Quick Shots Session I

Paper #1
January 11, 2024
10:00 am

EMERGENCY GENERAL SURGERY IN THE ERA OF DIRECT ORAL ANTICOAGULANTS: IS THERE AN INCREASED BLEEDING RISK? AN EAST MULTICENTER TRIALS STUDY

Seema Anandalwar, MD, Lindsay O'Meara, CRNP*, Roumen Vesselinov, Ph.D., Mira H Ghneim, MD*
University of Maryland

Presenter: Seema Anandalwar, MD

Objectives: To assess perioperative bleeding complications & in-hospital mortality in patients presenting with a history of DOAC vs. antiplatelet (AP) or warfarin use in patients requiring an emergency general surgery procedure (EGSP).

Methods: Prospective observational study across 21 centers between 2019-2022. Inclusion criteria were age ³18 years, & DOAC, warfarin or AP use within 24 hours of an EGSP. Outcomes included perioperative bleeding and in-hospital mortality.

Results: Of the 413 patients, 221 (53.5%) reported AP use, 152 (36.8%) DOAC use, & 40 (9.7%) warfarin use. Most common indications for surgery were obstruction (23% (AP), 45% (DOAC), 28% (warfarin)), intestinal ischemia (13%, 17%, 23%), & diverticulitis/peptic ulcers (7%, 7%, 15%). Compared to DOAC use, warfarin use was associated with significantly higher perioperative bleeding risk (OR 4.4 [2.0, 9.9]). There was no significant difference in perioperative bleeding risk between DOAC & AP use (OR 0.7 [0.4, 1.1]). Compared to DOAC use, there was no significant difference in mortality between warfarin use (0.7 [0.2, 2.5]) or AP use (0.5 [0.2, 1.2]). After adjusting for confounders, warfarin use (OR 6.3, p<0.001), medical history and operative indication were associated with an increased perioperative bleeding risk. Intraoperative vasopressor use (OR 4.7, p=0.003), medical history & postoperative bleeding (OR 5.5, p<0.001) were associated with an increased mortality risk.

Conclusions: Despite ongoing concerns about the increase in DOAC use & lack of readily available reversal agents, this study suggests that warfarin, rather than DOACs, is associated with higher perioperative bleeding risk. However, that risk does not result in an increase in mortality, suggesting that perioperative decisions should be dictated by patient disease & comorbidities rather than type of antiplatelet or anticoagulant use.

Table 1. Multivariable Logistic Regression Model Identifying Risk Factors Associated with an Increased Perioperative Bleeding Complications and In-hospital Mortality in EGS Patients Undergoing Urgent/Emergent Intervention within 24-hours of Antiplatelet or Antithrombotic Use (n=413)

	OR (95% CI)	p-value
Perioperative Bleeding Risk*		
Anticoagulant/Antiplatelet		
DOAC	Ref	
Warfarin	4.4 (1.9, 9.9)	<0.001
Antiplatelet	0.7 (0.4, 1.2)	0.17
Chemotherapy	4.1 (1.3, 13.7)	0.02
Peripheral vascular disease	2.3 (1.2, 4.4)	0.02
Intestinal ischemia	2.2 (1.1, 4.6)	0.03
Appendicitis	0.33 (0.15, 0.71)	0.005
Mortality**		
Post-operative bleeding	4.5 (1.8, 11.2)	0.59
Reversal products given before the operating room	10.8 (1.5, 77.5)	0.02
Intra-operative vasopressor use	3.6 (1.2, 10.8)	0.02
Chronic kidney disease	3.1 (1.2, 7.8)	0.02
Malignancy	2.7 (1.0, 7.1)	0.08

*AUROC = 0.74, **AUROC=0.93

Paper #2
January 11, 2024
10:06 am

AFTER-HOURS ROBOTIC ACCESS ALLOWS ACQUISITION OF ROBOTIC SURGICAL PROFICIENCY IN AN ACUTE CARE SURGICAL MODEL

Rebecca E. Wu, BS, MD*, Sylvia Martinez, MD, Nicole Tapia, MD*
Houston Methodist Hospital

Presenter: Rebecca E. Wu, BS, MD

Objectives: Optimal general surgery training on a robotic surgical platform (RSP) requires frequent access to the robot and a varied case mix in the immediate post-training period and beyond. Acute Care Surgery often involves "after-hours" (AH) operative times, defined as after 7pm or on weekends. Our institution previously did not provide AH access. We hypothesized that coordination and initiation of AH availability of the RSP would increase our robotic surgery access and allow improved robotic proficiency via decreased operative time on the RSP.

Methods: We queried our acute care surgical database for robotic and laparoscopic surgical cases from January 2021 to May 2023. AH robotic access was initiated in October of 2021. Case type and number, late (start time after 3pm) and AH case start times, and operative times were compared pre-and post-initiation of AH availability (preAH and postAH, respectively)

Results: A total of four attending surgeons were evaluated over the course of this study. A total of 100 robotic cases were performed preAH and 417 robotic cases postAH. The percentage of cases conducted robotically versus laparoscopically was significantly higher postAH ($p = 0.0024$). The number of late start, after-hours, and weekend cases significantly increased postAH ($p = 0.008$). Using cholecystectomy and inguinal hernia repair operative time as a proxy of surgeon proficiency, operative time significantly decreased postAH compared to preAH for both robot-assisted cholecystectomy ($p = 0.008$) and unilateral inguinal hernia repair ($p = 0.003$).

Conclusions: Coordinated training efforts of OR staff, surgeon specialized equipment training/troubleshooting, and department leadership within the institution's robotic surgery task force facilitated transition to AH access of the RSP. AH access allowed increased robotic surgery case volume and decreased operative time.
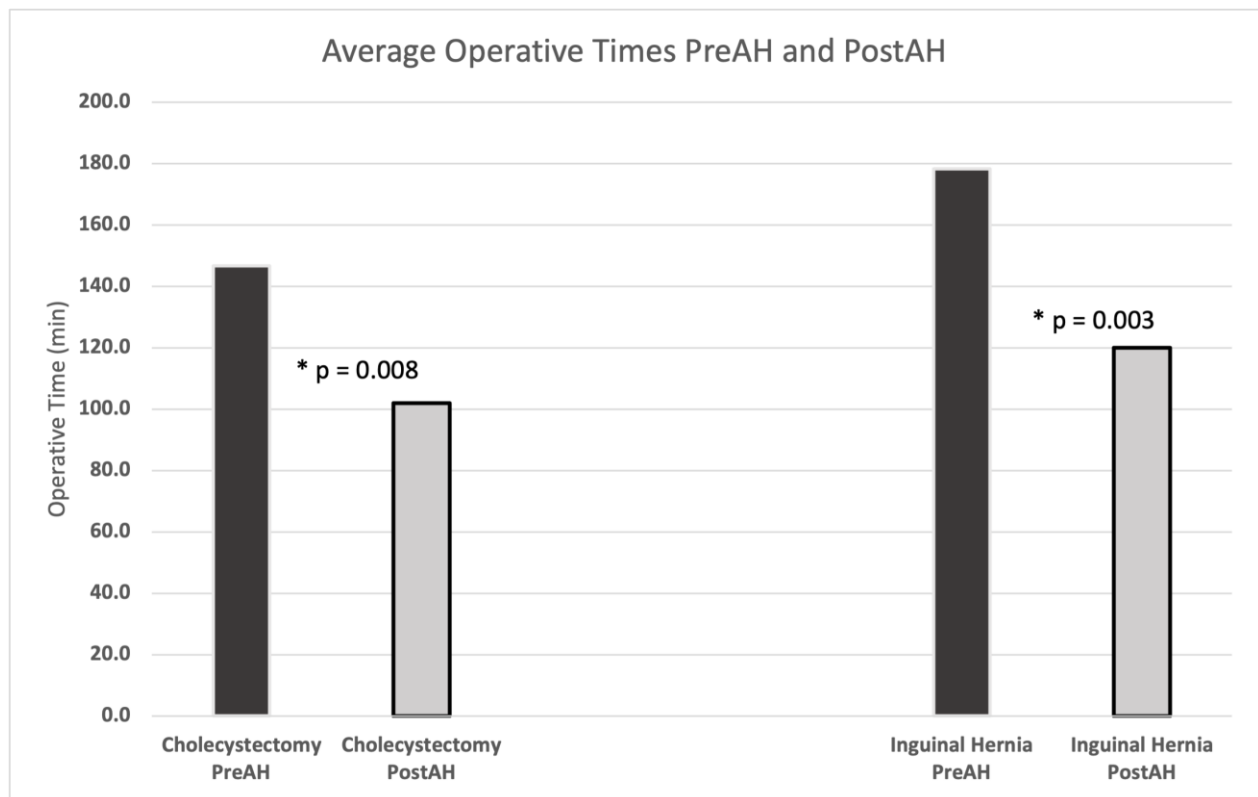
Average operation length (minutes) for robotic-assisted cholecystectomy and inguinal hernia repair preAH compared to postAH

Quick Shots Session I

Paper #3
January 11, 2024
10:12 am

IMPLEMENTATION OF A NOVEL EMERGENCY GENERAL SURGERY ALERT SYSTEM REDUCES TIME TO OR FOR HIGH-RISK DIAGNOSES

Rachel Rodriguez, MD, MS, FACS*, Jeremy H. Levin, MD*, Andrew L. Drahos, MD*, Robert McCormick, DO, Alison M Bales, BA, MD*, Kathryn McGhee, MD, Cyrus Feizpour, MD, Tyler Robinson, BS, MD*, Georgann Adams, CNS, Maria Thurston, CNS, Adam Nevel, MBA, MD, Peter Jenkins, MD*
Indiana University

Presenter: Rachel Rodriguez, MD, MS, FACS

Objectives: Hospital alert systems have been associated with improved outcomes for patients with time-sensitive diseases such as trauma and stroke. The aim of this study was to determine the impact of a novel emergency general surgery (EGS) alert system implemented at a large tertiary hospital for the three diagnoses with the highest mortality: necrotizing soft tissue infection, perforated viscus, and ischemic bowel.

Methods: We used clinical registry data (2018-2022) to perform a pre- and post-test assessment of the EGS alert system, instituted February 2020. The primary outcome was time-to-operating room (TTOR). Secondary outcomes included hospital days, ventilator days, ICU days, surgical site infections (SSI), pressor use, and mortality. Risk-adjusted negative binomial and logistic regression models were used to study continuous and categorical outcomes, respectively.

Results: A total of 230 patients were identified in the post-implementation (PI) group and 156 in the control group. Baseline characteristics between groups were similar for age, race, comorbidities, and transfer status. The PI group had more male patients (*p* value 0.04) and higher qSOFA scores (*p* value 0.002). The PI group had a significant reduction in TTOR compared to the control group (rate ratio [RR] 0.70, 95% confidence interval [CI] 0.61-0.80). There was also a reduction in deep SSI (odds ratio [OR] 0.21, 95% CI 0.05-0.92) in the PI group. There were no significant differences in hospital days, ventilator days, ICU days, superficial SSI, pressor use, or mortality.

