Poster # 1

ISOLATED INTRAPERITONEAL FLUID IDENTIFIED ON COMPUTED TOMOGRAPHY: THE CLINICAL IMPORTANCE FOR THE PEDIATRIC PATIENT WITH BLUNT ABDOMINAL TRAUMA

Tammy R Kopelman, MD *, Patrick J O'Neill, PhD, MD, Dario Pasalic, Melissa Pressman, PhD, Lorenzo Machado, MD, Sydney J Vail, MD. Maricopa Medical Center.

Introduction: Isolated free fluid (IFF) identified on abdominopelvic computed tomography (apCT) in the pediatric patient remains a challenge for the trauma surgeon. The purpose of this study was to review our experience with IFF after blunt abdominal trauma (BAT) and determine clinical indicators that may predict the need for intervention.
Methods: A retrospective study was performed at a Level I trauma center of pediatric BAT patients presenting from 1/2004 - 4/ 2009. Inclusion criteria were age < 15 years, significant mechanism of injury (MOI), and apCT demonstrating IFF in the absence of solid organ injury. Patient demographics, presence of clinical indicators of injury, radiographic interpretations and operative findings were collected and analyzed.
Results: 114 patients met inclusion criteria. Mean age was 9.8 years, 45% were male, and the MOI was most frequently motor vehicle collision (45%). ApCT revealed small amounts of IFF in 81% of cases which were typically confined to the pelvis (84%). Most patients (90%) were discharged without operative intervention. 12 patients did undergo surgical intervention with a therapeutic rate of 58%. When reviewed for clinical findings, MOI, and location/amount of IFF, the only significant ($p<0.05$) differences noted in the group requiring laparotomy were abdominal tenderness in the evaluable patient (71% vs. 23%) and presence of abdominal wall ecchymosis (86% vs.17%). Importantly, each of the clinical indicators assessed (pain, tenderness, abdominal wall ecchymosis) were inadequate predictors in determining the need for intervention with positive predictive values of only 14%, 17% and 25%, respectively. Also of note, no neurologically intact patient with an absence of clinical indictors of injury required operative intervention.
Conclusion: IFF identified on apCT scanning in the pediatric patient after BAT should not mandate laparotomy however no reliable clinical indicators were identified to predict the need for intervention. Additionally, the finding of IFF in the asymptomatic patient should not mandate in-patient observation to rule out occult intra-abdominal injury.

Poster # 2

THE DELAYED FAST EXAM IN A RURAL TRAUMA SYSTEM: IS IT ANY BETTER?

Rajan Gupta*, MD, Sarah E Greer, MD, MPH, Julia D Glaser, BSE, Jessica B Wallaert, MD.
Dartmouth Hitchcock Medical Center.

Introduction: Focused Abdominal Sonography for Trauma (FAST) has been reported to have a sensitivity as high as 100% in hypotensive patients, but is reduced to 75-88% in normotensive patients. The rapidity of an exam performed within a few minutes of patient arrival (and short time following injury in urban settings) has been implicated in the lower sensitivity. In rural systems, time from injury to FAST may be delayed due to prolonged transfer times. This study examines the hypothesis that the sensitivity of the FAST exam is higher when the exam is performed in a delayed time period from initial injury.

Methods: Patients evaluated over 15 months at a rural Level 1 trauma center (TC) were retrospectively reviewed. Inclusion criteria included blunt injury, normotension on arrival (SBP > 90mmHg), FAST and abdominal CT scan at the TC. Results of FAST were compared to CT, considered the gold standard. Sensitivity and specificity were calculated.

Results: 542 patients met criteria: 277 transported from the scene, and 265 transferred.

Overall	CT+	CT-
FAST+	22	7
FAST-	14	499

Sensitivity 61.1%
Specificity 98.6%

Scene	CT+	CT-
FAST+	9	3
FAST-	7	258

Sensitivity 56.2%*
Specificity 98.9%

Transfer	CT+	CT-
FAST+	13	4
FAST-	7	241

Sensitivity 65.0%*
Specificity 98.4%

*$p > 0.05$

Sensitivity and specificity for hypotensive patients during the same time period were 88.9% and 100%. Mean time from injury to CT scan was 163 min for scene patients, and 371 min for transferred patients. Attending presence did not significantly affect FAST sensitivity. Of 14 false negative FAST exams overall, 6 patients required operative intervention based on CT results, and 1 underwent angiographic splenic embolization.

Conclusion: Sensitivity in patients undergoing FAST exam an average of 6 hrs following injury (the transferred patients) remained low at 65.0%. Performing FAST in a delayed fashion does not improve sensitivity in normotensive patients; thus a more definitive evaluation of the abdomen is still required.

Poster # 3

BLUSH CHARACTERISTICS ON COMPUTED TOMOGRAPHY PREDICT THERAPEUTIC ANGIOGRAPHY AFTER BLUNT LIVER AND SPLENIC TRAUMA

Rosemary A Kozar*, MD, PhD, Niska Blevins, MD, KC Cole, DO, John B Holcomb*, MD, Alan Cohen, MD, Edmundo Dipasupil, BS, Bryan Cotton*, MD. University of Texas Health Science Center at Houston.

Objective: As CT scans have become more sensitive, optimal management of contrast extravasation in hemodynamically stable patients is unclear. We reviewed blush characteristics on admission CTs and outcome after angiography for nonoperative blunt spleen and/or liver trauma in order to discern the factors that predict positive angiograms.
Methods: Blunt splenic/liver injuries (2002-2008) with blush on admission CT and not requiring immediate operative intervention were divided into: therapeutic (+angio) and nontherapeutic (-angio) angiograms. Blush characteristics were categorized by size and location (free extravasation of intraperitional contrast, intra-parenchymal [IP] plus hemoperitoneum, or IP alone), variegated clot, hemoperitoneum volume, and intensity, then evaluated for correlation with therapeutic angiography and clinical outcomes.
Results: 1,990 patients were managed non-operatively, of which 101 had contrast extravasation and underwent immediate angio, and 72% were positive. Demographics, injury severity, and admission vitals/labs were similar between groups. Univariate analysis revealed IP blush size, intensity, free extravasation, and variegated clot predicted +angio for splenic injuries, while for liver, size of the IP blush, variegated clot, and intensity were predictive. Multivariable logistic regression revealed 3 factors correlating with + angio, (see table). Significant bleeding requiring operative intervention occurred in 3.6% - angi and 9.6% +angio patients. Mortality was 13% in -angio and 5.8% +angio patients.

Blush Characteristic	Odds Ratio	95% CI	p value
Spleen intraparenchymal blush size	3.11	1.56-6.21	0.001
Spleen variegated clot	12.3	2.92-52.23	0.001
Liver intraparenchymal blush size	4.54	2,11-9.76	<0.001

Conclusion: Blush characteristics on admission CT scans can reliably predict therapeutic angiography in hemodynamically stable patients with blunt splenic and/or liver injuries. These data can be used to avoid the known complications of nontherapeutic angiography.

Poster # 4

SHOULD ANGIOGRAPHY BE ROUTINELY PERFORMED FOLLOWING PENETRATING KIDNEY INJURIES?

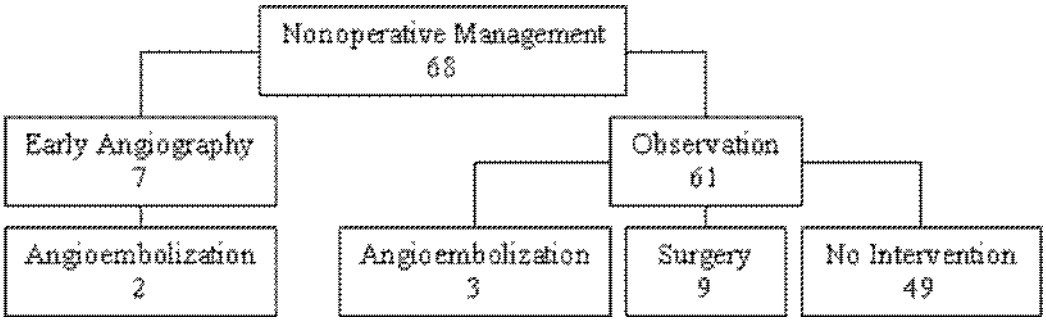
Mark Muir, MD, Kenji Inaba, MD, Adrian Ong, MD, Galinos Barmparas, MD, Bernardino Branco, MD, E Alexandra Zubowicz, Stephen Cohn*, MD. University of Texas Health Science Center at San Antonio.

Introduction: Renal injuries are present in about 7% of penetrating abdominal trauma. These wounds are increasingly managed selectively, but there is little contemporary information on the natural history of this injury. The purpose of this study was to examine the clinical outcomes of penetrating injuries to the kidney, and to determine if these patients may benefit from routine early angiography.

Methods: We conducted a retrospective review by querying the trauma registry for penetrating renal injuries at three Level I trauma centers.

Results: We identified 237 subjects with a penetrating renal injury, of whom 39 died within the first 24 hours and were excluded from analysis. Among the remaining 198 subjects, 130 (66%) underwent immediate exploratory laparotomy, resulting in 51 nephrectomies, 53 renal explorations/repairs (one required late embolization for hemorrhage), and 26 without exploration of Gerota's fascia. Of 68 subjects (34%) initially treated nonoperatively, 14 (21%) ultimately required an intervention (see figure). The likelihood of nonoperative failure and subsequent intervention appeared to increase with higher renal injury severity scores (22% for AAST grades I-III vs. 33% for grades IV-V).

Conclusions: Patients with penetrating renal injuries are often (34%) managed nonoperatively, although 21% of these subjects ultimately required either angiographic or surgical treatment. We believe that these patients should undergo routine early angiography, which may obviate the need for later surgical intervention.



Poster # 5

SAFETY OF LOW MOLECULAR WEIGHT HEPARIN (LMWH) FOR VENOUS THROMBOEMBOLISM (VTE) PROPHYLAXIS IN NON-OPERATIVE MANAGEMENT OF BLUNT SPLENIC INJURY

E Charles Moore, DO, MS, George Tsiotsias, DO, Mary Lachant, RN, MPA, MSW, Wassim elHabre, MD, Steven E Ross*, MD. Cooper University Hospital.

Background: Non-operative management (NOM) of blunt splenic injury is accepted in hemodynamically stable patients. Ongoing or recurrent bleeding is a common reason for failure of NOM. We undertook a retrospective study at our Level I trauma center to evaluate the hypothesis that the use of LMWH for VTE prophylaxis would increase the risk of NOM failure.

Methods: This study was a retrospective review of all patients admitted with blunt splenic injury to our Level I trauma center during a 5 year period (January 2002 to December 2006). All patients with initial NOM were included, while those undergoing immediate laparotomy were excluded. Admission coagulation studies, grade of splenic injury, and type of VTE prophylaxis were recorded. VTE prophylaxis for patients with brain injury did not include LMWH. NOM failure was defined as the need for operative treatment of splenic injury.

Results: Splenic injury was present in 220 patients during the study period. Fifty eight patients were excluded from the study because of immediate surgical intervention or incomplete records. Of 162 patients undergoing NOM, 99 received LMWH while 61 had sequential compression devices. NOM failure occurred in 9/99 (9.1%) of LMWH patients and 2/61 (3/2%) of those not receiving LMWH. There was not a significant difference in failure rates based on VTE prophylaxis method ($p=0.21$). This was true for all grades of splenic injury.

Conclusion: The use of LMWH for VTE prophylaxis in patients with NOM of blunt splenic injury appears to be safe.

Poster # 6

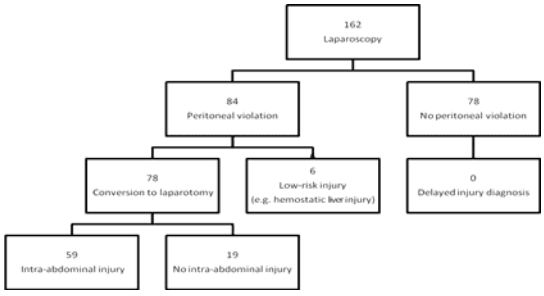
LAPAROSCOPIC EVIDENCE OF PARIETAL PERITONEAL PENETRATION WARRANTS LAPAROTOMY IN PATIENTS WITH ANTERIOR ABDOMINAL STAB WOUNDS

Mona Shah, MD, Garth H Utter, MD MSc, Joseph M Galante, MD, Lynette A Scherer*, MD, David H Wisner*, MD. University of California-Davis.

Introduction: The evaluation and management of patients with anterior abdominal stab wounds (AASWs) but no hypotension, evisceration, or peritonitis is not standardized across centers. Approaches include serial clinical assessment, computed tomography, diagnostic laparoscopy, and exploratory laparotomy. We sought to describe the positive and negative predictive value (PPV and NPV) of parietal peritoneal violation—as determined by laparoscopy—for an intra-abdominal injury requiring operative treatment.

Methods: We reviewed records of consecutive patients with AASWs from our center from 1/2003-3/2009. We collected data on initial management and injury characteristics using a standard instrument. We determined the PPV and NPV (95% C.I.) of peritoneal penetration for intra-abdominal injury, classified both liberally (any therapeutic maneuver) and restrictively (obligatory therapeutic maneuver—e.g., for full-thickness bowel injury).

Results: Of 361 patients with AASWs, 199 did not undergo laparoscopic evaluation of the parietal peritoneum due to immediate laparotomy (102), negative local wound exploration (27), contraindication to laparoscopy (12), or surgeon preference (58). The remaining 162 patients (figure) had mean abdominal AIS 2.0 ± 1.3; 118 (73%) had a single AASW. The NPV of parietal peritoneal penetration was 100% (95-100%). The PPV of penetration for any therapeutic maneuver was 55% (43-66%) and for an obligatory therapeutic maneuver was 42% (31-54%).



Conclusions: Absence of parietal peritoneal penetration on laparoscopy rules out intra-abdominal injury from AASW with virtual certainty, whereas its presence is sufficiently predictive of the need for operative treatment to warrant routine subsequent laparotomy.

Poster # 7

TIMING OF REOPERATION AFTER DAMAGE CONTROL SURGERY

Karina A McArthur,MD, Shazia Nazir, MD, Duncan Yoder, MD , Xzabia Caliste, MD, Susan Kennedy, BSN , Patricia Wehner, MD, Sava, Jack,* MD. Washington Hospital Center.

Introduction: Damage control laparatomy, with planned reoperation for anastamoses and removal of packs, is the standard of care for critically injured patients. However, there is little evidence to guide timing of reoperation. Surgeons are compelled to wait until resuscitation and correction of coagulopathy are complete, yet there is a widespread belief that too long a delay increases mortality and complications. This study examines the impact of timing of reoperation on death and major abdominal complications

Methods: The registry of a large Level I trauma center was used to identify patients who underwent laparatomy without fascial closure and that survived to reoperation between January 1998 and September 2009. Information was collected on patient demographics, injury characteristics, and outcomes including death, temporary vs. permanent closure and complications such as fistula, dehiscence or abscess. The two sample t-test was used for continuous variables and the Chi^2 and Fisher's exact test was used for categorical variables.

Results: Of 122 patients with complete data, 80 underwent reoperation prior to 48 hours and 42 had reoperation after 48 hours. There were no statistically significant differences between the groups in age (32.0 vs. 35.0, p= 0.34), ISS (23.1 vs. 26.1, p= 0.31), penetrating injury (75% vs. 59.5%, p=0.08), blood loss (L) (3.28 vs. 3.35, p=0.92), and units of blood transfused (U) (6.86 vs. 6.03, p=0.36). There was no statistically significant difference between the two groups in mortality (11.3% vs. 4.8%, p=0.20), permanent closure (87.8% vs. 78.1%, p=0.13), dehiscence (10.0% vs. 7.1%, p=0.44), fistula (10.0% vs. 4.8%, p=0.26), intra-abdominal abscess (18.8% vs. 21.4%, p=0.45) and total major abdominal complications (dehiscence, fistula and abscess) (27.5% vs. 28.6%, p=0.90).

Conclusions: We found no evidence of a difference in mortality or major abdominal complications when patients were reoperated greater than 48 hours after damage control laparatomy compared to those reoperated within 48 hours.

Poster # 8

WHEN DOES CRYSTALLOID RESUCITATION INCREASE MORTALITY IN THE ELDERLY AND NON-ELDERLY TRAUMA PATIENT?

Eric J Ley, MD, Cherisse Berry, MD, James Mirocha, MS, Marissa Srour, Daniel R Margulies*, MD, Ali Salim*,MD. Cedars-Sinai Medical Center.

Background: Vigorous intravenous fluid resuscitation after trauma can lead to increased mortality from hemorrhage or multisystem organ failure. Overresuscitation has been discarded in favor of controlled or hypotensive volume replacement. The volume at which fluid resuscitation leads to increased mortality was determined to establish the limit for elderly (= 70years) and non-elderly (<70 years) trauma patients.

Methods: The emergency department (ED) volume of fluid resuscitation administered to adult trauma patients admitted to a Level 1 Trauma Center between January 1, 2000, and December 31, 2008 was analyzed. Demographics and outcomes were analyzed to determine the fluid volume associated with poor outcomes. Logistic regression analysis was used to investigate the relationship between mortality and volume replacement.

Results: Overall 3,137 trauma patients received crystalloid resuscitation while in the ED; mortality was 5.2%. Among all age groups an increase risk of mortality was noted with increased volume, given in 100 cc units. After multivariable logistic regression analyses, crystalloid volumes greater than 1.5 liters in the elderly (OR 2.89, CI 1.13-7.41, P =0.027) and non-elderly (OR 2.01, CI 1.31-3.33, P <0.01) were determined to be independent risk factors for mortality. In both the elderly and non-elderly, volumes of 1.0 liter were not significant predictors for mortality.

Conclusion: Volume replacement greater than 1.5 liters is an independent risk factor for mortality. Care should be taken when providing the adult trauma patient greater than 1.5 liters of crystalloid while in the emergency department.

Poster # 9

CURRENT USE OF DAMAGE CONTROL LAPAROTOMY, CLOSURE RATES AND PREDICTORS OF EARLY FASCIAL CLOSURE AT THE FIRST TAKE-BACK

Quinton M Hatch, BS, Lisa M Osterhout, BS, Asma Ashraf, MD, Jeanette Podbielski, BSN, John B Holcomb,* MD, Bryan A Cotton,* MD, MPH. University of Texas Health Science Center-Houston.

Background: Damage control laparotomy (DCL) is a life saving technique but carries significant morbidity. If DCL is over utilized and the factors that predict early fascial closure have not been fully evaluated. The purpose of the current study was to determine (1) the current rate of DCL, (2) the percentage of DCLs that are closed at first take-back, and (3) possible physiological and resuscitative parameters predicting early fascial closure.
Methods: A retrospective review of all trauma laparotomies from a Level 1 trauma center between January 2004 and December 2008 was performed. Patients were excluded if they died prior to first take-back. Univariate and multivariate analyses were performed.
Results: 930 patients were eligible, 278 (30%) underwent DCL, 36 excluded for death prior to first take-back. Of the remaining 242 DCL patients, 83 (34%) were closed at first take back, 159 (66%) were not closed at first take-back. These two groups were similar in injury severity, demographics, and pre-hospital and ED fluids and vitals. Median ED INR (1.13 vs. 1.29, p=0.010), post-op INR (1.4 vs. 1.5, p=0.028), 24-hour fluids (11.9 L vs. 15.5 L, p=0.006), peak post-op intra-abdominal pressure (IAP) (15 vs. 18, p<0.001), and mortality (1.2% vs. 8.2%, p=0.027) were different between groups. Re-opening rates after closure were similar (3.6% in closed at first take-back vs. 6.1% in not closed, p=0.448). Multivariate analysis noted vacuum-assisted closure (VAC) at initial laparotomy (OR 3.1, 95% CI 1.42-6.63, p=0.004) was an independent predictor of closure at first take-back. However, post-op INR (OR 0.18, 95% CI 0.03-0.97, p=0.04) and post-op peak IAP (OR 0.85, 95% CI 0.76-0.95, p=0.005) predicted failure to close fascia at first take-back.
Conclusion: In similarly injured DCL patients, elevated post-op INR and IAP predicted inability to achieve primary fascial closure on first-take back, while use of the VAC was associated with early fascial closure. Given the low incidence of re-opening and lack of elevated abdominal pressures, a 30% DCL rate may represent the optimal balance between early fascial closure and the complications associated with the open abdomen.

Poster # 10

DAMAGE CONTROL LAPAROTOMY AND OPEN ABDOMEN IN GERIATRIC TRAUMA VICTIMS FAILS TO DELIVER THE SURVIVAL BENEFIT SEEN IN YOUNGER TRAUMA VICTIMS

Andrew Stephen MD, Daithi S Heffernan MD, Michael D Connolly MD, Shea Gregg MD, Matthew S Kozloff MD, David T Harrington MD, William G Cioffi* MD, Charles A Adams Jr* MD. Rhode Island Hospital Brown University.

Background: Damage control laparotomy (DCL) with prompt hemostasis, limiting contamination and avoidance of hypothermia, acidosis, and coagulopathy has significantly lowered mortality and revolutionized trauma care. It is unknown whether geriatric patients managed with DCL will reap the same benefits as younger trauma patients.

Methods: A retrospective review of all elderly trauma patients (age >/=65 years) versus a younger cohort (aged 18-35 years) admitted to a Level 1 trauma center over 5 years. DCL was defined as only those patients whose abdomen was deliberately left open at the end of the initial trauma exploration. Charts were reviewed for mortality, hospital and ICU length of stay, abdominal AIS score, number of explorations before closure, and closure technique (fascia closed primarily versus planned ventral hernia).

Results: 2,381 geriatric and 2,081 young patients were admitted. Of those with abdominal trauma (8% of geriatric and 30% of young patients), 13% of geriatric versus 23% of the young patients (p=0.003) underwent exploratory laparotomy. Of those who underwent exploratory laparotomy, there was no difference in the rate of DCL between the groups; 28% in geriatric versus 22.4% of young patients (p=0.6). All 7 of the DCL in the geriatric patients were due to blunt mechanism, versus 44% in the young patients (p=0.03). There was no difference in ISS, length of hospital or ICU stay between geriatric and young patients. 5 of the 7 geriatric and 7 of the 32 young patients died (p=0.02). 3 of the 5 geriatric DCL deaths and all 7 of the young deaths died before fascial closure or vicryl mesh coverage.

Conclusion: Elderly patients suffer significantly greater mortality following trauma. Data is lacking regarding outcomes following DCL and open abdomen in geriatric patients. Despite similar AIS and ISS, geriatric patients with DCL had higher mortality (72% versus 22%) when compared to a younger cohort aged. Despite maximal care, dismal outcomes face geriatric trauma patients who require a Damage Control Laparotomy.

Poster # 11

PENETRATING ESOPHAGEAL INJURY: A CONTEMPORARY ANALYSIS OF THE NTDB

Madhukar S Patel, ScM, Darren J Malinoski, MD, Ling Zhou, PhD, Melanie L Neal, MS, David B Hoyt*, MD. American College of Surgeons and University of California Irvine.

Introduction: Esophageal trauma is uncommon. Our aim was to evaluate the clinical management of perforating esophageal injury and determine risk factors for esophageal-related complications (ECs) and mortality in the National Trauma Databank (NTDB).

Methods: Patients with penetrating esophageal trauma were selected from Level 1 and 2 trauma centers in the NTDB (2007 & 2008) that specified using chart abstraction to document comorbidities and complications. Data collected included age, injury severity score (ISS), lengths of stay (LOS) and ventilation, systolic blood pressure (SBP) in the emergency department (ED), comorbidities, esophageal-related operations (EOPs), complications, and ECs. Univariate and multivariate analyses were conducted to identify independent predictors of ECs and mortality in patients with LOS > 24 hours.

Results: 173 penetrating esophageal traumas from 84 centers were studied:

		n	Age [mean]	ISS [mean]	SBP in ED [mean]	Time to 1st EOP (hrs) [median (IQ range)]
LOS < 24hr		62	28 + 10	47+28	23+47	0.1(0.0-0.5)
LOS > 24hr	Survived	104	31 +15	23 + 15	126+33	1.2(0.7-3.7)
	Died	7	33+14	48 + 25	89+45	2.4(0.7-5.8)
	p-value	N/A	0.6	0.003	0.011	0.08
	No ERCs	56	31 ± 15	23 ± 16	126 ± 38	1.0(0.7-3.0)
	ERCs	26	34 ± 14	30 ± 20	114 ± 39	1.1(0.7-7.0)
	p-value	N/A	0.2	0.06	0.123	0.592

Mean number of patients per center was 2.1 (range 1-12). Overall mortality was found to be 40% with 90% of deaths in less than 24 hours. In patients with LOS > 24hr, 53 had primary repair, 13 drainage, 3 resection, 1 diversion, and 43 unspecified. No significant difference in mortality was found in patients with ECs. Independent predictors of ECs were not identified but ISS and pulmonary embolism were independent predictors of mortality.

