 years [IQR 6-13], 64% were male, and median ISS was 17 [10–25]. During the study period, there was a statistically significant upward linear trend in the use of NOM and ERCP among the overall cohort (range 48% to 66%; P_{trend} =0.035, range 6.1% to 19%; P_{trend} =0.029, respectively). The significant upward trend in the proportion of NOM was maintained in the combined subgroup of patients treated at PTC and MTC (P_{trend} =0.037), while no significant trend was noted in the subgroup of patients at ATC (P_{trend} =0.661). Overall, there was no significant trend in the mortality rate (P_{trend} =0.382).
Conclusions: This study found a significant trend toward an increasing indication of NOM and ERCP, particularly with direct involvement of pediatric centers. Further research is required to understand the factors driving these recent practice changes and their associations with patient outcomes.

Poster #59

STATEWIDE DISCHARGE DATA SUPPORTS DEVELOPMENT OF INCLUSIVE TRAUMA SYSTEM

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Introduction: American College of Surgeons verification and state designation of trauma centers (TC) are tools utilized to optimize outcomes in the care of injured patients. Where participation in organized care is optional, new legislation to mandate participation in an inclusive trauma system (TS) may require demonstration of an outcomes gap. Given differences in populations treated TC versus non TC (NTC), a validated risk adjusted methodology is required for comparison. ICD 10 based injury severity score (ICISS) has been validated and utilized for comparison of outcomes.
Methods: After IRB approval state Healthcare Cost and Utilization Project (HCUP) data 2018-2020 was utilized and TC and NTC compared. All patients, pediatric, non geriatric adult, geriatric patients, subgroups of femur fracture, and traumatic brain injury (TBI) groups were evaluated for mortality and complications.
Results: Of 3,316,016 discharges, 593,157 (17%) had at least one injury diagnosis code. After excluding transfer patients, 375,541 records remained. 56.5% of patients were treated at TC and had lower risk adjusted mortality, a lower frequency of acute kidney injury (AKI), ventilator associated mortality, pulmonary embolus and surgical site infection as well as lower mortality with AKI. In subgroup analysis comparisons were hampered by the disproportionate treatment of some subgroups at TC, including all pediatric subgroups, 82.8% of TBI and 97.6% of shock subgroups. Where statistical significance was achieved, increasing age, increasing severity of injury, female gender and treatment at a NTC adversely affected survival in multivariate analysis. More patients with proximal femur fractures were treated at NTC (55%) and there was no benefit from TC treatment on risk adjusted mortality. Race only influenced mortality outcomes in TBI 0-15.9 and AKI.
Conclusions: Comparison of outcomes in hospitals in a state with a non inclusive TS demonstrates improved outcomes in injury care at TC, as well as demonstration that current destination protocols bring the majority of patients with some significant injuries preferentially to TC. These data provide support for TS development, including consideration for a more inclusive TS where uniform clinical data acquisition can be used for risk adjustment. Limitations include the need to eliminate transferred patients to avoid duplication and the use of discharge codes for patient classification.

Poster #60

THE HIDDEN POST-INJURY BURDEN: FRAGMENTATION OF CARE AFTER BLUNT PANCREATIC INJURY

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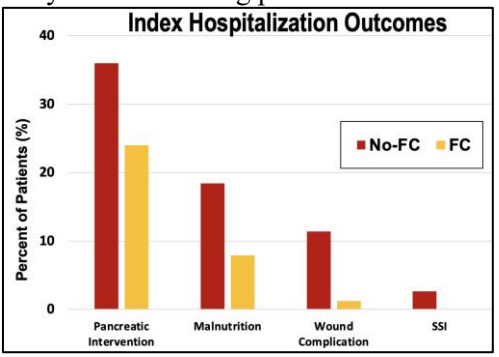
Introduction: Readmission to a different hospital leads to fragmentation of care (FC), and trauma patients may be uniquely vulnerable to FC. We analyzed FC incidence and outcomes after blunt pancreatic injuries (BPI).
Methods: The California Office of Statewide Health Planning Development dataset was evaluated for BPI (2016-2020). The primary outcome was FC rates by 6 months of discharge. FC were compared with those readmitted to their index admitting facility (no-FC). Distressed Communities Index (DCI) was used to measure socioeconomic factors.
Results: Among 539 patients with BPI, 264 met inclusion criteria. Over half of BPI (61%) experienced FC. Mechanism of Injury, Injury Severity Score, and abdominal Abbreviated Injury Score were similar between groups. Patients with FC had shorter index lengths of stay (4 v. 13 days) and shorter time to readmission (1 v. 15 days, both $p<0.01$). FC was less likely among patients who underwent operative interventions (36% v. 24%, $p=0.02$). There was no difference in age, sex, race, or intervention rates between groups at readmission. FC was more likely to occur among patients admitted to centers in low DCI areas. Patients with surgical site infections, malnutrition, or wound complications during index hospitalization were less likely to have FC (Fig). Among those with FC, 4% required intervention, and 1% died. Inflation-adjusted, median cost did not differ at the index hospitalization, nor the readmission between groups. Mortality during readmission did not vary by FC status.



Conclusion: BPI patients demonstrate a significant incidence of fragmentation of care. FC was more likely for centers in less distressed communities, and less likely for patients that had interventions, or incurred major wound or infectious complications.

Poster #61

COMMUNICATION MATTERS: THE IMPACT OF TRAUMA INFORMED CARE ON PATIENTS, FAMILIES, AND PROVIDERS

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Introduction: Trauma-informed care (TIC) is a set of principles designed to improve trauma care by recognizing the pervasive nature of trauma experiences; surgeon engagement can have significant impact on the trauma family experience. We aimed to characterize: 1) families' experience of communication in the Trauma Acute Care Surgery (TACS) ward, 2) differences between communication in TACS and the Surgical Trauma Intensive Care Unit (STICU), and 3) families' mental and emotional state.
Methods: This study was conducted at a Level 1 Trauma Center with a General Surgery Training Program. Surveys were collected from adult family members of patients admitted to TACS and STICU, as well as their attending and resident surgeons. Information access and communication with surgeons in TACS and STICU were compared using Wilcoxon rank sum test.
Results: TACS family members (N=42) and surgeons (N=27) completed surveys on 40 unique patients; data previously collected in the STICU included 88 families. TACS families reported meeting with a doctor less frequently (mean 3.44 times) than in STICU (mean 4.56; P=0.045). TACS families reported reduced information access, such as being able to get questions answered (50% TACS vs. 96% STICU; P<0.001) and being included in rounds (38% vs. 73%; P<0.001). Compared to STICU, TACS families agreed less frequently that the surgeon explained things in a way they could understand (71% vs. 90%; P=0.023) and listened carefully to them (69% vs. 85%; P=0.001). In TACS, families were less able to count on their friends for support (69% vs. 98%; P<0.001) and more likely to have little interest or pleasure in doing things (64% vs. 48%; P=0.024).
Conclusion: Family members report poorer quality of engagement with their providers, reduced access to information, and lower opinion of the quality of care after the ICU setting, while also experiencing less community support and increased anhedonia, a major symptom of depression. We recommend an increased focus on TIC principles in training and continuing education for both nurses and physicians to encourage care that increases patient and family control, validation, and empowerment for improved outcomes.

Poster #62

UNDERSTANDING THE NEEDS OF MEN EXPERIENCING DOMESTIC VIOLENCE WITHIN HOSPITAL-BASED VIOLENCE INTERVENTION PROGRAMS

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Introduction: An approach to reduce re-injury among trauma patients is linkage to hospital-based violence intervention programs (HVIPs) at time of injury. While domestic violence (DV) is a common cause of interpersonal violence, it is unclear what proportion of HVIP resources should be tailored to this violence type. We sought to characterize the extent of HVIP engagement dedicated to DV at a Level I Trauma Center, over five years.
Methods: This study uses mixed methods to examine the needs of patients engaged by our hospital's HVIP due to DV. Bivariate analysis of HVIP data contextualized the prevalence of imminent risk factors among patients with chi-square testing. Qualitative methods uncovered perceptions of patients among HVIP frontline staff using constructivist grounded theory. We analyzed patient cases to understand how staff build rapport with DV patients and assess their needs regarding imminent risk and safe discharge.
Results: Since 2018, our HVIP engaged more than 7,305 patients, with 12.5% presenting for injuries due to DV. Men and women have a similar likelihood of reporting DV, 57.2% and 42.8% ($p < 0.001$). Men engaged for DV report more imminent risk factors, relative to men engaged for community violence (CV) ($p < 0.001$). Factors include that someone currently wishes to harm the patient, patient was intended target, and patient experienced a similar injury in the past. Gendered stigma around DV deters men from seeking supports, including concerns with credibility and lack of confidence in ability to access services. Qualitative findings suggest HVIP staff occasionally misclassify an incident as CV, especially when a man is involved, and that there are challenges securing DV referrals for men.
Conclusion: At a new Level I trauma center, a significant share of men engaged by our HVIP report DV. DV in men is frequently conflated with CV. HVIP staff build a unique relationship and rapport with patients that may foster a safe environment for DV disclosure, especially among men. There is an opportunity for HVIPs to develop improved protocols to support men experiencing DV.

Poster #63

UNRAVELING THE VALUE OF TRAUMA ACTIVATION PAGES USING NATURAL LANGUAGE PROCESSING AND CLINICAL INTUITION

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Introduction: Hospitals generally circulate trauma activation pages to alert providers of incoming trauma patients. The content of such pages is often limited, sometimes misleading and inaccurate, and there is minimal to no standardization of content. The optimal content and structure for conveying patient acuity and clinical requirements is unknown. In this study, we sought to investigate the correlation between content of trauma activation pages and injury severity, as measured by Injury Severity Score (ISS). Surgeons and natural language processing algorithms were asked to predict injury severity and determine if a page containing limited data could convey equivalent information to a full, unstructured page.

Methods: All trauma activations from 2017 to 2021 at a single, academic level 1 trauma center were identified; patient demographics, trauma activation pages, activation level, mode of arrival, and injury severity scores were obtained. Descriptive statistics were performed. First, we asked attending trauma surgeons and acute care surgical fellows (N=6) to predict patient ISS clusters and likelihood of requiring surgical or interventional procedure within 6 hours of presentation based on (a) limited data elements and (b) the full text of the page. Natural language processing methods were applied to assess the value pages. In particular, term frequency-inverse document frequency (text frequency) analysis was performed. Logistic regression was used to independently predict injury severity based on (a) limited data elements (patient demographics, activation level, and transfer status) and (b) the full text of activation pages. Feature importance of individual phrases was assessed within each group. Model performance was assessed using accuracy and area under the receiver operating characteristic curve.

Results: Data for 3,797 trauma activations were obtained. Mean patient age was 48 years (SD +/- 21). 21% (N=794) were classified as high priority ("STAT"). Nearly 53% of patients presented directly from the scene (N=2023), with the remainder being transferred after initial evaluation at another hospital. Median ISS was 5 (IQR 4-10). On average, activation pages contained 9.4 words. The following 5 words were most frequently included in the page: fall (N=1595), crash (N=1454), motor vehicle (N=1238), fracture (N=689), and struck (N=511). Surgeons correctly predicted the ISS clusters for 49.4% (355/718) and 42.9% (256/597) of pages based on full text and limited data only, respectively. Text frequency analysis had an accuracy of 67% (95% CI: 64-70%) to predict injury severity clusters. Accuracy dropped to 32.0% when using limited data elements in a logistic regression model (Panel A). Independent of model type, activation level was most highly correlated with severity (odds ratio = 1.89, $p<0.05$). Feature importance is stratified by injury severity (Panel B). Surgeons correctly predicted whether a patient would require an intervention within 6 hours of presentation in 80.9% and 83.9% of cases, though the positive predictive value was 25.9% and 24.6% based on predictions for full text and limited data.