Conclusions: Implementation of a novel EGS alert system in a large tertiary center was associated with improved surgical response times for high-acuity patients. These findings support the use of an EGS alert system to both identify and optimize the care of patients with surgical emergencies.

Quick Shots Session I

Paper #4
January 11, 2024
10:18 am

30-DAY READMISSIONS AND THE NEED FOR SUBSEQUENT EMERGENT SURGERY FOLLOWING NONOPERATIVE MANAGEMENT OF PERFORATED DIVERTICULITIS USING THE NATIONAL READMISSION DATABASE

Josh Gazzetta, DO*, Sean Nix, DO, FACOS, FACS*, Calli Schardein, DO, Rita Orjionwe
University of Missouri - Kansas City

Presenter: Josh Gazzetta, DO

Objectives: The aim of this study was to investigate the 30-day non-elective readmission rates for patients hospitalized with perforated diverticular disease who were managed without surgery. Secondary aims were to evaluate the rate of patients requiring surgery on readmission and identify independent predictors for patient readmission.

Methods: A retrospective review of 143,546 patients from the National Readmission Database (NRD), between 2016 and 2020, was conducted. The patient population included patients admitted with perforated diverticulitis and managed nonoperatively. Patients readmitted were compared to those who were not readmitted. Comparisons for continues and categorical variables were made using the student t-test and chi-squared test, respectively. A logistic regression model was used to determine independent factors associated with readmission. All analysis was done with SAS 9.4. P values <0.05 identified significance.

Results: Among the patients with perforated diverticulitis who were managed non-operatively, 17,868 (12.4%) were readmitted within 30 days and 4,924 (27.6%) of patients readmitted required surgical intervention. The greatest independent predictors of readmission were patient insurance status, index length of stay, and patient disposition. Comorbidities predicting readmission included renal failure, chronic pulmonary disease, diabetes, fluid and electrolyte disorders, and hypertension. Hospital total charges were also higher at the index admission for patients requiring readmission.

Conclusions: Over 10% of patients who were managed non-operatively required readmission and over a quarter of those patients required surgery. This study highlights variables associated with increased risk of readmission, namely insurance coverage, index admission characteristics, and comorbidities.

	No readmission (n=125,687)	30 day non-elective readmission (n=17,868)	p-value
Age (Mean ± SD)	57.2 ± 14.7	59.7 ± 15.6	< 0.001
Male	64636 (51.4%)	8010 (44.8%)	< 0.001
Female	61051 (48.6%)	9858 (55.2%)	
Disposition of patient			< 0.001
Routine	107672 (85.7%)	13068 (73.1%)	
Transfer to Short Term Hospital	509 (0.4%)	160 (0.9%)	
Transfer Other: SNF[a], ICF[b]	3813 (3.0%)	1191 (6.7%)	
Home Health Care	12821 (10.2%)	3034 (17.0%)	
Against Medical Advice	832 (0.7%)	414 (2.3%)	
Alive, Destination Unknown	10 (0.0%)	0 (0.0%)	
Length of Stay (Mean ± SD)	4.3 ± 3.6	5.4 ± 4.5	< 0.001
Primary Expected Payor			< 0.001
Medicare	40609 (32.4%)	7426 (41.6%)	
Medicaid	13678 (10.9%)	2378 (13.3%)	
Private Insurance	60639 (48.3%)	6675 (37.4%)	
Self Pay	6638 (5.3%)	860 (4.8%)	
No Charge	807 (0.6%)	129 (0.7%)	
Other	3144 (2.5%)	385 (2.2%)	
Total Charges (Mean ± SD)	34611.4 ± 46269.5	44830.1 ± 50191.0	< 0.001
Comorbidities			
Hypertension	59110 (47.0%)	9642 (54.0%)	< 0.001
Fluid and Electrolyte Disorders	27641 (22.0%)	5154 (28.8%)	< 0.001
Obesity	24591 (19.6%)	3918 (21.9%)	< 0.001
Chronic Pulmonary Disease	16901 (13.4%)	3227 (18.1%)	< 0.001
Diabetes	15924 (12.7%)	3077 (17.2%)	< 0.001
Hypothyroidism	13341 (10.6%)	2189 (12.3%)	< 0.001
Depression	10740 (8.5%)	1945 (10.9%)	< 0.001
Liver Disease	6756 (5.4%)	1012 (5.7%)	0.111
Renal Failure	5963 (4.7%)	1567 (8.8%)	< 0.001

a- Skilled Nursing Facility
b- Intermediate Care Facility

Baseline characteristics of the study population

Variable	Odds Ratio Predicting Readmission (95% Confidence Interval)
Non Routine Discharge[a]	1.7 (1.63 - 1.77)
Payor[b]	
Medicaid	1.5 (1.42 - 1.58)
Medicare	1.24 (1.2 - 1.29)
Self Pay	1.2 (1.11 - 1.3)
Length of Stay 5+ Days	1.45 (1.4 - 1.5)
Renal Failure	1.37 (1.29 - 1.46)
Chronic Pulmonary Disease	1.21 (1.16 - 1.26)
Diabetes	1.17 (1.11 - 1.22)
Fluid and Electrolyte Disorders	1.15 (1.11 - 1.2)
Hypertension	1.05 (1.02 - 1.09)

a- compared to Routine Discharge
b- compared to Private Payor

Multivariable logistic regression of variables associated with readmission

Paper #5
January 11, 2024
10:24 am

EDUCATION OF TRAUMA PATIENTS ON OPIOIDS AND PAIN MANAGEMENT: A QUALITY IMPROVEMENT PROJECT

Carolina Chu, BS, MS, Braden Rolig, BS, Dana M. van der Heide, MD, Sharon Joseph, MD, Colette Galet, PhD, Dionne A. Skeete, MD*
University of Iowa Hospitals and Clinics

Presenter: Carolina Chu, BS, MS

Objectives: Our acute care surgery (ACS) team sustainably launched a pain management quality improvement project to reduce opioid prescriptions without affecting pain control in our elective surgery patients that led to decreased opioid prescribing habits on the inpatient ACS service. Consequently, we implemented patient education on opioids and pain management aiming to further decrease opioid use without compromising pain management on the Trauma service.

Methods: Trauma patients admitted from 8/1/21-7/31/22 and discharged to home were included. Pain management education started on 02/2022. Demographics, injury severity scores (ISS), pre-admission opioid and non-opioid adjunct use, type/dose of opioids and adjuncts prescribed at 24h pre-discharge and at discharge were collected. Opioids were converted to oral morphine equivalents (OME). Phone calls for pain and opioid prescription refills were collected from medical records and analyzed to assess the impact of patient education on opioid and pain management.

Results: A total of 372 patients were included, 202 pre-education and 168 post. OME prescribed at discharge was positively associated with 24-hour pre-discharge OME (B=2.23 [1.73-2.72], p<0.001) and negatively associated with pre-injury opioid use (B=-88.1 [-175.2-0.95], p=0.048). Higher OME at discharge was associated with increased likelihood of phone calls for pain (OR=0.983 [0.968-0.998], p=0.031) and opioid refills (OR=0.980 [0.964-0.996], p=0.014). Implementation of patient education led to decreased phone calls for pain (OR=0.354 [0.200-0.626], p<0.001) and decreased opioid refills (OR=0.394 [0.217-0.713], p=0.002) (Table 1). There was also an increased number of multiple adjuncts prescribed (p<0.049) (Figure 1), but no change in opioid prescriptions.

Conclusions: Patient education on opioids and pain management led to decreased phone calls for inadequate pain management and decreased number of opioid refills.
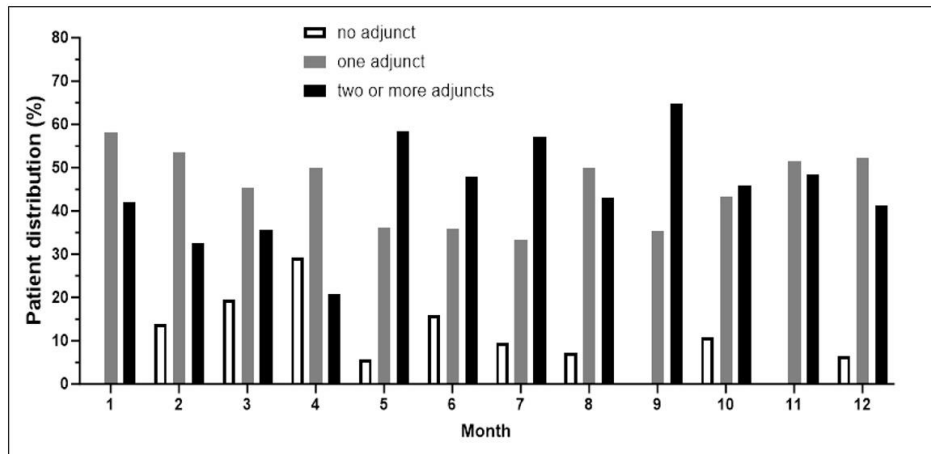
Figure 1. Adjunct prescription at discharge by month. The quality improvement project was implemented on month 6.