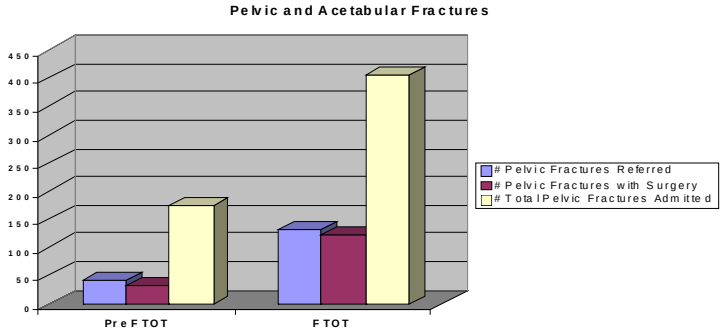
Conclusions: Most deaths in penetrating esophageal trauma occur in the first 24 hours due to severe associated injuries. Primary repair is the most common intervention and time to operation does not predict mortality.

Poster # 12

IMPACT OF ORTHOPEDIC TRAUMATOLOGISTS ON A CRITICAL AND ACUTE CARE SURGERY SERVICE

George M Testerman, MD, William Browder, MD*. East Tennessee State College of Medicine.

Background: As part of an improvement program for American College of Surgeons Committee on Trauma verification of our Level 1 trauma center, 2 full-time orthopedic traumatologists (FTOTs) were recruited to a critical and acute care surgery service faculty.
Objective: We hypothesized that FTOTs would increase interfacility transfer patients with complex pelvic / acetabular (P / A) fractures requiring operative procedures.
Methods: A trauma registry query identified 790 patients with (P / A) fractures admitted to the trauma critical and acute care surgery service over ten years. A medical records review determined patient demographics, interfacility transfer status, procedures, complications, and outcomes. The study groups included 173 (P / A) fracture patients 3 years before and 405 (P / A) fracture patients 3 years after recruitment of 2 (FTOTs). Student's t-test and chi-square determined statistical significance.
Results: Interfacility transfers of patients with complex (P / A) fractures requiring operative procedures were increased over 230% with FTOTs ($p < 0.01$) Minimally invasive pelvic fracture fixation techniques were used in 70% of cases. Financial analysis showed enhanced hospital margins and decreased direct costs per patient ($p<0.01$). Complications, mortality rates, and lengths of stay were decreased ($p<0.01$).
Conclusions: FTOTs enhance pelvic and acetabular fracture referrals, operative procedures, outcomes, and financials at a critical and acute care surgery service at a Level 1 trauma center in a rural setting.



Poster # 13

ACUTE CARE SURGERY IN THE COMMUNITY: IT WORKS!

Michael S Truitt, MD, Christopher Mitchell, MD, Manuel Lorenzo*, MD, Alicia Mangram, MD, Ernest Dunn*, MD. Methodist Hospital Dallas.

Introduction: One suggested model to meet the growing demand for the care of the acutely ill/injured has been the development of an acute care surgery (ACS) team. Much of the literature to date has dealt with the implementation of the ACS model in academia. We report the success of the ACS model in a community level II trauma center (TC).

Methods: At our urban level II TC, three acute care attending surgeons (ACA) were recruited to join three established surgeons to create an ACS team. Each new ACA (surgeon A, B, and C) was paid a fixed salary and took an average of five calls per month. Case logs, hospital activities, a financial analysis of the group, and career satisfaction surveys of the 3 new ACAs were reviewed from 8/2007 to 8/2009. In addition, an interview was conducted with all surgeons hired after the creation of the ACS team.

Results: During the study period, the ACAs performed an average of 351 surgeries per year. Of these 55% were major cases while 45% were minor. Approximately 65% of these were emergency general surgery (EGS), 29% were trauma related, and 6% were elective cases. On an annual basis, the ACAs had an average of 233 trauma admissions each and performed an average of 28 trauma operations. Overall, collections and physician stipends accounted for 83% of the ACA salary/benefits and the hospital covered the remaining 17%. However, by not requiring surgeons to participate in the call rotation, the hospital was able to successfully recruit several niche surgeons. One of these generated hospital charges of $19 million in 2008 and $26 million in 2009. Finally, the ACAs report extremely high satisfaction with their career, case load/diversity, and quality of life.

Conclusion: The ACS model can work well at a community based level II TC. The presence of ACAs can allow other surgeons to more effectively build elective practices. This, in turn, can subsidize the cost of the ACS program and contribute significantly to a hospital's bottom line. Hospitals, surgical staff, and patients stand to benefit from establishing an acute care surgical model at a community based level II TC.

Poster # 14

UTILITY OF ABBREVIATED LAPAROTOMY AND OPEN ABDOMEN MANAGEMENT IN THE OCTOGENARIAN POPULATION

Enoch Arhinful, MD, Donald Jenkins*, MD, Henry J Schiller*, MD, Daniel C Cullinane, MD, Martin D Zielinski, MD. Mayo Clinic.

Introduction: Controversy surrounds the role of abbreviated laparotomy and open abdomen (OA) management in the octogenarian population. There is concern that the initial insult, combined with its sequelae, is beyond the physiologic reserve of these patients raising the question of futility. As the national population ages, this dilemma will arise more frequently requiring analysis of the utility of OA in this demographic.

Methods: IRB approval was gained to analyze retrospectively patients aged 80 years or older with an OA after damage control laparotomy from 1997 to 2009. Univariate, multivariate and Kaplan-Meier analyses were used to evaluate the effects that demographics, comorbidities and clinical factors had on in-hospital mortality, abdominal closure rate and overall survival.

Results: 67 patients (32 men, 35 women) were identified. There was a 50% increase in the volume of OA from the 1997-2002 period to the 2003-2009 period. Acute general surgery (including vascular procedures) was the most common indication for laparotomy (95%) with trauma a distant second (5%). Indications for OA management included intra-abdominal sepsis (48%), abdominal compartment syndrome (34%), hemorrhage (12%) and evisceration (6%). Primary and partial fascial closure was obtained in 52% and 8% of patients, respectively, with a 40% planned ventral hernia rate. Overall in-hospital mortality was 37%. Multivariate analysis revealed congestive heart failure (OR 12.1, 95% CI 0.20-2.58) and acute renal failure (OR 8.8, 95% CI 0.31-1.88) correlated with in-hospital mortality. Of those surviving to hospital dismissal, 2-year survival was 66% with a 17 month median follow-up (range 1-125 months).

Conclusion: The number of octogenarians meeting criteria for OA management is increasing at our institution and will likely continue to grow. While primary closure is lower than demonstrated in younger patients, nearly half of octogenarians treated with OA will survive in the long term demonstrating the utility of this technique.

Poster # 15

ACUTE RENAL FAILURE IN PATIENTS UNDERGOING EMERGENT ABDOMINAL SURGERY

Christopher Busken, MD, Christina Berenguer, MD, Miller Hamrick, MD, Clyde Smith, MD, William Bromberg, MD*, Gage Ochsner, MD*. Memorial University Medical Center.

Objective: The purpose of this study is to determine the incidence of acute renal failure (ARF) in hospitalized patients following emergent general surgical (EGS) procedures and to identify factors that increase the risk of developing ARF in this population.

Methods: A retrospective review of all patients undergoing EGS procedures at an acute care hospital over a one year period was conducted. EGS patients were defined as those requiring a non-trauma, non-elective, intra-abdominal procedure urgently within 15 hours of presentation. ARF was defined as an increase in creatinine level by 0.5 mg/dl, or an increase to >1.5 mg/dl, or a doubling of creatinine within two weeks of the initial insult. Exclusion criteria were patients with computed tomography (CT) scans at outside facilities, patients less than 18 years of age, and preexisting renal failure requiring dialysis. Patient demographic data, baseline renal function, preoperative resuscitation, surgical procedure performed, and use of CT imaging were noted. Groups were then compared using univariate and multivariate analysis to determine if any individual condition or cluster of conditions increased patient risk of developing ARF.

Results: 229 patients met criteria for inclusion. The incidence of acute renal failure in EGS patients is 23.5%. The ARF group was older (58.0 vs. 41.3 years, $P<0.001$), more tachycardic upon presentation (102 vs 87 beats per minute, $P<0.001$)and had more comorbidities ($P<0.001$). The ARF group had more complications ($P<0.001$), increased hospital length of stay (LOS) (15.7 vs. 4.0 days, $P<0.001$) and increased ICU LOS (12.1 vs 4.1 days, $P=0.010$) as well as a higher mortality rate (9.3% vs. 0%, $P<0.001$).

Conclusion: Almost 25% of patients requiring urgent/emergent abdominal procedures with develop ARF. EGS patients that develop ARF are older, have more comorbidities, are more tachycardic on presentation, develop more complications during their hospitalization, and have increased ICU requirements. EGS patients that develop ARF have nearly a 10% mortality rate versus 0% for patients that did not develop ARF.

Poster # 16

ANGIOGRAPHIC EMBOLIZATION FOR UPPER GASTROINTESTINAL BLEEDING: PREDICTORS OF CLINICAL FAILURE

Jessica Lundgren, BS, BA, Kazuhide Matsushima, MD, Frank C Lynch, MD, Heidi Frankel*, MD, Robert Cooney*, MD. Penn State College of Medicine.

Background: Angiographic embolization (AE) has emerged as an important therapy for patients with upper gastrointestinal bleeding (UGIB). We hypothesized that discrete factors predictive of AE failure could be identified.

Methods: A retrospective chart review for patients with UGIB (excluding varices) who underwent AE between August 1999 and February 2009 was performed. AE failure was defined as requirement for another intervention (surgery, endoscopic therapy or another AE) for UGIB or death from bleeding after AE. Statistical analysis was performed using Fisher's exact test and Student t-test to explore the risk of AE failure.

Results: Of 48 total AE cases, 18 patients (37.5%) who failed AE were identified. Mortality rate was significantly higher in AE failure group (61.1% vs 13.3%, p=0.001). Anticoagulant use prior to UGIB, pre-AE vasopressor use, and coil embolization were significantly associated with AE failure.

	AE success	**AE failure**	***p* value**
Age=70	56.6%	50.0%	0.77
Male gender	56.7%	27.8%	0.07
Anticoagulant use	**0%**	**35.5%**	**<0.01**
Systolic BP<90	17.2%	33.3%	0.27
PRBC=6 units	53.3%	66.6%	0.55
Vasopressor requirement	**30%**	**66.7%**	**0.02**
Empirical embolization	53.3%	66.6%	0.55
Coil material for AE	**63.3%**	**100%**	**<0.01**

Conclusion: AE failure portends poor prognosis. Caution should be exercised when considering AE, particularly AE using coils, in patients with a history of anticoagulant or vasopressor use.

Poster # 17

ACUTE CARE SURGERY IS A PROFITABLE SERVICE LINE: IMPLICATIONS, SURGEON SHORTAGE AND ACCESS

Levi D Procter, MD, Ryan Korosec, CPA, MBA, Paul A Kearney*, MD, Pamela Chipko, RN, MBA, Bernard Boulanger*, MD, Phillip Chang, MD, Anthony Bottiggi, MD, Erik Hasenboehler, MD, Joseph Zwischenberger, MD, Andrew C Bernard*, MD. University of Kentucky.

Objective: Acute care surgery as a service line is profitable and the hospital margin is adequate to employ ACS.

Introduction: Acute care surgeons (ACS) care for trauma and emergent general surgery (EGS) patients. Large workload, weekend/night practice and limited reimbursement of physician charges have created a shortage of ACS.

Methods: We retrospectively analyzed fiscal data for 2009 at our Am. Coll. Surg.-verified Level I Trauma Center that has a mature ACS service line. Contribution margin (CM = total revenue - direct costs) and mean length of stay (LOS) were calculated for all patients admitted to the 5 ACS faculty. Inpatient data were stratified by trauma vs general surgery (GS), emergent vs elective, and by payor mix.

Results: Annual CM associated with the 5 ACS at our institution was $21,799,000 (Table). Trauma was 91% blunt. Trauma generated higher CM than GS, most likely due to the increased cost acuity index. GS was profitable, more if emergent than if elective ($9500 vs $5500, $p<0.01$). Self-payment was lower with EGS than for trauma (20% vs 25%, $p=0.02$). Values rounded for clarity.

Fiscal 2009	Cases	Annual CM ($M)	CM/ Case ($)	Mean LOS	Mean Case Mix Index	Mgd Care/ Commercial	Self-Pay/ Charity
Total	1767	21.799	12,400	8.7	3.42	34%	22%
Trauma	1113	15.914	14,400	8.9	3.58	37%	25%
General Surgery	654	5.885	9,000	8.4	3.00	28%	18%
GS-Elective	86	0.465	5,500	6.0	2.26	29%	12%
GS-Emergent	568	5.420	9,500	8.7	3.11	28%	20%

Discussion: EGS is more profitable than elective GS because of high case complexity but requires unique surgical infrastructure (acute care surgeons). These data suggest that hospital subsidization of acute care surgeons is a financially viable strategy to address the surgical work force shortage and the critical U.S. problem of access to emergency surgery.

Poster # 18

EFFECT OF TRAUMA CENTER STATUS ON 30-DAY OUTCOMES AFTER EMERGENCY GENERAL SURGERY

Angela M Ingraham, MD, Mark E Cohen, PhD, Clifford Y Ko, MD, MS, MSHS, Avery B Nathens*, MD, PhD. American College of Surgeons.

Introduction: With the evolution of acute care surgery (ACS), trauma surgeons increasingly care for emergency general surgery (EGS) patients. The quality of EGS care and the relationship of ACS to EGS outcomes are poorly understood. We compared outcomes after EGS procedures at trauma centers (TCs) versus nontrauma centers (NTCs).

Methods: We conducted a retrospective cohort study of EGS procedures at TCs versus NTCs among ACS NSQIP participants with outcomes of overall morbidity, serious morbidity, and mortality. TC versus NTC outcomes were compared utilizing regression modeling, generation of observed-to-expected (O/E) ratios, and outlier status (hospitals with confidence intervals of O/E ratios excluding one).

Results: Of 68,003 EGS procedures at 222 hospitals, rates of adverse outcomes were significantly higher at TCs than NTCs (Table). TC status was associated with slightly higher rates of morbidity yet comparable mortality. TCs were more likely to be high outliers; NTCs were more likely to be low outliers.

		TC (n = 42,479)	NTC (n = 25,524)
Overall Morbidity	Crude Rate (%, n)*	21.5 (9,129)	17.0 (4,350)
	Odds Ratio (95% CI)	1.10 (1.01-1.21)	Referent
	Outliers (Low, High) (n, %)	7, 9 (5.9, 7.6)	9, 4 (9.8, 4.4)
Serious Morbidity	Crude Rate (%, n)*	15.9 (6,752)	12.2 (3,102)
	Odds Ratio (95% CI)	1.07 (0.97-1.18)	Referent
	Outliers (Low, High) (n, %)	8, 6 (6.7, 5.0)	10, 4 (10.9, 4.4)
Mortality	Crude rate (%, n)*	6.4 (2,709)	4.8 (1,220)
	Odds Ratio (95% CI)	0.91 (0.81-1.03)	Referent
	Outliers (Low, High) (n, %)	4, 4 (3.4, 3.4)	2, 2 (2.2, 2.2)
* $p<0.0001$			

Conclusion: While morbidity outcomes tended to favor NTCs over TCs, mortality was no different. These data are surprising given the existence performance improvement (PI) processes in trauma centers. If the delivery of ACS and trauma are to be consolidated, it will be important to bring ACS under the trauma PI umbrella.

Poster # 19

COMPARISON OF HOSPITAL PERFORMANCE IN TRAUMA VERSUS EMERGENCY AND ELECTIVE GENERAL SURGERY: IMPLICATIONS FOR ACUTE CARE SURGERY QUALITY IMPROVEMENT

Angela M Ingraham, MD, Barbara Haas, MD, Mark E Cohen, PhD, Clifford Y Ko, MD, MS, MSHS, Avery B Nathens*, MD, PhD. American College of Surgeons.

Background: As emergency general surgery (EMGS) and trauma care is increasingly being delivered by the same personnel with overlapping resources, we postulated that the quality of care provided to EMGS and trauma patients would be similar. This was tested by comparing hospital performance in trauma and EMGS care. We also evaluated the relationship between trauma and elective general surgery (ELGS), believing that performance reflected institutional culture and would be similar across all services.

Methods: Regression models for mortality and serious morbidity were constructed for trauma, EMGS, and ELGS at 46 hospitals contributing data to both the National Trauma Data Bank (2007) and National Surgical Quality Improvement Program (2005-08). Correlations of observed-to-expected (O/E) ratios were examined. Outlier status (hospitals with confidence intervals of O/E ratios excluding one) was compared with weighted kappa.

Results: There was no significant relationship between trauma and EMGS mortality (r=-0.01, p=0.94; K=-0.10, p=0.61) or trauma and ELGS mortality (r=0.23, p=0.12; K=0.07, p=0.62). In addition, there was no significant relationship between trauma and EMGS morbidity (r=0.21, p=0.17; K=0.04, p=0.63) or trauma and ELGS morbidity (r=0.16, p=0.30; K=0.11, p=0.37). No hospitals were consistently low or high outliers across all three groups.

		Trauma 32,557	**EMGS** 14,239	**ELGS** 120,256
Mortality	Crude rate (%)	7	7	1
	Range O/E ratios	0.5-1.5	0.5-2.1	0.5-2.4
	Outliers (Low, High)	5, 5	3, 4	4, 8
Serious Morbidity	Crude Rate (%)	11	16	6
	Range O/E ratios	0.2-1.9	0.5-1.6	0.5-1.3
	Outliers (Low, High)	13, 8	4, 2	11, 7

Conclusions: Trauma PI programs are well-established compared to those for EMGS. Although EMGS patients utilize many of the same structures and processes as trauma patients, there is a lack of correlation between the quality of care provided to trauma and EMGS patients. EMGS should be incorporated into established trauma PI programs.

Poster # 20

BE AFRAID, BE VERY AFRAID: IMPLICATIONS OF PREOPERATIVE VENTILATORY STATUS ON PATIENT OUTCOMES

Joseph S Farhat, MD, H Mathilda Horst*, MD, Anthony Falvo, DO, Joe H Patton, Jr*, MD, Vic Velanovich, MD, Ilan S Rubinfeld, MD, MBA. Henry Ford Hospital.

Introduction: Acuity-adjusted outcomes have become an important means to assess institutional performance and to better counsel patients and families on risk related to proposed surgical interventions. Little is known about the outcomes of patients who are mechanically ventilated for various reasons prior to an operation. We explored the implications of preoperative mechanical ventilation on perioperative outcomes.

Methods: After approval of the IRB and in compliance with the National Surgical Quality Improvement Project (NSQIP) Data Use Agreement, data was obtained from the NSQIP Public Use Database regarding surgical inpatients over a four year period (2005-2008). The data were evaluated to determine the significant risk factors for a primary end-point of 30 day mortality. Specific risk factors were analyzed for significance utilizing Chi-square analysis.

Results: Total sample size was 413900 inpatients. Of these patients, 6427 (1.7%) required preoperative mechanical ventilation. The postoperative mortality of these patients was 36% versus 2.1% in the non-ventilated patients ($p<.001$). In comparison to non-ventilated patients, patients who required preoperative ventilation also had higher likelihoods (all $p<.001$) of failure to wean (Odds Ratio 50.3), morbidity (OR 15.7), infection (OR 3.9), and wound occurrence (OR 2.0).

Conclusions: This analysis of the NSQIP data demonstrates that patients requiring mechanical ventilation preoperatively have a 36% mortality rate, which is significantly higher than those not requiring ventilation. There is a paucity of previous studies that have evaluated preoperative mechanical ventilation as a risk factor for morbidity and mortality. The high rates of mortality in these patients should spur future studies to improve understanding of underlying causes, improve patient and family counseling, and potentially develop preventive strategies to avoid such adverse outcomes.

Poster # 21

EMERGENCY SURGERY IN THE ELDERLY: IS AGE A DOSE DEPENDANT VARIABLE, OR JUST ASSOCIATED WITH COMORBIDITIES?

Anthony Falvo, DO, HM Horst, MD*, Blyden Dionne, MD, Vic Velanovich, MD, Joe H Patton, MD*, Ilan Rubinfeld, MD. Henry Ford Hospital.

Introduction: Operating on the elderly emergently is serious business. Acute Care Surgeons will be disproportionately called upon to operate emergently on an aging patient population with diminished physiologic reserve. Only limited work has been done to identify the mortality risk of increasing age independent of comorbidities. ASA scoring has emerged as an important predictor of morbidity and mortality as it effectively summarizes comorbidities. We hypothesized that risk would increase with age independent of other risk factors like ASA.

Methods: After approval of the IRB and in compliance with the American College of Surgeons data use agreement, National Surgical Quality Improvement Project (NSQIP) Public Use Files (PUF) were reviewed (2005-2008). Patients were selected based on age >60, and had an emergency general surgery operation. Patients were stratified by age group. Data was analyzed using chi-square test and logistic regression.

Results: 22496 Patients of the total 635265 (3.5%) met our criterion for review. In these patients, mortality was 13.9%, 1.7% in the whole database. Mortality increased by age group: 8.9% patients 60-69 yrs, 13.5% patients 70-79 yrs and 21.6% patients >=80 yrs ($p<0.001$). Mortality also increased by ASA score ($p<0.001$) as summarized in Table 1. Both age group as a category and age as a linear variable were significant predictors of mortality by logistic regression ($p<0.001$).

Conclusions: Age represents an independent risk factor for mortality (dose dependant) even when accounting for broader comorbidity based variables like ASA scoring. This may be related to unmeasured frailty related variables which NSQIP does not currently address. Further development of our knowledge on risk factors in the elderly is warranted.

Poster # 22

REGIONALIZATION OF ACUTE CARE SURGERY CAN DECREASE MORTALITY

Jose J Diaz, MD*, Patrick R Norris, PhD, Oliver L Gunter, MD, Bryan R Collier, DO, William P Riordan, MD, John A Morris, MD*. Vanderbilt University Medical Center.

Introduction: During the development of an Emergency General Surgery (EGS) service, the severity of illness (SOI) can be high. A matured EGS program should experience a decrease in SOI overtime. We hypothesize that a matured, regional Acute Care Surgery / EGS service would be able to decrease mortality and length of stay over time.

Methods: Retrospective cohort study of a prospectively collected EGS repository from 2004-2008. Patients were included if they were discharged from the EGS service, and were stratified by year of discharge. SIRS, sepsis, shock, peritonitis, perforation, and acute renal failure were used as markers of severity of illness (SOI). Patients were defined as high acuity if they had one or more of these SOI markers. Primary outcome was in-hospital mortality. Differences in mortality, LOS, ICU admissions, SOI, charges, and distance were compared across and between years using non-parametric statistical tests (Wilcoxon Rank-Sum, Kruskal-Wallis).

Results: 3,282 patients met study criteria. The mean age was 47.4 ±17.5. The majority was female (1,723; 52.5%). The overall LOS was 6.4±9.4 days (median 4 days). 2,225 patients (67.8%) underwent an operative procedure. Table: *P<.05 compared to 2004. Year-to-year differences in LOS were not statistically significant following 2006 (P>.05), and year-to-year differences in SOI were not statistically significant following 2005. Mean ± SD reported for LOS.

Year	N	Mortality	LOS, days	SOI pts.
2004	307	15 (4.9%)	9.2 ±12.4	71 (23%)
2005	712	18 (2.5%)	**6.2 ±8.2***	**96 (13%)***
2006	736	22 (3.0%)	**5.7 ±9.6***	**114 (15%)***
2007	672	23 (3.4%)	**6.7 ±10.5***	**113 (17%)***
2008	855	**14 (1.6%)***	**6.0 ±7.8***	**144 (17%)***

Conclusion: Despite consistently high severity of illness, a dedicated and matured EGS service demonstrated a decrease in mortality and LOS.

Poster # 23

PREOPERATIVE CLOTTING AND PERIOPERATIVE TRANSFUSION DECISIONS IN BURNS

Claire R Larson, MD, Christopher E White, MD, Steven E Wolf*, MD, James Aden, PhD, Myung Park, MD, Charles E Wade, PhD. United States Army Institute of Surgical Research.

Introduction: Measurement of coagulation in burn patients is not well-delineated, and this information could assist in tailoring peri-operative blood administration and reduce unnecessary utilization. We sought to determine if measures of coagulation in preoperative burn patients were associated with peri-operative transfusion decisions.