Conclusion: The full content of trauma activation pages was more predictive of injury severity than a page that only included a limited subset of objective data. Surgeons showed similar capabilities; they were able to predict ISS clusters with higher performance when given more data. However, in all cases, trauma page information was only moderately predictive of ultimate injury severity. Future research is needed to further investigate the optimal content of trauma activation pages.

Poster #64

THE ABC SCORE DOES NOT PREDICT TRAUMATIC HEMORRHAGE IN AN INDIAN TRAUMA REGISTRY

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Introduction: In low- and middle-income countries (LMICs), the burden of trauma is high while access to blood products is limited. Effective decision-support tools are needed to help decide whether to mobilize scarce resources, such as massive blood transfusion. Our primary aim was to assess the performance of the Assessment of Blood Consumption (ABC) score - a common decision-aid for initiating massive blood transfusions in high-income country (HIC) trauma systems - within the Indian context.
Methods: We analyzed data from the Towards Improved Trauma Care Outcomes (TITCO) database, a prospective cohort of injured patients who presented to four Indian public hospitals between 2013 to 2015. We classified patients as having traumatic hemorrhage if they had an ICD-10 code for a solid organ injury and/or hemorrhage and also received at least one unit of transfusion. Test characteristics of the ABC score were assessed with area-under-the-receiver-operator characteristics (AUC) curves. Patient demographics, injury characteristics, and clinical outcomes were analyzed using multivariate logistic regression models to identify factors associated with traumatic hemorrhage.
Results: Of 5,080 patients were included in this analysis, 353 (6.95%) were identified as having traumatic hemorrhage and 4,727 (93.05%) were not. In this population, the ABC score had a sensitivity and specificity of 32.4% and 90.7%, respectively, when a cutoff of greater than or equal to 2 was used to predict bleeding. Logistic models revealed that road-traffic injury (RTI), arrival by private vehicle, elevated HR, low SBP, positive FAST, and mild GCS were all positively associated with traumatic hemorrhage.
Conclusion: The performance of the ABC is poor in the Indian context. Clinicians should use caution in applying decision-support tools developed for other contexts to their own. Several injury and patient characteristics were identified that may have more relevance to decision for transfusion in the urban Indian trauma setting.

Poster #65

THE STATUS OF ROAD SAFETY IN QATAR AFTER A DECADE OF ACTION: ANALYZING NATIONAL STATISTICS AND NATIONAL TRAUMA REGISTRY DATA

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Introduction: Road traffic injuries [RTIs] are the leading cause of preventable mortality in Qatar. In 2011, the country opted to participate in the Decade of Action for Global Road Safety [DoARS], with the goal to reduce the number of road traffic deaths and injuries by 50% by 2020. The objective of this study is to analyze indicators of road safety in Qatar, from 2011-2020, by combining national statistics and trauma registry data to report the status of road safety in Qatar and make recommendations to further improve road safety

Methods: Data on all patients with moderate to severe road traffic injuries seeking hospitalization and/or care from 2011-2020, were be collected from the trauma registry of the national Level 1 trauma referral center. Monthly and annual aggregate data on road traffic deaths, injuries and motor vehicle crashes, from the publicly accessible website of the Ministry of Development, Planning and Statistics were likewise collected.

Results: The RTI death rate [per 100,000 population] was reduced by 61% and the RTI rate reduced by 38%, from 2011 to 2020. The pre-hospital RTI death rate dropped by 60% while the in-hospital RTI death rate was reduced by 65%. It is estimated that 858 potential road deaths were prevented during the DoARS in Qatar.

Conclusion: The participation in the Decade of Action for Global Road Safety, by complying with the UN-recommended 5-pillars approach, by Qatar has resulted in reductions in road deaths and injuries that exceed the goals set by DoARS.

Poster #66

FROM TARGETS TO SOLUTIONS: IMPLEMENTING A TRAUMA QUALITY IMPROVEMENT BUNDLE IN CAMEROON

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Introduction: Global surgery research has been criticized for failing to transition from problem identification to solution implementation. A recent trauma quality improvement (TQI) program in Cameroon associated preventable deaths with deficiencies in primary survey evaluation and management. We introduced a context-specific TQI intervention to improve site-specific care gaps at a regional hospital in Cameroon.
Methods: Data on local trauma care practices were used to develop a bundle consisting of staff training, a trauma checklist, and monthly audit meetings. Trends in target process measures, including vital sign collection and primary survey performance, were compared between the six-month pre-intervention and post-intervention periods using chi-square analysis.
Results: Analysis included 246 pre-intervention and 217 post-intervention patients. Completion of all vital signs improved significantly after TQI implementation (Figure 1). Vital signs were measured more quickly (89% within 15 minutes vs. 78% pre-intervention, $p < 0.05$) and more frequently (53% with repeated vitals vs. 8%, $p < 0.01$). Primary survey assessment increasingly identified airway problems (8% vs. <1%, $p < 0.001$) and breathing problems (10% vs. 3%, $p < 0.001$) post-TQI, and interventions for respiratory issues (10% vs. 1%, $p < 0.001$) and cervical collar placement (8% vs. 0%, $p < 0.001$) were performed more frequently.
Conclusion: Implementation of a context-tailored TQI bundle was associated with significant improvements in previously identified target areas. Local data-derived interventions targeting frontline capacity can bridge the gap between recognized care deficits and tangible improvement in resource-limited settings.

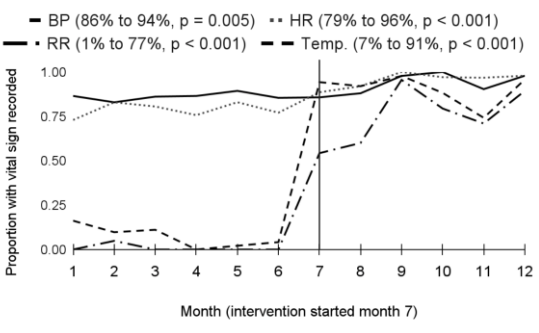

Figure 1: *Frequency of vital sign collection pre- vs. post-intervention*

Poster #67

ON MORTALITY RISK-ADJUSTMENT IN A CROSS-NATIONAL STUDY OF INJURED PATIENTS IN THE U.S. AND INDIA

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Introduction: Injury severity, typically measured by Injury Severity Score (ISS), is a major determinant of mortality after trauma. Adjusting for injury severity is essential when comparing mortality across different settings. Access to advanced imaging, critical for accurate ISS determination, is often severely limited in low/middle income countries (LMIC). Hence, ISS may not accurately reflect injury severity in these resource constrained environments. MGAP (Mechanism, Glasgow Coma Score, Age and blood Pressure), is not dependent upon imaging. The current study evaluates the accuracy of mortality prediction using MGAP versus ISS in an LMIC (India) and a high-income country (USA).
Methods: 2013-15 data from US National Trauma Data Bank (NTDB) and India Towards Improved Trauma Care Outcomes (TITCO) database was matched. Logistic regression models grouping patients within facilities were used to determine predictors of mortality. Models were varied to use ISS and MGAP for risk-adjustment, and the estimates compared. Inverse probability weighted regression adjustment (IPWRA) was used to estimate the population-level trauma mortality difference between the US and India.
Results: 687,407 adult patients (NTDB: 675,611; TITCO: 11,796) were included. Unadjusted mortality was significantly higher in India (23.15% vs 2.79% - $p < 0.001$). Overall, MGAP outperformed ISS for mortality prediction (AUROC 0.87 vs 0.81 - $p<0.001$). In NTDB, both scores performed well, though MGAP was superior (AUROC 0.88 vs 0.85 - $p<0.001$). In TITCO, while MGAP was highly predictive, ISS had poor predictability (AUROC 0.82 vs 0.58 - $p<0.001$) - Fig. The odds of mortality in India were higher with ISS based risk adjustment (OR 15.61, 95% CI 12.83-18.99) vs MGAP (OR 9.73, 95% CI 7.48-12.65). Using IPWRA, the difference between MGAP and ISS persisted, with ISS models showing an 11.4% relative increase in estimated mortality probability.
Conclusions: In low resourced environments with limited access to imaging after trauma, anatomical scores (e.g. ISS) are highly inaccurate for risk adjustment. Non-anatomical risk scores not dependent upon imaging intensity such as MGAP are highly accurate and superior to ISS.

Poster #68

TRENDS OF TRAUMA ADMISSIONS TO ICU DURING PANDEMIC: A TIME SERIES ANALYSIS

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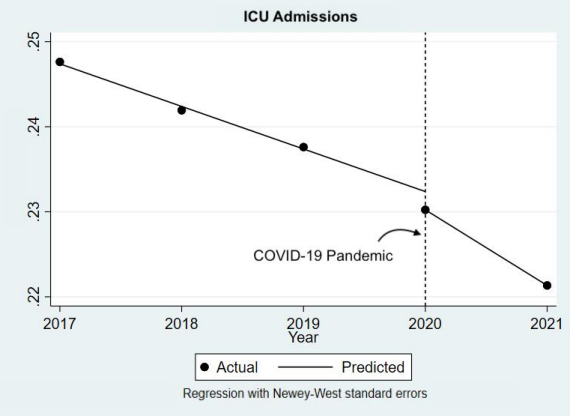
Introduction: During COVID-19 pandemic numerous modifications in management of patients was implemented in major trauma center to accommodate for the surge of ICU admissions while trauma admissions was at an all-time high. The aim of our study is to assess resource utilization during COVID-19 pandemic. We hypothesized that there was a decrease in ICU admissions among all trauma patients with similar characteristic during COVID-19 pandemic.

Methods: We performed a retrospective study of TQIP database (2017-2021), Patients admitted in 2017 - 2019 were defined as pre-pandemic period and 2020 and 2021 were defined as pandemic period. The primary outcomes were ICU admission. Secondary outcomes were mortality, hospital and ICU length of stay. Interrupted time series analysis was performed.



Results: Comparing pre-pandemic period to pandemic period patient attributes, and injury patterns were similar. Mortality rate was 3.5% on average. 59.3% of trauma patients were male and 74% were white. ICU admissions for trauma patient has been significantly reduced during pandemic (figure 1). While ICU length of stay remained similar (5.05 + 6.7 vs 5.23 + 6.8) for admitted patients, hospital length of stay was shorter during pandemic (5.3 + 8 vs 4.1 + 5.1).

Conclusion: ICU admissions of trauma patients have been declining over the years and this decline became steeper during pandemic. A natural hazardous phenomenon like pandemic which stressed healthcare systems nationwide triggered a rerouting of resource utilization, however outcomes for trauma patients remained similar.

Poster #69

THE COMMUNITY OF TRAUMA CARE: PARTNERING WITH STAKEHOLDERS TO IMPROVE INJURY OUTCOMES

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Introduction: Engaging trauma survivors/caregivers results in research findings that are more relevant to patients' needs and priorities. As such, their perspectives increase research significance; however, the underlying presumption is a lack of consensus. We aimed to describe stakeholder perspectives to assure research is meaningful, respectful, and relevant to the injured patient and their caregivers.
Methods: A multiphase, inductive exploratory qualitative study was performed, the first phase of which is described here. Virtual focus groups to elicit stakeholder perspectives and preferences were conducted across 19 trauma centers in the United States during 2022. Discussion topics were chosen to identify patients' motivation to join research studies, preferences regarding consent, suggestions for increasing diversity and access, and feelings regarding outcomes, efficacy, and exception from informed consent. The focus groups were audio recorded, transcribed, coded, and analyzed to identify the range of perspectives and common themes.
Results: Ten 90-minute focus groups included patients/caregivers (n=21/1) and researchers (n=14). Data analysis identified common themes emerging across groups (Table 1). The importance of trust and pre-existing relationships with the clinical care team pervaded the data across all groups.
Conclusion: Our findings reveal common themes in preferences, motivations, and best practices to increase participation in trauma research. The next phases will involve a vignette based survey to establish broad stakeholder consensus, followed by education and dissemination to share strategies to increase research engagement and relevance for patients, and form a panel of patients to support future research endeavors.