Variables		Pre-implementation n = 202	Post-implementation n = 168	p-value
Age (mean ± SD)		48.4 ± 18.7	47.8 ± 18.9	0.689
Male, n (%)		148 (73.3)	124 (73.8)	>0.999
Race, n (%)				
	White	167 (82.7)	149 (88.7)	0.410
	Black	16 (7.9)	10 (6)	
	Asian	2 (1)	1 (0.6)	
	Other	17 (8.4)	8 (4.8)	
Hispanic or Latino, n (%)		12 (5.9)	5 (3)	0.109
Comorbidities, n (%)				
Chronic pain		15 (7.5)	14 (8.4)	0.846
Anxiety		27 (13.4)	36 (21.4)	0.052
Depression		38 (18.8)	32 (19)	>0.999
Drug abuse		20 (9.9)	28 (16.8)	0.062
Alcohol abuse		26 (12.9)	25 (14.9)	0.650
Family alcohol abuse		0	4 (2.9)	**0.032**
Family drug abuse		0	1 (0.7)	0.425
Pre-injury opioid, n (%)		10 (5)	10 (6)	0.818
Pre-injury adjunct, n (%)		42 (20.8)	52 (31)	**0.031**
Pre-injury muscle relaxant, n (%)		12 (6)	3 (1.8)	0.062
Mechanism of injury, n (%)				
	Blunt	190 (94.1)	157 (93.5)	0.832
	Penetrating	12 (5.9)	11 (6.5)	
ISS		14.0 ± 7.7	12.4 ± 7.0	0.068
24 h pre-discharge prescribed OME, mg (mean ± SD)		44.0 ± 36.3	43.9 ± 25.7	0.231
Discharged without opioid prescription, n (%)		46 (22.8)	48 (28.6)	0.231
Opioid prescribed, n (%)				
	Dilaudid	48 (30.6)	38 (31.1)	0.162
	Lortab	3 (1.9)	0	
	Morphine	2 (1.3)	1 (0.8)	
	Oxycodone	102 (65)	80 (65.6)	
	Percocet	0	3 (2.5)	
	Tramadol	2 (1.3)	0	
Prescribed OME at discharge, mg (mean ± SD)		181.5 ± 157.0	173.0 ± 99.1	0.820
Prescribed adjunct at discharge, n (%)		177 (87.6)	158 (94)	0.049
Phone call for pain, n (%)		59 (29.2)	22 (13.1)	**<0.001**
Refill, n (%)		52 (25.7)	20 (11.9)	**<0.001**

Table 1. Patient characteristics and pain management information

Quick Shots Session I

Paper #6
January 11, 2024
10:30 am

A PEDIATRIC BRAIN INJURY GUIDELINE ALLOWS SAFE MANAGEMENT OF TRAUMATIC BRAIN INJURIES BY TRAUMA SURGEONS

Allison G. McNickle, MD, FACS*, Dina Bailey, RN, Mais Yacoub, MD, Douglas R. Fraser, MD, FACS*
UNLV School of Medicine

Presenter: Allison G. McNickle, MD, FACS

Objectives: We implemented a pediatric Brain Injury Guideline (pBIG) to stratify traumatic brain injuries (TBI) and allow management of less severe cases without repeat CT imaging or neurosurgical consultation. Injuries were classified as mild (pBIG1), moderate (pBIG2), severe (pBIG3) or isolated skull fractures (ISF) based on neurologic status, size and number of bleeds. We hypothesize that pediatric TBIs can be safely managed with this guideline.

Methods: Isolated TBIs (<18 years) were queried from this Level II Pediatric Trauma Registry after pBIG implementation from July 2021-March 2023. Datasets included age, injury specifics, repeat head CTs, neurosurgical consultations and interventions. Primary outcome was adherence to the guideline. Analysis was performed with Stata, with significance set at $p<0.05$.

Results: A total of 139 children with a mean age of 5.4 years were included. Skull fractures (113, 81%) and subdural hematomas (54, 39%) were the most common injuries. Repeat head CTs were obtained in 44 (32%) and neurosurgical consultation in 89 (64%). Seventeen (12.4%) required neurosurgical intervention. Overall guideline compliance was 83.5%, with best performance in the pBIG3 category (96%). One pBIG1 patient had increasing symptoms requiring upgrade, neurosurgical consultation and repeat head CT, but no intervention. Five children (3.6%) had post-discharge ER visits and 1 (0.7%) had a post-discharge CT. Three (2.2%) children died from their TBIs.

Conclusions: Adherence to the algorithm was 83.5% overall, with the lowest compliance in the moderate TBI (pBIG2) category. This group had the higher rates of unplanned head CT and neurosurgical consultations suggesting uneasiness with independent management of moderate injuries when compared to minor TBIs or isolated skull fractures. Outcomes with the use of the pBIG algorithm were otherwise acceptable.

	ISF	pBIG1	pBIG2	pBIG3
N (% of cohort)	49 (35.3)	10 (7.2)	28 (20.1)	52 (37.4)
Neurosurgery consult, n (%) *	23 (46.9)	3 (30)	12 (42.9)	51 (98.1)
Repeat head CT, n (%) *	3 (6.1)	1 (10)	9 (32.1)	31 (59.6)
Compliance with pBIG, n (%) *	42 (85.7)	8 (80)	16 (57.1)	50 (96.2)

Care of pediatric Traumatic Brain Injuries. ISF, isolated skull fractures; pBIG, pediatric brain injury guideline; *p<0.01

Paper #7
January 11, 2024
10:36 am

RISK FACTORS FOR PROGRESSION OF INTRACRANIAL HEMORRHAGE AFTER INITIATION OF VTE CHEMOPROPHYLAXIS? AN EVALUATION OF 1390 TBI PATIENTS

Keith W Burczak, D.O., Michael Van Gent, Devi Bavishi, MD, Thomas Clements, MD, Thaddeus J. Puzio, MD*,
Bryan A. Cotton, MD, MPH
University of Texas Health Science Center at Houston

Presenter: Keith W Burczak, D.O.

Objectives: The risk factors for progression of intracranial hemorrhage (ICH) after initiating chemoprophylaxis for venous thromboembolism (VTE) remain poorly described. The purpose of this study was to determine the rate of and risk factors for progression of ICH after initiating chemoprophylaxis.

Methods: We reviewed our trauma registry for all adult (â‰¥16 years old) head injured polytrauma patients admitted to the Trauma Surgery service between 9/16-12/21. Progression was defined as a documented increase in ICH, by neurosurgery or radiology faculty, following initiation of VTE chemoprophylaxis. Risk factors and outcomes were then evaluated.

Results: 1,390 patients met inclusion, 3% (43) of patients had progression following chemoprophylaxis. Progression patients were older (55 vs. 45) and had higher ISS (33 vs. 27); $p<0.05$. While pneumonia (49 vs. 21%) and sepsis (19 vs. 9%) rates were higher (both $p<0.05$), there were no differences between Progression and No Progression in time to initiation of prophylaxis (40 vs 38 hours), survival (88 vs. 92%) or VTE (0 vs. 4%); all p=NS. Univariate analysis noted higher initial CT rates of midline shift (21 vs 6%) subdural (47 vs 26%), and progression on 6-hr stability CT (64 vs. 34%); all $p<0.05$. Multivariate models confirmed these findings **(TABLE)**. Among these 3% of patients with progression, only 4 patients (0.3% overall) required intervention, and only two required craniotomy.

Conclusions: Intracranial hemorrhage progression after initiating VTE chemoprophylaxis is rare (3%) and often does not require intervention. The risk factors for progression following chemoprophylaxis align with those for spontaneous progression, indicating that chemoprophylaxis initiation does not significantly affect ICH progression. Early initiation of chemoprophylaxis (<48 hours) remains the standard of care for VTE prevention.

Risk Factors for Progression after Initiating Chemoprophylaxis			
	Odds Ratio	**95% C.I.**	**p-value**
Midline shift on initial CT	3.20	1.42-7.02	0.005
Progression on 6-hour CT	3.40	1.75-6.41	<0.001
Subdural on initial CT scan	2.40	1.26-4.42	0.007
Age in years	1.02	1.01-1.03	0.008

Paper #8
January 11, 2024
10:42 am

THE ASSOCIATION BETWEEN WHOLE BLOOD VERSUS BALANCED COMPONENT THERAPY AND SURVIVAL IN ISOLATED SEVERE TRAUMATIC BRAIN INJURY

Shahin Mohseni, MD, PhD, FEBS (EmSurg), FACS, Maximilian Forssten, MD, Dhanisha Trivedi, MD, Andras Buki, MD, PhD, Ahmad Mohammad Ismail, MD, PhD, Yang Cao, PhD, Marcelo Ribeiro Jr, MD, PhD, FACS, Babak Sarani, MD, FACS, FCCM*
George Washington University

Presenter: Shahin Mohseni, MD, PhD, FEBS (EmSurg), FACS

Objectives: Whole blood transfusion (WBT) is associated with improved hemostasis and possibly mortality in patients with hemorrhagic shock following injury but there are no studies in patients with isolated severe traumatic brain injury (TBI). The objective of this investigation was to compare outcomes of balanced component therapy (BCT) versus WBT in patients with an isolated severe TBI.

Methods: Adult patients (≥18years) registered in TQIP (2016-2019) who suffered a blunt isolated severe TBI (head AIS ≥3 in the head and ≤1 in the remaining body regions) and who received a BCT (1-2:1 PRBC:FFP and 1-2:1 PRBC:platelets) or WBT were eligible for inclusion. Patients were matched, based on the transfusion received, using propensity score matching. The primary outcome of interest was in-hospital mortality. A sensitivity analysis using inverse probability of treatment weighting (IPTW) on all patients with isolated TBI receiving transfusion was also conduced.

Results: A total of 217 patients received either WBT (n=82) or BCT (n=135). After propensity matching, 51 matched pairs were analysed. The rate of in-hospital mortality was significantly lower in WBT compared to BCT group (43.1% vs 66.7%, p = 0.025) corresponding to a relative risk reduction of 35% in in-hospital mortality [RR (CI 95%): 0.65 (0.45-0.94)]. In the sensitivity analysis, after IPTW, receiving a WBT was associated with a 32% lower risk of in-hospital mortality among patients who received a WBT, compared to, compared to those who received a BCT [IRR (95% CI): 0.68 (0.50-0.93), p = 0.014].

Conclusions: Whole blood transfusion in patients with severe isolated traumatic brain injury is associated with better survival compared to balanced component therapy. Further investigation into this finding using an appropriately powered, prospective study design is warranted.

Quick Shots Session I

Paper #9
January 11, 2024
10:48 am

SEX-BASED UTILIZATION AND OUTCOMES OF COLD-STORED WHOLE BLOOD FOR TRAUMA RESUSCITATION: ANALYSIS OF A PROSPECTIVE MULTICENTER STUDY

Shea Gallagher, MD, Joshua C. Dilday, DO*, Chaiss Ugarte, MD, Stephen Park, MD,
Anaar Siletz, MD, PhD*, Kazuhide Matsushima, MD*, Morgan Schellenberg, MD, MPH*, Kenji Inaba, MD,
Joshua P. Hazelton, DO, FACS*, John Oh, MD*, Jennifer M. Gurney, MD*,
Matthew J. Martin, MD, FACS, FASMBS*
LAC+USC Medical Center

Presenter: Shea Gallagher, MD

Objectives: Resuscitation with cold-stored whole blood (WB) has outcome benefits, but benefits varied by patient sex is unknown. There are also concerns about WB in pre-menopausal females leading to some protocols excluding this cohort. We sought to analyze WB utilization, outcomes, and disparities by patient sex.

Methods: Prospective multicenter study of WB resuscitation. Patients were stratified by sex and compared by transfusion strategy of WB or component therapy (CT). Generalized estimated equation models using inverse probability of treatment weighting were utilized.