Methods: Data including standard coagulation tests, thromboelastograms, excision area, and blood products given peri-operatively was collected from 30 controls and 36 patients undergoing initial = 20%TBSA burn excision. Statistical analysis was performed using Mann-Whitney U or t-tests (p=0.05). Univariate and multivariate regressions revealed which factors influenced peri-operative blood transfusion.

Results: %TBSA burned was 48±14.6% and total PRBCs received peri-operatively was 7±3.6 units. Preoperative burn patients had a higher INR compared to controls (1.24±0.17 vs. 0.94±0.14, p=0.05). Thromboelastography values in preoperative burned patients compared to controls indicated that the time necessary for clot formation (R-time) was longer (8.5±3.01 vs. 6.9±1.77 min, p=0.05), but clot formation rate (Alpha-angle) and clot strength (MA) were notably greater (56.9±12.60 vs. 48.4±10.22 degrees, 68.9±8.61 vs. 57.39±5.12 mm, respectively). Univariate analysis showed a weak association of area excised (r^2=0.135, p=0.02) and age (r^2=0.099, p=0.05) with PRBC administration in the operating room. A multivariate regression indicated associations with available demographic and laboratory data and PRBC use in 1) OR (r^2=0.24,p=0.008), 2) 24 hours postoperatively (r^2=0.477, p=0.008), and 3) total (r^2=0.328, p=0.01).

Conclusions: Preoperative burn patients do not begin to clot as rapidly as unburned individuals, but the resulting clot is stronger. Despite this knowledge, clotting ability does not have a strong association with the decision to administer PRBCs perioperatively.

Poster # 24

THE ROLE OF VASOPRESSIN IN SEVERELY BURNED CHILDREN

Soman Sen, MD, David G Greenhalgh*, MD. Shriners Hospital for Children Northern California.

Introduction: Vasopressin is frequently used to treat hemodynamic instability after severe injury, yet little data exist with respect to normal physiologic levels of vasopressin during acute illness in children. The purpose of this study was to identify physiologic levels of vasopressin in severely burned children in the 4 weeks following burn injury and to determine if vasopressin secretion is associated with mortality.

Methods: Children aged 1-18 years admitted to a single burn center over a 5 year period with burn injury >30% total body surface area (TBSA) burn were included in this prospective observational study. Parameters recorded included demographics, injury characteristics, vasopressin levels, and outcomes. Vasopressin was measured weekly for 4 weeks.

Results: A total of 68 children, mean age 7.9±0.6 years, mean TBSA of 47.0±2.2%, 25% with inhalation injury, were enrolled in the study. Mean length of stay (LOS) was 71.7±6.6 days. Mortality was 10.2%. Overall vasopressin level in the four weeks after admission was 1.40±0.2 pg/ml. Non-survivors had larger burns (71.2±8.4% vs. 44.2±2.0% TBSA, $p<0.001$) and higher incidence of inhalation injury (57% vs. 20%, $p<0.01$) than non-survivors. Vasopressin levels remained low in both groups in the four weeks (overall 1.47±0.21pg/ml survivors, 1.04±21 pg/ml non-survivors, $p>0.5$) and did not differ at any time point tested (week 1: 1.54±0.43 pg/ml survivors, 0.88±0.43 pg/ml non-survivors, $p>0.4$; week 2: 1.21±0.22 pg/ml survivors, 1.36±0.49 pg/ml non-survivors, $p>0.4$; week 3: 1.44±0.47 pg/ml survivors, 0.93±0.42 pg/ml non-survivors, $p>0.4$).

Conclusions: Vasopressin levels in children are low in both the ebb and flow phases after burn injury in both survivors and non-survivors. The persistent low levels in all patients and the lack of difference in vasopressin levels between survivors and non-survivors suggests that vasopressin should be used with caution in severely burned children.

Poster # 25

VENOUS THROMBOEMBOLISM IN COAGULOPATHIC SURGICAL ICU PATIENTS: IS THERE A BENEFIT TO CHEMICAL PROPHYLAXIS?

Meghan R Edwards, MD, Seth Felder, MD, Eric J Ley, MD, Marissa K Srour, James Mirocha, MS, Daniel R Margulies*, MD, Ali Salim*, MD. Cedars-Sinai Medical Center.

Background: Coagulation abnormalities are common among critically ill surgical patients. Little is known regarding the incidence of venous thromboembolism (VTE) in this select group of patients. Chemical VTE prophylaxis is often withheld due to a presumed increased risk of bleeding and assumption that these patients would not benefit from it.

Hypothesis: Coagulopathic critically ill surgical patients are at risk for VTE and should be treated with chemical prophylaxis.

Methods: A retrospective review was performed of all coagulopathic patients (INR > 1.5 or platelets < 100,000) admitted for at least 48 hours to the surgical intensive care units of a tertiary care center between January of 2008 and January of 2009. Patients were divided into 2 groups based on whether (Group 1) or not (Group 2) they received chemical prophylaxis. The incidence of VTE was then compared between the two groups.

Results: A total of 513 patients were included in the study: 241 patients in Group 1 and 272 patients in Group 2. The overall incidence of VTE was 16.4%. The incidence of VTE in the patients who received chemical prophylaxis was 17.0%, while the incidence in patients without chemical prophylaxis was 15.8% ($p < 0.72$).

Conclusion: Coagulopathic critically ill surgical patients remain at significant risk for VTE. Unfortunately, chemical VTE prophylaxis does not appear to decrease this risk. Further research is warranted to investigate the nature of this increased risk of VTE and the reason chemical VTE prophylaxis has no benefit.

Poster # 26

UNPLANNED EXTUBATIONS IN THE TRAUMA ICU: WHO GETS REINTUBATED?

R Zane Kelley, DO, Chantal R Reyna, MD, Annie E Pratt, MD, Jaleel S Anjum, MD, Elizabeth A Snavely, BA, Jay E Coates, DO, John J Fildes*, MD, Deborah A Kuhls*, MD. University of Nevada School of Medicine.

Objective: Unexplained extubation (UE) rates are up to 16% in mixed ICUs, with up to 56% of UE requiring re-intubation (RI). RI is associated with longer ICU and hospital length of stay (LOS). The purpose of this investigation is to determine risk factors leading to RI after UE in adult trauma patients. We hypothesized that multiple factors contribute to RI including age, elevated ISS, chest or head injuries and previous alcohol use.

Methods: We conducted a retrospective analysis of UE and RI using a Patient Safety database (PSN) in conjunction with a chart review for a 21 month period from 1/1/08 through 9/30/09. Statistical analysis utilizing odds ratio and pooled t-test were utilized with $p < 0.05$ considered statistically significant. IRB approval was obtained.

Results: During the study period there were 1624 intubated patients and 36 UE (2.2%). Five patients were excluded due to incomplete charts or multiple UE. Thirty-five percent of UE were RI (11/31). The average age and ISS of RI patients were 30.3 years and 21, while non-RI were 27.8 years and 18.8, respectively (ISS $p<0.05$). RI patients had an ICU LOS of 15.8 days and hospital LOS of 26.2 days, in contrast to non-RI patients with 5.6 days and 12.8 days correspondingly. 36% of RI patients were discharged home in contrast to 65% of the non-RI patients. Risk factors associated with RI include age, head and chest injuries, ISS and prior use of alcohol or drugs. Patients with P/F >300 prior to UE had lower rates of RI.

Category	Reintubation Rate %	Odds Ratio
Geriatrics (=55 years)	60.0	3.4
Head Injury AIS > 1	43.8	2.1
Chest Injury >1	43.0	3.0
ISS = 25	50.0	3.3
ISS =16	47.6	8.1
History of Drug Use	50.0	2.0
History of ETOH	40.0	1.5

Conclusion: UE in adult trauma patients occurs infrequently, with a RI rate of 35%. Factors associated with RI include geriatric age, ISS > 16, as well as the presence of head and chest injury. Patients with history of drug and alcohol use have higher RI rates than those without that history. This study is limited by sample size and retrospective design.

Poster # 27

CRITICALLY INJURED TRAUMA PATIENTS WITH SUBTHRESHOLD ENDOTRACHEAL ASPIRATES, WHO PROGRESSES TO PNEUMONIA?

Jennifer Roberts, MD, Karen Brasel, MD*. Medical College of WI, Department of Trauma Critical Care.

Background Quantitative bronchial sampling methods are currently recommended to diagnose VAP. Prognosis and recommendations for patients with initial sub-threshold results are unclear. We hypothesized that the patients with a sub-threshold result that progressed to VAP could be identified and could help guide subsequent treatment.

Methods 1833 ventilated trauma patients between 2003-2008 were admitted to the ICU. 420 were investigated for VAP. 10^5 CFU/ml from a quantitative endotracheal aspirate (EA) was used as a positive threshold. Retrospective review abstracted demographic, injury, and microbiologic information. Statistical analysis was performed using Wilcoxon rank sum and chi-square tests.

Results Of the 420 patients investigated, 169 were diagnosed with pneumonia. 88 patients originally had a sub-threshold EA, of which 18 progressed to VAP. The only differences in the group that progressed were a lower GCS on arrival and a concomitant diagnosis of ARDS. Patents who progressed had an increased number of ICU days (23.1 vs11.8 p=.006), total ventilator days (19.9 vs 9.2 p=.002), and total hospital days (28.3 vs 20.6 p=.03). 11 of 18 patients would have been diagnosed with VAP initially using a 10^4 threshold. However, there was only a 28% concordance between initial and final culture results.

	age	sex	**GCS**	WBC	Days on Vent prior to EA	Major Chest Injury (ISS>2)	Major Ortho injury (ISS>2)	**ARDS**
Progressed	37.5	83.3% male	**5.2**	11.1	4.4	14	11	**22%**
No Progression	42	68.6% male	**8.2**	12.5	3.8	42	26	**4.30%**
P-value	0.2988	0.2567	**0.03**	0.232	0.2903	0.2699	0.1076	**0.0311**

Conclusions The rate of progression to VAP in patients who have an initial sub-threshold EA is low but clinically significant. The presence of ARDS and lower initial GCS are associated with progression to VAP. However, the lack of concordant culture results suggests that earlier treatment might not prevent subsequent VAP.

Poster # 28

UTILITY OF A FOCUSED RAPID ECHOCARDIOGRAPHIC EVALUATION IN THE SURGICAL INTENSIVE CARE UNIT

Sarah B Murthi, MD, Paula Ferrada, MD, Grant V Bochicchio*, MD, John Hess*, MD, John Gottdiener, MD, Thomas M Scalea*, MD. University of Maryland Medical School.

Background: Transthoracic echo can provide useful information about cardiac function and intravascular volume status in the surgical intensive care unit, however cardiologists are not always available to interpret them.

Methods: We developed a focused rapid echocardiographic evaluation (FREE). The FREE is performed and/or interpreted by a surgeon/intensivist, with a full service echocardiographic system (Vivid i, GE Healthcare). Using standard echocardiographic measurements, information on cardiac function, preload, afterload and potentially significant anatomic findings are reported. The primary team provided relevant information and the treatment plan prior to the exam.

Results: In 10 months100 FREEs were performed, information was complete in 98 patients. Fifty-five percent of patients had sustained trauma, 26% had undergone cardiac surgery, 21% were other surgical intensive care unit patients (SICU), 88% were intubated. The most common clinical questions were, volume status (85%), global cardiac function (66%), type of shock (40%) and right heart function (36%); more then one selection was possible. The FREE was found useful in 93% of patients, answered the clinical question in 84% and changed the treatment plan in 62%. The FREE based changes included giving a fluid bolus (52%), removal of intravascular volume (33%), starting/titrating an ionotrope (10%) and starting/titrating a vasoconstrictor (10%). If the pre-FREE plan was to give a fluid bolus it changed in 45%, if the pre-FREE plan was to give a fluid bolus it changed in 58% of patients.

Conclusions: A SICU based echo program provides clinically useful information, which can be used to direct care. The FREE changed the treatment plan in 62% of patients in whom it was ordered. Methods of training and certification in transthoracic echo should be developed for surgeons. Further research is needed to determine the effect of surgeon performed echo on patient outcome.

Poster # 29

A BRONCHOALVEOLAR LAVAGE-BASED PROTOCOL CHANGES MANAGEMENT IN TRAUMA PATEITNS WITH VENTILATOR-ASSOCIATED PNEUMONIA

Christopher P Michetti*, MD, Tayseer Aldaghlas, MS, MD. Inova Fairfax Hospital.

Background: Directed antibiotic therapy based on accurate bacteriology is critical to ventilator associated pneumonia (VAP) treatment. Bronchoalveolar lavage (BAL) has been reported to be more accurate than endotracheal sputum aspirate (ESA) in VAP diagnosis. Our objective was to determine the frequency with which BAL results differ from ESA cultures as part of a BAL-based Trauma VAP protocol.

Methods: Prospectively collected microbiologic data on all trauma patients with VAP from 2007 through 2009 in a Trauma intensive care unit were retrospectively reviewed. Per our VAP protocol, a positive ESA prompts a BAL and initiation of broad empiric antibiotics. Patients with ESA followed by quantitative BAL were included. Discordant results were defined as either entirely different bacteria on BAL vs. ESA, or presence/absence of bacteria on BAL that would change antibiotic choice. Only VAP patients diagnosed by ESA and quantitative BAL in protocol sequence were included. Cause of death was judged as VAP-attributable or not.

Results: The percentage of VAP patients diagnosed according to the protocol was 54% (2007), 85% (2008), & 75% (2009). Of 137 VAP patients overall, 95 met study criteria and had 102 pairs of cultures. 28 patients (29.4%) and 30 pairs of cultures (29.4%) had discordant results. Of discordant pairs, 21 showed bacteria of a different Gram stain. Mortality was 9.4% overall, 4.2% in the study group, and 3.9% in the last 2 years of increased protocol compliance. VAP-attributable mortality was 2.1 % overall (all in 2007) and 0% in the study group.

Conclusions: BAL reveals different or additional organisms than ESA in almost one third of patients. Mortality from VAP in trauma patients is very low. Use of BAL as part of a VAP protocol in trauma patients may more accurately define VAP bacteriology and guide subsequent antibiotic therapy.

Poster # 30

THE 2009 H1N1 PANDEMIC AND THE SUDDEN DEMAND FOR ECMO RESOURCES: HOW A MATURE TRAUMA PROGRAM PROVIDED CRITICAL SUPPORT

Andy Michaels MD, MPH, Jon Hill MD, David Bliss MD, Bernie Sperley DO, Brian Young MD, Peter Quint MD, Sue Bergstrom RN, Cheryl Batazzo RN, Tanya Shanks RN, William Long* MD, Lori Morgan MD, MBA. Legacy Emanuel Health System.

Objective: Patients with severe H1N1 pneumonia created a sudden stress on tertiary health care systems with ECMO capability. In a single referral center, the established procedures, protocols and staff of the Level I Trauma Service were critical to meet these suddenly increased demands for clinical, systems and human resources.

Methods: When APRV and high frequency oscillator ventilation failed, we used standard ECMO circuits and the VDR®-4 critical care ventilator (Percussionaire® Sandpoint, Idaho). We cannulated patients percutaneously in the ICU and transported them on ECMO from outlying hospitals in a ground ambulance. Trauma Service resources included a Mobile Surgical Transport Team, direct to OR resuscitations, massive transfusion protocols, trauma performance improvement processes, Trauma Resuscitation Nurses, in-house attending MDs and experienced staff familiar with protocol driven care.

Results: Over a 90-day period 15 patients with severe pulmonary collapse from confirmed or presumed H1N1 were treated with ECMO. All patients were referred; nine were transported on ECMO. Patients were 33.5 years old (6 to 58), 47% male and had been ventilated 3.3 ± 3.2 days. ECMO weaning was possible in 67%, 60% survived to discharge. PreECMO PF ratios were 58.7 +- 20.7, compared to postECMO PF ratio: 260.7 ± 147.2. ECMO duration was 9.0 ± 3.8 days. Cause of death was cerebral ischemia in three patients, hemorrhage in two and cerebral hemorrhage in one. No patient died of lung failure. No scheduled OR cases were cancelled and the Trauma Service, ED and ICUs never went on diversion. Surviving patients were discharged at their neurological baseline.

Conclusion: H1N1 pneumonia created a severe public health challenge for referral centers with ECMO capability. The human, clinical, and procedural resources of our Trauma Service were successfully adapted to this non-trauma emergency and critical care crisis without disruption of other essential hospital services. The H1N1 patients treated with ECMO had a 60% survival rate and were all discharged to home.

Poster # 31

EARLY USE OF DIAPHRAGM PACING IN SPINAL CORD INJURY TO WEAN FROM VENTILATORS: DECREASING INTENSIVE CARE UNIT STAYS AND COSTS

Raymond P Onders MD, Lawrence Lottenberg* MD, Michael Cheatham* MD, Saeid Khansarinia MD. University Hospitals Case Medical Center.

Background: Ventilator dependent spinal cord injured (SCI) patients can require significant intensive care unit time until appropriate rehabilitation or long term ventilator facilities are available. Diaphragm Pacing (DP) has been used successfully to replace mechanical ventilators for tetraplegics. This report will describe early utilization of DP after traumatic injury.

Methods: Prospective multi-center non-randomized interventional protocol under IRB approval for a humanitarian use device (HUD). Patients underwent laparoscopic diaphragm motor point mapping with electrode implantation and subsequent diaphragm conditioning and ventilator weaning.

Results: Over 300 subjects have been implanted worldwide with DP from 2000-2010, five patients were implanted with DP during their initial trauma hospitalization and form the basis for this report. Mechanism of injury included two falls, two diving injuries and one football injury. Age ranged from 17 to 61 years old. Two patients had no health insurance. Time from injury to implantation ranged from 7 days to 8 weeks. All implants were successful. Ventilator weaning took less than one day to 4 weeks. Four patients graduated to rehabilitation hospitals and one patient to a long term care facility once ventilator free. Two patients subsequently recovered volitional breathing and were weaned from DP.

Conclusion: The cost of ventilator dependent SCI patients is over $800,000 during the first year after injury. Mechanical ventilation with it's nearly 100% pneumonia rate being the most expensive therapy. DP has been shown to decrease pneumonia rates and in this report earlier implantation decreased ICU stays. This allows for more efficient and cost effective use of ICU beds which is an increasing focus in our aging, underinsured and uninsured population. Most importantly functional electrical stimulation has a neuroplasticity effect. This study showed it can help in recovery with 40% not needing DP long term.

Poster # 32

RISK FACTORS FOR VENOUS THROMBOEMBOLISM IN CRITICALLY ILL TRAUMA PATIENTS WHO CANNOT RECEIVE CHEMICAL PROPHYLAXIS: WHO SHOULD GET AN IVC FILTER?

Darren J Malinoski, MD, Tyler Ewing, BS, EMT-B, Fariba Jafari, BS, Bryan Sloan, BS, EMT-B, Brian Nguyen, Madhukar Patel, MS, Cristobal Barrios, MD , Allen Kong, MD, Marianne Cinat, MD*, Matthew Dolich, MD, Michael Lekawa, MD*, David Hoyt, MD*. UC Irvine.

Background: Standard venous thromboembolism (VTE) prevention for critically ill trauma patients includes sequential compression devices and chemical prophylaxis. When contraindications to anticoagulation are present, prophylactic inferior vena cava filters (IVCF) may be used to prevent pulmonary emboli (PE) in high-risk patients, but specific indications are lacking. We sought to identify independent predictors of VTE in critically-ill trauma patients who cannot receive chemical prophylaxis in order to identify a subset of patients who may benefit from prophylactic IVCF placement.

Methods: All trauma patients in the surgical ICU were prospectively followed from January 2008 to December 2009. Patients with an ICU length of stay (LOS) > 2 days who had contraindications to prophylactic anticoagulation were included. Screening duplex exams were obtained within 48 hours of admission and then weekly. CT-angiography for PE was obtained if clinically indicated. Patients were excluded if they did not receive a duplex or if they had a post-injury VTE prior to ICU admission. Data regarding VTE rates (lower extremity [LE] DVT or PE), demographics, past medical history (PMH), injuries, surgeries, ventilator (vent) days and ICU LOS were collected. Univariate and multivariate analyses were performed to identify independent predictors of VTE with a $p < 0.05$.

Results: Data were complete for 411 trauma patients with a mean age of 48 ± 22 years and 8 ± 9 ICU days. 72% were male and the mean ISS was 22 ± 13. 30 (7.3%) patients developed VTE: 28 (6.8%) with LEDVT and 2 (0.5%) with PE. Risk factors for VTE after univariate analysis were PMH of VTE, any extremity fracture (Fx), pelvis or LE extremity Fx repair, sepsis, ICU LOS, and vent days. Only PMH or VTE (OR = 28, CI 6-119) and any extremity Fx (OR = 2.5, CI 1.1-5.8) remained as independent predictors of VTE.

Conclusion: Prophylactic IVCF may be considered in critically ill trauma patients with extremity fractures or a PMH of VTE who cannot receive chemical prophylaxis.

Poster # 33

OPTIMAL TIMING OF THORACOSCOPY FOR RETAINED HEMOTHORAX.

William Tobler, MD, Karl Pilson, MD, Eric Mahoney, MD, Kofi Abbensetts, MD, Andrew Glantz, MD, Peter Burke*, MD, Suresh Agarwal*, MD. Boston University Medical Center.

Objective: Adverse pulmonary and infectious consequences of retained hemothorax in trauma are well recognized, as is the morbidity associated with open thoracotomy for decortication procedures. In this study we attempt to show optimal timing of intervention may avoid exacerbating hemorrhage and facilitate thoracoscopic therapy for this problem.

Methods: This is a five-year, retrospective review of all patients admitted to an urban, level one trauma center with significant hemothorax who underwent delayed chest exploration for signs and symptoms of retained hemothorax all of whom had undergone thoracostomy tube drainage on admission.

Results: There were 56 patients who underwent delayed thoracoscopic exploration for signs and symptoms of hemothorax over the study period. Of these 44 underwent successful therapeutic thoracoscopic intervention and 12 required conversions to open thoracotomy. Two patients who required conversion did so due to hemorrhage that could not easily be controlled with the thoracoscope. Both of these patients had thoracoscopy on post-injury day #3. The remainder of patients required conversion because the retained clot was too dense and adhesive to be removed effectively with thoracoscopy. The mean post injury time for surgery in the group where thoracoscopic intervention was successful was 5.18 days with a range of 2-11 days. If the two patients who required conversion are excluded from the group that required conversion the mean post- injury day for surgery was 8.75 days with a range of 8-14 days. No patient that required conversion for difficulty with the procedure was operated on before post-injury day #8 and no patient underwent successful thoracoscopic therapy after day #11.

Conclusions: Where signs and symptoms of post traumatic retained hemothorax are present patients who undergo thoracoscopic intervention between post injury day 4 and 8 are least likely to require conversion to an open procedure either due to exacerbation of hemorrhage or to technical difficulty with decortication/pleurodesis.

Poster # 34

ALI/ARDS IN EMERGENCY SURGERY: THE US CRITICAL ILLNESS AND INJURY TRIALS GROUP (USCIITG) LUNG INJURY PREVENTION STUDY COHORT

Pauline K Park*, MD, Kristen C Sihler, MD, J Jason Hoth*, MD, Harry L Anderson, III*, MD, Naomi Shimizu, MD, Adebola O Adesanya, MB, MPH, Ednan K Bajwa, MD, MPH, Steven Y. Chang, MD, Ousama Dabbagh, MD, Ognjen Gajic, MD. University of Michigan, for the USCIITG Lung Injury Prevention Investigators.

Objective: To examine the incidence, hospital resource utilization and mortality of ALI/ARDS associated with emergency surgery in the US Critical Illness and Injury Trial Group (USCIITG) Lung Injury Prevention Study.

Methods: The USCIITG Lung Injury Prevention Study prospectively enrolled 5584 patients at high-risk for development of ALI/ARDS at 22 centers. Patients admitted with at least one high-risk surgical characteristic (pancreatitis, smoke inhalation, traumatic brain injury, lung contusion, long bone fractures, acute abdomen, spinal, thoracic, cardiac, aortic and emergency surgery) were identified. Patients who underwent emergency surgery were compared to those who did not. Within the emergency surgery cohort, we examined outcomes in patients who did or did not develop ALI/ARDS by AECC consensus criteria.

Results: Of the 2916 patients admitted with a surgical ALI/ARDS risk factor, 339 underwent emergent operation. ALI/ARDS developed more frequently in this cohort than in the patients who did not require surgery (16.5 vs. 6.1%, $p < 0.01$).