Table 1.

Topics of Discussion	Themes
Motivation to Participate	Altruism, New knowledge/perspective, Health status, Recognition of benefits of giving back
Informed Consent Best Practices	Timing, Researcher's approach/characteristics, Focus on altruistic nature, Trust/respect

Poster #70

ANTIBIOTICS AND SURGICALLY TREATED ACUTE APPENDICITIS, WHEN WHERE AND WHY?

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Introduction: Antibiotics within an hour of incision reduces the incidence of surgical site infection (SSI) in clean-contaminated abdominal surgery. Patients who undergo emergency surgery are often receiving treatment antibiotics and may not benefit from additional antibiotics immediately prior to skin incision though hospital protocols may recommend them. We hypothesized that additional prophylactic antibiotic coverage does not decrease incidence of SSI in emergency appendectomy patients.
Methods: We evaluated outcomes of patients after a policy change recommending pre-incision antibiotics regardless of ongoing antimicrobial therapy. We reviewed all adult patients at a single institution that underwent emergency appendectomies for acute appendicitis between 2013 and 2020. Variables included age, sex, perforation, body mass index (BMI), Elixhauser comorbidity index (ECI), surgical approach, emergency department antibiotics (EDA), and preoperative antibiotics. EDA were further subclassified into none, narrow and broad spectrum. The primary outcomes were superficial/deep and organ-space SSIs. Bivariable and multivariable logistic regression models were created to assess the independent impact of each strategy. Multivariable models compared those receiving pre-incision cefazolin to those receiving no pre-incision antibiotics.
Results: Patients (n= 1328) with a mean age (SD) of 39.5 (17.0) years (40% female) were reviewed. Age, sex, perforated appendicitis, EDA, ECI and BMI all were predictive of infection (table). Pre-incision antibiotics were not predictive of SSI (p= 0.632). After adjustment for age, sex, perforation, EDA, ECI and BMI only perforation [OR 17.08 95% CI (6.97 – 51.43)] and male sex [OR 2.75 95% CI (1.29 – 6.43)] were associated with organ-space infection while pre-incision cefazolin was not [OR 0.83 95% CI (0.38 – 1.97)]. ED broad spectrum antibiotics were associated with lower incidence of superficial/deep infection [OR 0.06 95% CI (0.00 – 0.68)] however pre-incision cefazolin was not [OR 0.71 95% CI (0.08 – 15.34)].
Conclusion: For patients undergoing emergency appendectomies who have received broad spectrum antibiotic treatment, additional pre-incision cefazolin does not reduce the incidence of superficial/deep or organ-space SSI.

Poster #71

ANTIHISTAMINES VS. RESUSCITATION AND COMPLICATIONS IN BURN INJURIES: A RETROSPECTIVE STUDY

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Introduction: In theory, management of vascular permeability after thermal injuries via antihistamines may reduce the histamine-mediated synthesis of reactive oxygen species, inflammation, and edema. Antihistamine use to target microvascular endothelial barrier dysfunction following thermal injuries in humans is not well known. The therapeutic application of histamine receptor antagonists may reduce resuscitation requirements and ultimately improve outcomes in thermal injuries.
Methods: A retrospective analysis was conducted using the EMR records at the University Medical Center in Lubbock, TX. We checked if the burn patients from July 2015 to July 2021 (N=199) had a previous prescription for antihistamines prior to the hospital visit and/or a 24-hour Medical Administration Record (MAR) of antihistamines during the hospital stay. The patients were grouped into three categories: control (no antihistamine usage), patients using H1 blockers, and patients using H2 blockers. Outcomes were assessed on infection rates, sepsis development, graft loss ≥ 20%, hospital LOS, acute kidney injury, amount of resuscitation fluid used, urine output, and mortality.
Results: Out of the participants, 39.7% used H2 blockers, and 7.7% used H1 blockers. Chi square analysis was used. When compared to the control group, there were no significant differences in outcomes relating to graft loss of over 20% or infection rates in patients using H1 or H2 blockers. However, only H2 blockers were found to significantly decrease mortality rates ($p=0.018$) in burn patients in comparison to the control group.
Conclusion: H2 blocker usage prior to or within 24 hours of a burn injury can potentially decrease mortality rates. The antagonistic mechanism of H2 blockers on histamine-mediated processes in a burn injury may contribute to improved vascular permeability management and, thus, decreased damage from burn-induced reactive oxygen species and edema.

Poster #72

DEVELOPMENT AND VALIDATION OF A PREDICTIVE MODEL FOR ACUTE RESPIRATORY DISTRESS SYNDROME AFTER TRAUMA

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Introduction: ARDS is a well-known complication after trauma associated with increased morbidity and mortality. Little is known about factors predisposing injury victims to develop ARDS. With the current project we aim to develop a predictive model for ARDS development after trauma.
Methods: The TQIP database (2013-2020) was queried. Patients ≥15 years with a hospital stay ≥48h were examined. Data were split into training and testing subsets at a 4:1 ratio. Uni- & multi-variable logistic regression models were fitted, and subsequently ten-fold cross-validated with a logistic LASSO model to select optimal penalization for AUC maximization. Variable selection cut-offs were determined with Yudens J-statistic.
Results: A total of 4,045,541 patients were analyzed. The selected LASSO model reduced the variable pool from 58 considered to 35, without sacrificing performance (all-models AUC 0.83). Male gender [O.R. 1.48 95% C.I. (1.43-1.53)], and BMI [1.01 (1.01-1.01)], as well as history of diabetes [1.13 (1.08-1.17)], bleeding disorders [1.94 (1.83-2.05)], COPD (but not smoking) [1.59 (1.52-1.67)], hypertension [1.16 (1.12-1.20)], prior MI [1.94 (1.76-2.14)], CHF [1.28 (1.20-1.37)], alcoholism [1.66 (1.59-1.73)] & cirrhosis [1.68 (1.53-1.85)] all predisposed for ARDS. Penetrating (and specifically firearm) injuries [6.44 (2.87-14.41)], as well as burns [3.01 (2.71-3.34)], motor-vehicle crashes [1.6 (1.54-1.67)] and struck pedestrians [1.58 (1.48-1.69)] also independently increased risk for ARDS, as did lower pressure [0.997 (0.997-0.998)], temperature [0.84 (0.82-0.86)], O2 [0.989 (0.987-0.99)], and GCS [0.87 (0.87-0.87)] in the ED. Patients with rib [1.56 (1.51-1.61)] (and especially flail chest [2.31 (2.16-2.47)]) and pelvic [1.19 (1.14-1.24)] (but not lower extremity) fractures, pulmonary contusions [1.94 (1.86-2.01)], and those requiring thoracotomy [2.04 (1.83-2.27)], or cranial decompression [2.30 (2.12-2.49)] had increased risk for ARDS. Contrast to published data, age and race were not predictors, and neither were plasma, platelet and cryoprecipitate transfusions. Red blood cells were [1.06 (1.05-1.07)].
Conclusion: Our validated model may be used as an online tool to determine patients at risk for ARDS development, so critical care admission and appropriate strategies and resources can be allocated.

Poster #73

DIVING DEEPER INTO POST-INJURY SEPSIS: EPIDEMIOLOGY OF CULTURE NEGATIVE AND RECURRENT SEPSIS

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Introduction: While critically injured trauma patients are known to be at high-risk for subsequent infection, patterns of negative microbiologic culture and recurrent sepsis events remain poorly understood.
Methods: We performed a retrospective analysis of 3,194 critically ill trauma patients admitted to our Level 1 Trauma Center between 2012-2020 requiring mechanical ventilation ≥3 days. Sepsis events were identified by a novel, automated method based on clinical data from the electronic health record, consistent with Sepsis-3 definitions. Culture results and recurrent sepsis episodes were determined and linked to clinical outcomes.
Results: The overall incidence rate of sepsis in this severely injured (median ISS 30, IQR 25-43) population was 24% (n=747/3194). The median time to onset of 1st sepsis episode was 8 days (IQR 6-11). Half of all initial sepsis events (n=372, 49%) occurred within the first 7 days, while only 12% (n=93) developed late, after day 14. Pre-existing organ dysfunction was common prior to sepsis onset (SOFA 3, IQR 2-6). While microbiologically confirmed pneumonia was the leading source of infection (n=342, 46%), one-third (n=249, 33%) of initial sepsis events were culture negative. More than one-third of septic patients (n=257, 34%) developed 1 or more additional sepsis episodes during their hospitalization. Compared to isolated septic episodes, a trajectory of recurrent sepsis was independently associated with baseline characteristics of shock on arrival, advancing age, and penetrating mechanism. Additionally, the incidence of chronic critical illness (61% vs 36%), as well as ventilator, ICU & hospital days, were all significantly greater in patients with recurrent sepsis events (all $p<0.001$).
Conclusion: A high rate of negative microbiologic cultures and pre-existing organ dysfunction are likely contributors to the challenges of timely and accurate diagnosis of sepsis among critically ill trauma patients. Recurrent sepsis episodes are associated with a clinical trajectory of chronic critical illness, which has been linked with an endotype of persistent inflammation and immunosuppression, and poor long-term outcomes.

Poster #74

EFFECT OF VOLUME RESUSCITATION ON CEFAZOLIN PHARMACOKINETICS IN TRAUMA PATIENTS

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Introduction: Cefazolin is regularly used as prophylaxis in trauma patients to avoid infection. However, evidence-based antibiotic dosing guidelines are lacking among patients receiving massive transfusion. We hypothesized that an association between volume resuscitation and cefazolin pharmacokinetics (PK) exists.

Methods: We conducted a prospective study to develop a population PK model using remnant blood samples of fifteen trauma patients meeting indications for cefazolin and initiation of massive transfusion protocol. Individual Bayesian estimates for cefazolin clearance (CL) and volume of the central compartment (V_c) were derived from the model. Linear regression was performed to evaluate associations between these PK parameters and various volume resuscitations received including whole blood, packed red blood cells (PRBCs), fresh frozen plasma (FFP), and crystalloids.

Results: Patients received between 525-2100ml of whole blood, 350-9223ml of PRBCs, 0-5265ml of FFP, and 1400-6025ml of crystalloid. The median cefazolin CL and V_c were 4.6 L/h (range 1.6-10.3 L/h) and 4.4 L (range 2.3-25.2 L), respectively. The p-value (*P*) and R^2 for the association between resuscitation type and cefazolin CL and V_c are listed in the table below.

Resuscitation type	CL	V_c
Whole blood	P=0.08, R^2=0.2	P=0.3, R^2=0.07
PRBCs	P=0.9, R^2=0.0004	P=0.6, R^2=0.02
FFP	P=0.9, R^2=0.002	P=0.2, R^2=0.1
Total blood products	P=0.9, R^2=0.001	P=0.3, R^2=0.01
Crystalloids	P=0.7, R^2=0.008	P=0.5, R^2=0.03
Total volume resuscitation	P=0.83, R^2=0.004	P=0.2, R^2=0.1

Conclusions: In this prospective pilot study, there was no statistically significant association between cefazolin PK parameters and the amount of volume resuscitation received. These data suggest that re-dosing of cefazolin should be conducted independent of the volume of blood products or crystalloid administered.