Results: 1617 patients (83% male; 17% female) were included; 76% of males and 55% of females received WB. Male WB had more blunt trauma (45% vs 31%) and higher shock index (SI; 1.0 vs 0.8) compared to the male CT cohort (all p<0.05) but similar injury severity score (ISS). The female WB cohort was older (53 vs 36) and primarily blunt trauma (77% vs 62%) vs the female CT cohort (all p<0.05) but had similar SI and ISS. Figure 1 shows complication rates by sex and transfusion strategy. Male WB had lower early and overall mortality (27% vs 42%), but a higher rate of acute kidney injury (16% vs 6%) vs the male CT cohort (all p<0.01). Female cohorts had no difference in mortality, but the WB cohort had higher bleeding and pulmonary complications. WB use was independently associated with decreased mortality (OR 0.6; p<0.01) for males but not for females (OR 0.9; p=0.78; Figure 2). Females were less likely to receive WB vs males, with wide variability between individual centers (0%-33% female vs 66%-100% male, p<0.01).

Conclusions: WB was independently associated with a decreased mortality for males with no difference identified for females. WB was significantly less utilized in females and showed wide variability between centers. Further study of the impact of patient sex on outcomes with WB and WB utilization is needed.
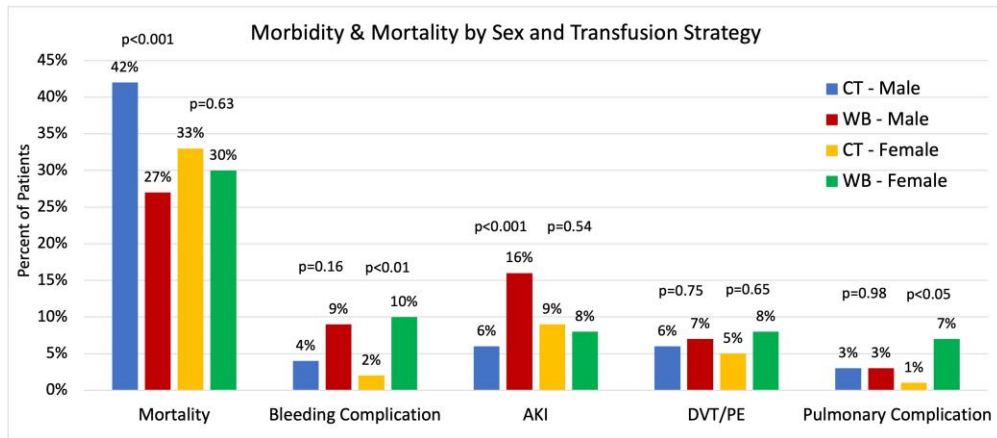
The morbidity and mortality outcomes by sex and transfusion strategy employed.
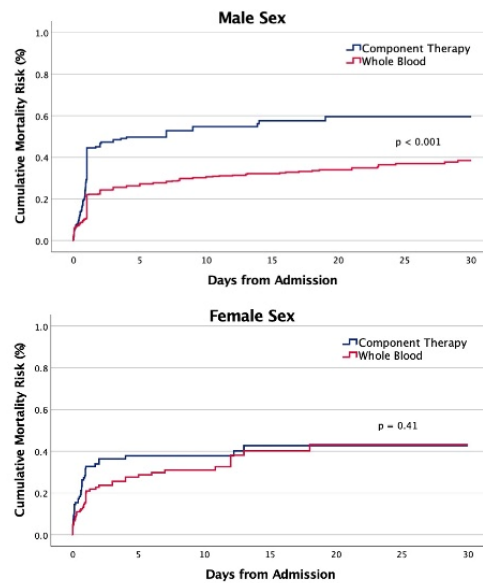
Kaplan-Meier curve demonstrating 30-day mortality by sex and transfusion strategy employed.

Quick Shots Session I

Paper #10
January 11, 2024
10:54 am

WHOLE BLOOD RESUSCITATION IN CRITICALLY INJURED OLDER ADULTS: CAN LESS BE MORE?

Thaddeus J. Puzio, MD*, Jan-Michael Van Gent, DO, Thomas Clements, MD, Carter Kaminski, DO,
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University of Texas Health Science Center at Houston

Presenter: Thaddeus J. Puzio, MD

Objectives: Whole blood (WB) has recently been described as the ideal resuscitation strategy, but most studies are limited to relatively young, healthy trauma patients. We sought to characterize the safety and efficacy of WB resuscitation relative to blood component (COMP) resuscitation in critically injured older adults.

Methods: A prospective observational cohort study of critically injured patients receiving emergency-release blood products was performed. All older adult (65yo +) trauma patients resuscitated between November 2017 and December 2021 were included. The WB group included patients receiving any group O WB units. The COMP group received no WB units, instead relying on fractionated blood (red blood cells, plasma, and platelets). Univariate and multivariate analyses were performed.

Results: Of the 2118 patients receiving emergency release blood products, 290 older adults were identified (172 WB and118 COMP). Median age was similar between groups (74 in WB and 75 in COMP; p=0.21). While the groups had similar baseline demographics, WB patients were more severely injured with higher ISS. Patients had similar coagulation parameters, but WB patients were more hypotensive, had lower GCS, and more acidotic on arrival. (TABLE 1) Both groups received a similar total number of blood products (6 WB vs 5 COMP) and had similar rates of acute renal failure (15 vs 17%), sepsis (17 vs 15%), and ARDS (8 vs 5%); all p=NS. With univariate analysis WB patients had lower 30-day survival (53% vs. 65%; p=0.03), but there was no difference when controlling for ISS and degree of shock (OR 1.98, CI 0.64-6.08, p=0.23). WB exposure was associated with a nearly 60% reduction in 24hr blood transfusions (TABLE 2).

Conclusions: In this study of older adults receiving emergency release blood products, those receiving WB were more critically injured. Despite this, WB resuscitation was associated with a nearly 60% reduction in 24hr blood transfusions.

	WB (n=172)	COMP (n=118)	p-value
Male sex	72%	65%	0.124
Median BMI	27 (24, 30)	26 (22, 30)	0.203
White race	62%	58%	0.493
Blunt mechanism	94%	95%	0.812
Injury Severity Score	26 (16, 36)	20 (10, 29)	0.003
Arrival heart rate	85 (68, 105)	87 (76, 104)	0.434
Arrival systolic pressure	96 (78, 121)	120 (97, 140)	<0.001
Arrival GCS	8 (3, 15)	14 (6, 15)	<0.001
ED pH	7.28 (7.20, 7.36)	7.34 (7.26, 7.39)	<0.001
ED lactate	3.6 (2.2,6.0)	2.8 (1.8, 4.5)	0.035

Table 1: Baseline Characteristics

	Odds ratio	95% C.I.	p-value
WB exposure	0.42	0.18-0.96	0.041
Injury Severity Score	1.05	1.02-1.08	0.001
Blunt mechanism	0.60	0.13-2.67	0.502
Arrival SBP	0.99	0.98-1.00	0.592
Arrival Lactate	1.15	0.97-1.35	0.087

Table 2: Regression model predicting 24-hour blood transfusions

Quick Shots Session II

Paper #11
January 11, 2024
10:00 am

PREHOSPITAL UNDER TRIAGE RATES IMPROVE WITH IMPLEMENTATION OF A NOVEL EMS EDUCATIONAL MODULE

Rachel Cary, BS, Rachel Cary, BS, Jennifer Geller, BS*, Michael Rallo, BS, Amanda Teichman, MD*,
Zachary Englert, DO*, Timothy Murphy, Lisa Falcon, MSN, RN, TCRN, NE-BC,
Mayur Narayan, MD, MPH, MBA, MHPE, FACS, FCCM, FICS*, Rachel L. Choron, MD, FACS*
Rutgers Robert Wood Johnson Medical School

Presenter: Rachel Cary, BS

Objectives: Prehospital triage is critical to ensure timely activation of trauma center resources. Under-triage (UT) results in higher morbidity and mortality. To minimize this risk, the American College of Surgeons Committee on Trauma recommends trauma centers aim for an UT rate below 5%. Our center has a 3-tiered triage system aimed at optimizing resource allocation. We hypothesized that a trauma triage criteria educational module (TCEM) would 1) improve emergency medical services (EMS) provider confidence and accuracy in triage and 2) improve our UT rate.

Methods: From July-November 2022, the TCEM was taught to 8 local EMS agencies transporting to our Level 1 trauma center. Pre and post-class surveys assessed EMS provider triage confidence using a Likert scale 1-5. Validated trauma scenario questions were used to measure triage accuracy. The UT rate was compared between January-May 2022 (pre-TCEM) to January-May 2023 (post-TCEM) using trauma registry data. Data were analyzed using paired Wilcoxon signed rank and t-tests.

Results: 72 EMS providers participated in TCEM, most were Caucasian (65.3%), non-Hispanic (84.7%), males (77.8%) with EMT-B certifications (90.3%). There was a significant increase in triage confidence from pre-TCEM to post-TCEM (2 vs 5; $p<0.001$, Table1) and accuracy (23.2% vs 88.9%; $p<0.001$, Table 2). Regression analysis did not indicate a significant difference in confidence or accuracy based on years of experience, paid or volunteer provider status, or transport volume per week. The UT rate improved after TCEM initiation (6.7% vs 2.0%; $p<0.001$).

Conclusions: This novel community based educational program demonstrated improvements in EMS provider confidence and accuracy with regard to pre-hospital triage. Additionally, after TCEM implementation, UT rates fell below the 5% benchmark. Outreach programs like these are often well received by EMS, and implementation is highly reproducible at other centers.

Table 1. EMS Provider Triage CONFIDENCE Before and After Participation in the Trauma Triage Criteria Education Module (TCEM). Likert scale (1-5)			
	Pre-Test	**Post-Test**	**p-value**
Overall (median, IQR)	2 (1)	5 (2)	<0.001
Alpha	3 (2)	4 (1.3)	<0.001
Bravo	2 (2)	4 (2)	<0.001
Charlie	3 (1)	4 (2)	<0.001
Tiered trauma triage system: Alpha – highest level of activation, Bravo – partial trauma activation, Charlie – ED only level trauma activation			

Table 1. EMS Provider Triage CONFIDENCE Before and After Participation in the Trauma Triage Criteria Education Module (TCEM). Likert scale (1-5)

Table 2: EMS Provider Triage ACCURACY Before and After Participation in the Trauma Triage Criteria Education Module (TCEM)			
	Pre-Test Score	**Post-Test Score**	**p-value**
Overall (mean %, SD)	29.2% (23.7)	88.9% (19.2)	<0.001
Alpha Scenario 1	65.3%	95.8%	<0.001
Alpha Scenario 2	18.1%	91.7%	<0.001
Bravo Scenario	16.7%	90.3%	<0.001
Charlie Scenario	16.7%	77.8%	<0.001

Table 2: EMS Provider Triage ACCURACY Before and After Participation in the Trauma Triage Criteria Education Module (TCEM)

Quick Shots Session II

Paper #12
January 11, 2024
10:06 am

FACTORS IMPACTING UNDERTRIAGE OF PATIENTS MEETING TRIAGE CRITERIA FOR HIGH-LEVEL TRAUMA CARE

Jamie Beiriger, BS, Jacob Puyana, MD, Andrew-Paul Deeb, MD, David Silver, MD, MPH, Liling Lu, MS,
Joshua B. Brown, MD, MSc, FACS*
University of Pittsburgh Medical Center

Presenter: Jamie Beiriger, BS

Objectives: Patients injured in rural regions fare worse than their urban counterparts. Undertriage (UT) may play a role in this disparity. Our aim was to explore driving forces for EMS clinician destination selection among undertriaged trauma patients to understand actionable targets for improvement.