	No Emergency Surgery Surgical Risk Factor		Emergency Surgery No ALI/ARDS		Emergency Surgery ALI/ARDS		
	mean ± SD	n	mean ± SD	N	mean ± SD	N	*P*
Age	55.0 + 18.1	2577	46.3 + 18.9	282	48.1 + 19.1	57	<0.05
APACHE 2	7.5 + 5.6	2577	8.7 + 7.1	282	16.4 + 8.00	57	<0.05
Vent days	3.7 + 6.9	1067	3.8 + 5.4	139	10.8 + 12.6	48	<0.05
ICU LOS	4.3 + 7.8	1757	6.1 + 7.6	159	14.2 + 18.0	56	<0.05
Hosp LOS	8.9 ± 9.7	2577	10.9 ± 13.4	282	23.6 ± 22.8	57	<0.05
Death	3.2%	82/2577	3.9%	11/282	21.1%	12/57	<0.01

Statistical analysis: χ^2 for categorical values; one-way ANOVA with pairwise comparisons for differences in group means

Conclusion: In this multicenter trial, the emergency surgery cohort was younger and more acutely ill than the at-risk patients who did not undergo surgery during the first 24 hours after admission. ALI/ARDS incidence was significantly higher in the emergency surgery cohort, with increased hospital and ICU resource utilization and a five-fold increase in crude mortality. Optimal integration of care in the ER, OR and ICU through the Acute Care Surgery model potentially will improve outcome for these critically ill patients.

Poster # 35

SINGLE NUCLEOTIDE POLYMORPHISMS IN THE MBL2 GENE PREDISPOSE TO INFECTIOUS COMPLICATIONS IN POLYTRAUMA PATIENTS

Maarten WGA Bronkhorst, MD, Esther MM van Lieshout, PhD, Peter Patka, MD PhD, Sponsor: Loek Leenen, MD PhD. Erasmus MC Rotterdam.

Introduction. Polytrauma patients are at serious risk for developing infectious complications during hospital stay which may add significantly to mortality. Single Nucleotide Polymorphisms (SNPs) in the *MBL2* gene on chromosome 10, coding for Mannose Binding Lectin (MBL), may lead to lowered or absent serum levels of MBL. MBL is considered a key molecule in the lectin pathway of complement activation. MBL deficiency was previously identified as risk factor for occurrence and course of infections. The aim of this study was to determine if MBL deficiency due to the presence of SNPs in the *MBL2* gene predisposed severely injured trauma patients for infectious complications.

Methods. Venous blood samples were taken from 104 polytrauma patients admitted to a Level I Trauma Center with ISS 16 or higher in which DNA was isolated (QIAamp DNA Blood Mini Kit, QIAgen). After PCR the genotype of *MBL2* SNPs was determined for exon 1 (codon 52, 54 and 57; alleles 'D', 'B' and 'C' respectively) and promoter region (position -221; Y/X variant) using High Resolution Melting Analysis (HRMA) on a LightScanner (HR-96, Idaho Technology).

Results. Genotyping the *MBL2* gene was performed for 104 patients. Median age was 44 years and 82% were male. Forty (38%) patients had a SNP in the promoter region and/or exon 1 of the *MBL2* gene. Thirtythree patients (32%) were heterozygous for the promoter SNP (Y/X). For exon 1, 64 patients (62%) were homozygous (A/A), in 35 patients (33%) one variant allele was found (A/B, A/C or A/D), and 5 patients (5%) had a homozygously mutated haplotype (0/0). Positive wound cultures were 59% for A/A, 80% for A/0 and 100% for 0/0 haplotype. A positive trend was seen for sputum cultures 51% A/A versus 67% 0/0, NS) and bloodstream infection (22% A/A versus 31% A/0, NS)

Conclusion. In this cohort 38% of polytrauma patients have deficient MBL serum levels as a result of *MBL2* gene SNPs. These patients are at increased risk for developing positive wound cultures.

Poster # 36

HISTONE DEACETYLASE INHIBITORS ATTENUATE TOLL-LIKE RECEPTOR-4 DEPENDANT ACTIVATION OF INFLAMMATORY CASCADE

Wei Chong, MD, PhD, Yongqing Li, MD, PhD, Kyu Seok Kim, MD, PhD, Guang Jin, MD, PhD, Baoling Liu, MD, Jennifer Lu, BS, Eugene Y Fukudome, MD, George C Velmahos, MD, PhD*, Marc deMoya, MD* , Hasan B Alam, MD*. Massachusetts General Hospital/ Harvard Medical School.

Introduction: We have shown that treatment with suberoylanilide hydroxamic acid (SAHA), a histone deacetylase inhibitor, improves survival after a lethal dose of lipopolysaccharide (LPS). As LPS is known to exert its effects through the Toll-Like Receptor (TLR), we hypothesized that SAHA attenuates the TLR-4 signaling cascade.

Methods: Mouse macrophage (RAW264.7) cells were exposed to LPS (1 μM) and 2 hours later, treated with SAHA (1 μM). Sham (no SAHA, no LPS) macrophages served as a control. Cells were harvested at different time points and fractioned. Western blots were performed to assess various components of the TLR-4 cascade including: expression of myeloid differentiation factor 88 (MyD88) and phospho-IL-1 receptor1-associated kinase 1 (phospho-IRAK1) in whole cell lysate, and translocation of NF-κB p65 from cytosal (C) to nuclei (N). Total mRNA was isolated to analyze gene expression of tumor necrosis factor α (TNF-α) and interleukin-6 (IL-6) by real-time PCR. Finally, secreted cytokines (TNF-α and IL-6) were measured in the cell culture medium.

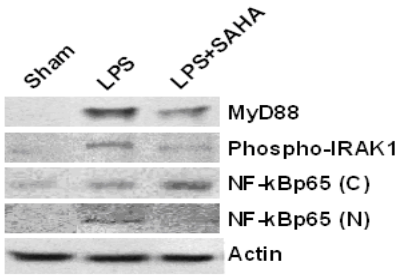


Figure: SAHA post-treatment suppressed LPS-stimulated MyD88 expression, IRAK1 phosphorylation, and NF-κB nuclear translocation in mouse macrophages.

Results: LPS significantly enhanced MyD88 protein expression, IRAK1 activation (phosphorylation), nuclear translocation of NF-κB protein, and gene expression and secretion of TNF-α and IL-6 proteins. SAHA treatment significantly attenuated all of these changes.

Conclusions: Treatment of macrophages with SAHA, even 2 hours after LPS insult, suppresses MyD88 expression, IRAK1 activation, and NF-κB translocation. It also decreases TNF-α and IL-6 gene and protein levels. Our data demonstrate for the first time that the anti-inflammatory effects of SAHA are exerted through a down regulation of the LPS-TLR4-MyD88 pathway.

Poster # 37

RISK FACTORS AND PREDICTION MODEL FOR MRSA NOSOCOMIAL INFECTION IN INTENSIVE CARE UNIT

Kazuma Yamakawa, MD, Osamu Tasaki, MD, Junichi Kitayama, MD, Yasushi Nakamori, MD, Satoshi Fujimi, MD, Hiroshi Ogura*, MD, Yasuyuki Kuwagata, MD, Toshimitsu Hamasaki, PhD. Department of Emergency and Critical Care, Osaka General Medical Center.

Introduction: Nosocomial infection of methicillin-resistant *Staphylococcus aureus* (MRSA) in critically ill patients is associated with prolonged ICU stay and high mortality. If MRSA infection can be predicted on admission, it is possible to strengthen the precaution for MRSA transmission. The purpose of this study is to clarify the risk factors of MRSA nosocomial infection and develop the predictive model of infection in ICU.

Materials and Methods: Three hundred eighty two consecutive patients who stayed in the ICU for more than 2 days were included in the present study. Thirteen patients were excluded from the analysis as MRSA-positive on admission because MRSA was detected by first screening culture within 2 days after admission. Other MRSA-positive patients were defined as having been colonized by nosocomial transmission. Nosocomial infection was diagnosed according to NNIS manual. Eleven candidate prognostic variables possibly related to outcome were evaluated. All the variables used in the study were obtained within 24 hrs of admission to predict the risk of infection in the early phase of stay. Stepwise multivariate logistic regression analysis was used to identify independent risk factors for nosocomial infection of MRSA, and to find the best subset of variables for prediction.

Results: Twenty three patients (6.2%) had MRSA infection and 346 patients (93.8%) had no infection. Intubation within 24 hrs of admission (INT), the existence of open wound within 24 hrs of admission (OW), treatment with antibiotics within 24 hrs of admission (TA) and history of steroid use (ST), were detected as prognostic indicators (Table). Logistic model showed 0.851 of area under the ROC curve with 95% CI of 0.779-0.922. If 0.095 was taken as a cutoff value, sensitivity was 91.3% (21/23), specificity 71.1% (246/346).

	odds ratio	95% CI	p-value
INT	5.706	1.579 – 20.615	0.008
OW	4.154	1.402 – 12.311	0.010
TA	4.090	1.126 – 14.852	0.032
ST	3.865	1.256 – 11.894	0.018

Conclusion: Our prediction model will be useful for predicting MRSA nosocomial infection and can be used to strengthen preemptive precautions for MRSA infection.

Poster # 38

THE STRESS HORMONE EPINEPHRINE INCREASES IGA TRANSPORT ACROSS RESPIRATORY EPITHELIAL SURFACES

Tamara Kamash, David M Liberati MS, Lawrence N Diebel*, MD. Wayne State University.

Objective: Secretory IgA (SIgA), the principle antibody at mucosal surfaces is produced as dimeric IgA by local plasma cells and is transported via a specific receptor, polyimmunoglobulin receptor (pIgR), expressed on the basal surface of mucosal epithelial surfaces and then released with a cleaved portion of pIgR, secretory component (SC) attached forming SIgA. Respiratory SIgA levels are increased early after injury in both human and laboratory animals; the mechanisms are uncertain. Stress hormones including epinephrine (Epi) and cortisol increased early following injury; further, respiratory epithelial cells are known to be responsive to β-agonists. We therefore studied the effect of Epi on IgA transport (transcytosis) *in vitro*.

Methods: Calu-3 respiratory epithelial cell monolayers grown in a two-chamber cell culture system were treated for 24 or 72 hours with Epi (10^{-3} M). Dimeric IgA was then added to basal media in the cold and apical media obtained at intervals. Free SC and SIgA were measured by ELISA and pIgR expression determined by flow cytometry. Cell monolayer integrity was confirmed by transepithelial electrical resistance (TEER).

Results: Mean±S.D; IgA ng/ml, pIgR MFI, N = 3 for each group

	SIgA		SC		pIgR
	3hr.	12hr.	(-) IgA	(+) IgA	
Calu-3	2.5 ± 1.1	15.1 ± 1.2	5.6 ± 1.0	12.5 ± 2.1	12.8 ± 0.8
Calu-3+Epi 24hr.	9.1 ± 0.4*	39.4 ± 2.2*	21.9 ± 2.3*	29.6 ± 2.2*	26.5 ± 1.5*
Calu-3+Epi 72hr.	5.2 ± 2.0	15.8 ± 1.6	40.5 ± 2.6*#	54.8 ± 2.5*#	17.6 ± 1.2

*p<0.001 vs. Calu-3 cells, #p<0.001 vs. Calu-3+24hr. TEER remained stable in all experimental groups.

Conclusion: Exposure of Calu-3 cells to Epi led to early increases in SIgA and free sc transcytosis. This was associated with an increase in pIgR expression. IgA transcytosis returned to control values at 72hr. reflecting diminished pIgR available for transcellular transport of IgA to the apical surface. Epi is likely an upstream signal in the enhanced IgA response at respiratory surfaces following injury.

Poster # 39

LATENT HERPES SIMPLEX VIRUS INFECTION INCREASES THE RISK OF ACINETOBACTER BAUMANNII INFECTIONS IN SEVERELY BURNED PATIENTS

Soman Sen, MD, Ho Phan, MD, Nova Szoka, BS, Alura Barsun, FNP, Tina Palmieri, MD*, David Greenhalgh, MD*. University of California Davis.

Introduction. Recovery from severe burn injury is often complicated with infections by opportunistic pathogens such as *Acinetobacter baumannii*. Risk factors for the development of these infections may be the result of immune suppression created by massive inflammatory states. One indication of the severity of immune suppression may be the occurrence of latent viral infections such as HSV, which may create an environment allowing for increased opportunistic bacterial infections.

Methods. A 5-year (July 2003 to July 2008) retrospective review was performed of severely burned adult patients with TBSA burn injury greater than 30% who survived more than 7 days. Data collected included age, TBSA burn injury, hospital length of stay, ventilator days, mortality, HSV infections and bacterial infections. A total of 129 patients were reviewed of which 71 patients met the entry criteria.

Results. Patients were divided into two groups, those with latent HSV infections (HSV+), and those without HSV infections (HSV-). 21 patients were in the HSV+ group and 50 patients were in the HSV- group. There was no difference in age (44.2 vs. 39.8 years) or TBSA burn injury (45.9% vs. 45.5%) between HSV+ and HSV- groups respectively. Hospital length of stay (60.9 vs. 39.8 days*) and total ventilator days (34.9 vs. 22.2 days*) were significantly greater in the HSV+ group. In comparison to the HSV- group, HSV+ patients had a significantly increased risk of developing *Acinetobacter baumannii* pulmonary infections (O.R. 6.4 [1.8-22.3]*) and on multivariate analysis, HSV infection was independently associated with a significantly increased risk of *Acinetobacter baaumannii* infections (O.R. 9.1 [1.9-44]*). ($p<0.05$)

Conclusion. Latent HSV infection during recovery from severe burn injury is associated with a markedly increased risk of *Acinetobacter* infections. The mechanism behind this interaction is as yet unknown, however HSV reactivation in this setting may be an indicator of a severe immune suppressed state leading to opportunistic bacterial infections.

Poster # 40

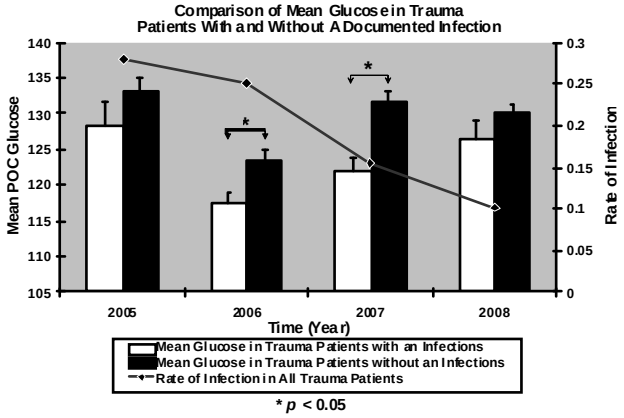
THE IMPACT OF BLOOD SUGAR CONTROL ON NOSOCOMIAL INFECTIONS IN THE TRAUMA ICU

Holly Sheldon, MD, Joanna Ng, Gustavo Bauza, MD, Juan Mella, MD, Peter Burke*, MD, Suresh Agarwal*, MD. Boston University Medical Center.

Objective: To determine the impact of blood glucose control on the development of nosocomial infections in the Trauma Intensive Care Unit (TICU).

Methods: A retrospective review of all trauma patients admitted to the TICU at an urban, level 1 trauma center over a 48 month period. Patients admitted at least 48-hours and 8 point of care glucose (POC) readings were included. Data was collected via the Clinical Database Warehouse and Trauma Registry (TRACS). All POC glucoses were averaged over length of stay. Infection rate was determined by dividing number of infections by patients in the study period.

Results: From 2005 until 2008, 959 trauma patients were admitted. 128 (13.3%) had 177 nosocomial infections (0.18 infections/pt). Infections were equally distributed between UTI's, VAP's, and CBI's, 31.6%, 35.6%, and 31.6%, respectively. The POC for infected trauma patients (ITP) was 123.06 mg/dL vs. 129.65 mg/dL ($p < 0.01$) for non-infected trauma patients (NI). NI had a higher percentage of POC fall between 150 - 180 mg/dL ($p < 0.05$), whereas ITP fell between more often between 81-149 mg/dL and >200 mg/dL ($p < 0.05$). ISS in ITP was higher (24.06 vs. 17.55, $p < 0.01$).



Conclusion: Nosocomial infection in trauma patients does not appear to be affected by average glucose. However, the rate of infection in trauma patients is significantly related to ISS. There appears to be factors other than tight blood sugar control that impact the development of infections in trauma patients.

Poster # 41

DEFINING THE GOLDEN THERAPEUTIC WINDOW FOR SEPSIS

Daniel E Vazquez, MD, Dong H Song, MD, Stephen J Cheng, Dennis Hawisher, Stephen W Bickler, MD, David M Cauvi, PhD, Raul Coimbra*, MD, PhD, Antonio De Maio, PhD.
University of California, San Diego.

Introduction: Therapy to alleviate sepsis is still mainly supportive. Since the current dogma views sepsis as an uncontrolled inflammatory response, attempts have been made to block inflammatory mediators in patients but without real success. A major problem with any clinical trial directed at ameliorating sepsis is that the actual therapeutic window has not been defined. Using the gold standard animal model for sepsis, cecum ligation and puncture (CLP), we attempt to define this therapeutic window.

Methods: Eight-week-old, male C57BL/6J mice were subjected to CLP (1.5 cm ligation, 16G puncture). At 3 and 20 h after CLP, the ligated cecum was removed (CLP+CR) and mortality was compared with animals that received sham operation (CLP+Sham) or no further operative manipulations after CLP. The pattern of inflammatory response in lungs was evaluated by quantitative RT-PCR.

Results: CLP+CR at 3h resulted in 100% survival, whereas at 20h it did not improve outcome as compared with CLP+SHAM or CLP without manipulation ($p<0.5$ by Log rank test). The inflammatory profile showed two phases: a hyper-inflammatory response (<6 h after CLP) and hypo-inflammation (>20 h after CLP).

Conclusion: The response to sepsis induced by CLP displayed two phases: an early phase (<6 h) characterized by a robust inflammatory response and the ability to reverse outcome (mortality) after a therapeutic intervention. The second phase (>20 h) displayed a reduction in the inflammatory response and an inability to reverse outcome. This final phase resembles a state of innate immune-exhaustion. Thus, the therapeutic window for sepsis is during a very early stage after injury.

Poster # 42

FACTORS ASSOCIATED WITH A NEED FOR MORE THAN ONE RELAPAROTOMY IN PATIENTS WITH SEVERE PERITONITIS

Carlos Ordoñez, MD, Marisol Badiel, MD, MSc, John Loaiza, BSc, Luis Pino, MD, Fernando Rosso, MD, Marcela Granados, MD, Gustavo Ospina, MD, Juan Carlos Puyana*, MD.
FundaciÃ³n Valle del Lili, Department of Surgery and Critical care.

Background: Most patients with severe secondary peritonitis (SSP) require a re-laparotomy to intra-abdominal- infection (IAI) control. However, factors predicting need for relaparotomy after the first procedure have not been widely characterized.

Objective: To identify possible factors associate to need for more than one re-laparotomy in SSP patients.

Methods: Adult SSP patients undergoing laparotomy between 2004 and 2009 included within the single-center PERIT registry were collected. We excluded patients with severe peritonitis secondary to appendicitis. Patients subjected to more than one re-laparotomy were studied. Variables with a p value < 0.1 in a bivariate analysis were included in a multivariate logistic regression for a further analysis of predictors for need for re-laparotomy.

Results: Two-hundred forty-seven patients included in the PERIT registry. A total of 212 patients with SPP were included to analyze. Eighty seven patients (41%) required more than one re-laparotomy. Median number of re-laparotomies was 3. Most SPP were associated to colon (n=94, 44,3%), small intestine (n=83, 39,2%) and biliary tract (n=33, 15,6%) perforations. Cultures were positive in 74,5% of first laparotomy: gram negative bacteria were isolated in 53,3%, gram positive bacteria in 16,5% and fungi in 4,7%. Hospital mortality was 17% (n=36). Multivariate analysis is described in the table 1.

Table 1. Multivariate analysis for predictors of re-laparotomy

≥ 1 relaparotomies	Odds Ratio	P>z	[95% Conf.	Interval]
APACHE II >15	3.28	0.000	1.69	6.35
Post-operative peritonitis	3.40	0.001	1.64	7.05
Generalized peritonitis	2.97	0.015	1.24	7.14
SOFA > 4	2.83	0.002	1.46	5.48

Predict model: 76.8% (goodness of fit test, p=0.699)

Conclusion: Post-operative peritonitis, generalized peritonitis, APACHE II >15 and SOFA>4 could predict need for re-laparotomy in SSP patients.

Poster # 43

COMPLIANCE WITH THE INSTITUTE FOR HEALTHCARE IMPROVEMENT VENTILATOR-ASSOCIATED PNEUMONIA BUNDLE DECREASES THE RATE OF PNEUMONIA IN THE SURGICAL INTENSIVE CARE UNIT

Darren Malinoski, MD, Kumar Gandhi, BS, Marianne Cinat, MD*, Cristobal Barrios, MD, Allen Kong, MD, Matthew Dolich, MD, Michael Lekawa, MD*, David Hoyt, MD*. UC Irvine.

Objective: The Institute for Healthcare Improvement (IHI) created the Ventilator-Associated-Pneumonia (VAP) Bundle in 2005 to decrease the incidence of VAP. Although individual components of the Bundle have been studied for efficacy, the effectiveness of compliance with the Bundle as a whole has not been evaluated. We **hypothesized** that Bundle implementation would significantly reduce the occurrence of VAP and sought to identify independent predictors of VAP in our Surgical Intensive Care Unit (SICU).

Methods: Baseline VAP rates in our SICU were obtained from July-December 2007. The IHI VAP Bundle was implemented in January 2008 and consisted of daily interruption of sedation, head of bed elevation, assessment of extubation potential, and both stress ulcer and thrombosis prophylaxis. Data regarding patient demographics, injuries, illnesses, Bundle compliance, transportation out of the SICU, and VAP rates were prospectively collected for all patients intubated for $\geq$ 48 hours from January – June 2008. VAP was diagnosed according to Center for Disease Control criteria. Bundle compliance was defined as meetings all five elements 80% of the time. VAP rates were compared before and after implementation of the Bundle and both univariate and multivariate analyses were used to determine independent predictors for VAP with a $p < 0.05$.

Results: There were 19 VAP cases in 1067 vent days prior to the Bundle (17.8/1000 vent days) and 11 cases in 1208 vent days after the Bundle (9.1/1000 vent days, p=0.04, Mid-P exact). In the 74 patients intubated for >/= 48 hours, Bundle compliance was achieved in 47 (64%). Non-compliance was due to lack of HOB (96%), lack of interruption of sedation (1%), or both (3%). Independent predictors of VAP were Bundle Compliance (OR = 0.1, CI 0.02-0.59) and abdominal or pelvic surgery (OR = 5.7, CI 1.1-30).

Conclusions: Implementation of the IHI VAP Bundle significantly reduced the VAP rate in our SICU and this was correlated with Bundle compliance. Increased compliance with HOB, especially in patients with abdominal or pelvic surgery may improve outcomes.

Poster # 44

ALCOHOL-RELATED BRIEF INTERVENTIONS AS A CRITERION FOR AMERICAN COLLEGE OF SURGEONS LEVEL I TRAUMA CENTER VERIFICATION: HOW BEST TO TRAIN THE INTERVENTIONISTS?

Jason A London, MD MPH *, Christopher W Dunn, PhD, Garth H Utter, MD MSc. Kaiser Permanente.

Background: The American College of Surgeons Committee on Trauma requires that Level I trauma centers perform brief interventions (BIs) for injured patients identified as problem drinkers. It is not known what type of training is optimal to conduct these BIs.

Study Design: We conducted a prospective cohort study at a Level I University trauma center. We compared two methods of training nurse practitioners (NP) without prior expertise to conduct BIs; workshop (WS) training versus "on-the-job" (OTJ) training, and whether a "booster" session would improve BI skills. We assessed BI skills using a standardized patient actor and a 21-point checklist of counseling tasks ("FLO" score) and a Motivational Interviewing (MI) rating scale, before and after a "booster" session.

Results: Nine WS- and five OTJ-trained NPs participated. FLO scores did not differ between the two groups after initial training (9.6 ± 2.4 and 7.8 ± 0.4, WS vs. OTJ, respectively; 95% C.I. of difference -4.1 to 0.6). FLO scores improved in both groups after "booster" training (9.1 ± 2.0 and 16.0 ± 2.2, Time 1 vs. Time 2, respectively; 95% C.I. of difference 4.7 to 9.1). After "booster" training, both groups failed to reach established competence thresholds for Motivational Interviewing Spirit (2.4 ± 0.9, threshold 5.0) and Reflection-to-Question Ratio (0.27 ± 0.20, threshold 1.0).

Conclusions: In preparing NPs to conduct BIs, OTJ training by an experienced peer appears to be comparable to WS training by expert counselors. Interventionist knowledge and performance can be improved by "booster" training. Neither OTJ nor WS training seem to prepare NPs to perform MI, the style of counseling used in the evidence base supporting BI in trauma centers. The level of BI skills achieved by expert counselors in prior studies might not be as readily exported to other centers as the ACS-COT BI requirement implicitly assumes.