Poster #75

FACTORS ASSOCIATED WITH ANXIETY AND DEPRESSION AT ONE-YEAR POST-MAJOR TRAUMA: A MULTI CENTRE STUDY

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Introduction: Longer term recovery following trauma is impacted by physical and psychological factors. The presence and impact of anxiety and depression on longer term recovery in severely injured patients is unknown. This multi-site study investigated the prevalence of anxiety and depression at one year after trauma critical care admission.
Methods: Adult trauma patients admitted to four Level 1 Critical Care Units were enrolled over 18 months. Survivors were followed-up at one year post injury using EQ-5D-5L questionnaires (n=990). Patient responses were dichotomized into those with or without reported anxiety or depression.
Results: 295 questionnaires were completed (30% response rate). Two thirds (63%) reported anxiety or depression (AoD) at one year following injury, and this was associated with a worse overall health state ($p<0.0001$). Those with AoD were younger (53 years vs. 60 years, $p=0.03$) and more likely to have experienced psychological problems (16% vs. 5%, $p<0.01$). Injury severity was the same for both groups (median 25), but penetrating injury was more common (9% vs. 2%, $p=0.01$) in those with AoD. Anxiety and depression were associated with longer critical care (11 vs. 8 days, $p=0.04$) and hospital stays (32 vs. 24 days, $p<0.01$). All physical EQ-5D problems were worse in the presence of AoD, especially pain (severe/extreme pain 53% vs. 23%, $p<0.001$). In multivariable analysis, factors associated with anxiety and depression at one year were: younger age (OR 0.97 [95% CI 0.96-0.99] $p=0.008$), a previous psychological diagnosis (OR 3.2 [95% CI 1.4-7.3] $p=0.005$), penetrating injury (OR 10.6 [95% CI 1.9 – 57.7] $p=0.006$) and pain at follow up (OR 1.7 [95% CI 1.2-2.4] $p=0.002$).
Conclusion: Longer term anxiety and depression following significant trauma was common in those with previous psychological problems. Clinical assessment in hospital should include screening to identify those at risk. Improved longer term pain management may also enhance psychological recovery after injury.

Poster #76

FRAILTY SCORE AND INCENTIVE SPIROMETRY PREDICT ICU LENGTH OF STAY IN PATIENTS WITH RIB FRACTURES

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Introduction: Guidelines suggest mandatory Intensive Care Unit (ICU) stay for geriatric patients with rib fractures may improve outcomes. However, not all geriatric patients have the same degree of frailty. The Clinical Frailty Scale (CFS), a measure of physiologic condition, independently predicts adverse patient outcomes among geriatric patients. Incentive spirometry (IS) values are associated with the physiologic quality of the respiratory system. CFS and intake IS are values that can be quickly collected during patient triage. The objective of this study is to determine if CFS and intake IS are independently associated with ICU length of stay and discharge disposition in patients of age ≥ 45 with rib fractures.

Methods: Medical records from patients greater than 45 years-old with rib fractures admitted to a Level 1 trauma center from 2016 to 2019 were reviewed. Primary outcome was ICU length of stay ≥2 days, with a primary predictor of CFS. This was assessed using logistic regression and controlled for the following covariates: age, sex, ISS, chest AIS, GCS, Charlson score, IS (<500, 500-999, 1000-1499, 1500+, or missing), number of fractures, and bilateral rib fractures. Area under the curve (AUC) was calculated for this multivariable logistic regression model as well as for age, CFS, and IS independently. Mean CFS among the discharge disposition groups (home, facilities, death, or other) was assessed using linear regression.

Results: 883 patients were included. 361 patients (40.9%) had an ICU LOS ≥2 days. Higher CSF was significantly associated with an ICU LOS ≥2 days (p=0.001; OR for a one-point increase in CFS: 1.28 [95% CI: 1.11, 1.47]). The full model had an AUC of 0.74 (95% CI: 0.71-0.78), indicating good discrimination between patients with and without longer ICU LOS. Age on its own did not successfully discriminate between the two groups (AUC 0.50 [95% CI: 0.47-0.54]). CFS and the IS categories performed better than age, but each alone provided weak discrimination between the groups (CFS: AUC 0.56 [95% CI: 0.52-0.60], IS: AUC 0.63 [95% CI: 0.59-0.66]). Mean CFS differed by discharge disposition (p<0.0001). Patients discharged to a facility also had a higher average CFS than those discharged home (0.41 points [95% CI: 0.24, 0.58]).

Conclusion: Together, CFS and intake IS values may be useful in predicting ICU length of stay and discharge disposition for those with traumatic rib fractures. These results provide a simple assessment that may help to guide admission disposition and resource use for patients with rib fractures and varying degrees of frailty.

Poster #77

POTASSIUM IS AN EARLY INDICATOR OF MORTALITY, COMPLICATIONS, AND LENGTH OF STAY IN ADULT TRAUMA PATIENTS

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Introduction: The average trauma patient has a considerable amount of data collected in their initial evaluation with unclear significance. We hypothesized that an elevated potassium level in the first 24 hours of admission was associated with increased mortality and complications.
Methods: All adult trauma patients in our internal registry from 2016 to 2021 with laboratory results available from the electronic medical record were analyzed. The maximum and minimum serum potassium over the patient's first 24 hours after admission were determined and outcomes for mortality and complications were compared using risk-adjusted multivariable logistic regression. Linear regression compared differences in length of stay. For all tests, statistical significance was set as $p < 0.05$.
Results: We analyzed 8,220 adult trauma patients with 24-hour laboratory data. In the risk-adjusted multivariable analyses, greater peak serum potassium (SP) in the first 24 hours was associated with increased mortality (OR=1.53, $p < 0.001$), acute kidney injury (AKI) (OR=2.53, $p<0.001$), hemorrhagic shock (OR=2.75, $p<0.001$), multi-system organ failure (MOF) (OR=2.76. $p<0.001$), myocardial infarction (MI) (OR=1.98, $p<0.001$), severe sepsis (OR=2.04, $p<0.001$), and increased length of stay. This association persisted in those with blunt trauma. Cut-point analysis found that a peak serum level of 4.6 mEq/L was 81% specific for mortality and 4.47mEq/L correlated with increased mortality (OR=1.73, $p<0.001$), AKI (OR=2.05, $p<0.001$), and hemorrhagic shock (OR=2.14, $p=0.006$).
Conclusion: In the first 24 hours of admission, higher maximum SP levels were associated with increased mortality, AKI, hemorrhagic shock, MOF, MI, severe sepsis, unplanned extubation, ICU days, and hospital days in all trauma patients. A peak SP greater than 4.6 mEq/L was 81% specific for mortality and 4.47 mEq/L showed a correlation with mortality, AKI, and hemorrhagic shock, underscoring its possible use in acute care.

Poster #78

THE IMPACT OF BALANCED TRANSFUSION ON POST-HEMOSTASIS RESUSCITATION IN TRAUMA

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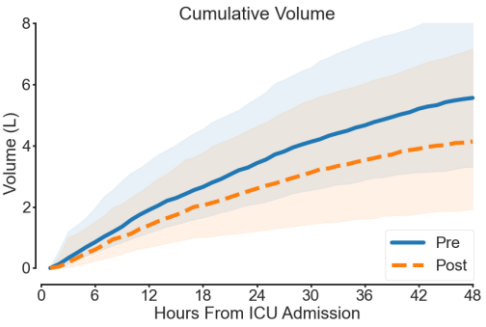
Introduction: Few interventions have changed the approach to trauma resuscitation as balanced blood product transfusion; yet, its impact on resuscitation after hemostasis remains unstudied. We sought to determine how post-hemostasis resuscitation has evolved after balanced transfusion and identify opportunities for further improvement.
Methods: We examined adult trauma patients transfused in the ED. Focusing on the post-hemostasis period after ICU arrival, we compared patient and injury characteristics, resuscitation over the first 48 hours of ICU admission, lab values, and outcomes pre- (2012-2015) and post-institutional implementation of balanced transfusion (2016-2019).
Results: The 2649 subjects were 70% male with blunt trauma (81%; ISS 27, IQR [17, 38]). Post-2015 (n=1472), patient and injury characteristics were similar apart from obesity (26% vs 10%, p≤0.001), compared with pre-2015. On ICU arrival, pH (7.37 vs 7.35, p≤0.001) and platelets (155 vs 149 $10^3/\mu L$, p≤0.001) were improved. In the ICU, more patients received blood (26% vs 13%, p≤0.001) and vasopressors (17% vs 12%, p≤0.001). Crystalloid volume (IVF) decreased (4.1 vs 5.6L, p≤0.001) and was given later in admission (Figure). Rate of INR >1.5 by 48 hours (43% vs 56%, p≤0.001) decreased, while AKI rose (8% vs 5%, p=0.02). Mortality was similar at 16%.
Conclusion: Post-2015, patients appear to be better resuscitated upon ICU arrival. In the ICU, resuscitation has shifted to embrace blood products and vasopressors, and move away from IVF. While coagulopathy has improved, the incidence of AKI is higher, with the potential for poorer outcomes. There remains room for improvement, perhaps through earlier and more targeted IVF administration.



Poster #79

DOES PIC SCORE PICK CORRECTLY? EVALUATION OF A PIC-BASED ADMISSION SYSTEM

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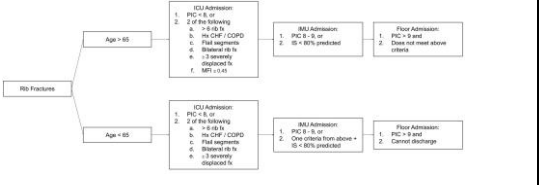
Introduction: Injury to the chest wall is common following blunt trauma and can lead to significant morbidity and mortality if not managed appropriately. A multitude of triage tools have been developed to guide clinical prognostication for this patient population, including the Pain, Inspiratory effort, Cough (PIC) score. First introduced in 2014, the PIC score system has gained momentum as a leading strategy for the triage of patients with chest wall injury. However, to date, the efficacy, accuracy, and safety of the PIC score system have not been validated outside of its original institution. This study evaluates the use of the PIC score system in initial Emergency Department (ED) triage, down-grade, and discharge criteria for trauma patients with chest wall injury at a single institution.

Methods: The original PIC algorithm triages patients by inspiratory capacity. On 12/1/2020, our institution implemented and expanded the criteria to include the PIC-score itself, age, and severity of chest wall injury. This is a retrospective study conducted at a large, academic Level I Trauma Center verified by the American College of Surgeons on patients with chest wall injuries, admitted between 1/1/2018-3/1/2022. The Pre-PIC (1/1/2018-11/20/2020) and Post-PIC (1/1/2021-3/1/2022) group were comprised based on admission date. Patients admitted during guideline implementation (12/1-31/2020) were excluded along with those who were not admitted, intubated or died in the ED, or unable to participate in PIC testing (see Figure 1).

Results: There were 2,461 patients triaged to the Pre-PIC and 1,278 triaged Post-PIC group. The two cohorts did not differ significantly in baseline demographics or mechanisms of injury (see Table 1). Post-intervention, a greater proportion of patients were triaged to step-down units instead of the ICU ($p < 0.001$). There were no significant differences in ICU length of stay, hospital length of stay, total ventilator days, incidence of respiratory complications, or mortality in the pre versus post PIC groups. A sub-group analysis was performed to assess if patients triaged to units outside of the ICU in the Post-PIC group had less complications, however, found no differences in unplanned ICU admissions, complications, or LOS.

Conclusions: This study demonstrates that implementation of a modified PIC-score triage system did not significantly alter the clinical course of patients with isolated traumatic chest wall injury treated at a high-volume trauma center. While our modified PIC-scoring system did triage less patients to the ICU initially, their hospital LOS, incidence of complications and mortality rates did not differ from the pre-PIC cohort. This suggests that further refinement of the PIC-scoring system is needed in order for this prognostication tool to reach a clinically impactful level.

Figure 1: Rib fracture triage algorithm for admission and down-grading



Intensive Care Unit (ICU), Pain Inspiratory Capacity and Cough (PIC), History (Hx), Congestive Heart Failure (CHF), Chronic Obstructive Pulmonary Disease (COPD), Fracture (Fx), Modified Frailty Index (MFI), Intermediate Care Unit (IMU), Incentive Spirometry (IS).