Methods: We included injured adult patients who met national field triage guideline criteria for transport to the highest level of trauma center (step 1&2) from the NEMSIS database in 2018. UT was defined as transport to a non-level I/II trauma center. Multivariable logistic regression determined the association between UT and patient and system characteristics, including urbanicity and EMS documented reason for destination selection. Undertriaged patients were categorized as recognized or unrecognized by EMS as requiring high-level trauma center care using the reason for destination to identify underlying factors associated with UT decisions.

Results: We included 36,094 patients. Patients injured in nonurban regions had 2-4 times higher odds of UT than urban patients, although this decreased when extending appropriate triage to include any level of trauma center (Fig 1). The most common reason for destination selection was protocol (52%) in urban areas and closest facility (49%) in nonurban areas. The odds of UT were significantly increased when the reason for destination was patient/family choice (ref protocol: aOR 6.29 95%CI 5.28-7.5). Nonurban setting was associated with recognition of requiring high-level trauma care but UT for system factors (Fig 2).

Conclusions: UT remains higher in nonurban areas. Transport destination decision reasoning plays a role. Nonurban EMS clinicians likely recognize the need for trauma center care but transport to closer facilities as opposed to not recognizing injury severity. This may allow more targeted efforts to improve UT in rural America.
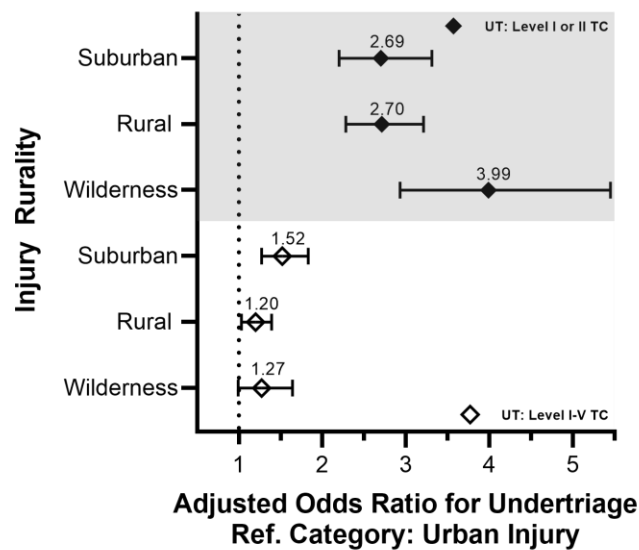
Forest plot of odds ratios of rurality association with undertriage adjusted for demographic, injury, and system factors. The top half of the figure (grey) defines appropriate triage as transport to a level 1 or 2 trauma center and the bottom half of the figure (white) defines appropriate triage as transport to any level trauma center.
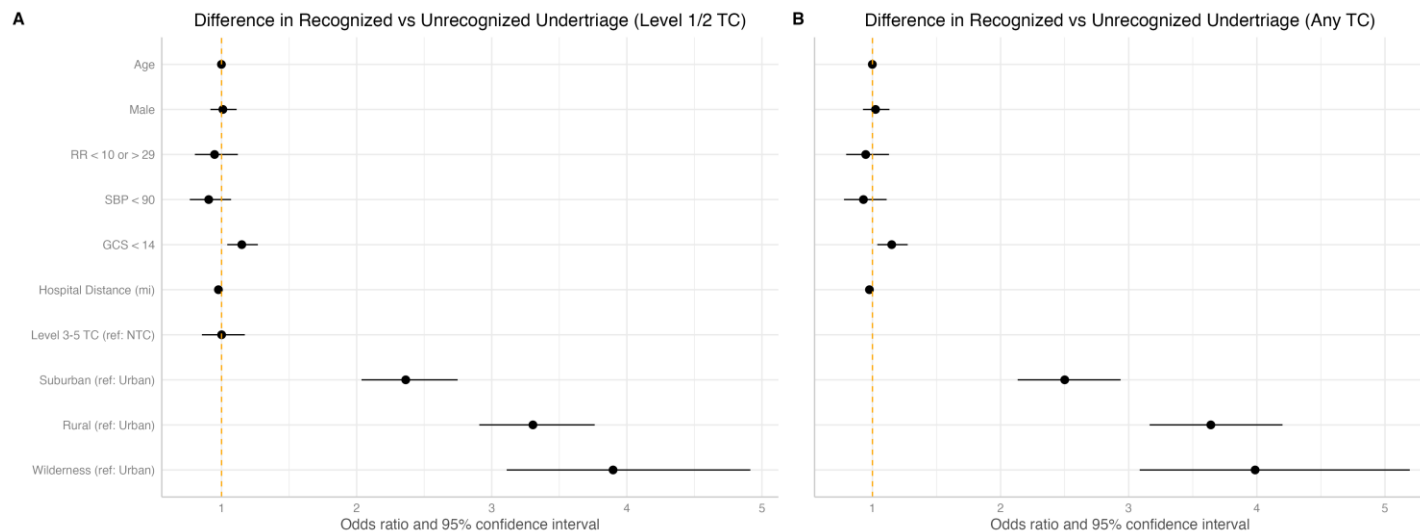
Forest plot of patient, injury, and system characteristics association with recognized injury severity in undertriaged patients from a multivariable regression model. Association presented as adjusted odds ratios with 95% confidence intervals. **2A** defines appropriate triage as transport to a level 1 or 2 trauma center and **2B** defines appropriate triage as transport to any level trauma center.

Quick Shots Session II

Paper #13
January 11, 2024
10:12 am

INTRA-ABDOMINAL VERSUS PRE-PERITONEAL ADMINISTRATION OF RESQFOAM FOR TREATMENT OF EXANGUINATING PELVIC HEMORRHAGE

David King, MD*, Quynh Pham, PhD, Ahmed Elsharkawy, PhD, Ahmed Eid, PhD, MIchael Duggan, DVM,
John Beagle, MS, Shawn Gelsinger, MS, MIchael Fornaciari, MD, Upma Sharma, PhD,
John O. Hwabejire, MD, MPH*, David King, MD*
Massachusetts General Hospital

Presenter: David King, MD

Objectives: ResQFoam is a novel intervention intended to act as a hemostatic bridge to surgery in the treatment of intra-abdominal (IA) exsanguination. We hypothesized that IA administration of ResQFoam would be similarly efficacious as direct administration into the pre-peritoneal (PP) space in pelvic fracture with bleeding.

Methods: In swine, pelvic bleeding consisted of a unilateral, retro-peritoneal vascular injury combined with complex bony pelvic fracture. After injury, animals received fluid resuscitation alone (control, n=14), fluids with PP administration of ResQFoam (n=10), or fluids with IAl ResQFoam (n=10) and monitored for 3 hrs.

Results: Both IA and PP ResQFoam provided similar survival benefit compared to control animals (Figure 1). The median survival times for the IA and PP administrations were 87 minutes (quartile range, QR: 42-180 minutes; p=0.008) and 124 minutes (QR: 59-180 minutes, p=0.002), respectively, compared to 17 minutes (QR: 4-60 minutes) for the controls. There was no difference in median survival time between the IA and PP groups (p=0.734). Survival at 1 hour was 60% and 70% for the IA and PP groups, respectively, compared to 21% in the controls (p=0.035 and 0.092, respectively); survival rate at 3 hours was 40% for both ResQFoam vs 0% in controls (p=0.020). There were no differences in survival rate at 1, 2, or 3 hours between the foam IA and PP groups (p=1.000). Both ResQFoam groups facilitated hemodynamic stabilization of MAP and reduced normalized hemorrhage rate from 5.4±4.6 g/kg/min in controls to 0.6±0.7 g/kg/min (p=0.004) and 0.5±0.5 g/kg/min (0.003) in the IA and PP groups, respectively. There was no difference in the normalized hemorrhage rate between the two methods of foam deployment (p=0.989).

Conclusions: Similar survival benefits were obtained with ResQFoam in the treatment of exsanguinating pelvic fracture via both the IA or PP approaches.
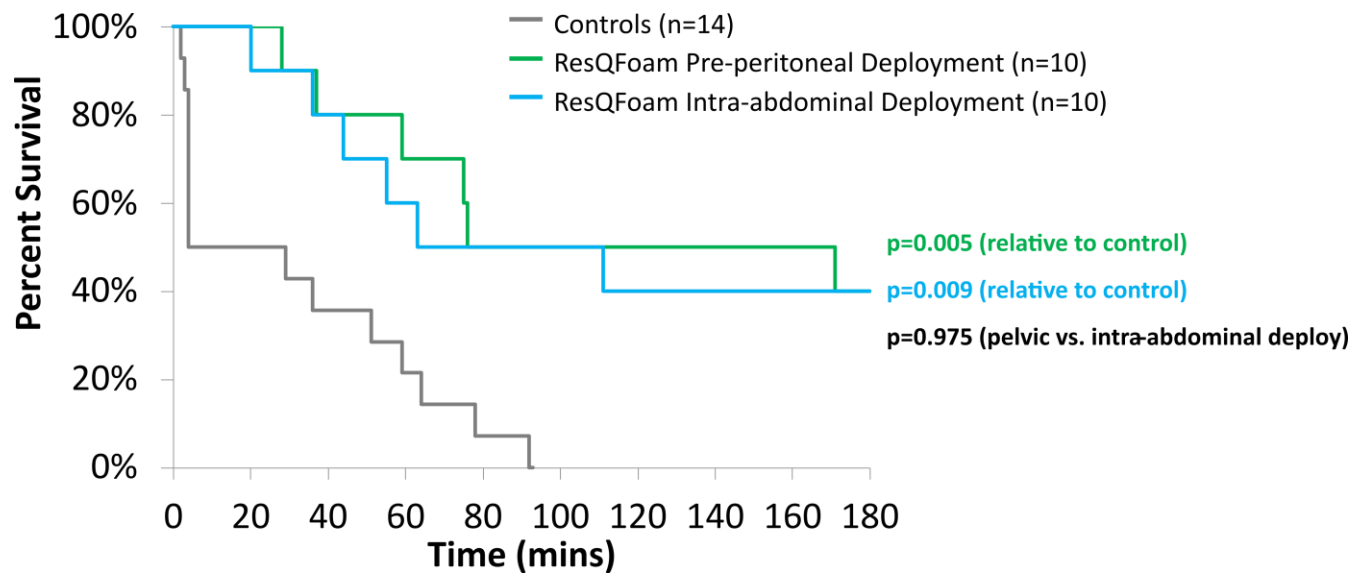
Kaplan-Meier curve for ResQFoam groups vs control

Quick Shots Session II

Paper #14
January 11, 2024
10:18 am

ASSOCIATION OF HOSPITAL RURAL DESIGNATION ON SHORT-TERM OUTCOMES OF PATIENTS WITH PERIPHERAL VASCULAR TRAUMA

Nam Yong Cho, BS, Zachary K. Tran, MD*, Nicole Charland, BS, Amulya Vadlakonda, BS,
Joanna Curry, BS, Areti Tillou, MD, Peyman Benharash, MD,
David Geffen School of Medicine

Presenter: Nam Yong Cho, BS

Objectives: Peripheral vascular trauma (PVT) is a major contributing factor to long-term disability and mortality among patients with traumatic injuries. However, data on how rural designation of a treating facility correlates with outcomes and specifically limb loss rates following PVT are lacking. The present study evaluated the clinical and financial outcomes of PVT in a nationally representative cohort.