Poster # 45

THE MEDIA CAN INCREASE AWARENESS AND CHANGE BELIEFS OF ORGAN DONATION IN THE HISPANIC AMERICAN POPULATION

Ali Salim*, MD, Danielle Schulman, BA, Eric J Ley, MD, Cherisse Berry, MD, Sonia Navarro, BA, Linda S Chan, PhD. Cedars-Sinai Medical Center.

Hypothesis: A focused media campaign, including culturally sensitive educational material on organ donation, positively influences organ donation awareness and beliefs, resulting in an increase in the likelihood of organ donation in the Hispanic American (HA) community.

Methods: Respondents, age=18, drawn randomly from lists of Hispanic surnames from four Southern California neighborhoods with a high percentage of HA served as the study population. Cross-sectional telephone surveys were conducted before and after a media campaign involving television commercials and a dedicated organ donation "float" in the Tournament of Roses Parade in Pasadena, California. Surveys measured awareness, perception, and belief regarding organ donation and intent-to-donate. Their differences between Pre and Post surveys were analyzed.

Results: A total of 524 Pre-media and 528 Post-media subjects were surveyed. Adjusting for the significant demographic characteristics between the Pre and Post surveys, the post-media survey respondents has shown an increase in organ donation awareness (43% vs. 31%, adjusted odds ratio (AOR) [95% confidence interval (CI)]: 1.85 [1.40, 2.45]; $p<0.0001$) and in the belief that donation is a social responsibility (54% vs. 45%, AOR [95% CI]: 1.42 (1.09, 1.86); $p=0.009$) with a decrease in the unwillingness to donate to strangers (26% vs. 32%, AOR [95% CI]: 0.63 [0.47, 0.84]; $p=0.002$) and in the belief that organ transplant is cruel (16% vs 25%, AOR [95% CI]: 0.56 (0.40, 0.78); $p=0.0007$). The intent-to-donate between the two surveys, however, was not found to be statistically different (30% vs 32%, $p=0.64$).

Conclusions: This study demonstrates that a media campaign emphasizing culturally sensitive educational material can significantly influence organ donation awareness and beliefs in HA, although its impact on the intent-to-donate has yet to be realized.

Poster # 46

PREPARING TRAUMA TEAMS FOR AUSTERE AND DISASTER ENVIRONMENTS: DEVELOPMENT OF A TRAINING PROGRAM UTILIZING INANIMATE AND PORCINE SIMULATION

Tyler Putnam MD*, Linda Dahlgren DVM, Sonya Ranson PhD, Cindy Hatfield DVM, Jeannette Capella MD, Carol Gilbert MD*, Allan Philp MD*, Robert Smith MD*, Jonathan Dort MD*, William Fry MD*, Ellen Harvey MSN, Kathryn Booth BSN, Stephen ReMine MD. Virginia Tech Carilion School of Medicine.

Objective: To develop a reproducible, time-efficient training program for surgeons, residents, and nurses who must prepare for emergency care in austere/disaster conditions.
Methods: A biphasic disaster surgery training program was developed at a civilian Level One trauma center. In Phase I, each team completed two damage control thoraco-abdominal operations (one full light, one severe light limitation) on porcine models after inanimate simulation lab orientation. Supply resources were limited. In Phase II, first phase lessons were applied and new teams completed a thoracoabdominal inanimate simulated operation, TeamSTEPPS^{R} training and damage control surgery on a porcine model in light limited conditions. Trained senior nurses and surgeons served as evaluators. Data included technical skills, tissue differentiation, resources, safety and task time.
Results: 46 personnel on 8 trauma/critical care teams completed damage control procedures in austere, light limited conditions. Simulation based inanimate training improved skills confidence in the animate lab ($p<.001$). Mean operative time difference was not significant; day (71 min) and night (88 min). Mortality in each light condition was equivalent. The most difficult procedure with night vision goggles was placement of an arterial shunt. Major challenges were identified; tissue differentiation (74% success for bile, blood, succus, urine, stool, and irrigation fluid), physiologic limitations (neck pain-29%, headache-35%, nausea-18%) and time for training. No significant difference was noted in pre and postoperative visual acuity and depth perception. 85% of the participants rated the training effective for patient care in austere, light limited conditions and reported that TeamSTEPPS^{R} principles improved their trauma/critical care team performance.
Conclusion: A training program utilizing an inanimate simulation laboratory and porcine specimens successfully provided intense trauma team preparation for austere or disaster scenarios. Potential applications exist for both civilian and military trauma teams.

Poster # 47

ADVANCED AGE ALONE AS CRITERIA FOR FULL TRAUMA ACTIVATION DOES NOT AFFECT MORTALITY.

Jennifer Knight, MD, Matthew Loos, MD, Jon Engle, MD, Steve Lindauer, BS, Stephen M Davis, MPA, Alison Wilson*, MD. West Virginia University.

Objective: Trauma patients of advanced age have a higher mortality than younger patients with the same injury severity score (ISS). Therefore, it has been proposed that age alone be a criterion for the full trauma activation (P1). We hypothesize that this will not affect mortality in trauma patients of advanced age.

Methods: All trauma patients over the age of 65 years, who presented to a level 1 trauma center over 2 years, were compared. For the protocol year (2005), patients were given P1 status based on advanced age alone. In the control year (2006), priority designation was based on criteria set by the American College of Surgeons (ACS). Differences in clinical characteristics and mortality were compared using the Wilcoxson rank sum and Pearson chi-square test with an alpha of 0.05 selected as the threshold of statistical significance.

Results: 584 patients were evaluated. In 2005, of the 320 patients admitted, 158 (49.3%) required full activation by advanced age alone per protocol. In 2006, of the 264 patients admitted, 30 (11.4%, $p < 0.0001$) required full activation. Clinical characteristics were similar for both cohorts (table). The mortality overall was 8.75% in the protocol year and 8.37% in the control year ($p = 0.87$). When comparing the overall mortality of either year, listed above, to the mortality seen in patients receiving full trauma activation based on age alone and not ACS criteria (7.87%), there was no statistical difference ($p = 0.76$ and 0.86 respectively).

	Protocol year	Control year	P value
	Mean	Mean	
Age	77.36	77.67	0.65
ISS	10.67	11.65	0.08
TRISS	0.914	0.907	0.05
GCS	13.8	13.6	0.27
LOS	6.03	5.4	0.85
ICU LOS	1.978	1.68	0.37
Vent Days	1.084	1.034	0.83

Conclusion: Age alone as criteria for full trauma activation does not affect mortality and it significantly increases the cost of caring for patients of advanced age.

Poster # 48

NEXUS CRITERIA IS INADEQUATE TO RULE OUT FRACTURE AFTER SIGNIFICANT BLUNT TRAUMA COMPARED TO CT

Therese M Duane*, MD, Julie Mayglothling, MD, Sean P Wilson, Luke G Wolfe, MS, Michael B Aboutanos*, MD MPH, James F Whelan, MD, Ajai K Malhotra*, MD, Rao R Ivatury*, MD.
Virginia Commonwealth University Medical Center.

Introduction: EAST guidelines now recommend CT to evaluate cervical spine fractures after blunt trauma in patients who do not meet NEXUS criteria (NC) yet no imaging is allowed in those patients who do meet these criteria. NC are based on patients with both minor and severe (trauma team activation (TTA)) trauma. The purpose of this study was to evaluate the NC using CT as the gold standard in TTA patients.

Methods: We prospectively evaluated 2131 blunt TTA patients at our level I trauma center. NEXUS criteria defined as alertness (GCS=15), evidence of intoxication, clinically distracting injury, midline c-spine tenderness or neurologic deficits was documented. CT was used to determine the accuracy of these criteria.

Results: There were 124 patients with and 2007 patients without cervical spine fractures. The fracture group was older (43.7 years ± 19.7 vs. 37.5 years ± 17.5, p=0.0006) with a lower GCS (13.5 ± 3.5 vs. 14.4 ± 3.9, p=0.0002) and initial SBP (132.4 mmHg ± 24.1 vs. 139.3 mmHg vs. 23.1, p=0.005). The sensitivity and specificity of NC for all patients were 79.84% (99/124) and 47.14% (946/2007), respectively. The positive predictive value (PPV) and negative predictive value (NPV) were 8.53% (99/1160) and 97.43% (946/971), respectively. In patients with a GCS of 15 (Table 1) NC had a Sens =73.03%, Spec=54.47%, PPV=8.2%, NPV= 97.32%. In those who met NC (Table 2) Sens=52.0%, Spec=81.3%, PPV=11.5%, NPV=97.3%. 17/24(71%) of the patients with missed injuries based on NC required further intervention (14 collars, 2 OR, 1 Halo).

Table 1	CT -	CT +	Total
NC +	728	65	793
NC -	871	24	895
Total	1599	89	1688

Table 2	CT -	CT +	Total
NC +	200	26	226
NC -	871	24	895
Total	1071	50	1121

Conclusion: As in our previous trial, NC is inaccurate compared to CT to diagnose c-spine fractures in TTA patients. CT should be used in all blunt TTA patients regardless of whether they meet NEXUS criteria.

Poster # 49

DEEP VEIN THROMBOSIS (DVT) PROPHYLAXIS IN TRAUMA: UNDERUTILIZED AND ASSOCIATED WITH LOWER MORTALITY

Elliott R Haut*, MD, Eric B Schneider, PhD, Adil H Haider, MD, MPH, Kent A Stevens, MD, MPH, Frederick P Rivara, MD, MPH, Gregory J Jurkovich*, MD, Ellen J MacKenzie, PhD, Peter J Pronovost, MD, PhD, Edward E Cornwell, 3rd*, MD, David T Efron*, MD. The Johns Hopkins Medical Institutions.

Introduction: DVT is a common complication in trauma. Studies have shown prophylaxis reduces DVT incidence, but few (if any) examined its impact on mortality. We hypothesize that DVT prophylaxis is independently associated with lower mortality and evidence-based guidelines for optimal DVT prophylaxis are underutilized, even at level 1 trauma centers.

Methods: We examined adult trauma patients (ages 18-84) admitted 2001-02 with at least one AIS=3 injury who survived =24 hours from 18 Level 1 trauma centers in The National Study on Costs and Outcomes of Trauma Care (NSCOT) database. In-hospital mortality rates were compared between patients receiving and not receiving DVT prophylaxis (Sequential Compression Devices [SCD] and/or Heparin). Multivariate regression was utilized to control for potential confounders including age, gender, mechanism, injury severity, major surgical procedure, GCS and presentation in shock. Individual body region AIS scores were included to control for patients with a possible contraindication to heparin (ie. brain, solid organ, or pelvic injury).

DVT Prophylaxis	% of Patients
None	22.2%
Heparin (+/- SCD)	46.7%
Heparin (alone)	19.5%
SCDs (+/-heparin)	58.3%
SCDs (alone)	31.1%
Heparin & SCDs	27.2%

Results: Of 2593 total patients, 53% did not receive heparin prophylaxis and 22% received no form of DVT prophylaxis. Unadjusted mortality was lower for patients receiving DVT prophylaxis (4.09% vs. 8.84%, $p<0.001$). After adjustment, patients receiving DVT prophylaxis had significantly lower mortality (RR=0.46, 95% CI 0.35-0.60). Patients receiving heparin prophylaxis showed 62% lower mortality (RR=0.38, 95% CI 0.29-0.51). In patients not receiving heparin, SCDs were associated with lower mortality (0.72, 95% 0.54-0.97).

Conclusions: DVT prophylaxis is associated with lower mortality after trauma. However, a significant proportion of trauma patients receive no DVT prophylaxis. These findings reinforce the importance of standardizing best-practices in the treatment of trauma patients and improving the implementation of guidelines.

Poster # 50

EQUALLY DEADLY: BEING UN-HELMETED OR BEING UN-RESTRAINED

Michael S Chopko, MD, Joshua Brown, BA, Mark L Gestring, MD*, Julius Cheng, MD*, Paul E Bankey, MD*, Nicole A Stassen, MD*. University of Rochester.

Introduction: It is thought that patients injured in closed compartment (CC) collisions (automobile) are not as severely injured as those in open compartment (OC) collisions (motorcycle/ATV/snowmobile). This has led to the belief that un-helmeted patients in OC collisions have the highest mortality and injury severity. The purpose of this study was to determine if CC are indeed safer than OC when no protective devices are used.

Methods: Blunt injury patients, >15 yrs., were identified using NTDB v7 (assaults and pedestrian versus car excluded). Vehicle type, injury patterns and protective device use was identified using ICD-9 E codes. Outcomes measured: demographics, injuries sustained, hospital length of stay (LOS), intensive care unit (ICU) LOS, need for mechanical ventilation, mortality, abbreviated injury scale (AIS) head/torso/extremity, and injury severity score (ISS). Statistics used for analysis were Chi Square and Mann-Whitney.

Results: 652,067 patients met study criteria, 122,705 patients in OC, 529,362 patients in CC, 178,913 restrained, 76,873 un-restrained, 48,393 wearing a helmet and 18,459 un-helmeted. The rate of restraint system/protective device use was <70%. When used, they did decrease overall ISS, need for ICU admission and mortality. Un-restrained patients had the same ISS and mortality rate as un-helmeted patients. (Table)

	Restrained N=178,913	Un-restrained N=76,873	Helmet N=48,393	No Helmet N=18,459
ISS	10±10	13.5±12*	13±11	13±12
Mechanical Vent	8%	13%*	10%	10%
Ventilator days	8±16	9±24*#	9±25	7±22
Overall LOS	5±10	6±11*	6±10	6±10
ICU admission	23%	35%*#	26%	30%*
ICU LOS	6±9	7±11*	7±9*	6±9
Mortality	3%	6%*	4%	6%*
Head AIS=3	20%	24%*	29%	31%*#
Torso AIS=3	36%	43%*#	45%*	40%

* p<0.05 protective device/no protective device, # p<0.05un-restrained/no helmet

Conclusions: This study verifies protective devices decrease mortality and injury severity. However, unlike previous reports, this study shows that un-restrained patients in CC do not have a lower injury severity or mortality rate than their un-helmeted counter-parts in OC. Hence, there remains a need for increased education and legislation regarding the importance of protective device and restraint use, as their overall utilization rate remains low.

Poster # 51

ALCOHOL USE BY PEDESTRIANS AND CYCLISTS WHO ARE STRUCK BY MOTOR VEHICLES: HOW DRINKING INFLUENCES BEHAVIORS, MEDICAL MANAGEMENT AND OUTCOMES

Linda A Dultz, MD, MPH, Spiros Frangos, MD, MPH, George Foltin, MD, Mollie Marr, BFA, Ronald Simon, MD*, Omar Bholat, MD, Deborah Levine, MD, Dekeya Slaughter-Larkem, BS, Patricia Ayoung-Chee, MD, H Leon Pachter, MD*. New York University.

Introduction: Injuries to pedestrians and cyclists by motor vehicles represent a significant public health hazard in large cities. This study investigates the role of alcohol in motor vehicle collisions involving pedestrians and cyclists and how it affects work-up, treatment, and outcomes.

Methods: Demographic, scene-related, and outcomes data were prospectively collected between December 2008- December 2009 on all pedestrians and cyclists who presented to a Level 1 trauma center after being struck by a motor vehicle. Variables were obtained by interviewing patients, scene witnesses, and first responders as well as medical records.

Results: 558 patients met criteria including 415 pedestrians and 143 cyclists. 14.7% (61/415) of pedestrians and 13.3% (19/143) of cyclists had used alcohol prior to the incident. Of the pedestrians struck, those intoxicated were less likely to cross the street in the crosswalk with a green light (21% vs. 47%; p=0.00001) and more likely to cross mid-block (44% vs. 19%; p=0.00001) compared to sober patients. Of the cyclists, 88% of those intoxicated were not wearing helmets (vs. 73% of sober patients; p=0.083). Alcohol use led to more initial imaging studies for both pedestrians and cyclists (Tables 1& 2). Average GCS was lower for drunk pedestrians, while average ISS and LOS were higher as compared to sober ones (Table 1). Similar trends were noted for cyclists (Table 2).

Pedestrians	No alcohol use	Alcohol use	p value
CT head	37%	79%	0.00000
CT neck	31%	75%	0.00000
CT chest	19%	34%	0.005
CT abd	25%	49%	0.00009
GCS	14.7	13.5	0.00012
ISS	4.75	7.70	0.011
LOS	2.07	4.00	0.017

Table 1. Initial imaging studies and outcomes for pedestrians

Cyclists	No alcohol use	Alcohol use	p value
CT head	32%	84%	0.00002
CT neck	30%	58%	0.016
CT chest	14%	32%	0.048
CT abd	19%	47%	0.005
GCS	14.7	14.2	0.139
ISS	3.1	5.5	0.145
LOS	0.44	1.4	0.059

Table 2. Initial imaging studies and outcomes for cyclists.

Conclusion: Alcohol use is associated with dangerous pedestrian and cyclist behaviors and is a significant but poorly recognized risk factor. These patients undergo more extensive initial imaging studies, sustain more severe injuries, and have longer hospital LOS.

Poster # 52

MODERN OUTCOMES OF PATIENTS WITH MANGLED EXTREMITIES: A GREATER MORTALITY RISK THAN EXPECTED?

Patricia Ayoung-Chee, MD, Ronald Simon*, MD, Nina E Glass, MD, Nicholas Haddock, MD, Jamie Levine, MD, H Leon Pachter*, MD. NYU School of Medicine.

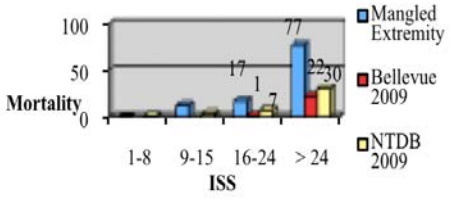
Introduction: Caring for patients (pts) with mangled extremities (ME) remains a challenging problem for trauma surgeons. This hospital-based study evaluates outcomes of pts who sustained a ME.

Methods: From 2006 to 2008, all pts admitted to the Bellevue Trauma Service with a lower extremity fracture were reviewed. Pts with gunshot or stab wounds, those who required one operation for definitive repair and had no vascular or neurologic injury and those who died during resuscitative efforts were excluded. Data were collected from medical records and the institutional trauma database. MESS was calculated based on descriptions in the physical exam, operative reports, and discharge summary.

Results: Forty-seven pts met inclusion criteria with 58 MEs. The average limb MESS was 5.8 and the avg ISS was 13.5. Fourteen patients underwent 17 amputations on arrival. They were the same age (46.5 vs 50.4, p=0.5), but had higher limb MESS (7.3 vs 5.1, p=0.0001), higher ISS (12.2 vs 16.1, p=0.1) and higher mortality (27% vs 10%, p=0.3), compared to pts who did not have immediate amputation. Of the pts who underwent initial limb salvage (n=33), 8% of limbs required eventual amputation. The overall total limb amputation rate was 36%. Grouping patients by ISS, pts who had a ME had a higher mortality compared with our institutional avg and the avg from the NTDB for all trauma pts (Fig. 1). Pts with bilateral MEs had a mortality of 43% compared with pts who had only one ME (21.4%) (p=0.02) despite having similar ISS (23±17.2 vs. 16±10.9, p=0.1).

Conclusion: For any given ISS, pts with MEs had a much higher mortality rate than for all-comers. Pts with bilateral MEs had a significantly higher mortality compared with pts with only one ME. ISS appears to underestimate the injury severity and mortality risk of pts with MEs.

Fig. 1 Mortality by ISS



Poster # 53

THE EFFECTS OF INSTITUTING A HOSPITAL GUIDELINE TO REVERSE THE COAGULOPATHY OF PLAVIX (CLOPIDOGREL) IN TRAUMATIC BRAIN INJURY PATIENTS

Jose L Pascual, MD, PhD, Amanda McNicholas, CRNP, Alexander Bridges, Carrie Sims*, MD, Babak Sarani*, MD, Forrest Fernandez MD, C WIlliam Schwab*, MD. The Reading Hospital and Medical Center.

Introduction: Multiple studies have shown benefits of systematic reversal warfarin (W) in traumatic brain injury (TBI) patients but none have evaluated platelet reversal of clopidogrel bisulfate (Plavix©, Pl) despite its increasing use in the general population.

Objective: To evaluate benefits of guideline-directed reversal of W or Pl in TBI patients.

Methods: The medical records of consecutive TBI patients were extracted from a rural Level 2 center's trauma registry between June 2008 and June 2009. In December 2008, a hospital guideline was instituted directing all incoming TBI patients with intraaxial blood on Pl or W to promptly receive platelets or plasma & vitamin K respectively within 2 hours of arrival. Demographics, ISS, GCS, time to product transfusion, time to INR normalization and TBI progression on CT scan were gathered. The Mann U Whitney test was used with $p<0.05$ considered significant.

Results: A total of 202 patients were abstracted (111 pre-guideline [Pre] and 91 post-guideline [Post] with 41 using Pl or W (20 pre & 21 post). Four and 2 patients were both on W and Pl in the pre and post time periods respectively. Gender, age, GCS, ISS, AIS head, type of head bleed & mechanism of injury did not differ between groups. Time to INR normalization was reduced from 23.5 (20.2-26.8) hours to 11.1 (9.2-13) hours in patients with elevated INR on admission ($p=0.01$). Table shows effect of guideline on outcomes in patients either on W or Pl. The guideline was associated with a reduction in the time to product transfusion and INR correction, tending to reduce mortality and hemorrhage progression on CT.

	Pre	Post	P value
ICU length of stay	3.3d	1.9 d	0.07
Time to transfusion	3.7h	1.9h	0.01
Mortality	32%	17%	>0.05
Craniotomy rate	5%	0%	>0.05
Injury progression on CT	53%	47%	>0.05

Conclusion: Institution of a hospital guideline to reverse W and Pl in TBI patients reduces time to transfusion, and return to normal clotting and may improve in-hospital outcomes.

Poster # 54

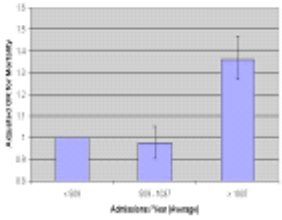
TRAUMA VOLUME AND OUTCOMES: IS BIGGER ALWAYS BETTER?

Melissa S Logan, MD, Christopher M Watson, MD, George Stukenborg, PhD, Tjasa Hranjec, MD, Jeffry Young*, MD, J Forrest Calland, MD. University of Virginia, Department of Surgery.

Introduction: It is well-accepted that trauma patients have better outcomes in designated trauma centers compared with institutions not having those specialized services and interests. Higher case volumes are known to be associated with better outcomes in certain high-risk surgical procedures. Our hypothesis is that although outcomes may improve with increasing patient volume in designated trauma centers, at some critical level this volume-outcome relationship is reversed, with further volume increases having a negative impact on patient outcome manifested by increasing mortality.

Methods: National Trauma Data Bank records for 469,327 consecutive patients treated at 101 Level I trauma centers between 2002 and 2006 were examined. Facility volume was calculated and incremented by deciles. Multivariable logistic regression analysis was used to calculate the odds of death associated with each tercile of facility volume, adjusted for injury severity.

Results: Chi-square test analysis indicates that trauma center volume is a highly statistically significant predictor of mortality. The lowest mortality risk occurred in centers with mid-range levels of volume. Patients in the three highest volume centers had between 3.4 and 3.9 times the adjusted odds of death observed for patients in the lowest volume center.



Conclusion: Our analysis of ACS Level 1 trauma centers finds outcomes are better as volume increases. However at the highest volume centers the relationship reverses with worse outcomes for patients. There appears to be a critical level above which the likelihood of risk-adjusted survival declines. These findings have the potential to dramatically change the way trauma centers are designed or the criteria by which adequacy of resource allocation is judged. Regionalization of care has its limitations and trauma patients may be the first to experience this effect.

Poster # 55

CHECKLIST-STYLED DAILY SIGNOUT ROUNDS IMPROVE HOSPITAL THROUGHPUT IN A MAJOR TRAUMA CENTER

John C Lee, MD, Frederick B Rogers, MD*, Dan Wu, DO, Lois Sakorafas, MD, Matthew Edavettal, MD, Tracy Evans, MD. Lancaster General Hospital.

Background: The concept of ICU checklist has received much attention due to its ability to improve patient care by minimizing complications and improve patient throughput. We hypothesized that the checklist concept, as applied to daily sign-out rounds, could lead to similar expedited throughput for patient stays at a major trauma center.

