Poster #10

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

Megan E. Lundy, MD; Tanya Anand, MD, MPH, FACS;
Hamidreza Hosseinpour, MD; Haley Eversman, BS;
Sai Krishna Bhogadi, MD; Qaidar Alizai, MD;
Michael Ditillo, DO, FACS; Banan Otaibi, MD;
Louis J. Magnotti, MD, MS, FACS; Bellal Joseph, MD, FACS
The University of Arizona

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

Yu-Tung Wu, MD; Chi-Tung Cheng, MD, PhD; James Bardes, MD; Morgan Schellenberg, MD, MPH; Matthew Martin, MD; Kenji Inaba, MD; Chi-Hsun Hsieh, MD; Kazuhide Matsushima, MD
Chang-Gung Memorial Hospital

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

Samir M. Fakhry, MD; Mathew Carrick, MD;
Melissa R. Hoffman, MD, ND; Yan Shen, PhD; Dorraine Watts, PhD
Center for Trauma and Acute Care Surgery Research, HCA Healthcare

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

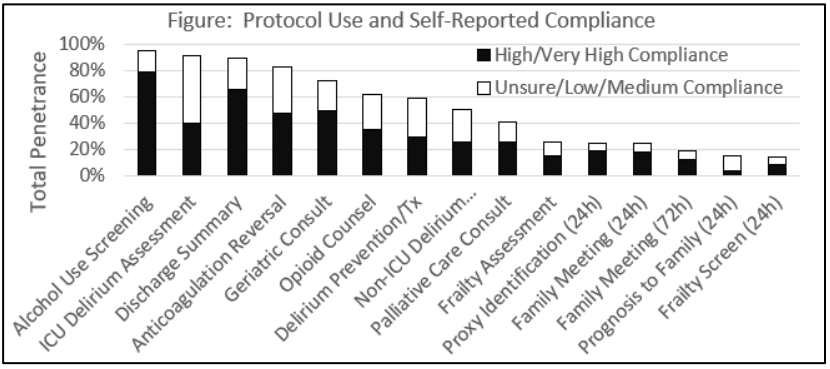
* Trauma significantly different from Medical and Surgical for all comparisons (p<.05).

Poster #13

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

Vanessa Ho, MD, MPH; Molly Jarman, MD; Christine Cocanour, MD;
Avery B. Nathens, MD, MPH, PhD; Ben L. Zarzaur, MD, MPH;
Bellal Joseph, MD MPH; Joseph Posluszny, MD;
Deborah M. Stein, MD, MPH; AAST Geriatric Committee;
ACS BPG Work Group
MetroHealth Medical Center

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

Oluwaseun J. Adeyemi, MD, MSurg, PhD; Cherisse Berry, MD, FACS;
Marko Bukur, MD; Charles DiMaggio, PhD;
Corita Grudzen, MD, MSHS, FACEP; Sanjit Konda, MD, FAAOS;
Omotola Akinsola, PhD., LGSW, MEdPsych; Abidemi Adenikinju, MD;
Joshua Chodosh, MD, MSHS, FACP
New York University School of Medicine

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

Maximilian P. Forssten, MD; Yang Cao, PhD;
Ahmad Mohammad Ismail, MD, PhD; Ioannis Ioannidis, MD;
Lakshika Tennakoon, MD, MPhil; David A Spain, MD, FACS;
Shahin Mohseni, MD, PhD, FEBS (EmSurg), FACS
Orebro University School of Medical Sciences

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

Leslie H. Vuoncino, MD; Jennifer K. FitzGerald, RN, MSN, ACNP; Aaron J. Wright, RN, MSN, FNP-C; Christine A. Williams, MS, RN, CNS; James F. Holmes, MD, MPH; Joseph M. Galante, MD, MBA, FACS
UC Davis Medical Center

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

Jacqueline J. Blank, MD; Zhi Geng, MD, MPH; Elinore J. Kaufman, MD; Gary A. Bass, MD, PhD; Pengxiang Li, PhD; Jay A. Yelon, DO; Forrest Fernandez, MD; Daniel N Holena, MD; Lewis J. Kaplan, MD; Mark J. Seamon, MD; Jeremy W. Cannon, MD
University of Pennsylvania

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

Ahmad Mohammad Ismail, MD, PhD; Frank Hildebrand, MD, PhD; Maximilian P. Forssten, MD; Marcelo A. F. Ribeiro Jr., MD, MSc, PhD, FACS; Parker Chang, BS; Yang Cao, PhD; Babak Sarani, MD, FACS, FCCM; Shahin Mohseni, MD, PhD, FEBS (EmSurg), FACS
Orebro University School of Medical Sciences

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.