Methods: Patients (>18 years) undergoing open or endovascular procedures following admission for PVT were identified using the 2016-2020 Nationwide Readmission Database. Treating facilities were categorized as *Urban* or *Rural.* Injury severity was quantified using Trauma Mortality Prediction Model (TMPM). Multivariable regressions were used to evaluate the impact of facility type on outcomes of interest, which included amputation on index hospitalization, mortality, hospitalization duration, costs, and 30-day readmission.

Results: Of 19,831 patients, 4,795 (24.2%) were *Rural. Rural* were older, more commonly female, and had a higher proportion of patients in the lowest income quartile (Table 1). The TMPM score and the proportion of patients undergoing endovascular interventions were similar between *Rural* and *Urban* patients. After adjustment, *Rural* had higher odds of amputation (AOR 1.68, 95%CI 1.33-2.13) compared to *Urban* (Figure 1). While rates of mortality and prolonged hospitalization were similar, *Rural* was associated with lower cost (β**ASK CHRISTINE: -$3.2K, 95%CI -6.0--0.4) and odds of 30-day readmission (AOR 0.74, 95%CI 0.60-0.92).

Conclusions: Patients undergoing vascular intervention for PVT at rural facilities are more likely to undergo amputation for injuries of comparable severity, with lower incremental costs and risk of 30-day readmission. These findings highlight the risk factors linked to limb loss in PVT patients and underscore potential disparities in rural regions.

	Rural (N=4,795)	Urban (N=15,036)	P-Value
Age (years)	38 [27-56]	35 [26 -51]	<0.001
Female (%)	21.3	18.9	0.02
Lowest Income Quartile (%)	51.1	38.1	<0.001
TMPM Score	0.05 [0.01-0.32]	0.05 [0.01-0.36]	0.34
Compartment Syndrome (%)	13.5	14.6	0.25
Rhabdomyolysis (%)	3.1	3.0	0.93
Endovascular Intervention (%)	7.9	6.6	0.06
Fasciotomy (%)	12.2	10.3	0.04

Table 1. Baseline characteristics stratified by patient location (Rural vs Urban). Categorial variables are reported as percentages (%), while continuous variables are reported as medians with an interquartile range (IQR). TMPM, trauma mortality prediction model.
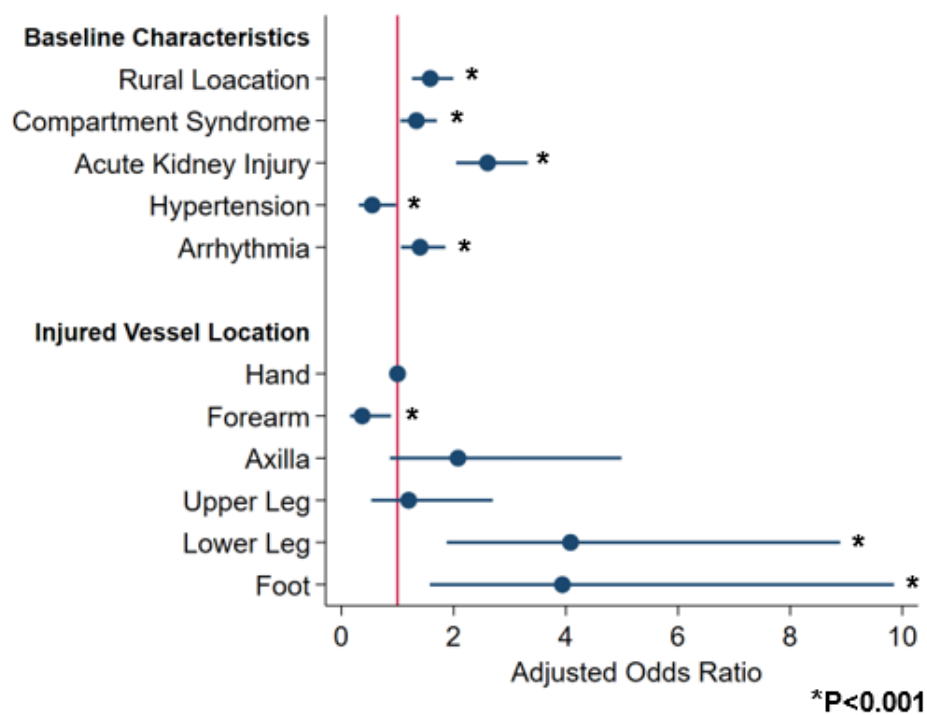

Figure 1. Factors associated with amputation at index hospitalization in patients with peripheral vascular trauma.

Paper #15
January 11, 2024
10:24 am

PROSPECTIVE COMPARISON OF A SHORT VERSUS LONG CHEST TUBE WATER SEAL TRIAL FOR TRAUMATIC PNEUMOTHORAX

Tara E van Veen, MD, Stephen Varga, MD
Inova Fairfax Hospital

Presenter: Tara E van Veen, MD

Objectives: Chest tube (CT) placement is a frequent intervention for trauma patients, yet there is not sufficient evidence to guide management after placement. Water seal trial duration varies considerably. The primary objective of this study was to compare a shorter versus a longer water seal trial regimen prior to CT removal in patients with a CT placed for traumatic pneumothorax.

Methods: This is a prospective, multicenter study of patients with traumatic pneumothorax. Inclusion criteria was patients aged 18+ with traumatic pneumothorax and use of water seal (WS) trial. CT management was at the discretion of the study center. Chest x-rays (CXRs) were performed 4-8 hours after removal. Primary outcomes were recurrent pneumothorax after CT removal and WS trial failure. Secondary outcomes were CT reinsertion, CT duration, and hospital length of stay.

Results: Of the 1620 patients included in the study, 328(20%) underwent a short WS trial(0-8 hours), 279(17%) a medium WS trial(9-21 hours), and 1013(62%) a long WS trial (22+ hours). WS trial failure rates differed significantly among the three cohorts($p < 0.001$); short WS trial had the lowest rate of 16.5%(95% CI:12.6%-20.9%), significantly lower compared with medium WS trial (29.8%[24.5%-35.5%]) and longer WS trial (35.9%[33.0%-39.0%]). However, the rate of recurrence or worsening pneumothorax was highest in the short WS trial cohort, which was 15.2%(11.5%-19.6%) and significantly higher compared with 8.2%(5.3%-12.1%) in the medium and 9.4%(7.7%-11.3%) in the long cohorts. Reinsertion of CT for pneumothorax was low among all 3 groups: short 6.1%(3.8%-9.3%), medium 3.94%(1.9%-6.9%), and long 5.09%(3.8%-6.6%).

Conclusions: Shorter water seal trials for traumatic CTs have higher rates of recurrent pneumothorax. Clinical significance of these recurrent pneumothoraxes needs to be investigated further as shorter trials did not lead to higher rates of CT reinsertion.

Quick Shots Session II

Paper #16
January 11, 2024
10:30 am

SURGICAL TRAINEE LEVEL IMPACTS MORTALITY IN THE SEVERELY INJURED TRAUMA PATIENT

Christopher O'Neil, MD, Walter A Ramsey, MD, Alexis K Jones, BS, Nicole B Lyons, MD, Brianna Cohen, MD, Luciana Tito Bustillos, MD, Brandon M. Parker, DO*, Jonathan P. Meizoso, MD, MSPH*, Shevonne Satahoo, MD, Gabriel Ruiz, MD*, Edward Lineen, MD, Enrique Ginzburg, MD*, Carl I. Schulman, MD, MSPH*, Louis R. Pizano, MD*, Nicholas Namias, MBA, MD*, Joyce I Kaufman, MD
Ryder Trauma Center, University of Miami Miller School of Medicine

Presenter: Christopher O'Neil, MD

Objectives: Resident education is a central tenet of academic surgery. In a time-sensitive specialty like trauma, trainees serve a pivotal role in the immediate care of critically ill patients. This study tests the hypothesis that variable levels of trainee experience influence outcomes in life-threatening trauma.

Methods: The trauma registry at an academic Level I trauma center was reviewed from 10/2015-12/2021. All patients admitted with an ISS > 15 met inclusion criteria. Burns, patients that arrived without vital signs, and those with an ISS=75 were excluded. Patients were stratified by admitting trauma team. To comply with ACGME guidelines, our institution rotates through three teams with distinct trainee staff every 24 hours. Team FF has two fellows, team FR has a fellow and a PGY-IV resident, and team RR has a PGY-V and a PGY-II resident. Attending surgeons rotate randomly through all three teams. Primary outcome was overall mortality. Secondary outcomes included length of stay and in-hospital complications.

Results: In 3,103 patients, overall mortality was 12.3%. Each team had a near equal number of admissions with similar baseline characteristics (Table 1). Teams with higher trainee experience were associated with decreased mortality: 10.2% for FF, 12.8% for FR, 13.9% for RR (p=0.034). There were no significant differences in hospital LOS or in-hospital complications. When comparing cohorts of critically injured patients (ISS > 35), there was an even more pronounced difference in mortality: 32.1% for FF, 42.8% for FR, 47.1% for RR (p=0.027).

Conclusions: Severely injured trauma patients had significantly different rates of mortality depending on the level of the on-call trainee staff. Staffing models, support for trainees, and rules limiting overlap of fellows and chief residents may need to be re-evaluated as they can have an impact on patient survival.