Table 1: Demographics, disposition and clinical outcomes of trauma patients with isolated chest wall injury before and after implementation of modified-PIC score guided admission

Variable	Overall (n = 3,739)	Pre-PIC (n = 2,461)	Post-PIC (n = 1, 278)	P-value
Age (mean years)	48.04	48.09	47.95	1.000
Percent male	69.3% (2,691)	69.6% (1,770)	68.6% (921)	1.000
Percent blunt	87.9% (3,416)	88.1% (2,239)	87.64% (1,177)	1.000
Base Deficit	-3.32	-3.35	-3.19	1.000
ISS (mean)	18.4	18.7	17.7	0.4614
Max AIS Thorax (median)	3	3	3	0.2551
ED Triage Floor Bed Step-Down Unit ICU Observation Unit Operating Room	 35.4% (1,374) 4.6% (177) 34.7% (1,346) 2.6% (101) 22.8% (886)	 34.6% (879) 2.3% (59) 36.3% (922) 2.8% (71) 24% (610)	 36.9% (495) 8.8% (118) 31.6% (424) 2.2% (30) 20.6% (276)	<0.0001
ICU LOS	8.1	8.7	7.44	0.3806
Hospital LOS	11.36	11.75	10.63	1.000
Total Ventilator Days	11.49	11.88	10.47	1.000
Unplanned Return to ICU	3.8% (146)	3.2% (81)	4.8% (65)	0.5990
Unplanned Intubation	4.2% (164)	4.6% (116)	3.6% (48)	1.000
Sepsis	1.2% (45)	1.4% (35)	0.7% (10)	1.000
PE	1.5% (58)	1.5% 938)	1.5% (20)	1.000
Pneumonia	2.0% (78)	2.1% (52)	1.9% (26)	1.000
ARDS	1.5% (58)	1.8% (45)	0.98% (13)	1.000
CA w/ CPR	1.0% (39)	1.1% (28)	0.8% (11)	1.000
Mortality	3.2% (123)	3.4% (87)	2.7% (36)	1.000
Readmission	0.8% (31)	0.8% (21)	0.7% (10)	1.000

Injury Severity Score (ISS); Trauma Score & Injury Severity Score (TRISS); Intensive Care Unit (ICU); Length of Stay (LOS); Pulmonary Embolism (PE); Acute Respiratory Distress Syndrome (ARDS); Cardiac Arrest (CA).

Poster #80

COMMUNITY-LEVEL SOCIAL FACTORS AND FUNCTIONAL OUTCOMES AFTER EXTREMITY INJURY

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Introduction: Extremity injuries represent one of the most common injury patterns seen in the emergency department and are a common cause of long-term functional impairment. Although social determinants as a whole are known to play a key role in long-term trauma outcomes, it is unclear which social factors play a greater role so that interventions can be targeted and resources optimized. This study aimed to identify specific community-level social factors associated with long-term functional limitations after severe extremity injury.

Methods: Adult patients with a severe extremity injury (AIS>2) treated at one of three level-1 trauma centers were prospectively followed six to 12 months post-injury. These data were matched with Social Vulnerability Index (SVI) percentile rankings of 15 social factors at the census tract level (table). We used multivariable-adjusted regression models to assess for independent associations between social factors and functional limitations.

Results: A total of 1,454 patients were included [54% female, mean age 63.7 (SD= 21.5)]. Among them, 1,388 (95%) had an extremity AIS of 3, 1,075 (74%) had surgery, and 314 (22%) were admitted to the ICU. The most common injury type was a hip fracture (45%). Forty-five percent of patients reported a new functional limitation in performing an activity of daily living at 6-12 months post-injury. Several social factors were associated with increased odds of post-injury functional limitations.

Census tract-level variables	OR (95% CI)	P value
Socioeconomic status subindex		
Poverty rate, % under federal poverty level	**1.06 (1.01-1.10)**	**0.01**
Unemployment rate, %	1.02 (0.98-1.07)	0.36
Per capita income, scaled to multiple of $1000	**1.05 (1.01-1.11)**	**0.03**
Education, % age >=25 y with no high school degree	**1.05 (1.00-1.10)**	**0.03**
Household and disability subindex		
Age >=65 y, %	0.98 (0.94-1.03)	0.44
Age <=17 y, %	0.99 (0.95-1.03)	0.51
People with disability (noninstitutionalized), %	1.04 (0.99-1.08)	0.12
Single parent household, %	1.04 (1.00-1.08)	0.06
Minority status and language subindex		
Any racial/ethnic minority, %	1.04 (0.99-1.09)	0.10
Limited English proficiency, %	**1.05 (1.01-1.09)**	**0.02**
Housing and transportation subindex		
Housing in structures with >=10 units, %	1.02 (0.98-1.07)	0.32
Mobile homes, %	1.02 (0.98-1.07)	0.27
Occupied housing units people > rooms, %	1.04 (1.00-1.08)	0.08
Households without vehicles, %	**1.04 (1.00-1.08)**	**0.04**
People in institutionalized group residences, %	1.01 (0.98-1.05)	0.51

Boldface indicates statistical significance [P < 0.05 (two-sided)].
Owing to rescaling of the variables, ORs for each index shows the change in odds of each outcome for a 0.1 unit increase of the original index measure (scale from 0 to 1).
Per capita income necessarily reversed as high income equates with low vulnerability and vice versa

Conclusion: Severe extremity injury patients from census tracts with a higher proportion of people living below 150% poverty, no high school diploma, limited English proficiency, no vehicles, and/or lower per capita income are more likely to have injury-related functional limitations in 6-12 months. To reduce these patients' long-term burden, interventions addressing social determinants should prioritize socioeconomic, language, and transportation barriers to care.

Poster #81

OSCILLATORY SHEAR STRESS REDUCES VEIN VALVE MICROTHROMBOSIS IN A CRITICALLY ILL HUMAN POPULATION

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Introduction: Deep Venous Thrombosis (DVT) causes significant morbidity and mortality after Trauma. We have previously shown oscillatory shear stress (OSS) genes maintain an anti-coagulant phenotype at vein valves that is lost in the presence of DVT and in static, critically ill patients. We hypothesized that restoration of OSS-inducing flow in critically ill humans would restore this protective phenotype and decrease spontaneous thrombosis using a Rapid Cycling Compression Device (RCCD).

Methods: Brain dead human organ donors who screened negative for DVT on arrival to our Organ Procurement Center (OPC) had an RCCD applied to a single lower extremity delivering 6 cycles/min of calf compression over < 1 second. The RCCD stayed in place until clinical organ procurement. The bilateral common femoral veins were harvested, and all vein valve segments were serially sectioned and stained with hematoxilyn and eosin (H&E). Microthrombi at vein valves from RCCD treated extremities were compared to those found at vein valves from contralateral nonRCCD treated extremities.

Results: Valves from 7 donors were evaluated (RCCD n= 18, no RCCD n=16). One non RCCD donor had a single valve with gross DVT visible. There was a significant reduction in microthrombosis at vein valves in limbs receiving RCCD therapy. (RCCD 11.1%, no RCCD 43.8%, p=0.038, Fisher exact test)

Conclusions: OSS flow to extremities using RCCD resulted in decreased micro and gross thrombosis in treated extremities in critically ill brain-dead donors. This cutting edge technology has the potential to change how we approach DVT prevention in trauma patients. Future studies will focus on characterization of the immunologic characteristics of microthrombi and their role/progression in DVT pathogenesis, and further reduction of gross DVT/macrothrombi at human vein valves with RCCD therapy.

Table 1 – Chi-squared analysis of thrombosis in RCCD vs no RCCD therapy

	No Thrombosis	Thrombosis	Total
RCCD	16	2	18
nonRCCD	9	7	16
Total	25	9	34
Chi-squared p = 0.016, Fisher Exact test p = 0.038			

Poster #82

DISPARITIES IN THE BURDEN OF TRAUMATIC INJURIES FROM INTERPERSONAL VIOLENCE IN PREGNANT WOMEN

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Introduction: Interpersonal violence (IPV)-related homicide often correlates with a history of non-fatal injuries. Pregnant women have an increased risk and severity of IPV, especially from an intimate partner; however, the nationwide burden and associated social disparities are not well described. The objective of this study is to describe the contemporary burden of IPV on pregnant women and identify patient characteristics associated with an increased risk of IPV.
Methods: The National Inpatient Sample was queried for all pregnant women between Jan 2016-Dec 2019. ICD-10-CM diagnoses were abstracted to generate an approximate Abbreviated Injury Scale (AIS) and Injury Severity Score (ISS). Traumatic injuries from IPV were identified as intentional injuries related to certain injury mechanisms (cut/pierce, firearm, struck by/against). Baseline characteristics were compared between the IPV and no-IPV groups. Multivariable regression was performed to identify clinical factors associated with IPV-related injuries.
Results: 29,735 pregnant patients presented with traumatic injuries with 1,105 (0.04%) identified as IPV. IPV patients had severe injuries (ISS >15) more frequently compared to non-IPV patients (95 [8.6%] vs 750 [2.6%], $p<0.001$). IPV patients were younger (median 25 years [IQR 21-30] vs 27 [23-32], $p<0.001$), more likely to be of Black race (550 [50%] vs 7,930 [29%], $p<0.001$), be in the lowest income quartile (590 [55%] vs 10,800 [38%], $p<0.001$), and have higher rates of substance use disorder (350 [32%] vs 5,380 [19%], $p<0.001$). Multivariable regression showed Black race (OR: 2.74, CI: 1.90-3.94, $p<0.001$) and substance use disorder (OR: 1.95, CI: 1.43-2.66, $p<0.001$) were associated with increased odds of IPV. Additionally, third trimester pregnancies had increased odds of their intimate partner being identified as the perpetrator of the trauma (OR: 1.71, CI: 1.05-2.80, $p=0.031$).
Conclusion: There are significant racial and social disparities in the burden of IPV during pregnancy. With the loss of federal protections to access abortion and the expectation these systemic changes may yield increases in IPV, it is imperative that clinicians recognize populations at increased risk for IPV to pursue targeted intervention and prevention services.

Poster #83

GEOCODING: THE IMPACT OF BEING TREATED AT THE NEAREST HOSPITAL

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Introduction: Trauma is a leading cause of death in many large inner cities around the world, in part due to high levels of interpersonal violence, transit accidents, and immature trauma systems.
We evaluated the impact of distance between the site of the injury and the hospital where the patients were first transported and treated. The impact of distance on the most remote poorly served highly violent neighborhoods (HVN) was analyzed.
Methods: We performed a secondary analysis of a prospectively collected cohort of moderate to severe trauma patients treated in four main trauma hospitals in our city between December 2012 and June 2013. We geocoded the injury site and the hospitals to calculate the distance traveled and travel time. Patients treated in the nearest hospital (group A) were compared with those who were taken to more distant sites. (group B). Groups were compared with Chi^2 test or Wilkoxon-Mann-Whitney tests, as needed. Unadjusted and adjusted ORs were calculated with multiple logistic regressions.
Results: We included 606 patients, 85.3% male. Penetrating trauma occurred in 56.3%. Seventy-two percent of the patients were treated in hospitals equivalent to level 1. Patients taken to the nearest hospital were older, less frequently had penetrating trauma, less frequently were uninsured, and less frequently came from (HVN). Trauma severity and survival probability were similar.

Effect of Being Treated at the Nearest Hospital

Variable	Group A	Group B	p
n	368	238	--
Male, n(%)	322 (87.5)	195 (81.9)	0.06*
Age, years, median (IQR)	28 (22 – 40)	32 (23 – 44)	0.04**
Penetrating trauma, n (%)	233 (63.3)	108 (45.4)	<0.001*
Uninsured, n (%)	68 (18.5)	19 (8.0)	<0.001*
ISS	16 (11 – 25)	18 (11 – 27)	0.16**
PS	0.99 (0.94 – 0.99)	0.99 (0.90 – 0.99)	0.33**
Agua-Blanca	105 (28.3)	16 (6.7)	<0.001*
Mortality	93 (25.3)	26 (10.9)	<0.001*

ISS. Injury Severity Score. PS Probability of survival.
* Chi2. **Wilcoxon-Mann-Whitney

Patients injured in HVN sites had a significantly lower probability of being treated in the nearest hospital. After adjusting for the relevant variables, the odds of death were lower when the patients were treated in the nearest hospital (adjusted OR 0.27 95% CI 0.14 - 0.52) and increased when they came from HVN (adjusted OR 1.85 95% CI 1.01 - 3.37).
Conclusions: Our results indicate that regions where disparities in care reflected by higher number of uninsured trauma patients arriving from poorer district were associated with longer distances and traveled time had a higher mortality. These data not only confirm the beneficial impact of trauma regionalization but also points to specific areas were specialized trauma centers need to be located.