Method: We examined two time periods PRE (Sep. 2008-Jan. 2009) and POST (Sep. 2009-Jan. 2010), matched for seasonal variation in admission diagnosis, for all patients admitted to a major trauma center (>2000 admissions/year). An organ system-based checklist was utilized during daily sign-out for all patients in the POST period. We examined age, ISS, injury mechanism (blunt vs. penetrating), discharge status, complications and rates, ICU and overall hospital length of stay for differences. P =0.05 was considered significant.

Results: There were similar numbers of patients (PRE: 824 vs. POST: 798). There were no statistical differences in the median age (45 vs. 46), ISS (8 vs. 8), injury mechanism, or probability of ICU admission (37% vs. 33%). We found no statistical differences in the incidence of complications (3.1% vs. 2.9%, p= 0.86) or mortality rate (4.1% vs. 2.7%, p= 0.12). We did discover statistically significant differences in the median ICU days (2 vs. 1, p= 0.007) as well as median hospital length of stay [2 days, inter-quartile differences Q1-Q3 of PRE (1-5) and POST (1-4), p= 0.000]. These trends remained valid even among the severely injured (ISS = 16), with a hospital LOS of 5 vs. 3, p= 0.021.

Conclusion: A simple, organ system-based checklist can be successfully adopted for daily sign-out rounds on a busy, multi-provider trauma service. We were able to expedite trauma patient throughput in both ICU and overall hospital stays, with a trend toward decreased mortality. This improvement may translate into a direct cost saving for the hospital.

Poster # 56

DEAD BUT NOT DEFICIENT: INSURANCE BASED DISPARITIES IN FUNCTIONAL OUTCOMES AMONG DISCHARGED PATIENTS.

Oluwaseyi B Bolorunduro MD MPH, David C Chang MPH MBA PhD, Eric B Schneider PhD, Tolulope A Oyetunji MD MPH, Cassandra Villegas MPH, Marie L Crandall MD MPH*, Elliot R Haut MD*, David T Efron MD*, Edward E Cornwell 111 MD*, Adil H Haider MD MPH.
Department of Surgery, Howard University College of Medicine.

Introduction: Uninsured patients have greater mortality risk after traumatic injury. However, the effects of insurance on functional outcomes at hospital discharge are unknown.

Objective: Determine the independent effect of insurance on mortality and the presence of functional deficits upon discharge from hospital after moderate to severe injury.

Methods: Retrospective analysis of the 2002-2006 National Trauma Data Bank including patients aged 16-64 with an ISS >=9. Patients were categorized with one of three possible outcomes at hospital discharge: 1) alive without deficits, 2) alive with deficient locomotion, speech or feeding, or 3) dead. Insured and uninsured patients were compared using multinomial regression adjusting for age, gender, race, ISS, length of stay, ED hypotension, GCS and injury mechanism.

Results: 684,159 patients met criteria. Median age was 35, median ISS was 14 and 24% were uninsured. Insured and uninsured patients had similar rates of deficit-free discharge (85.3 vs. 85.6%). Insured patients had lower mortality (5.1% vs. 9.4%*) and were more likely to have deficits at discharge (9.3% vs. 5.3%*) compared to uninsured patients (*$p<0.01$). After adjustment, insurance status made no difference in the risk of deficit-free discharge. Uninsured patients had greater relative risk ratio (RRR) of mortality (1.32, 95% CI 1.27-1.38) but had reduced risk of functional deficits (RRR 0.66, 95% CI 0.64 - 0.69).

Conclusion: This large database demonstrates outcomes disparities that correlate with insurance status: the uninsured patients are more likely to die whereas the insured are more likely to survive with deficits.

Poster # 57

THE EPIDEMIC OF RADIATION EXPOSURE IN MEDICINE: TRAUMA PATIENTS AT GROUND ZERO

Daniel Wu, DO, Frederick B Rogers*, MD, Jo A Miller, RN, BSN , John C Lee, MD, Lois U Sakorafas, MD, Mathew M Edavettal, MD, Tracy L Evans, MD, Lanyce A Horn, RN, MSN.
Lancaster General Health.

Introduction: There is a growing awareness of radiation exposure (RE) for diagnostic imaging as a public health problem due to six-fold increase in its use since the 1980s. We sought to determine the extent of RE in trauma in the diagnostic imaging that happens on admission.

Hypothesis: Diagnostic imaging with computed tomography expose trauma patients to high levels of RE.

Methods: For one year (7/08-6/09), all trauma admissions to a Level II trauma center (95% blunt: 5%penetrating) were retrospectively reviewed for diagnostic workup with computed tomography (CT). Based on estimates of the typical effective dose of RE (assessed in milliseverts [mSv]) for each type of CT scan obtained from published literature, the cumulative dose of RE for each patient was calculated, as was age and Injury Severity Score (ISS). The patients were also categorized based on the relative RE as follows: **Low:** <5mSv; **Moderate:** 5-20mSv; **High:** >20mSv.

Results: During this time 2273 patients were evaluated in the emergency department for trauma. Of these, 394 (17%) did not undergo CT scanning. There were 1311 (58%) trauma patients that received **High** levels, 414 (18%) **Moderate** levels, and 154 (7%) **Low** levels of RE. The average age of population was 46.4, with no significant statistical variation amongst the groups. As measured by the Pearson correlation coefficient of 0.098, there is no significant relationship between the ISS and the amount of radiation to which an individual was exposed.

Conclusions: 1.Radiation exposure in the work-up of trauma patients exposes them to maximal yearly amounts (i.e. = 20mSv/yr) in over 50% of cases. **2**. There was no significant correlation between amount of radiation exposure and severity of injury in our cohort of patients. **3.** It is no longer acceptable to perform 'pan-scans' as part of the trauma patients work-up, but rather selective CT based on positive physical exam.

Poster # 58

INTRAOSSEOUS ACCESS IN PEDIATRIC TRAUMA PATIENTS: NOT SO EASY; NOT SO SAFE???

Christine Leeper, BS, Lori Gaertner, BS, David Rodeberg*, MD, Barbara A Gaines*, MD.
Childrens Hospital of Pittsburgh of UPMC.

Introduction: Intraosseous (IO) access has obvious utility in the management of critically injured children in whom typical access is challenging or unobtainable. Placement of IO lines is generally believed to be a simple procedure with few complications. We hypothesize that while IO access is potentially life-saving, it is less often successful and more frequently associated with complications than commonly believed.

Methods: After IRB approval, we performed a 5-year review of patients admitted to our level 1 pediatric trauma center who required IO access. Demographic information, injury mechanism and severity, and patient outcome were collected. Specific data regarding IO usage including indication, insertion site, number of attempts and outcome, ultimate vascular access, and complications was collected. Descriptive statistics, student t-test, and chi square analysis were performed; $p<0.05$ was considered statistically significant.

Results: Fifty-four patients were identified in whom 78 IO lines were placed. Initial success rate was 91%; however 27 (34%) were not functional at the time of arrival at the trauma center. Placement of twenty catheters (26%) was associated with either major or minor complications. Minor complications included: infiltration/edema (13), transient motor deficits (2), and transient vascular compromise (2). There were three major complications (4%): bilateral lower extremity gangrene, unilateral gangrene with compartment syndrome and ultimately, below-the-knee amputation, and unilateral compartment syndrome with associated local tissue necrosis. Children less than 2 years of age ($p<0.005$) and those with an attempted femoral line on the same extremity as the IO ($p=0.01$) were more likely to suffer complications.

Conclusion: IO insertion is a potentially life-saving procedure in children. Like many infrequently performed procedures it appears to be more difficult to perform successfully and subject to more complications than previously reported. In particular, one should avoid attempts at femoral access above an IO.

Poster # 59

PLASMA SDF-1 ELEVATION FOLLOWING TRAUMA: A MARKER OF POOR OUTCOME ?

Ziad C Sifri*, MD, Ed Hanoush, MD, Ehab Elhassan, MD, Lauren S Sherman, Alicia M Mohr*, MD, David D Livingston*,MD. UMDNJ-NJMS.

Introduction: Stromal cell-derived factor-1 (SDF-1) is key in the mobilization and homing of hematopoietic progenitor cells (HPC). We have shown that following injury in humans HPC mobilize in a sustained fashion to peripheral blood (PB) and that SDF-1 is increased in PB and at sites of injury in an animal model. We hypothesized following trauma in humans, plasma SDF-1 is elevated and correlates with degree of injury and mortality.

Methods: 101 PB samples were collected from 39 trauma patients (TP) at different time points following injury. 16 healthy volunteers served as controls (C). Samples were centrifuged and supernatants assayed by ELISA for SDF-1 and categorized by survival, admission base deficit (BD), injury severity score (ISS), age, gender and time from injury. Data expressed as mean ng of SDF-1/100 mg of total protein±SEM. *P<0.05 by Mann-Whitney, ANOVA Tukey-Kramer and Pearson X^2 as appropriate.

Results: Initial SDF-1 (0-48hrs) was higher both in TP vs. C and in TP who died (n:6) vs. those who survived (3.8±0.3 vs. 2.7±0.2 and 5.3±0.6 vs. 1.4±0.7 *p<0.01). SDF-1 elevation increased over time and persisted for up to 21 days (Fig1). TP with initial SDF-1 =4 had similar age, ISS and BD but significantly higher mortality (Fig2). No difference was seen in SDF-1 levels between TP with ISS<25 vs. =25 (3.8±0.3 vs. 3.8±0.4 p>0.05).

Conclusion: After injury there is rapid and sustained increase of plasma SDF-1 that persists for up to 21 days. A higher initial SDF-1 was associated with a higher mortality but not to the degree of injury. These findings suggest that plasma SDF-1 significantly increases following injury and may be a marker of worse outcome.

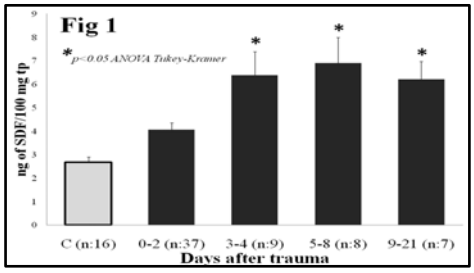


Fig 2

*p<0.01 Pearson X^2

	Age	F:M	BD	ISS	Mortality
SDF-1<4 (n:20)	43.8±4.3	1:1.9	4.2±4.6	19.1±3.1	0%
SDF-1≥4 (n:14)	52.3±5.2	1:2.5	5.6±3.6	23.6±2.6	35.7%*

Poster # 60

A SURVEY OF AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA (AAST) MEMBER PRACTICES IN THE MANAGEMENT OF ADULT BLUNT SPLENIC INJURY

Ben L Zarzaur*, MD, MPH, Rosemary A Kozar*, MD, PhD, Timothy C Fabian*, MD, Raul Coimbra*, MD, PhD. University of Tennessee Health Science Center, University of Texas Medical School at Houston, University of California San Diego.

Objective: Conflicting data exist regarding pseudoaneurysm screening (PSA-S), initial angioembolization (IE), deep venous thrombosis prophylaxis (DVT-P) and activity limitation (AL) after hemodynamically stable blunt splenic injury (BSI). To determine if equipoise was present in BSI management, the multi-institutional trial committee of the AAST approved a survey of member practice patterns regarding BSI management.

Methods: Over 2 months, AAST members were invited to participate in an online survey. Practice patterns and attitudes surrounding PSA-S, IE, DVT-P, and AL as an outpatient in a football player (FP) and a sedentary patient (SP) after BSI were determined.

Results: The survey response rate was 37.5%. Practice patterns varied by injury grade (Table). There was little consensus in use of IE, PSA-S, DVT-P and AL. When queried regarding need for a series of randomized controlled trials to determine an optimal management algorithm for adults with BSI 68.1%, somewhat or strongly agreed.

% of respondents who would	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
observe only	94.4	84.6	54.1	32.7	27.4
use IE	0.77	4.6	14.7	23.5	25.5
screen for PSA	3.5	10.8	28.6	32.7	28.2
Use IE and screen for PSA	0.4	0	2.7	11.2	18.9
use only mechanical DVT prophylaxis	24.2	28.4	36.2	44.8	44.8
suggest AL of < 4 weeks for FP	25.8	13.9	3.5	0.8	0.8
suggest AL of 4-8 weeks for FP	46.9	49.8	25.4	22.3	19.6
suggest AL of > 8 for FP	9.6	15.1	34.6	31.2	33.1
suggest AL until healing on CT for FP	16.2	18.5	28.5	38.5	39.2
suggest never return to football	0	0	0	0.8	1.9
suggest AL of < 4 weeks for SP	56.5	41.5	23.1	12.3	10.8
suggest AL of 4-8 weeks for SP	36.9	48.4	48.1	41.2	39.2
suggest AL of > 8 for SP	5.4	8.1	22.3	28.1	28.9
suggest AL until healing on CT for SP	1.2	1.9	4.2	14.6	17.7

Conclusions: There is considerable variation and equipoise regarding BSI management particularly for high-grade injuries. These results will aid in the design of prospective observational and random trials to determine optimal BSI management.

Poster # 61

PRE-HOSPITAL VISENSIA (BIO-SIGN) INDEX PREDICTS IN-HOSPITAL LIFE-SAVING INTERVENTIONS IN TRAUMA PATIENTS

Ayan Sen, MD, Ilan Rubinfeld, MD, Ogochukwu Azuh, BS, Victor Coba, MD, Andrea Doud, BS, Paul Brady, BS, Iyad Khourdaji, BS, Joe P Patton, MD*, H Mathilda Horst, MD*. Henry Ford Hospital.

Background: Prehospital trauma triage relies on physiologic, anatomic, and mechanistic indicators of injury to minimize over-triage and under-triage, which remain persistently high. The Visensia Index Score (VIS) is a proprietary algorithm based on a bedside monitor using neural network methodology that integrates 5 vital signs (VS): heart rate, respiratory rate, blood pressure, pulse oximetry & temperature (OBS Medical, IN). It calculates a score ranging from 1 (no abnormality) to 5 (severe abnormalities). We hypothesized that prehospital VIS predicts trauma patients likely to need life-saving interventions (LSI) after arrival to a level one trauma center.

Methods: After IRB approval, the trauma registry was used to retrospectively review 297 patients admitted to our level 1 trauma center over a 6 month period. Vital signs were obtained from the pre-hospital run-sheets. Pre-hospital VIS was calculated based on the vital signs in a blinded manner. LSI's carried out within six hours of arrival to the trauma center (CPR, Resuscitative drugs, Intubation, Blood Transfusion, Chest tubes, Emergency Laparotomy etc) were considered outcome variables. We used univariate and multivariate regression analysis to assess the predictability of the VIS for emergent LSI.

Results: Pre-hospital VIS $\geq$3 was predictive of trauma patients who needed LSI after arrival to a trauma center in the multivariate analysis (Odds ratio 1.8 (1.3-3.4; 95% Confidence Interval; $p<0.05$). The model had an area under ROC of 0.79 in discriminant analysis. VIS outperformed other independent variables like Heart rate, Systolic blood pressure, Oxygen saturation and GCS (Glasgow Coma Scale).

Conclusions: Using VIS, which integrates five vital signs by automated computation, may serve as a useful point-of-care triage score to stratify decision-making and identify trauma patients likely to need LSI and, therefore, urgent transfer to a level one trauma center.

Poster # 62

SINGLE DRUG SEDATION WITH FENTANYL FOR POSTINTUBATION SEDATION IN TRAUMA PATIENTS

Christopher P Michetti*, MD, John F Maguire, MD, Aditya Kaushik, MD, Thomas V Boro, MD, Ranjit R Pullarkat, MD, Anne G Rizzo*, MD, Hani Seoudi*, MD, Melody Meehan, RN, BSN, CFRN, Linda Robinson, MA, MS, RN. Inova Fairfax Hospital.

Objective: Compare a fentanyl-only (FO) regimen for prehospital postintubation sedation in trauma patients to the standard protocol (SP) of fentanyl + benzodiazepine, to determine if the simplified single drug regimen is safe and efficacious.

Methods: Intubated patients transported by one helicopter unit from 12/1/05 to 4/30/09 to a Level I trauma center were retrospectively reviewed. Before 2007 only SP was used; afterwards both regimens were used with choice at medics' discretion. Systolic blood pressure (BP), heart rate (HR), Glasgow coma scale (GCS), time until first neurosurgical intervention (NSI; = ICP monitor or craniotomy) in 1st 24 hrs, time to craniotomy in 1st 24 hrs, and other outcomes were compared. Significance was tested by ANOVA.

Results: Groups were similar for age, sex, mechanism, EtOH level, & comorbidities except hypertension. Results reported in means unless noted. When SP patients prior to 2007 were separately analyzed as a control group, no differences were found (not shown).

	SP (n = 196)	**FO (n = 89)**	p-value
Injury Severity Score	22.8	22.5	NS
History of Hypertension	5.7 %	14.9 %	0.012
Lowest field postintubation BP	116	108	NS
Lowest trauma bay BP	118	113	NS
% with any trauma bay BP≤90	8.4%	14%	NS
Highest field postintubation HR	103	103	NS
Highest trauma bay HR	104	103	NS
Postintubation GCS	7.8	7.3	NS
Crystalloid in trauma bay	2257 ml	2020 ml	NS
Minutes to first NSI	278	405	NS
Minutes to craniotomy	271	213	NS
ICU days	7.3	8.2	NS
Mortality	11.2% (n=22)	16.9% (n=15)	NS

Conclusions: Use of a straightforward regimen of fentanyl alone for prehospital postintubation sedation had similar outcomes compared to the usual combination drug regimen in this study. Elimination of benzodiazepines in this setting appears safe. A larger prospective study may be warranted.

Poster # 63

CUMULATIVE 1 YEAR RADIATION EXPOSURE IN A GERIATRIC TRAUMA POPULATION

Ajar Kochar BA, Daithi S. Heffernan MD, Rajan K. Thakkar MD, Sean F. Monaghan MD, Michael D. Connolly MD, Matthew S. Kozloff MD, Shea Gregg MD, Charles A. Adams Jr.* MD, William G. Cioffi* MD. Rhode Island Hospital Brown University.

Background: Diagnostic radiology usage, particularly computed tomography (CT), in trauma patients continues to rise markedly. This is especially true in geriatric patients with multiple confounding factors. Total radiation exposure to geriatric patients following trauma, the subsequent hospitalization and 1 year follow, has not been previously analyzed.
Methods: This was a retrospective chart-review of radiographic studies on geriatric (=65 years) trauma patients at a Level I Trauma Center from September 2007 to September 2008. The radiographic tests for each patient were tabulated, separating tests by day of admission, length of hospitalization and one year follow-up. Radiation was calculated using the Chaney and Batchelor method, a formula utilizing tissue-to-air and depth ratios.
Results: The population consisted of 233 males and 231 females, with an average hospital and ICU length of stay of 7.9 and 3.1 days. An average of 3.38 CTs and 3.91 x-rays were ordered on the day of admission. Brain CT and chest xray were the most commonly ordered studies. The mean radiation exposure on day of admission, subsequent hospital course and 1 year follow up were 10.9, 4.5 and 5.5 milliSieverts (mSv) respectively. Gender, age, and mechanism did not affect cumulative dose exposures. MilliSievert exposures on Day of Admission; Subsequent hospital stay: and 1 year follow-up were higher for ICU patients (17.8 vs 7.88mSv; 10.1 vs 2.1mSv; 7.5 vs 4.8mSv – $p<0.0001$): patients who stayed >5days (14.4 vs 8mSv; 9.3 vs 0.78mSv; 7.5 vs3.9mSv – $p<0.001$) and patients with ISS>/= 20 (16.2 vs 9.47mSv; 6.5 vs 4mSv; 6.4 vs 5.3mSv – $p<0.001$).
Conclusions: This is the first analysis of radiation exposure to geriatric trauma victims. This study reveals that geriatric trauma patients encounter cumulative radiation exposure over the course of a hospitalization similar to that documented in other studies. Even with the additional radiation exposure in the year following a trauma admission, the average cumulative radiation exposure experienced per patient does not approach levels concerning for the development of malignancy.

Poster # 64

PRE-INJURY BETA BLOCKER USE DOES NOT AFFECT THE HYPERDYNAMIC RESPONSE IN OLDER TRAUMA PATIENTS

Daniel S Eiferman, MD, David C Evans, MD, Charles H Cook*, MD, Jonathan M Christy, MD, Claire V Murphy, PharmD, Anthony T Gerlach, PharmD, David E Lindsey, MD, Melissa L Whitmill, MD, Paul R Beery, MD, MS, Steven M Steinberg*, MD, Stanislaw P Stawicki, MD.
Ohio State University Medical Center.

Background: Recent literature suggests that beta blocker administration after traumatic injury improves outcomes. Trauma dogma dictates that the physiologic response to injury is blunted by beta blockers. We sought to determine how the pre-injury cardiac medication profile influences admission physiology as well as post-injury outcomes.

Methods: Trauma patients older than 45 admitted to a single level I trauma center were retrospectively reviewed. Pre-injury medication profiles were evaluated for beta blockers (BB), calcium channel blockers (CCB), anti-lipid agents, angiotensin-converting enzyme inhibitors (ACE), angiotensin II receptor blockers (ARB), anti-arrhythmic, and diuretic use. Multivariate logistic regression analysis was used to identify relationships between pre-injury medications and post-injury complications and mortality. Admission vital signs were compared between patients based on their cardiac medication profile.

Results: Study group of 450 patients (mean age 62.2 years, Injury Severity Score >10 32%) revealed that only patients simultaneously taking BB, CCB, and ACE/ARB had lower admission heart rates when compared to any other cardiac medication combination (71 versus 80-89 bpm, multiple ANOVA). There was no statistically significant difference in systolic or diastolic blood pressures among patients taking various cardiac medication regimens. In multivariate analysis only age, Injury Severity Score, and Glasgow Coma Score significantly affected morbidity and mortality. No cardiac medication, alone or in combination, impacted outcomes.

Conclusions: Except for simultaneous use of BB, CCB, and ACE/ARB, pre-injury cardiac medications do not cause clinically significant alterations of vitals signs upon admission to the trauma unit. Pre-injury cardiac medication profile does not prognosticate post-injury morbidity or mortality. The concern that single- or double-agent cardiac-specific medications may blunt the hyperdynamic response to injury seems unfounded.

Poster # 65

THE ELDERLY AND SUPER-ELDERLY TRAUMA PATIENT: ARE PREDICTORS OF OUTCOME IDENTICAL?

Julie L Wynne, MD, Bellal A Joseph, MD, Terence S O'Keeffe, MBChB, Narong Kulvatunyou, MD, Rifat Latifi, MD, Peter M Rhee*, MD, Randall S Friese*, MD. University of Arizona.

Objective: The purpose of this study was to identify predictors of outcome after injury in elderly and super-elderly patients.

Methods: A retrospective observational cohort study was performed at our urban Level I Trauma Center. Patients older than 64 years of age admitted between 10/2007 and 09/2009 comprised our study sample. The sample was divided into two groups, elderly (65-79 years) and super-elderly (=80 years). Binary logistic regression analysis controlling for multiple covariates was used to identify variables predictive of dispo home and mortality.

Results: 1107 patients were enrolled. 52% were male. The mean age was 76.3±8.15 years. Median ISS was 9[4, 16]. 97% were blunt. Overall mortality was 8.7%. 38.3% were discharged to a facility other than home. Admit diastolic blood pressure was the only differing variable. (ORs in Table)

	Elderly Group		Super-elderly Group	
	Dispo Home	*Mort*	*Dispo Home*	*Mort*
Age	0.90 (0.85-0.95)	1.19 (1.06-1.33)	0.93 (0.86-0.99)	NS
ED GCS	NS	0.76 (0.69-0.84)	NS	0.71 (0.61-0.84)
ICU Admit	NS	4.7 (1.11-19.6)	NS	30.2 (2.89-315)
ISS	NS	1.09 (1.04-1.14)	NS	1.08 (1.01-1.16)
Hosp LOS	0.73 (0.67-0.80)	NS	0.67 (0.58-0.77)	NS
Any OR	0.45 (0.28-0.75)	NS	NS	NS

Conclusions: Hospital LOS, admission ISS, admission GCS, and need for ICU admission demonstrated similar ability to predict mortality and dispo home after injury. However in the super-elderly group, age was no longer predictive of mortality and ICU admission became a more powerful mortality predictor. Therapeutic interventions for the injured super-elderly patient based solely on age are not justified.

Poster # 66

RACE MATTERS: COSTS AND INTENSITY OF CARE FOR TRAUMA PATIENTS AT THE END OF LIFE.

Zara Cooper, MD, MSc, Frederick P Rivara, MD, MPH*, Jin Wang, PhD, Gregory J Jurkovich, MD*, Ellen MacKenzie, PhD. Brigham and Womens Hospital.