Trauma Team	FF (n = 1019)	FR (n = 1054)	RR (n = 1030)
Baseline Characteristics			
Age	41 (27-57)	40 (27-58)	41 (28-58)
Male	761 (75%)	804 (76%)	821 (80%)
Blunt Mechanism	853 (84%)	872 (83%)	846 (82%)
ISS	22 (17-29)	22 (18-29)	22 (18-29)
Hypotensive on Arrival (SBP<90)	76 (7.5%)	80 (7.6%)	88 (8.5%)
Severe TBI	385 (38%)	417 (40%)	418 (41%)

Patient baseline characteristics

Trauma Team	FF (n = 1019)	FR (n = 1054)	RR (n = 1030)	p-value
Outcomes				
Mortality	104 (10.2%)	135 (12.8%)	143 (13.9%)	**0.034**
Hospital LOS	11 (6-25)	12 (6-25)	12 (6-25)	0.951
ICU LOS	4 (0-13)	4 (0-12)	4 (0-12)	0.878
Emergent OR	272 (26.7%)	317 (30.1%)	290 (28.2%)	0.230
Time to OR (mins)	32 (16-86)	35 (18-99)	33 (15-85)	0.440
Time in OR (mins)	149 (106-217)	146 (105-196)	156 (112-226)	0.338
Complications				
Acute Kidney Injury	32 (3.1%)	34 (3.2%)	34 (3.4%)	0.979
ARDS	13 (1.3%)	8 (0.8%)	16 (1.6%)	0.237
Infection	88 (8.6%)	80 (7.6%)	67 (6.5%)	0.190
Pulmonary Embolism	26 (2.6%)	18 (1.7%)	25 (2.4%)	0.370
Failure to Rescue	22 (2.2%)	22 (2.1%)	28 (2.7%)	0.580
Critically Injured Cohort (ISS ≥ 35)				
Number of Cases	140 (13.7%)	173 (16.4%)	157 (15.2%)	0.235
Mortality	45 (32.1%)	74 (42.8%)	74 (47.1%)	**0.027**

Clinical outcomes and in-hospital complications for the three trauma teams

Quick Shots Session II

Paper #17
January 11, 2024
10:36 am

FALLING APART: DOES METHAMPHETAMINE USE INCREASE COMPLICATION RATES IN THE MANAGEMENT OF BOWEL INJURIES? A MATCHED ANALYSIS.

Bryan Campbell, DO, Alyssa N Carroll, MPH, Andrea Krzyzaniak, MA, Laurinda Jackson, MD, MPH, Joseph Lee, MD, Alexandra Rooney, MPH, Richard Calvo, PhD, Michael J. Krzyzaniak, MD*, Kimberly A. Peck, MD*, Michael Sise, MD*, Vishal Bansal, MD
Scripps Mercy Hospital Trauma Service

Presenter: Bryan Campbell, DO

Objectives: Despite widespread methamphetamine use among trauma patients and prior evidence of vasoconstrictive effects, there is a paucity of data evaluating its impact on bowel injury management. We hypothesized that methamphetamine use prior to bowel injury increases the likelihood of complications following repair.

Methods: Trauma Quality Improvement Program data 2017-2019 were used to identify patients >16yrs with toxicology screening who had operative management of bowel injury within 24hrs of admission. Patients positive for cocaine or with a hospital stay (LOS) <3days were excluded. Patients were grouped as methamphetamine positive (METH+) or negative for all substances (TOX-) then direct matched on sex, age, ISS, and blunt v. penetrating injury. Index and subsequent procedures and TQP-reportable outcomes including LOS, mortality, and infection rates were compared using non-parametric analysis.

Results: 3,182 patients met inclusion criteria. After direct matching 335 METH+ to 335 TOX- patients, cohorts appeared to receive similar initial treatment as the rates and types of index procedures did not significantly differ (excision 48 vs. 46%; repair 47 vs. 42%; resection 25 vs. 32%; drainage 10 vs. 6%). Postoperatively, METH+ patients had higher rates of subsequent repair (19% v. 8%, p=0.02) and drainage procedures (33 v. 19%, p=0.02), with interventional radiology (IR) drains comprising most of this difference (Figure 1). Matched METH+ and TOX- groups were comparable on hospital LOS, ICU LOS, ventilator days, mortality, and infection rates.

Conclusions: Despite similar initial operative treatments, METH+ patients had significantly more post-operative repair and drainage procedures. This suggests higher complication rates and supports toxicology screening to identify METH+ patients who may require additional interventions following traumatic bowel injury.
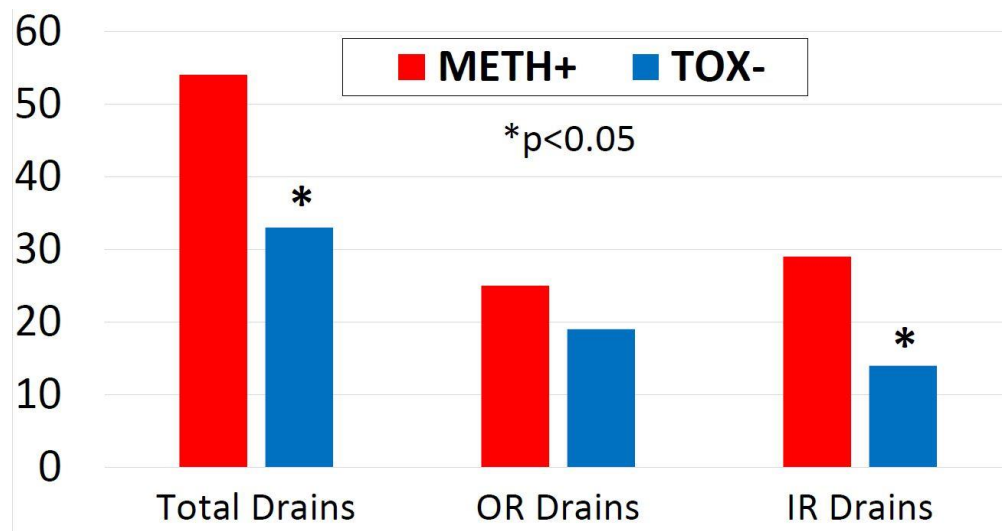
Increased drain placement in METH+ patients after index operation for bowel trauma.

Paper #18
January 11, 2024
10:42 am

FIREARM RELATED INJURY, IT'S NOT JUST PHYSICAL: USING THE PROMIS INSTRUMENT TO DEMONSTRATE ADVERSE LONG-TERM PATIENT REPORTED OUTCOMES

Jennifer Geller, BS*, Jennifer Geller, BS*, John Park, Khushi Patel, BS, Alexander Cong, MD, Amanda Teichman, MD*, Anne Pierce, Zachary Englert, DO*,
Mayur Narayan, MD, MPH, MBA, MHPE, FACS, FCCM, FICS*, Rachel L. Choron, MD, FACS*
Rutgers Robert Wood Johnson Medical School

Presenter: Jennifer Geller, BS

Objectives: The burden of firearm injury(FI) extends beyond hospitalization, however literature focuses mostly on short-term outcomes. Patient-Reported Outcomes Measurement Information System(PROMIS) is a NIH validated tool to assess quality of life(QoL). We hypothesize 1)FI survivors report worse socioeconomic, physical, and mental health outcomes post-FI vs pre-FI and 2)the PROMIS tool can congruently describe long-term patient reported outcomes.

Methods: This is a retrospective study where a phone survey was conducted with FI survivors admitted January 2017 to August 2022. Questions assessed demographics, socioeconomics, mental and physical health pre-FI vs 6 months post-FI; McNemar test was used for analysis. PROMIS-29+2 Profilev2.1 instrument provided a common metric to assess health-related QoL. The HealthMeasures Scoring Service was used to calculate scores.

Results: Of 242 eligible FI survivors, 71 were successfully contacted and 38 surveyed. Respondents were 84.2% male, 71.1% Black, 55.3% aged 18-29, and 68.4% had high school level education. The survey revealed survivors unemployment increased post-FI vs pre-FI(55.2% vs 13.2%,p<0.001, Table1). Survivors also reported increased mental health needs(84.2% vs 21%,p<0.001). Most(73.7%) also reported lasting physical disability.

Similarly the PROMIS instrument demonstrated largely worse health-related QoL scores post-FI, particularly high anxiety/fear (T-score 60.2, SE 3.1, CI 54.6-66.3, Table 2), pain resulting in life interference (T-score 60.0, SE 2.3, CI 55.7-63.9), and worse physical function (T-score 42.5, SE 3.0, CI 38.2-46.9).

Conclusions: FI survivors had more unemployment and worse mental health post-FI. This study shows, PROMIS can be used to determine health-related QoL in the FI population with findings congruent to a parallel phone survey, demonstrating worse pain, anxiety, and physical function among survivors.

Table 1. Firearm Violence Survivors' Self-Reported Socioeconomic, Physical and Mental Health Outcomes using a Questionnaire via Phone Survey			
	Pre-Firearm Injury	At least 6 months Post-Firearm Injury	p-value
Not Employed	**5 (13.2%)**	**21 (55.2%)**	**<0.001**
Collecting Unemployment or Disability Benefits	3 (7.9%)	7 (18.4%)	0.206
Alcohol Use	10 (26.3%)	8 (21.1%)	0.637
Substance use	10 (26.3%)	13 (34.2%)	0.532
Housing			
Own or rent	25 (65.8%)	20 (52.6%)	0.456
Staying with friends/family or homeless	13 (34.2%)	18 (47.4%)	0.369
Reported depression, anxiety, PTSD, or other mental health	**8 (21.1%)**	**32 (84.2%)**	**<0.001**
Wanted counseling after firearm violence		20 (52.6%)	
Firearm Violence Recidivist	3 (7.9%)	4 (10.5%)	0.705
Lasting Disability			
Cognitive		1 (2.6%)	
Mental Health/Emotional		**21 (55.3%)**	
Physical		**28 (73.7%)**	

Table 1. Firearm Violence Survivors' Self-Reported Socioeconomic, Physical and Mental Health Outcomes using a Questionnaire via Phone Survey

Table 2: Firearm Violence Survivors' Health-Related Quality of Life using the PROMIS-29+2 Profile vs2.1 Instrument				
PROMIS Instruments with T-Score's >50 indicating worse function	*T-Score*	*SE*	*95% CI*	
Pain Resulting in Life Interference, median	**60.0**	**2.3**	**55.7**	**63.9**
Depression and Sadness	51.2	3.1	45.1	57.3
Anxiety / Fear	**60.2**	**3.1**	**54.6**	**66.3**
Fatigue	49.0	2.8	43.9	54.3
Sleep Disturbance	52.2	3.3	46.1	58.3
PROMIS Instruments *with T-Score's <50 indicating worse function*	*T-Score*	*SE*	*95% CI*	
Physical Function	**42.5**	**3.0**	**38.2**	**46.9**
Ability to Participate in Social Roles / Activities	48.1	2.8	43.8	52.4
Cognitive Function	47.1	6.2	35.5	57.4

The NIH validated PROMIS-29+2 Profile vs2.1 survey was used to calculate scores
T-Score of 50 indicates the average among the United States population with a Standard Deviation of 10. (ex. T-score of 60 is one SD above the mean)

Table 2: Firearm Violence Survivors Health-Related Quality of Life using the PROMIS-29+2 Profile vs2.1 Instrument

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PREDICTORS OF RECIDIVISM WITHIN A RURAL GERIATRIC TRAUMA POPULATION

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Objectives: Trauma recidivism research has focused largely on younger patient populations and penetrating injuries. More evidence is needed to evaluate geriatric recidivism and associated comorbidities, specifically within a rural population. This study aimed to determine predictors of trauma recidivism among patients over 65 years of age at a rural level one trauma center.