Poster #84

HIGHER SOCIAL DEPRIVATION INDEX IS ASSOCIATED WITH INCREASED MORTALITY IN THE EGS POPULATION

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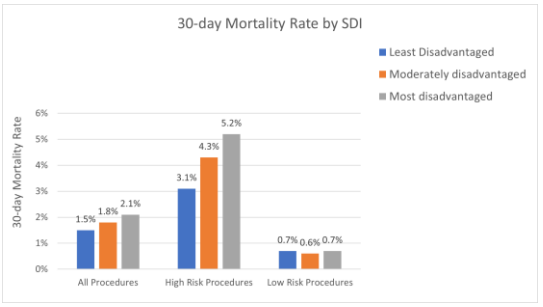
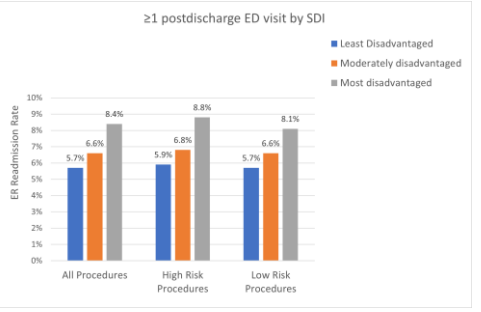
Introduction: Emergency General Surgery (EGS) disorders represent a wide spectrum of disease with high complication and mortality rates. Race, insurance and socioeconomic status have been associated with mortality in the EGS population. Social deprivation index (SDI) is a geographic area demographic index used to quantify variations in healthcare. We aimed to examine the mortality and complication rates of EGS procedures across a large integrated healthcare system.
Methods: This is a retrospective cohort study of adult EGS patients from 2017 through 2021 with CPT codes for high-risk (small bowel resection, colectomy, or peptic ulcer procedure) or low-risk procedures (appendectomy or cholecystectomy). Primary outcome was 30-day mortality; secondary outcomes were length of stay (LOS) and post-discharge ED visits.
Results: A total of 12,786 patient visits were analyzed, 4,148 high risk and 8,638 low risk procedures. High-risk EGS patients from high SDI areas experienced significantly greater mortality than those from low SDI areas (p=0.023, OR 1.95) when adjusted for age and gender. EGS patients from high SDI areas were more likely to have ≥1 post-discharge ED visit and have longer LOS than those patients from low SDI areas (p=0.008, OR 1.41 and p <.0001, respectively) when adjusted for age and gender.
Conclusion: Living in a high SDI area is associated with higher mortality, greater postoperative ED visits and longer LOS in the EGS population. This study highlights the need for geographically targeted interventions to match resources with EGS patients at highest risk for complications and death.





Poster #85

LOST IN TRANSLATION? COMPREHENSION OF CARE IN ENGLISH- VS. SPANISH-SPEAKING TRAUMA PATIENTS

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Introduction: Culturally responsive care is a core recommendation to reduce health disparities. Language barriers contribute to misunderstandings, dissatisfaction, and worse outcomes. This is exacerbated in trauma when communication is constrained by time, complexity, and competing priorities. We hypothesized that Spanish-speaking trauma patients (SSP) would have less accurate comprehension of care (CC) and discharge instructions compared to English-speaking patients (ESP).
Methods: We retrospectively reviewed discharges from a Level 1 trauma center 10/2021-03/2022 who were age ≥18, primarily ESP or SSP, discharge GCS ≥14, and without memory loss. Patients were surveyed <48 hours from discharge to assess CC. Patients self-rated CC on a Likert scale, and answered open-ended questions on CC and discharge instructions. Charts were reviewed to assess and rate concordance of CC with actual care.
Results: We included 46 patients (21 SSP, 25 ESP). Mean age was 48.3 years SSP, 43.3 ESP; 47% SSP were female vs. 32% ESP (p=0.28). 56% SSP had ≥ high school diploma vs. 72% ESP (p=0.34). Self-rated CC was similar, with both groups rating high understanding of their care and follow-up. SSP were less likely to accurately report diagnoses and home medications than ESP, even when corrected for education level, despite having high confidence in their comprehension of care.
Conclusion: Though both SSP and ESP self-rated their comprehension of their care highly, there were significant differences between groups' accuracy. Increased use of certified medical interpreters throughout hospitalization may improve language disparities in patient comprehension.

Component of Comprehension	% Near or Complete Concordance		p-value	Adjusted OR* [95% CI] REF=English	p-value*
	English	Spanish			
Diagnoses	92.0% (23)	57.1% (12)	**0.01**	0.11 [0.02, 0.64]	**0.01**
Inpatient Testing	84.0% (21)	66.7% (14)	0.17	0.33 [0.06, 1.7]	0.18
Inpatient Treatment	76.0% (19)	66.7% (14)	0.48	0.87 [0.21, 3.64]	0.85
Home Medication	84.0% (21)	57.1% (12)	**0.04**	0.20 [0.04, 0.91]	**0.04**
Home Care (non-medication)	76.0% (19)	52.4% (11)	0.09	0.32 [0.08, 1.27]	0.11
Follow-Up Appointments	68.0% (17)	38.1% (8)	**0.04**	0.32 [0.09, 1.13]	0.08
Return Precautions	64.0% (16)	38.1% (8)	0.08	0.34 [0.09, 1.25]	0.10

**Adjusted analysis accounting for patients' self-reported highest level of education*

Poster #86

RACIAL DISPARITIES IN POLICE TRANSPORTATION OF TRAUMA PATIENTS OVER TIME

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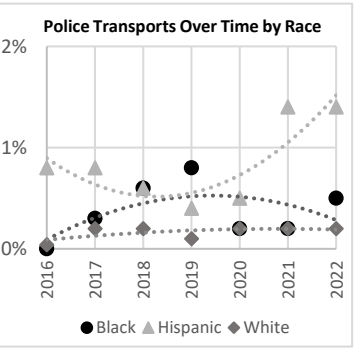
Introduction: The study objective was to determine if racial disparities exist among trauma patients brought in by police.
Methods: This retrospective cohort study included adult trauma patients admitted to six level I-II trauma centers in CO, TX, & KS (1/1/15-7/15/22). Transfer patients, and other or unknown races were excluded. Comparisons were made by race: non-Hispanic (NH) White, NH-Black, or Hispanic. The outcome was police transport, $\alpha<0.01$.
Results: Of 46,581 patients (77% NH-White, 17% Hispanic, 5% NH-Black), there was a disproportionately higher amount of Hispanic (0.9%) and NH-Black (0.4%) patients transported by police (n=128) when compared to NH-White (0.1%) patients, $p<0.01$. Hispanic patients were 6.4 (4.5, 9.2) times more likely to be transported by police than NH-White patients. NH-Black were 2.7 (1.3, 5.5) times more likely to be transported by police than NH-White patients. The most common cause of injury among Hispanic patients was a fall. For NH-Black and NH-White patients, the most common injury cause was assault, $p<0.01$. Hispanic patients' injuries were more severe than both NH-White and NH-Black patients, $p<0.01$. Over time, police transport of NH-White patients remained relatively constant, moderate $r^2 = 0.4$. For NH-Black patients there was a negative quadratic association over time with a peak in police transport in 2019 and a continuous decline since, moderate $r^2 = 0.3$. For Hispanic patients, there was a positive quadratic correlation with drop in police transports in 2019 followed by a consistent increase, strong $r^2 = 0.7$.



Conclusions: Hispanic and NH-Black patients were more likely to be police transports than NH-White patients. While police transport of NH-White patients has remained constant overtime, since 2019 police transport of Hispanic patients increased, and for NH-Black patients' police transport decreased. These data could be used to guide action addressing racial inequities in police transport, such as policies providing criteria for police transport of trauma patients.

Poster #87

RISK FACTORS FOR LOSS TO FOLLOW-UP AFTER TRAUMATIC INJURY: A SINGLE INSTITUTION STUDY IN AN URBAN, SAFETY NET, LEVEL 1 TRAUMA HOSPITAL

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Introduction: After traumatic injury, loss to follow up (LTFU) occurs at rates up to 47%, though the most recent data is a decade old. This study provides an updated assessment of risk factors for LTFU after trauma.
Methods: A retrospective chart review was conducted of trauma admissions from 12/1/2018 to 12/31/2019. Data from 2020 and 2021 was excluded due COVID-19. Exclusion criteria included age under 18, transferred to another service during hospitalization, and those with no scheduled follow up within 30 days. Categorical variables were compared using Pearson's Chi-square tests. Continuous variables were analyzed using two-tailed t-tests or Mann Whitney Wilcoxon tests for parametric and non-parametric variables, respectively. Logistic regression was used to create an model adjusted for relevant factors identified on univariate analysis. Statistical significance was designated at α=0.05. Analysis was completed using SAS Software Version 9.4 (SAS Institute Inc., Cary, NC, USA).
Results: 1,350 patients met inclusion criteria, with a 25.11% LTFU rate. In an unadjusted model, race/ethnicity, language, insurance status, employment, co-morbid psychiatric disorder or substance use disorder (SUD), trauma activation level, injury severity score (ISS), injury location and mechanism, length of hospital and ICU stay, disposition, and follow up scheduled at time of discharge were associated with a significantly lower LTFU. Multivariate logistic regression found insurance and employment status, SUD, and ISS remained significant. The final model was stratified by race due to interactions between race and the significant variables. In this model, white patients with non-private insurance had lower odds of LTFU compared to private insurance (OR 0.377, 95% CI 0.246 – 0.579), non-white patients with SUD had increased odds of LTFU compared to those without SUD (OR 2.77, 95% CI 0.944-0.988) and for each one-point increase in ISS their odds of LTFU decreased by 3.4% (95% CI 0.944-0.988).
Conclusion: Unmodifiable social determinants of health, including insurance status, employment status, and ISS, are associated with LTFU in the trauma population. Close attention should be paid to patients at risk for LTFU to ensure adequate engagement with the healthcare system.

Poster #88

IMPLEMENTATION OF AN OUTPATIENT PTSD SCREENING INITIATIVE AT A LEVEL 1 TRAUMA CENTER

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Introduction: Psychosocial care for trauma patients is fragmented and often limited to inpatient acute crisis counseling. Many trauma patients are at risk for post-traumatic stress disorder (PTSD) but have limited resources after discharge. As part of a trauma-informed care initiative, an algorithm for outpatient PTSD screening was developed. We hypothesized that this would supplement inpatient screening processes and better capture patients at risk.
Methods: Retrospective single-center study conducted at a Level I trauma center between August 2022-January 2023. Trauma patients (≥18 years) seen for outpatient follow-up in Trauma Surgery, Physical Medicine & Rehabilitation (PM&R), Orthopedics, and Neurosurgery clinics were included. Patients were screened for PTSD utilizing the validated PC-PTSD-5 tool or clinical judgement. Rates of screening and follow-up were collected and barriers to care summarized.
Results: 49 trauma psychology referrals were obtained. 19 patients were screened via the PC-PTSD-5 tool, with 11 identified to be at risk for PTSD and provided outpatient referral. 38 referrals were made based on clinical judgment. Referrals were obtained from Trauma (55%), PM&R (29%), Orthopedics (14%) and Neurosurgery (0.06%). 28 new patient encounters were completed (57% virtual visits). There were 8 no-shows (29%). Reported barriers included financial hardship, insurance coverage, traumatic brain injury, and patient disinterest.
Conclusion: In this pilot study, implementation of outpatient PTSD screening at a Level I trauma center generated 49 referrals for psychosocial services. Though challenges persist, this screening process specifically addresses post-discharge needs for the trauma patient. Further research and program development are needed to improve adherence to validated PTSD screening and ensure comprehensive trauma-informed care for patients.