Introduction: Recent data from the NTDB suggests that uninsured trauma patients have a higher mortality than those commercially insured, and Medicare data shows that Blacks and Hispanics use more healthcare resources in the last 6 months of life than Whites. We sought to determine if such differences in resource utilization occur in trauma patients who died in hospital following moderate to severe injury.

Methods: We used data from the National Study on the Costs and Outcomes of Trauma, a prospective cohort study of 18 Level 1 and 51 non trauma centers in 12 states. We conducted a multivariate analysis of a weighted sample of the 1,109 subjects who died in hospital to examine racial/ethnic variation in intensity of care and daily hospital costs.

Results: In multivariate analysis adjusted for age, ISS, Charlson comorbidity score, gender, mechanism, trauma center designation, and payor status, Blacks received higher intensity care than Whites or Hispanics. Blacks were more likely to receive critical care consultation RR=1.67 (95%CI, 1.22, 2.30), Specialty Care Assessments RR=1.44 (95% CI, 1.12, 1.86) and Procedures RR=1.22 (95%CI, 1.00, 150). Hispanics were less likely to have withdrawal of care orders, RR=0.72 (95% CI, 0.53, 0.98) than other groups. Blacks had higher total costs, and Hispanics had higher daily costs but these were not statistically significant. There were no significant differences in length of stay among different racial groups.

Conclusion: Racial differences exist in the intensity of care for trauma patients at the end of life; Blacks have more consultations and procedures, and Hispanics are less likely to have withdrawal of care orders which could explain the trend toward higher total costs for Blacks. These differences are not explained by significant variability in length of stay, age, comorbidities, insurance, injury type or severity. However they do suggest racial disparities in provider treatment and patient preferences

Poster # 67

DISADVANTAGED CHILDREN ARE AT HIGH RISK FOR INJURY, BUT RISK FACTORS CHANGE OVER TIME

Lakshmi Sridharan, BA, Marie Crandall, MD, MPH*. Northwestern University.

Background: Injury is the leading cause of death for children over the age of one. The incidence of childhood injury varies greatly depending on social factors, including income, history of family violence, and other social stressors**.** We investigated the incidence of injury among children up to five years of age in a cohort of vulnerable families.

Methods: The Fragile Families and Child Wellbeing Study is a longitudinal cohort of approximately 5000 families across the United States which deliberately oversamples unwed couples and lower-income families. Data from interviews with mothers conducted shortly after birth and follow-up surveys at one, three, and five years were used for this analysis. Multivariate regression analysis was used to identify independent risk factors for injury in year five and included data about race, parental age, household income, neighborhood safety, parental drug use, education, and insurance status.

Results: Five year follow-up data on injury was complete for 2,397 families. 296 children were injured at age five (12.3%). Multivariate regression found that the strongest predictors of injury in year five were male gender (OR 2.62, 95% CI 1.02-6.75, p=0.04) and being in the lowest income stratum (OR 1.23, 95% CI 1.01-1.49, p=0.03).

Conclusions: Children in vulnerable families are at higher risk for injury. The incidence of 12.3% found in this cohort is significantly higher than CDC risk for 5 year olds overall, 9.3%. This study has had the advantage of following a longitudinal cohort, which has demonstrated a persistently elevated risk of injury among these children, and that risk factors for injury have changed as these children have grown. In year one, injury was associated with maternal alcohol use and use of spanking for discipline. In year three, previous injury and African American race predicted injury. But as these children reached school age, low household income and male gender were risk factors for injury. This suggests that targeted interventions for caregivers, play environments, and social welfare may have differential effects on childhood injury incidence as children age.

Poster # 68

INSURANCE STATUS, NOT PERSISTENT SYMPTOMS, DETERMINES FOLLOW UP AFTER MILD TRAUMATIC BRAIN INJURY

Marie Crandall, MD, MPH*, Felise Zollman, MD. Northwestern University.

Introduction: Trauma patient follow-up can be challenging. Injury patterns and patient populations are heterogeneous and follow up may vary widely according to needs and expectations, and may be quite poor. However, among patients with a particular type of injury, differences in rates of follow up should be minimal. We hypothesized that follow up rates for patients after a mild traumatic brain injury (mTBI) would be similar.

Methods: 299 consecutive patients with a diagnosis of mTBI were referred from our Level I trauma center (TC) to our partner rehabilitation institute (RI) from 7/07-12/08. 199 of these patients had contact information available and were contacted by the RI one month after their injury and were offered care for any persistent symptoms. Outpatient TC clinic records were used to determine TC follow-up and to ascertain persistent symptoms not communicated to the RI. Chi2 and student's T statistics were used to determine predictors of follow up. Arc-GIS software was used to map.

Results: Seven (3.5%) patients contacted by the RI one month after discharge followed up with the RI for persistent symptoms. Of the 199 contacted by the RI, 119 followed up with the TC. Upon these TC visits, 20 additional patients (10%) complained of persistent neurologic symptoms and were referred to the RI. All of the patients who kept appointments with the RI had insurance; none of the patients who were referred from the TC but did not follow up with the RI had insurance. Lack of insurance significantly decreased the likelihood of follow up with a TC (68% vs. 26%, OR 0.61, $p=0.03$) or the RI. Patients who followed up were older (mean age 41 vs. 35, $p=0.04$) and had longer lengths of stay (6 vs. 2.5 days, $p<0.001$). Race, persistence of symptoms, and geography did not predict follow up.

Conclusion: Trauma patient follow up for after mTBI is strongly affected by insurance status, irrespective of persistence of symptoms. These disparities have concerning implications for outcomes after mild traumatic brain injury.

Poster # 69

RANKING THE FACTORS AFFECTING LONGTERM FUNCTIONAL OUTCOMES AFTER TRAUMA: AN APPLICATION OF STRUCTURAL EQUATION MODELING

Adil H Haider MD, MPH, Renan Castillo PhD, Cassandra Villegas MPH, Elliott R Haut* MD, David T Efron* MD, Frederick P Rivara MD, MPH, Gregory J Jurkovich* MD, Avery B Nathens* MD, PhD, MPH, Edward E Cornwell III* MD, Ellen J MacKenzie PhD. Center for Surgery Trials and Outcomes Research- Department of Surgery, Johns Hopkins School of Medicine.

Introduction: Along with injury severity, several medical and non-medical factors influence outcomes after trauma. However, the relative impact of each of these patient factors on outcomes is unknown. The objective of this study is to examine the causal relationships between injury severity, pre-injury health, race, insurance and direct measures of socio-economic status (SES) on one-year functional outcomes after trauma.

Methods: Cohort study of patients in the National Study of Costs and Outcomes of Trauma. Patients with ISS > 9, aged 18-64 were included. A Structural Equation Model (SEM) methodology was used to quantify causal relationships between injury and patient factors and a composite outcome measure derived from SF 36 Mental and Physical functioning scores 12 months post injury. Injury severity was quantified using anatomic profile component scores and presence of hypotension in ED. Patient factors included in the model were: race/ethnicity, presence of private insurance, SES (years of education, presence of college degree and poverty status) and pre-injury health (no. of co-morbidities, age and self reported pre-injury health status). SEM results are reported as standardized effects with values ranging from -1 to 1; which represent the change [in standard deviations (SD)] in the dependent variable relative to a one SD change in the predictor.

Results: 1,827 patients were followed. In a SEM adjusted for all factors, the relative impact of each factor on one year composite SF 36 scores was as follows: Pre-Injury Health (+0.56*), Injury Severity [Head and Neck injury (-0.13**)**; all remaining serious injuries (-0.29*)], Private Insurance (+0.22**)**, Black race (-0.17**)** and SES (+0.16**)**. Hispanic ethnicity did not impact outcomes. *(*significantly predicts outcomes $p < 0.05$)*

Conclusion: Pre injury health best predicts of one year functional outcomes after trauma, followed by injury severity. Private insurance, Black race, household income and education are also strong independent predictors of outcomes. The individual pathways by which these non-medical factors cause outcome disparities need to be further explored.

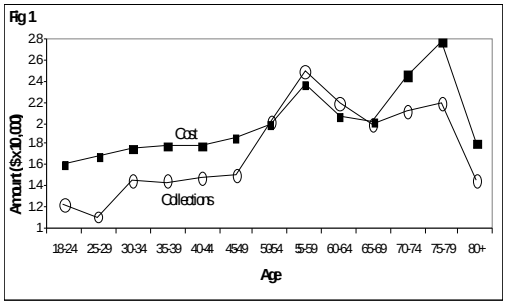
Poster # 70

CURRENT TRAUMA PATIENT REIMBURSEMENT FAILS TO MEET THE COST OF INPATIENT CARE

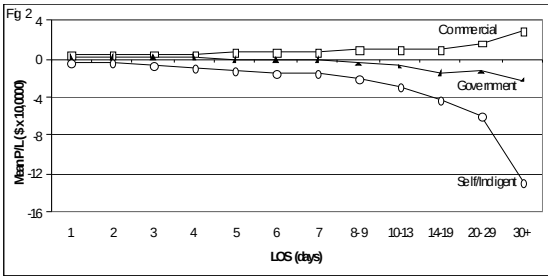
Samir M Fakhry*, MD, S Christopher Derderian, BS, Pamela L Ferguson, PhD, Deborah Couillard, BSN, Casey T Liddy, MHA, E Douglass Norcross*, MD. Department of Surgery, Medical University of South Carolina.

Introduction Trauma care is expensive and often not profitable, forcing many trauma center (TC) closures. The purpose of this study was to evaluate profitability (P/L=cost-collections) and determine whether P/L was associated with specific patient types.

Methods Trauma registry and hospital financial records of patients > 18 years admitted to our Level 1 TC from 7/03 to 6/08 were selected. Patients were analyzed by injury severity score (ISS), length of stay (LOS), age, gender, race, mechanism (blunt vs penetrating) and insurance.



Results 7041 patients met inclusion criteria (72% male, age 40±2 years, ISS 12.0±10.6, 87% blunt, LOS 6.54±10.8 days); with 37% Commercial, 22% Government (Medicare, Medicaid, Champus), 36% Self Pay. Costs exceeded collections for all age groups except 50-65 (Fig 1) but age was not an independent predictor of P/L. Mean P/L was $222 for patients with a LOS of 1 day and –$26,629 for LOS ≥30 days, but varied by insurer (Fig 2). Mean P/L was –$413 for patients with ISS of 1-3 and –$7,800 for ISS 34-75 but also varied by insurer. Regression analysis showed self-pay, blunt and increasing LOS associated with decreased P/L.



Conclusion Insurance, mechanism and LOS were strong predictors of profitability. Current reimbursement rates do not cover the cost of caring for most trauma inpatients. Hospitals continue to depend on cost shifting, supplemental payments and other methods to sustain TCs. These data can inform contract negotiation by hospitals as well as health policy and reform efforts. Large, multi-center studies are needed to confirm these findings.

Poster # 71

ROUTINE CHEST RADIOGRAPHY AFTER CHEST TUBE REMOVAL IN ASYMPTOMATIC TRAUMA PATIENTS IS NOT COST EFFECTIVE

Lois U Sakorafas, MD, Roxanne L Chandler BS, Lanyce A Horn, RN, John C Lee, MD, Dan Wu, DO, Tracy L Evans MD, Matthew M Edavettal, MD, PhD , Frederick B Rogers*, MD.
Lancaster General Hospital.

Objective: The removal of a chest tube has traditionally been used as an indication for Chest X-rays (CXR) in trauma patients. We hypothesized that routine CXRs post chest tube removal does not result in re-insertion of chest tube in asymptomatic non-ventilated trauma patients without associated clinical indication and is not cost effective.

Methods: All consecutive trauma patients evaluated in a level II trauma center of a community hospital over a 10-year period from 2000 to 2009 were retrospectively reviewed. Patients who had chest tube placement at any time during their hospitalization were identified from our prospectively collected trauma database. Medical records and official CXR film reports of all patients who received more than one chest tube on different days were reviewed to identify those who required re-insertion of chest tube after removal.

Results: There were 16, 608 trauma patients evaluated between 2000 and 2009. Of these, 627 patients (3.8%) received a total of 828 chest tubes. No asymptomatic non-ventilated trauma patient required re-insertion of chest tube based solely on CXR findings without associated clinical indication. We estimated that omission of routine CXRs after chest tube removal will result in a yearly decrease of hospital charges by $12,420 to $16,560.

Conclusion: CXR after chest tube removal in asymptomatic non-ventilated trauma patients does not result in re-insertion of chest tube and can be safely obtained based on clinical indication. Routine CXR after chest tube removal in asymptomatic trauma patients is not cost effective.

Poster # 72

MAKE UP YOUR MIND: REGIONAL VARIATIONS IN RECOGNIZING THE NEED TO TRANSFER SEVERELY INJURED PATIENTS

David Gomez, MD, Barbara Haas, MD, Brandon Zagorski, MSc , Joel G Ray, MD MSc, Gordon Rubenfeld, MD MSc, Avery B Nathens, MD PhD FACS*. St. Michaels Hospital, University of Toronto.

Introduction: A significant proportion of patients who receive initial care at non-trauma centers (NTC) experience delays in transfer to trauma center (TC) care. Delayed recognition of the need to transfer is likely a significant contributor to prolonged transfer times. We set out to deconstruct the time transfer patients spend in the ED, with the aim of better understanding impediments to timely transfer.

Methods: A regional referral service database was linked with an ED population-based dataset to capture the timing of decision to transfer (DT-time) and total ED-time in a cohort of injured adults who received initial care at NTCs and were successfully transferred to TCs. Data were aggregated at the county level. Mean times were compared using ANOVA.

Results: We identified 806 severely injured patients who received initial care at NTC and were transferred to TCs; Mean ED-time was 3.7 h (range 1.5-6.4 h). On average, DT-time accounted for more than half of ED-time; however, significant regional variation was identified as DT-time represented 21% to 71% of ED-time across counties. County DT-time ranged from 0.6 to 3.3 h (mean 2 h). Mean DT-times were significantly shorter in patients with more severe injuries and penetrating mechanism of injury (table).

*p value <0.01	**Mean DT-Time (h)**
Age	
< 65	2
≥ 65	2.3
Mechanism*	
Blunt	2.3
Penetrating	0.8
ISS*	
15 - 24	2.3
25 - 75	1.8
Head AIS ≥ 3	
Yes	2.1
No	2

Conclusions: We have identified significant variations in ED and DT-times. DT-time more accurately reflects variations in the early care of injured patients at NTCs compared to ED-time, as it is independent of the availability of transportation assets. Prompt identification of the need to transfer may significantly expedite the transfer process and reduce total transfer times.

Poster # 73

THE EFFECT OF TRAUMA CENTER DESIGNATION ON ORGAN DONOR OUTCOMES IN SOUTHERN CALIFORNIA

Ali Salim*, MD, Darren Malinoski, MD, Eric J Ley, MD, Danielle Schulman, BA, Chirag Desai, BA, Sonia Navarro, BA, Donald Dafoe, MD. Cedars-Sinai Medical Center.

Background: The shortage of organs for transplantation has become a public health crisis. To alleviate this crisis, trauma centers are required to establish a relationship with a recognized organ procurement organization (OPO) and are encouraged to actively care for potential organ donors.

Objective: To investigate the effect of trauma center designation (trauma center vs. non-trauma center, level I vs. level II) on organ donor outcomes during a 5-year period.

Methods: This is a retrospective study using the database from the Southern California regional OPO which serves 14 transplant centers and 220 hospitals. Data regarding the number of: referrals for organ donation, eligible donors, actual donors, type of donor, consent rate, conversion rate, organs recovered, and organs transplanted were recorded between 2004 -2008. Data was compared between trauma centers (n=25) and non-trauma centers (n=171) and also between level I (n=18) and level II (n=7) trauma centers.

Results: A total of 16,830 referrals were evaluated in the 5-year time period. The table below demonstrates the pertinent comparisons.

	Trauma	Non-trauma	P-value	Level I	Level II	P-value
Referrals	1257	15573		721	536	
Eligible deaths	23% (283)	16% (2477)	<0.001	23% (163)	22% (120)	0.93
Actual donors	15% (196)	10% (1613)	<0.001	15% (109)	16% (87)	0.59
Consent Rate	63%	59%	<0.001	61%	66%	0.44
Conversion rate	69%	64%	0.12	66%	72%	0.33
OPPD	3.97	3.72	0.04	3.82	4.2	0.13
OTPD	3.57	3.18	0.004	3.46	3.7	0.32

OPPD – organs procured per donor, OTPD – organs transplanted per donor

Conclusions: Trauma centers have significantly better organ donor outcomes compared to non-trauma centers. However, only 7% of all organ donors in Southern California were treated at trauma centers. Factors responsible for the improved outcomes at trauma centers should be evaluated, reproduced, and disseminated to non-trauma centers with the intent of alleviating the growing organ shortage crisis.

Poster # 74

EVOLUTION OF TRAUMA MECHANISM OF INJURY OVER TIME IMPACTS TRAUMA SYSTEMS

Mariah Alexander, MD, Christy Lawson, MD, Blaine L Enderson*, MD. University of Tennessee Medical Center at Knoxville.

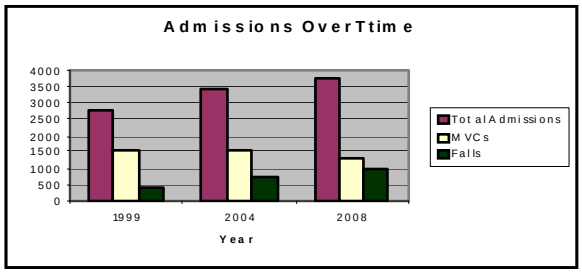
Introduction: Mechanism of injury in trauma changes over time as a result of system changes, prevention and safety activities, and changes in the population. These changes have implications for trauma centers due to reimbursement and care issues.

Objective: This study examines the evolution of trauma at a regional Level I Trauma Center over 10 years to document the impact of changing mechanism of injury.

Methods: The trauma registry was reviewed for total trauma admissions, mechanism of injury, age, ISS, mortality, and financial information. Data from three one year time periods is represented here.

Results:

Year	Total Adm	MVCs	Age	ISS	Deaths	Falls	Age	ISS	Deaths
1999	2790	1512(54%)	35±19.2	14±11.5	85(5.6%)	423(15%)	51.8±24.9*	11±9*	18(4.2%)
2004	3425	1572(46%)	37±19.6	13±10.4	93(5.9%)	699(20%)	51.9±24.6*	10±7*	26(3.7%)
2008	3699	1326(36%)	38.8±20	15±10.2	56(4.2%)	997(25%)	56±24*	10±7.3*	47(4.7%)



Total admissions increased steadily over the study. The percentage of MVCs has decreased, while falls have increased. The population of fall patients is older, with lower ISS, but mortality rates are high. Medicare as a portion of payer mix is increasing as the population ages.

Conclusions: 1) Mechanism of injury changes over time as trauma systems and populations change. 2) The impact of MVCs is decreasing. 3) Fall is an important trauma mechanism, even at referral centers. 4) The trauma population is aging. 5) These facts have implications for reimbursement and resource utilization.

Poster # 75

REVISION OF CURRENT AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA RENAL STAGING SYSTEM

Jack W McAninch*. Lahey.

Purpose: We propose a revision of the current renal injury grading system established by the American Association for the Surgery of Trauma (AAST) based on our institution's > 25 year longitudinal experience. Our goal is to expand the current grading system to include segmental vascular injuries and renal pelvis injuries, as well as establishing a more rigorous criterion for grade IV and grade V injuries.

Methods/Materials: We retrospectively reviewed our prospectively gathered contiguous renal database of 3580 renal injuries to describe a revised renal grading injury scale based on clinical renal salvage outcomes. We focused on the mechanism of injury, the stability of the patient, radiographic imaging, associated non-renal injuries and clinical salvage outcome data.

Results: We compared the nephrectomy rate and overall clinical renal salvage rate using the current 1989 AAST renal injury scale to our 2009 revised renal injury staging classifiation (RISC). No changes were made in the definition of grade I-III injuries. The revised grade IV classification includes all collecting system and renal pelvis injuries and all segmental arterial and/or venous injuries. The revised grade V classification is limited to main renal artery and/or vein injuries, including arterial and venous thrombosis previously classified as a grade IV injury.

Conclusion: Our proposed revision of the 1989 AAST original renal injury scale maintains excellent correlation with the severity of renal injury and the overall clinical renal salvage rate. The reclassification of the current grade IV and V renal injury categories provides a more complete and rigorous definition of renal injuries. The revised RISC will better facilitate clinical investigation and outcomes research both nationally and internationally by providing clarity and precision in discussion of renal injuries while still performing its fundamental objective to reflect increasingly complex injuries.

Poster # 76

IS THERE A SURVIVAL BENEFIT OF LEVEL I VS. LEVEL II TRAUMA CENTERS IN AN ORGANIZED MATURE TRAUMA SYSTEM?

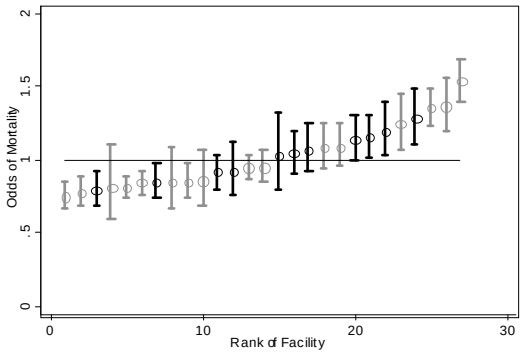
Frederick Rogers*, MD, MS, Turner Osler*, MD, MS, Michael Horst, PhD, Lanyce Horn, MSN, RN. Lancaster General Hospital.

Background: Pennsylvania (PA) has one of the oldest, most well-established trauma systems in the country. Because requirements for verification for Level I vs. Level II trauma centers within PA differ minimally (requirements for patient volume, residency, and research), we wondered if survival differed between Level I vs. Level II centers.

Methods: Using a data set that included a total of 140,691 patients admitted over a 5-year period (2004-2008), odds of mortality for 16 Level I and 11 Level II centers were computed using a random effects logistic regression model. Adjusted odds of mortality at Level I vs. II hospitals were compared using the Wilcoxon rank sum test.

Results: Level I centers had higher crude mortality rates than did Level II centers (5.07% Level II vs. 5.48% Level I), but median adjusted mortality rates were not different for the two types of centers. A graphical approach to performance of Level I vs. Level II shows considerable variability among centers, but Level II centers (in black) seem no different than Level I (in grey).

Conclusion: As trauma systems mature, the distinction between Level I and II trauma centers blurs. The hierarchal descriptors "Level I" and "Level II" in a mature trauma system seem pejorative, implying hospitals labeled "Level II" may have inferior results. Because these two groups of centers actually have similar results, current terminology should be replaced with non-hierarchal descriptors.



Y>1 = (increased mortality)
Y<1 = (decreased mortality)

Poster # 77

THE EFFICACY OF A REGIONALIZED TRAUMA SYSTEM: GROUND LEVEL FALLS

Angela Cade, MD, Alan D Cook, MD, Brad King, MD, John D Berne*, MD, Luis Fernandez*, MD, Scott H Norwood*, MD. East Texas Medical Center.

Introduction: Ground-level falls (GLF) lead non-fatal injuries treated in US hospitals and are increasing in our region. The purpose of this study was to evaluate the efficacy of our regional trauma system for triage and treatment of GLF. We hypothesized that mortality would vary according to trauma center verification level (ACS level).

Methods: Our regional trauma registry was queried. Data included demographics, comorbidities, acute physiology, injuries, lengths of stay (LOS), survival, disposition, and ACS level. Patients were assigned to the ACS level where they were ultimately admitted. Multivariate logistic regression methods were used to model anatomic trauma severity and the probability of death (p(death)). Odds ratio (OR) for observed-to-expected (O:E) mortality was estimated for ACS level.

Results: GLF patients numbered 8,490 in our region over 17 years. Mean age was 74.6 years. The mean p(death) was 0.0207 (95% CI 0.0199-0.0214). The overall mortality rate was 0.0214 (95% CI 0.0814-0.0245). ACS level III and IV centers treated the majority of GLF in our region (63.6%). There was no difference in O:E mortality between the level I and II centers. Level III/IV centers had an O:E of 0.53 compared to the level I center, (p=0.02). Among the patients 65 and older, there were no differences in O:E mortality between any ACS verification level. See table.

Conclusions: Mortality from GLF is greater than that predicted by anatomic injury alone. GLF patients are triaged to appropriate levels of care. Variation in O:E mortality is not completely explained by variables we measured and may warrant future investigation.