Methods: This was a retrospective study that included trauma patients over 65 years of age admitted to a rural trauma center (2015-2021). Logistic regression was used to determine the effect of age, sex, injury type, comorbidity prevalence, and fall prevalence to determine chances for recidivism. Association Rule Mining (ARM) analysis was used to determine the significance of a comorbidity combination to recidivism.

Results: A total of 6025 patients were included. Patients who were older, female, had multiple comorbidities and presented for a fall were significantly more likely to become a recidivist. Patient comorbidities with the highest rate of recidivism were esophageal varices (19%), dementia (15.9%), and congestive heart failure (CHF) (15.1%). Two-way combinations that resulted in greater odds of recidivism included hypertension (HTN) with dementia (19.5%), HTN with CHF (17.5%), and HTN with diabetes mellitus (10%). The HTN and dementia combination covered 11.1% of the total population and 19.5% of the time a patient with this combination was a recidivist. Patients with this combination were also 2.2 times more likely to be recidivist than non-recidivist.

Conclusions: Trauma recidivism within the geriatric trauma population in the rural setting can be predicted by certain patient characteristics and specific medical comorbidities. By identifying patients with high-risk co-morbidities pre-discharge and utilizing an interdisciplinary, preventive approach in conjunction with primary care providers one could have a significant impact on the rate of readmissions.

Table 1. Variables Associated with Recidivism			
Variables	**Odds Ratio**	**P value**	**Confidence Intervals**
Age	1.0367	< .001	1.024-1.049
Sex	1.569	< .001	1.245-1.978
Injury type	2.139	0.474	0.267-17.134
Comorbidity	4.164	< .001	2.760-6.284
Fall	2.833	< .001	1.824-4.401

Multiple logistic regression analysis of variables associated with recidivism

Table 2: One-way and Two-way Comorbidity Combinations with the Highest Impact on Recidivism					
Combination of Comorbidities	Percent with Combination (Coverage)	Percent of Recidivist (Confidence)	Odds Ratio	P Value	95% Confidence Interval
One-way combination					
Esophageal Varices	6.3%	19.2%	2.529	(p<.001)	1.855, 3.447
Dementia	17.3%	15.9%	2.197	(p<.001)	1.760, 2.744
CHF	15%	15.1%	1.974	(p<.001)	1.558, 2.500
COPD	19.7%	10.9%	1.253	(p=.061)	0.989, 1.586
Hypertension	78.3%	9.6%	1.224	(p=.113)	0.953, 1.571
Diabetes Mellitus	33.1%	8.7%	0.903	(p=.350)	0.730, 1.118
Current Smoker	13.3%	8.1%	0.838	(p=.260)	0.616, 1.140
Two-way combination					
Hypertension-Dementia	11.1%	19.5%	2.221	(p<.001)	1.536, 3.212
Hypertension-CHF	12.2%	17.8%	1.332	(p<.001)	0.771, 2.302
Hypertension-COPD	14.5%	12.7%	0.552	(p=.106)	0.269, 1.133
Hypertension-Diabetes Mellitus	26.3%	10%	0.505	(p<.001)	0.341, 0.750

Association mining rule analysis of comorbidity combinations on recidivism

IN OLDER PATIENTS, IS FEMALE SEX ASSOCIATED WITH WORSE PHYSICAL DECLINE AFTER INJURY?

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Objectives: Older patients are at increased risk of injury and have higher mortality rates than younger patients. While work has been done looking at how injury affects patient reported outcomes long term, less is known about how injuries affect older people's long-term mental and physical health.

Methods: We performed a prospective, observational pilot study of patients age 65 and older admitted to a rural level 1 trauma center with an injury between 7/2021-3/2022. Demographic, injury, hospital and post-discharge data was collected for all patients. Trauma specific frailty index (TSFI), and PROMIS 29+2 surveys were completed at initial inclusion into the study (for pre-injury status), and at 3,6 and or 12 month follow up. The PROMIS-29+2 includes seven domains: Physical function, depression, anxiety, fatigue, sleep disturbance, ability to participate in social roles and activities, pain and cognition. P value of < 0.05 was considered significant.

Results: 44 patients were enrolled in the study. Patient demographic, hospital and injury data are shown in Figure 1. Demographic, injury and hospital variables were similar for men and women. Frailty and pre-injury PROMIS scores were also similar for men and women at baseline, however, women were more likely to have a significant decrease in their physical function and fatigue domain scores at follow up compared to their baseline (Figure 2).

Conclusions: This study successfully used PROMIS scores to assess patient reported outcomes in older injured adults at a rural trauma center. Older women were at greater risk for significant decline in their physical function and worsening of fatigue compared to older men, even with similar baseline PROMIS scores, demographics, frailty levels and injury factors. As this is a pilot study, there are likely many covariates that were not be explored that may account for this finding. Further research is needed.

	All Patients N = 44	Male N = 26	Female N = 18	P value
Age *median (range)*	75 (65-92)	72 (65-92)	77 (65-92)	0.15
Rural Home Address *n (%)*	33 (75)	20 (77)	13 (72)	0.72
Race *n (%)*				0.47
White	40 (91)	24 (92)	16 (89)	
Native American	3 (7)	1 (4)	2 (11)	
Black	1 (1)	1 (4)	0 (0)	
Transferred from another hospital *n (%)*	30 (68)	18 (69)	12 (67)	0.86
Charlson Comorbidity Index *median (IQR)*	7 (4-8)	7 (4-10)	7 (5-8)	0.91
Frail by TSFI *n (%)*	27 (61)	18 (69)	9 (50)	0.20
Ground Level Fall *n (%)*	20 (46)	9 (35)	11 (61)	0.08
Trauma Activation Level *n (%)*				0.83
Highest Level	8 (18)	5 (19)	3 (17)	
Mid Level	22 (50)	12 (46)	10 (56)	
Lowest Level	14 (32)	9 (35)	5 (28)	
Injury Severity Score *median (IQR)*	12 (9-22)	10 (8-21)	14 (8-25)	0.61
Hospital Length of Stay *median (IQR)*	11 (7-16)	11 (7-15)	10 (7-20)	0.91
ICU Admission *n (%)*	28 (64)	16 (62)	12 (67)	0.73
Require Operation *n (%)*	22 (50)	15 (58)	7 (39)	0.22
Complication *n (%)*	30 (68)	17 (65)	13 (72)	0.63
Prior To Injury Status				
Mobility Assistance at Baseline *n (%)*	15 (34)	6 (23)	9 (50)	0.06
Lives Alone *n (%)*	16 (36)	8 (31)	8 (44)	0.36
Pre-Injury PROMIS Score Worse than General Population *n (%)*				
Pain	12 (27)	8 (31)	4 (22)	0.53
Physical Function	29 (66)	19 (73)	10 (56)	0.23
Social Roles	12 (27)	8 (31)	4 (22)	0.53
Sleep	8 (18)	4 (15)	4 (22)	0.56
Anxiety	14 (32)	8 (31)	6 (33)	0.86
Depression	15 (34)	10 (39)	5 (28)	0.46
Fatigue	9 (21)	5 (19)	4 (22)	0.81
Cognition*	9 (27)	7 (35)	2 (15)	0.22
Discharge Disposition *n (%)*				0.15
Home	9 (21)	7 (27)	2 (11)	
Home with services	5 (11)	5 (8)	3 (17)	
Skilled Nursing	23 (52)	11 (42)	12 (67)	
Inpatient Rehab	7 (16)	6 (23)	1 (6)	
Mortality *n (%)*	7 (16)	4 (15)	3 (33)	0.90
Assistance Level at Discharge *n (%)*				0.90
Independent	5 (11)	3 (12)	2 (11)	
Moderate Assist	26 (60)	16 (61)	10 (56)	
Maximum Assist	13 (30)	13 (27)	6 (33)	

Patient demographic, injury and hospital data. Prior injury status was collected by patient PROMIS scores recalled retrospectively for the week prior to injury. Continuous variables were compared using Mann Whitney U tests and categorical variable compared using Chi-square tests. Abbreviations: n = number of patients. IQR = Interquartile Range; TSFI = Trauma specific frailty index
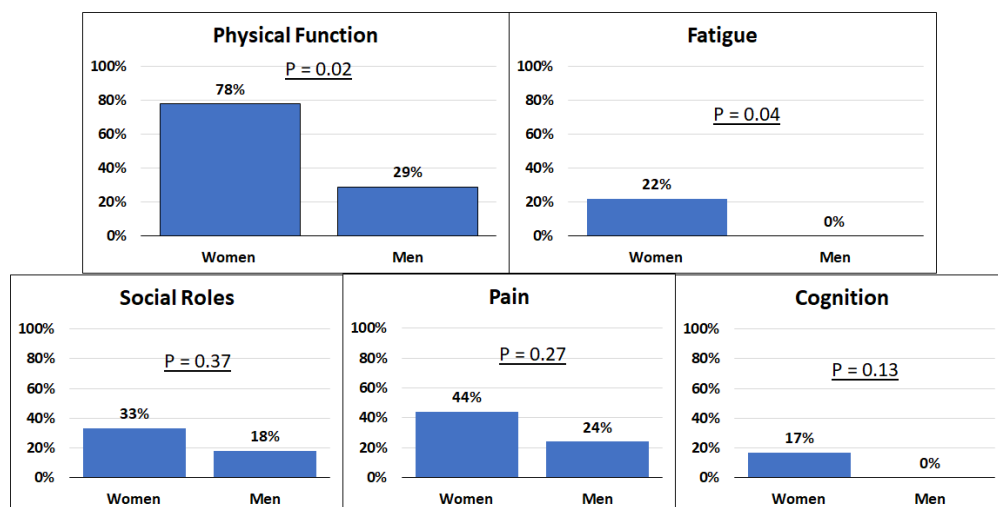
PROMIS domains for 26 patients with follow up (59% response rate). 78% of women had a decline in physical function domain scores at follow up compared to baseline, versus 29% of men. This worsening from baseline also seen in the fatigue domain for women. Other domains had higher rates of worsening in women, but differences were not significant. Sleep is not depicted as no patients had worsening.