Poster #89

CHARACTERIZING HIGH-GRADE SPLENIC INJURIES TO GUIDE PROCEDURE CHOICE FOR INITIAL ANGIOGRAPHY

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Introduction: The Western Trauma Association and The Eastern Association for the Surgery of Trauma Guidelines for the management of adult blunt splenic trauma recommends angiography for patients with contrast blush on initial CT scan. The American Association for the Surgery of Trauma (AAST) Spleen Injury Score was updated in 2018 and reclassified all splenic injuries with a blush as Grade 4+. This study compared outcomes of patients requiring repeat splenic intervention after initial angiography (defined as repeat angiography or splenectomy) based on the new scoring system. We hypothesized that findings on initial CT imaging could indicate likelihood of requirement for repeat intervention.
Methods: A retrospective review was conducted of all patients presenting to a single Level I Trauma Center who underwent splenic angiography for splenic trauma between January 1, 2002, and December 31, 2021. Each patient's injury was graded using the revised 2018 AAST Spleen Injury Scale, and all Grade 4 and 5 splenic injuries were included in the study. High-risk features on CT imaging were defined as active extravasation, evidence of pseudoaneurysm, hilar injuries, multiple lacerations, or Grade 5 injuries. Data was analyzed using chi-square, one-way ANOVA and Mann-Whitney-U analysis.
Results: There were 153 patients with Grade 4 and Grade 5 injuries who underwent initial angiography. Of these, 44 (28.8%) underwent angiography alone (AO), 17 (11.1%) underwent proximal embolization (PE), and 92 (60.1%) underwent selective embolization (SE). There was no evidence of active extravasation at angiography in 36% (n=9) of patients who underwent initial angiography and required a repeat splenic intervention; each of these patients had Grade 5 splenic injuries, multiple splenic lacerations, or hilar lacerations on initial CT imaging. After initial angiography, 25 (16.3%) patients required repeat splenic intervention. Repeat intervention was required in 18.2% (n=8) AO patients, 16.3% (n=15) SE patients, and 11.8% (n=2) PE patients. All patients who required a second procedure after initial embolization had active extravasation and 96% (n=24) had a perisplenic hematoma on initial CT imaging. Furthermore, 60% (n=15) of the patients who required repeat intervention were classified as Grade 5 on initial CT scan. Of the patients who required repeat intervention, 28% (n=7) had a pseudoaneurysm or vascular irregularity identified during initial angiography. A greater percentage of patients in the repeat procedure group died versus those that did not require a repeat intervention (12.0 vs 3.9%). The repeat procedure group had more ventilator days (4.0 vs 2.5, $p < 0.001$), longer LOS (14.2 vs 10.7, $p < 0.001$), and a higher complication rate (63.6% vs 36.9%, $p = 0.016$) compared to patients who did not require a second procedure. There was no difference in the average procedural time of initial procedure for those that required repeat intervention and those that did not (38.9 vs 35.6 minutes $p = 0.901$).
Conclusion: The results demonstrate that all patients requiring repeat splenic intervention after initial angiography had evidence of high-risk features on initial CT imaging. Furthermore, Proximal Embolization patients were shown to require less repeat intervention. Overall, the requirement for repeat intervention is associated with worse outcome measures. Studies prioritizing PE in patients with high-risk features on CT imaging even without evidence of active extravasation on initial angiography should be considered.

Poster #90

DEAD SHOT: THE ROLE OF WHOLE-BODY COMPUTED TOMOGRAPHY IN THE MANAGEMENT OF PATIENTS WITH GUNSHOT WOUNDS TO THE TORSO

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Fundación Valle del Lili

Introduction: This study aims xto evaluate the safety and outcomes (number of surgical interventions and overall mortality) of whole-body computed tomography (WBCT) in the management of patients with gunshot wounds (GSW).
Methods: We conducted a cross-sectional, retrospective analysis of all patients with GSW's to the torso admitted at a Level 1 Trauma Center from January-2018 to December-2021. Patients with head AIS-scores >= 3 and ISS-scores<9 were excluded. Institutional WBCT protocol for penetrating trauma consists of a single-pass arterial and portal venous contrast scan that includes the neck, thorax, abdomen, and pelvis. All hemodynamically unstable (HU) patients [Systolic blood pressure (SBP) <100 mmHg and/or heart rate (HR) >120 bpm] taken to the scanner were transient responders (TR) to initial resuscitation.
Results: A total of 582 patients were included: 258 (44%) HU and 324 (56%) hemodynamically stable (HS). WBCT was performed in 135 (52%) and 175 (54%) patients of each group, respectively. In HS patients who did not have major surgery, the rate of minimally invasive procedures (MIP) increased by 150% in the WBCT group compared to the non-WBCT group. Among HU patients, the rate of major surgery decreased by 40% and the rate of MIP increased by 58% in the WBCT group vs. the non-WBCT group. In addition, overall mortality was lower in the WBCT group vs. the non-WBCT group, which was also true for TR [WBCT 4% vs. non-WBCT 15%, p=0.06]. None of the patients (HU or HS) died in the CT scanner. A sub-analysis including patients with injuries to multiple anatomical regions [N=204] showed that the MIP rate was 5 times higher in HS patients that had WBCT. On the other hand, the rates of major surgery [37% vs. 65%,p<0.01], overall mortality [6% vs. 28%, p<0.01], and TR mortality [6% vs. 19%, p=0.07] were all lower in HU patients that had a WBCT.

	Hemodynamic Stability (N = 582)					
	Unstable (n=258) 44%			Stable (n=324) 56%		
	WBCT (n=135) 52%	No WBCT (n=123) 48%	P value	WBCT (n= 175) 54%	No WBCT (n=149) 46%	P value
ISS, median (IQR)	17(13-26)	17(13-25)	0.8	16(10-20)	10(9-16)	<0.001
ISS > 15, n (%)	90(67%)	83(67%)	0.9	89(51%)	41(28%)	<0.001
SBP, mm Hg, median (IQR)	92(81-100)	80(64-95)	<0.001	123(112-133)	125(115-137)	0.2
SBP < 100 mm Hg, n (%)	110(81%)	111(90%)	0.04	NA	NA	-
No Major Surgery[1], n (%)	95(70%)	62(50%)	<0.001	123(70%)	113(76%)	0.2
Minimal Invasive Procedures[2], n/N (%)	47/95(49%)	19/62(31%)	0.02	49/123(40%)	18/113(16%)	<0.001
Overall Mortality, n (%)	5(4%)	19(15%)	0.001	0	1(1%)	0.45
Mortality TR, n/N (%)	5/130(4%)	10/102(10%)	0.06	0	1(1%)	0.45

1) No Major Surgery: No major incision was performed (Laparotomy, Thoracotomy, Sternotomy, or Cervicotomy)
2) Minimal Invasive Procedures: Laparoscopy, Thoracoscopy, and/or Thoracostomy
Abbreviations: ISS: Injury Severity Score, NA: Not Applicable, SBP: Systolic Blood Pressure, WBCT: Whole Blood Computed Tomography, TR: Transient Responders.

Conclusion: WBCT in hemodynamically unstable GSW patients who are transient responders is a safe and effective tool that can avoid unnecessary major surgeries and increase the use of minimally invasive procedures without impacting mortality.

Poster #91

DEMOGRAPHIC DIFFERENCES IN TIME-TO-OR FOR BLUNT AND PENETRATING ABDOMINAL TRAUMA PATIENTS

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Introduction: Both time-to-OR and socioeconomic (SES)/demographic factors have been shown to influence outcomes for abdominal trauma. This study characterizes the demographic variability of facilities with better trauma performance. We additionally evaluated patient factors and injury patterns of abdominal trauma victims after stratifying for time-to-OR.
Methods: This is a cohort study of TQIP data (2010-2020) including patients with abdominal trauma treated surgically within 6 hrs. Patients with abdominal AIS=6 and head, neck, or thorax AIS>2 were excluded. Hospitals were classified as slow, medium, or fast using 75th percentile time-to-OR. Patient demographics, clinical characteristics, and outcomes (time-to-OR, mortality, hospital LOS, time on ventilator, OR, and hospital disposition) were summarized by facility speed. Data are mean±SD.
Results: There were 55,950 patients from 2,730 facilities; a higher percentage of patients were male (83%), Black (36%), Hispanic (22%), and self-pay (27%) than the national average of those characteristics. There were 1163(43%) community, 374(14%) nonteaching, and 1166(43.1%) University hospitals, the majority of which were nonprofit (89%). For facilities, 76(3%) were categorized as slow, 2395 (88%) were medium, and 241(9%) were fast. Compared to fast hospitals, slow facilities had more female, white, and privately insured patients ($p<0.0001$). Slow hospitals had more blunt injuries (36.7%vs13%) and less penetrating injuries (63.1%vs87%). The overall Injury Severity Score and abdominal AIS score were similar across all facilities. Facility-level analysis showed an equal number of yearly abdominal trauma cases across all hospitals, with similar teaching and nonteaching hospitals ($p>0.05$). The mean time-to-OR for slow hospitals was 127.0±84 min compared to 52±51 for fast. Mean ICU LOS was longer in fast hospitals (7vs6 days), ventilator time was similar. Total LOS was longer for fast hospitals; these patients were significantly more likely to be discharged to home without services (73%vs67%).
Conclusion: Hospitals with faster door-to-OR time are large university centers with a higher proportion of uninsured minority patients with penetrating injuries. Though these hospitals get patients to the OR faster, they face more extended hospital LOS and difficulty discharging patients to skilled care.

Poster #92

FINDING THE SWEET SPOT: IMPACT OF ADMISSION GLUCOSE ON OUTCOMES IN TRAUMATIC COLON INJURIES

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Introduction: Perioperative hyperglycemia has long been associated with infectious complications in non-trauma patients undergoing colon surgery. Whether it plays a similar role in patients with traumatic colon injuries has yet to be established. The goal of this study was to examine the impact of admission blood glucose on outcomes in patients with traumatic colon injuries.
Methods: Consecutive patients over a 3-year period who underwent operative management of colon injuries were identified. Patient characteristics, mechanism and injury severity, admission glucose, intraoperative packed red blood cell transfusions (PRBC), use of intestinal diversion, and type of repair were recorded. Outcomes including mortality and colon-related morbidity (intraabdominal abscess formation or suture line failure) were collected and compared. Multivariable logistic regression (MLR) analysis was then performed to determine the impact of admission glucose on colon-related morbidity.
Results: 246 patients were identified: 108 with non-destructive injuries and 138 with destructive injuries. Of the destructive colon injuries, 38 underwent proximal diversion and 100 underwent resection and anastomosis. Patients with colon-related morbidity (n=70) were clinically similar to those without (n=68) with respect to age (31 vs 28 years-old, p=0.290), gender (82.9% male vs 91.2%, p=0.147), penetrating mechanism of injury (70% vs 64.7%, p=0.507), ISS (21 vs 19, p=0.303), admission systolic blood pressure (117 vs 122, p=0.174), and admission lactate (4.08 vs 3.16, p=0.151). There were no colon-related mortalities. Admission glucose (170 vs 142, p=0.021) and intraoperative PRBC transfusions (4 vs 0.5 units, p=0.0004) were higher in those patients who developed colon-related morbidity. MLR identified only intraoperative PRBC transfusions as an independent predictor of increased colon-related morbidity (OR=1.076, 95%CI 1.018-1.147, p=0.015).
Conclusion: While higher admission glucoses are associated with increased risk of intraabdominal abscess formation or suture line failure, intraoperative transfusion requirements remain the best independent predictor of colon-related morbidity.

Poster #93

HIGH-GRADE LIVER INJURIES WITH CONTRAST EXTRAVASATION MANAGED INITIALLY WITH ANGIOGRAPHY VERSUS OBSERVATION: A MULTICENTER STUDY

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Introduction: High grade (IV-V) liver injuries with active extravasation (HGLI+Extrav) are associated with significant risk of complications and mortality. For low grade injuries, an observation (OBS) first strategy is beneficial over initial angiography (IR), however, it is unclear if OBS is safe for HGLI+Extrav. Therefore, we evaluated the management of patients with HGLI+Extrav, hypothesizing that patients receiving initial IR will have decreased operative and mortality rates compared to initial OBS.

Methods: This is a secondary analysis of a prospective, observational, multicenter study. Patients with HGLI+Extrav managed with initial OBS or IR were included. Pregnant patients, non-traumatic hemorrhage, transfers, those with cirrhosis, or dead-on arrival patients were excluded. The primary outcome was need for operation. Secondary outcomes included liver-related complications and mortality. Bivariate comparisons of patients managed initially with OBS versus IR were performed.

Results: From 59 patients with HGLI+Extrav, 23 (39.0%) were managed with OBS, and 36 (61.0%) with IR initially. There was no difference in age, sex, mechanism of injury, or injury severity score between cohorts (all $p>0.05$). IR patients had an increased median heart rate (103 vs. 91, $p=0.04$) but statistically similar, albeit clinically different shock index (0.94 vs 0.75, $p=0.06$) compared to OBS patients. 75% of IR patients underwent angioembolization during first IR, whereas only 13% of OBS patients underwent any IR, with all undergoing angioembolization. IR patients had increased rates of operation (13.9% vs. 0%, $p=0.049$), but there was no difference in liver-related complications (44.4% vs 43.5%) or mortality (5.6% vs 8.7%) between cohorts (both $p>0.05$).

Conclusion: Over 60% of all patients with HGLI+Extrav were managed with IR initially. Patients selected for IR initially had an increased rate of operation yet similar rates of liver-related complications and mortality compared to patients selected by surgeons to be initially managed with OBS. This suggests that in appropriately selected HGLI+Extrav initial OBS may be reasonable. Future prospective randomized trials are needed to confirm these findings as there are concerns for selection bias within this observational study.

Poster #94

INTERRATER AGREEMENT OF CT GRADING OF BLUNT SPLENIC INJURIES: DOES THE AAST GRADING NEED TO BE REIMAGINED?

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Introduction: The Revised Organ Injury Scale (OIS) of the American Association for Surgery of Trauma (AAST) is the most widely accepted classification of splenic trauma. Splenic injury grade is a key factor for deciding on non-operative management, splenic embolization, and predicting risk of non-operative management failure. The objective of this study was to evaluate inter-rater agreement for CT grading of blunt splenic injuries.
Methods: CT scans in adult patients with splenic injuries at a level 1 trauma centre were independently graded by 5 fellowship trained abdominal radiologists using the AAST OIS for splenic injuries – 2018 revision. The inter-rater agreement for AAST CT injury score, as well as low-grade (I-III) versus high-grade (IV-V) splenic injury was assessed. Examinations with two rater disagreement in key clinical scenarios (no injury versus injury, and high versus low grade) were reviewed by a staff abdominal radiologist and trauma surgeon to identify possible underlying causes of disagreement.
Results: A total of 610 examinations were included in the study. The inter-rater absolute agreement was low (Fleiss kappa statistic 0.38, $p < 0.001$), but improved when comparing agreement between low and high grade injuries (Fleiss kappa statistic of 0.77, $p < 0.001$). There were 34 cases (5.6%) of minimum two-rater disagreement about no injury vs injury (AAST grade ≥ I). There were 46 cases (7.5%) of minimum two-rater disagreement of low grade (AAST grade I-III) versus high grade (AAST grade IV-V) injuries. Likely causes of disagreement were interpretation of clefts versus lacerations, peri-splenic fluid versus subcapsular hematoma, application of adding multiple low grade injuries to higher grade injuries, and identification of subtle vascular injuries.
Conclusion: There is significant disagreement in grading of splenic injuries using the existing AAST OIS for splenic injuries, including at key clinical cutoffs that can significantly impact patient management decisions.

Poster #95

MULTI-CENTRIC STUDY ON ORGAN DONATION AFTER TRAUMA: A HIERARCHICAL MACHINE-LEARNING CLUSTER ANALYSIS

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Introduction: Organ availability has always been a significant setback, and as the number of patients being added to waiting lists rises, the gap between organ supply and demand continues to increase. The primary aim of this study is to characterize subtypes of organ donors after major trauma and examine the relationship between the application of damage control strategies (DCS) and organ donation outcomes.
Methods: Prospective multicentric observational data were recorded from three major trauma centers in Northern Italy. A hierarchical machine-learning algorithm was used for clustering the patients. The functional response rate is defined as the proportion of organs that did not have primary dysfunction in the first 30 days from all transplanted organs.
Results: A significant difference between the clusters was found in the total number of DCS procedures applied (Cluster 1 4.31 ± 2.54 vs. Cluster 2 1.98 ± 1.54, $p<0.001$). With regards to the donation of solid organs, Cluster 1 has produced significantly more hearts (65% vs. 34%, $p=0.001$). The functional response rate was equal (93% vs. 93%, $p=0.929$).
Conclusion: Aggressive DCS to save trauma patients' lives does not negatively impact the chances of organ donation in suitable donors

Poster #96

PANCREATICODUODENECTOMY IN TRAUMA PATIENTS WITH GRADE IV-V DUODENAL OR PANCREATIC INJURIES: A MULTICENTER TRIAL

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Introduction: The utility of pancreaticoduodenectomy (PD) for high-grade traumatic injuries remains unclear and data regarding its use are limited. We hypothesized PD does not result in improved outcomes when compared to non-PD surgical management of grade IV-V pancreaticoduodenal injuries.
Methods: This is a retrospective, multicenter analysis from 35 Level-1 trauma centers from 1/2010-12/2020. Included patients were ≥ 15 years old with AAST grade IV-V duodenal and/or pancreatic injuries. The study compared operative repair strategy: PD vs non-PD.
Results: The sample (n=95) was young (26 years), male (82%), with penetrating injuries (76%). Non-PD patients (n=63) underwent primary repair alone (PRA, 35%) or complex repair with adjunctive measures (CRAM, 65%) such as pyloric exclusion, duodenectomy, and/or gastrojejunostomy. There was no difference in demographics or severity of illness (SBP, GCS, ISS, MTP) between PD (n=32) vs non-PD patients (all $p>0.05$). Anatomically, PD patients had more concomitant pancreaticoduodenal (91%vs 70%), grade V duodenal, grade V pancreatic, ampulla, pancreatic head, and pancreatic ductal injuries compared to non-PD patients (all $p<0.05$); however, 43% of grade V duodenal and 40% of grade V pancreatic injuries were still managed with non-PD. There was no difference in damage control, number of operations, duodenal leak, other anastomotic leak, mortality, or readmission between PD vs non-PD (all $p>0.05$). PD patients had more GI related complications and longer ICU and hospital length of stay compared to non-PD patients (all $p<0.05$).

Pancreaticoduodenectomy(PD) vs non-PD Outcomes in Grade IV-V Pancreaticoduodenal Injuries

	All Patients (n=95)	PD (n=32)	Non-PD (n=63)	p value
Duodenal Leak	22 (23%)	7 (22%)	15 (24%)	1.000
Anastomotic Leak	9 (10%)	5 (16%)	4 (6%)	0.159
Antibiotic Use for Leak	18 (19%)	3 (9%)	15 (24%)	0.105
Parenteral Nutrition	52 (55%)	21 (66%)	31 (49%)	0.190
GI Related Complication	50 (53%)	22 (69%)	28 (44%)	**0.031**
ICU Length of Stay (days)	10 [4-24]	17 [7-29]	6 [2-23]	**0.012**
Hospital LOS (days)	27 [13-42]	34 [24-45]	25 [9-38]	**0.017**
Mortality	19 (20%)	4 (13%)	15 (24%)	0.279

Conclusion: PD did not offer improved outcomes among patients with grade IV-V pancreaticoduodenal injuries. Without sound scientific support for PD outcome benefit, our results suggest PD may be overutilized.

Poster #97

PREPERITONEAL PELVIC PACKING INCREASES THE RISK FOR VENOUS THROMBOEMBOLISM IN ISOLATED SEVERE PELVIC FRACTURES

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Introduction: Preperitoneal pelvic packing (PPP) has been advocated as a damage control procedure to reduce bleeding from pelvic fractures and is included in the treatment algorithms of major trauma societies despite weak evidence.to support it. We hypothesized that venous stasis caused by PPP is associated with an increased risk of venous thromboembolism (VTE). In order to minimize other risk factors that complicate the interpretation of the results, the current study included only patients with isolated severe pelvic fractures.

Methods: This is a retrospective cohort analysis using the TQIP database (2016-2019). Adult patients with isolated severe blunt pelvic fractures (pelvis abbreviated injury score [AIS] ≥ 3, AIS ≤ 2 in all other body regions) were included. Patients who underwent PPP in the first 24 hours were matched to patients who did not using a 1:3 nearest propensity score match. Matching was performed based on demographics, vital signs on admission, comorbidities, injury characteristics, type and timing of initiation of VTE prophylaxis, and additional procedures including laparotomy, resuscitative endovascular balloon occlusion of the aorta [REBOA], and angioembolization. The rates of VTE were compared between the two groups.

Results: 11,594 patients with isolated severe pelvic fractures were identified, of which 71 underwent PPP in the first 24 hours. 64 patients in the PPP group were matched with 182 patients in the No-PPP group. There were no significant post-match differences between the groups in any of the baseline variables. PPP patients had significantly higher rates of VTE and deep vein thrombosis (DVT) (VTE: 14.1% vs 4.4% $p=0.018$, DVT: 10.9% vs 2.2% $p=0.008$) as well as higher in-hospital mortality (14.1% vs 2.2% $p<0.001$).

Conclusion: Preperitoneal pelvic packing use in the management of patients with isolated severe pelvic fractures is associated with an increased rate of VTE and DVT complications.

Poster #98

USE OF FUNNEL PLOTS TO IDENTIFY INDIVIDUAL SURGEONS AS SIGNIFICANT OUTLIERS IN MORTALITY AFTER EMERGENT TRAUMA LAPAROTOMY

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Introduction: Comparisons of surgeon-specific procedural outcomes are significantly affected by differences in patient case-mix and volume. Funnel plots are a widely accepted method to account for these differences and identify performance outliers. We applied this technique to further develop our work to compare individual surgeon outcomes following emergent trauma laparotomy (ETL) at a large level 1 trauma center.
Methods: Retrospective review of a single center database of ETL from 2019-2022. ETL was defined as laparotomy within 90 minutes of patient arrival, excluding those with Emergency Department (ED) thoracotomy. Intraoperative (OR), 6-hour, 24-hour, and in-hospital mortality rates were plotted using funnel plots with 95% and 99.7% confidence intervals.
Results: 19 faculty performed 471 ETL [median 25, range=1-62]. 21% (n=100/471) presented with hypotension (SBP≤90). Initial ED vitals/labs, ISS, AIS-Head, and AIS-Abdomen were all similar across individual surgeons. Overall mortality rates for the entire cohort by time period: OR: 2% (11/471); 6-Hour: 3% (15/471); 24-Hour: 5% (22/471); Hospital: 8% (39/471). ED length of stay (p=0.004) and operative duration (p<0.001) were significantly different in the group. Funnel plots showed that mortality was within the 95% confidence interval for most surgeons. There were two "probable outliers" (>99.7%) for 6-hour mortality (**Figure. 1**), one each at OR and 24-hour mortality, and none for hospital mortality.
Conclusion: Probable outliers in early mortality were identified while none were present for hospital mortality. Funnel plots are useful to identify the impact that individual surgeons have on ETL outcomes.