Entire Cohort	Level I	Level II	Levels III and IV
OR for O:E Mortality (95%CI)	Referent	1.04 (0.63-1.74)	0.53 (0.31-0.91)*
Mortality Rate, mean (95%CI)	0.060 (0.044-0.076)	0.031 (0.024-0.038)	0.011 (0.008-0.014)
Age 65 and Older			
OR for O:E Mortality (95%CI)	Referent	1.13 (0.66-1.93)	0.58 (0.32-1.02)
Mortality Rate, mean (95%CI)	0.07 (0.05-0.09)	0.03 (0.03-0.04)	0.01 (0.01-0.02)
** p=0.02 compared to Level I. All others p>0.05.*			

Poster # 78

THE ROLE OF ANTIBIOTICS IN THE REDUCTION OF INFECTIOUS COMPLICATIONS IN TUBE THORACOSTOMY MANAGEMENT OF TRAUMATIC HEMOPNEUMOTHORAX: A PROSPECTIVE, DOUBLE-BLINDED STUDY

Nathaniel McQuay, Jr, MD, James Cipolla, MD, Christy D Stehly, BS, William S Hoff*, MD. St. Lukes Hospital.

Objective: The role of prophylactic antibiotics in patients requiring chest tubes is controversial. The level of evidence supporting this practice is not definitive. The primary objective is to examine the efficacy of prophylactic antibiotics reducing the incidence of infectious complications in patients with thoracic injuries requiring thoracostomy tube.

Methods: All patients evaluated at a Level I trauma center requiring closed tube thoracostomy were eligible for enrollment. Exclusion criteria included: Age < 16, pregnancy, open fracture, immunosuppression, chest tube placed >72 hrs following admission. Patients were randomized to two groups comparing Antibiotics (Group 1) to Placebo (Group 2). Study medication was started prior to tube insertion and given for 24 hours. Variables evaluated included age, sex, MOI, HLOS, incidence of pneumonia and empyema during initial hospitalization and at 30 day follow up.

Results: Fifty patients were enrolled and randomized, Group 1 n= 24 and Group 2 n= 26. The cohort was mostly male with an average age of 56.6 years sustaining mainly blunt injuries. All patients received study medication prior to tube placement. There were no differences between the two groups in reference to variables evaluated. The rate of pneumonia was 4.2% in Group 1 and 7.7% in Group 2. There were no empyemas diagnosed in either group. All infectious complications occurred during the initial stay with no new occurrences on follow up.

Conclusion: The need for antibiotics in conjunction with thoracostomy tube placement appears unnecessary. The above investigation may serve as a feasibility study in planning a definitive multicenter trial.

Poster # 79

UTILITY OF A UNIFIED TRAUMA TEAM COMBINED WITH MULTIDISCIPLINARY DISCHARGE ROUNDS

James M Haan MD*, Jennifer Ward BA, Stephen Helmer PhD. St. Francis Via Christi.

Background: Length of hospital stay can be a significant drain on resources. Several papers describe a decreased length of stay by using a unified team with a single surgical attending and resident team managing all trauma patients combined with discharge rounds utilizing a team composed of all affiliated specialties. Utilizing these two concepts, we believed, would decrease length of stay in a Level 1 trauma center previously using individual private practice surgeons with a dedicated resident trauma team.

Methods: Retrospective chart review of patients admitted during two one-year periods. During the private practioner (PP) era patients were admitted and followed by a single attending with a dedicated resident team during their admission. A single surgical attending managed all trauma patients with a resident team assuming care from on-call attendings under the unified trauma team (TT). Biweekly multidisciplinary rounds were added. Retrospective review of trauma registry and charts were performed analyzing demographic, physiologic, and outcome variables

Results: Demographic and physiologic data were statistically similar for PP (2671 patients) vs. TT (2825 patients) including: age (40), injury severity score (11), admission Glasgow Coma Scale (13.8), base deficit (-4 vs. -5), need for operation (25). Hospital length of stay (4.7 vs. 3.6 days) was statistically decreased. Intensive care length of stay (ILOS) (4.3 vs. 3.95 days), % patients ventilated (11% vs. 10%), ventilation duration (6.3 vs. 5.5 days) trended lower but were not stastically significant. Mortality (4%), unanticipated readmission (5.4 vs. 5.8%), and preventable deaths were statistically similar (2 vs. 3 pt) between groups.

Conclusion: Institution of a single managing trauma team combined with biweekly discharge rounds can significantly decrease HLOS and possibly ILOS, duration of ventilation, increase overall trauma admissions, without increasing complication rates.

Poster # 80

AUTOTRANSFUSION IN EMERGENT OPERATIVE TRAUMA RESUSCITATION

Xzabia Caliste MD, James H Street III MD, Christine Trankiem MD, Anthony Shiflett DO, Karina McArthur MD, Jack Sava* MD. Washington Hospital Center.

Introduction: Autotransfusion of red cells is not uniformly used in abdominal trauma. While cell salvage likely avoids some consequences of allogeneic transfusion, the risk of infection is poorly understood, especially in the setting of hollow viscus injury. This paper studies the outcomes of patients who were autotransfused during emergency trauma operations in which they were identified as sustaining full thickness hollow viscus injury.

Methods: Computerized medical records were used to identify 179 patients from 1999-2008 with penetrating and blunt abdominal trauma requiring intra-operative blood transfusion. Recipients of autotransfusion and banked blood were compared with recipients of banked blood products only (control group). T-test were used to compare the means and Chi-squared and Fisher's Exact Test were used to compare proportions. Multivariate Regression was used to evaluate the primary outcomes: survival and blood stream infection. Models were adjusted for Age, ISS, EBL, SBP and autotransfusion.

Results: 108 controls and 71 autotransfused patients were evaluated. T-tests showed no statistical significance regarding Age, ISS, LOS, post-op INR and volume of banked blood products. Both groups were proportional with colon injury. The mean SBP for the control group was 99 +/-41 and 89 +/-48 for the autotransfused, (p=0.2). EBL was 2472 +/- 3261 for controls and 4056 +/-3825 for the autotransfused (p=0.003). Total volume of blood transfused was 2792 and 5513 for controls and autotransfused patients respectively, (p=0.003). 90 controls (84%) and 53 autotransfused (76%) survived to discharge (p=0.21). 20 controls (19%) and 17 autotransfused (24%) developed BSI, (p=0.45). Logistic Regression revealed that an ISS>25, SBP <90 and EBL >2L predicted mortality and there was a trend towards decreased survival with Age>50. There is no significant relationship between Age, ISS, EBL, SBP or Group on the presence of blood stream infection.

Conclusion: We found no evidence that emergent autotransfusion worsens clinical outcomes in the setting of concomitant hollow viscus injury.

Poster # 81

SURVEY OF STATE PRACTICES FOR USING ACSCOT TRAUMA CENTER VERIFICATION IN THE DESIGNATION OF LEVEL 1 AND LEVEL 2 ADULT TRAUMA CENTERS

Robert W Fincher, DO, Moustafa Hassan*, MD, Maryann Fields, BSN, Willian Marx*, DO, Mark E Hamill, MD. State University of New York Upstate Medical University.

Objective: Trauma center verification has been demonstrated as an important step in improving trauma patient outcomes. While a standardized trauma center verification process is available through the American College of Surgeons Committee on Trauma (ACSCOT) use of this program varies at the state level. This study examined the use of the ACS verification process by individual states in adult level 1 and 2 trauma centers.

Methods: Multiple internet searches were conducted examining individual state criteria for designation and verification of adult level 1 and 2 trauma centers. Specific state law and written policy were reviewed where available. In cases were information was not otherwise available, contact was made directly with the specific state agencies involved or with trauma coordinators at state designated centers.

Results: Information was available for all states. Twenty (40%) require formal ACSCOT verification either as part of a state level trauma designation process [16 (32%)] or, in states without a specific process [4 (8%)], as the sole method for self-designation. In 5 (10%) states, ACSCOT verification was as least partially optional with state criteria used if ACS verification was not pursued. Designation and verification in 23 (46%) states was based on individual state developed criteria. Significant variations between these criteria were noted. Of these 23 states, 13 (57%) had at least one trauma center obtain ACSCOT verification though not specifically required. One state had no formal process and allowed hospital self designation as trauma centers without any criteria or verification One state had mixed criteria based on EMS region with some areas requiring ACS verification.

Conclusion: Trauma center designation and verification standards vary significantly between different states. While the ACSCOT verification process provides a standard for verification, the adoption of this standard is far from universal. Further study is needed to determine if the use of non-standard criteria for trauma center designation and verification has an effect on trauma care outcomes.

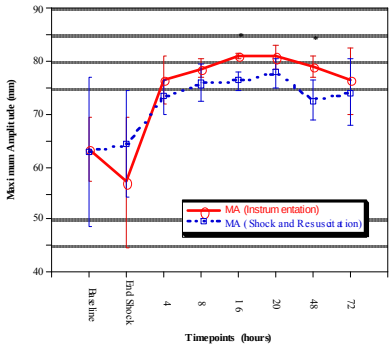
Poster # 82

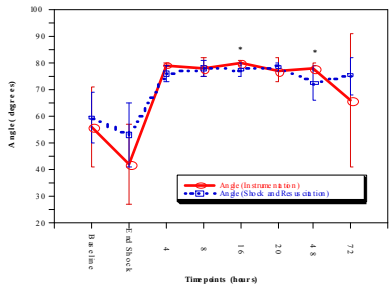
HYPERCOAGULABILITY AS DETERMINED BY THROMBELASTOGRAPHY IS PRESENT EARLY AFTER TRAUMA AND RESUSCITATION

Kristine E Mulier, MBS, Joseph G Greenberg, MD, Gregory J Beilman, MD *. University of Minnesota.

Introduction: Coagulopathy associated with trauma is incompletely understood. Trauma patients are frequently coagulopathic early after injury and become hypercoagulable within days of injury. Thrombelastography (TEG) allows real-time evaluation of the coagulation status of patients. We hypothesized that TEG will identify post-traumatic hypercoagulable state in our porcine model of hemorrhagic shock and resuscitation.

Methods: Fourteen male Yorkshire pigs were sedated, instrumented, and splenectomized via laparotomy. Eight of these animals underwent a shock protocol consisting of a pulmonary contusion via captive bolt gun, 35% hemorrhage and two liver fractures. Vital signs, hemodynamic and physiologic parameters, and TEG were measured at baseline, after shock and at intervals after injury thru 72 hours post injury.





Results: Animals undergoing surgery and instrumentation demonstrated the same hypercoagulable patterns as animals that received shock, injury, and resuscitation. In the model hypercoagulability was present in both groups at 4 hours after injury and continued for 72 hours post-injury (increased angle and maximum amplitude, $p<0.05$ compared to baseline, all timepoints from 4-48 hours post-injury). Statistically significant differences between the groups were noted at both 16 and 48 hours post-injury (*).

Conclusion: Hypercoagulability is present early after surgical intervention and trauma. This finding has implications for use of DVT prophylaxis in trauma patients.

Poster # 83

The Fate Of Rural Trauma Transfers: Systems In Evolution Or A Bumpy Road?

Eric H Bradburn * DO, Luis Garcia MD, Jeffery Kashuk* MD, Robert Cherry* MD , Daniel Carney* MD, Patrick Bryant* MD, Kazuhide Matsushima* MD , Hiedi Frankel*MD. Penn State Hershey.

Objective: Continued maturation and regionalization of trauma systems has led to improved access from rural areas resulting in increased numbers of patients transferred to a level 1 trauma center. Despite this, little has been reported regarding specific outcomes of the transferred patient vs. those arriving directly from the scene. We hypothesized that significant differences exist in outcomes and throughput between these groups.

Methods: 3,726 patients over 5 years were identified from our level 1 trauma center data base and divided into transfers from other institutions (889, 24%) or direct arrivals from the scene (2837, 76%). Primary head and burn injuries were excluded. Risk factors of interest included: age, ISS, injury patterns, transfusions, shock indices, hospital and ICU length of stay (LOS, days), and overall complications (infectious, thrombotic, respiratory, cardiac). Logistic regression analysis (LR) was utilized to identify the independent effects of transfer on: complications and mortality, controlling for the above risk factors.

Results: Transfer patients had a significantly lower mean ISS (11.6±8.3 vs. 12.7±9.2, p=0.002), ISS=16 (25% vs. 30.1%, p=0.003), and received less transfusions (28, 3.1% vs. 132,4.7%, p=0.05) but had longer hospital LOS (7.7 vs.7.0 days, p=0.001) and increased overall complications (11.7% vs. 9.0 %, p=0.02). After adjustment for confounders (age, shock index, transfusions, ISS, injury patterns, vent days) LR demonstrated transfer to be an independent predictor of overall complications (OR1.49; 95% CI 1.15-1.92, p= 0.002, AUC=0.792), but not mortality (p=0.27).

Conclusions: Despite lower acuity, transfer patients had significantly increased overall complications and longer hospital stays compared to direct arrivals from the scene. These findings have important implications regarding continued regionalization of care, future trauma outreach efforts and resource allocation, particularly in the rural sector.

Poster # 84

IMPROVING OVERTRIAGE OF AEROMEDICAL TRANSPORT: A REGIONAL PROCESS IMPROVEMENT INITIATIVE

Toan T Huynh*, MD, Gregg Fleming, RN, Charlotte M Thomas, RN, Michael H Thomason*, MD, Ronald F Sing*, DO, David G Jacobs*, MD. Carolinas Medical Center.

Introduction: Aeromedical transport (AMT) is an effective means of rescuing critically injured patients to definitive care. Given the lack of guidelines for AMT activation, we examined the effect of implementing a Trauma Advisory Committee (TAC) initiative focused on reducing AMT overtriage rates.

Methods: TAC outreach coordinators (OC) implemented a process improvement (PI) initiative and collected data prospectively from January 2007 to December 2009. Overtriage was defined as patients who were airlifted and later discharged from the emergency department. Quarterly, OC held PI meetings with local EMS agencies. Patients were grouped by counties belonging to the TAC versus those outside TAC's jurisdiction. Differences between groups were compared by Mann-Whiney Rank Sum test.

Results: There were 2139 patients from 15 counties. After implementation, overtriage rates from counties under TAC's oversight declined compared to non-TAC counties (Table). The reduction in overtriage continued over time.

	2007		2008		2009	
	TAC	non-TAC	TAC	non-TAC	TAC	non-TAC
n	367	385	325	385	301	376
Overtriage (%)	65 (18%)	81 (21%)	56 (17%)*	89 (23%)	33 (11%)*§	63 (17%)
Age (year)	36 ± 2	38 ± 3	39 ± 4	37 ± 3	41 ± 4	37 ± 6
GCS	14.4 ± .8	14.2 ± .4	14.5 ± .5	14.3 ± .1	14.6 ± .5	14.2 ± .6

Data: mean ± SE. * $p < 0.05$ vs. non-TAC same year, § $p < 0.01$ vs. previous years.

Conclusions: By way of a regional trauma advisory process improvement, implementation of an initiative focused on overtriage led to a more efficient use of aeromedical transport.

Poster # 85

RECOMBINANT FACTOR VIIA TO CORRECT COAGULOPATHY IN PATIENTS WITH TRAUMATIC BRAIN INJURY PRESENTING TO OUTLYING FACILITIES PRIOR TO TRANSFER TO THE REGIONAL TRAUMA CENTER

Lauren Sowery, MD, Carlos VR Brown*, MD, Kelli H Foulkrod, MSc, Eardie Curry, PharmD, Alex B Valadka*, MD, Cynthia S Glover, RPh, Kim Grabarkewitz, RPh, Terry Green, RPh, Patrick Hanegan RPh, Steve Hail, RPh, John Admire, BS. University of Texas Southwestern - Austin, University Medical Center Brackenridge.

Background: Timely correction of coagulopathy in patients with traumatic brain injury (TBI) improves mortality. Coagulopathy is usually corrected with plasma, but smaller hospitals may lack sufficient resources to efficiently correct coagulopathy with plasma before transfer to a trauma center. Recombinant, activated factor VII (VIIa) has recently been identified as an effective method to correct coagulopathy in patients with TBI. In January 2008 our trauma center distributed single 1.2 mg vials of VIIa to outlying facilities in our region. These vials were to be used specifically to correct coagulopathy in patients with TBI prior to transfer to our institution. The purpose of this study was to compare outcomes in patients who received VIIa to those who did not.

Methods: Retrospective study from 1/1/2008 through 12/31/2009 of all patients with TBI and coagulopathy (INR $\geq$ 1.5) transferred to our level 1 trauma center.

Results: Twenty-three patients with coagulopathy and TBI were transferred to our trauma center, 100% sustained a fall and 100% were taking warfarin at the time of injury. Ten patients received VIIa to correct coagulopathy prior to transfer, while 13 did not. When comparing the VIIa group to the no-VIIa group there was no difference in age (80 vs. 78, p = 0.49), male gender (40% vs. 46%, p = 0.77), GCS (13 vs. 14, p = 0.78), ISS (20 vs. 19, p = 0.75), transfer time (222 minutes vs. 234 minutes, p = 0.78), or INR at outlying facility (2.5 vs. 2.3, p = 0.70). Both groups received one unit of plasma prior to arrival at our trauma center; each patient in the VIIa group received a single 1.2 mg dose of VIIa at the outlying facility. Upon arrival to our trauma center the VIIa group had a lower INR (1.0 vs. 3.0, p = 0.02) and the VIIa group had a lower mortality (0% vs. 39%, p = 0.03).

Conclusions: In coagulopathic patients with TBI presenting to outlying institutions with limited resources to quickly provide plasma, VIIa efficiently corrects coagulopathy prior to transfer to definitive care at the regional trauma center. More rapid correction of coagulopathy with VIIa in this patient population may improve mortality.

Poster # 86

TRAUMA MORNING REPORT: PERFORMANCE IMPROVEMENT, NOT JUST PATIENT SIGN-OUT

Patrick K Kim*, MD, Adam D Fox, DO, Janet McMaster, RN, MHSA , C William Schwab*, MD, Patrick M Reilly*, MD. University of Pennsylvania.

Background: Trauma Center outcomes ideally are independent of time or day of patient presentation. The factors contributing to continuous high performance remain unclear. In addition to appropriate *clinical* care, certain *processes* of care may positively impact outcomes. One process may be a structured Morning Report, a daily conference dedicated to review and transition of patient care, education, and performance improvement (PI). We evaluated the PI content of our Morning Report regarding care of new patients.

Methods: We reviewed PI records and ED radiology logs (1/2009-2/2010) at a Level I Trauma Center. Morning Report occurred 7 days/week, including weekends and holidays. A checklist agenda was strictly followed. All new patients were discussed. Radiology images and reports were reviewed. Typical weekday attendance was faculty, fellows, residents, students, nurse practitioners, trauma program manager (TPM), and PI coordinator (PIC). If TPM and PIC were absent, attendings completed PI occurrence forms for review. PI occurrences were grouped by phase of care.

Table 1. PI occurrences identified at Morning Report (N=61)

Trauma Bay	**59%**
Airway	8%
Pleural space	5%
IV access	5%
Medication	5%
FAST	3%
Radiologic workup	31%
Other procedures	3%
Inpatient (non-OR)	**17%**
Admitting unit/service	6%
VTE management	5%
Add/change procedure	3%
Operating Room	**15%**
Operative judgment	7%
Operative technique	8%
Other "systems" issues	**8%**

Results: 2682 trauma patients (20% penetrating) were treated (mean ISS 10.5; mortality 5.7%). At Morning Report, 61 PI issues were formally identified in 59 patients (Table 1). 28% of PI issues involved weekend admissions. 105 revised radiology reports were reviewed (Table 2).

Table 2. Radiology revisions identified at Morning Report* (N=105).

New trauma finding	21%
Additional trauma finding	15%
Retract trauma finding	5%
Additional incidental finding	27%
Clarify preliminary report	32%

*Excludes results relayed by phone

Conclusions: PI issues were identified in all phases of initial care and were equally likely to be identified for weekend admissions. A daily, structured Morning Report facilitates PI issue identification, promotes rapid feedback to providers, and may contribute to continuous high performance at busy Trauma Centers.

Poster # 87

POST TRAUMATIC STRESS DISORDER IN HOSPITALIZED TERRORIST BOMBING ATTACK VICTIMS

Noam Shussman MD, Miklosh Bala MD ,Ayelet Mintz MD, Gideon Zamir MD, Arye Shalev MD, Avraham I Rivkind* MD , Gidon Almogy MD. Hadassah -Hebrew University Medical Center.

Background: Post-traumatic stress disorder (PTSD) is a psychiatric disorder that results from exposure to a traumatic event. The individual may develop symptoms of three distinctive types: intrusive and unwanted recollections, avoidance followed by emotional withdrawal, and heightened physiological arousal. Hospitalized victims of suicide bombing attacks (SBA) are unique due to the circumstances and severity of their injuries which could affect the occurrence and delay the recognition of PTSD.

Objectives: To evaluate the prevalence and severity of PTSD among hospitalized victims of SBA and to assess variables of physical injury as risk factors for the development of PTSD.

Methods: Forty-six hospitalized victims SBA were evaluated for PTSD using the PSS-sr questionnaire by phone. Demographic and medical data regarding the severity and type of injury, and medical treatment were collected from medical files. Injury Severity Scale (ISS) was used to assess severity of physical injury.

Results: Twenty-four of 46 (52.2%) hospitalized victims of SBA developed PTSD. Presence of blast lung injury was significantly higher in the PTSD group compared with the non-PTSD group (37.5% vs. 9.1% respectively, $p<0.04$). There was no significant difference in ISS between PTSD and non-PTSD groups. Blast lung injury and intracranial injury were found to be positive predictors of PTSD (odds ratio 125 and 25, respectively). No correlation was found between length of stay, length of ICU stay or severity of physical injuries and the severity of PTSD.

Conclusions: Hospitalized victims of SBA are considerably vulnerable to develop PTSD. Victims should be monitored closely and treated in conjunction with their physical treatment. Blast lung injury and intra cranial injury are predictors of PTSD.

Poster # 88

THE IMPACT OF THE VERSION OF THE ABBREVIATED INJURY SCALE ON INJURY SEVERITY CHARACTERIZATION AND QUALITY ASSESSMENT OF TRAUMA CARE

Hideo Tohira, MPH, MD, Ian Jacobs, PhD, Kazuo Ishikawa*, MD, Tetsuya Matsuoka, MD.
University of Western Australia.

Background: The Abbreviated Injury Scale (AIS) was revised in 2005, and updated in 2008 (AIS08). This revision includes adding new injury descriptors and changing injury severities. It is not yet investigated how these changes can affect the injury research.

Aims: This study aims to investigate the impact of the AIS version on injury severity characterization and quality assessment of trauma care.

Methods: We used all trauma patients registered in the Japan Trauma Data Bank between 2004 and 2008. We converted AIS 90 update 98 (AIS98) codes into AIS08, by using a table available in the AIS08 dictionary. We calculated both Injury Severity Score (ISS) and New ISS (NISS) based on AIS98 and AIS08 (ISS98, ISS08, NISS98 and NISS08) and compared the means of these four measures. We also compared the number of major trauma patients (ISS=15). We derived two multivariate logistic regression models to estimate risk-adjusted mortality using NISS98 or NISS08. We computed the observed-to-estimated death ratios and their 95% confidence intervals (CIs) of each hospital to assess hospital performance, using two models. We counted the number of hospitals whose entire CI band was below 1 (high-performance outlier) and above 1 (low-performance outliers). We used repeated-measure one-way ANOVA and McNemar's test for comparison.

Results: The number of study subjects was 19,759. Overall mortality was 16.0%. Mean ISS98, ISS08, NISS98 and NISS08 were 17.3, 15.2, 21.3 and 18.5, respectively. ISS and NISS based on AIS08 were significantly less than those based on AIS98 ($p<0.00001$). The proportion of major trauma was 48% by ISS98 and 40% by ISS08 ($p<0.001$). The numbers of high- and low- performance outliers were different between two assessments.

Model	NISS98	NISS08
High-performance outliers	1	2
Low-performance outliers	4	3

Conclusion: The difference of the AIS version will affect selecting trauma patients of a given injury severity and can affect quality assessment of trauma care. Researchers should pay more attention to selecting the AIS version in their trauma-related research.

Poster # 89

HOSPITAL-BASED VIOLENCE PREVENTION: REDUCING THE MORTAL AND FISCAL PRICE TAGS

David Grunwald, MS, Dahianna Lopez, RN, MSN, Rosemary Reidy, BS, Marci Pepper, BS, Julia Walsh, MD, MSc, Rochelle A Dicker*, MD. University of California, San Francisco.

Introduction: For every homicide, an additional 100 people are violently injured in the United States. An estimate of the long term costs of violent injury is $264 billion yearly. Our level I trauma center's violence prevention program (VPP) is designed to reduce our preprogram injury recidivism rate of 36.6%. The purpose of this study was to evaluate the VPP recidivism rate and conduct a cost-analysis comparing VPP programmatic cost to cost associated with treating interpersonal violent injury. We hypothesize that the VPP reduces recidivism and provides cost-savings in public dollars.

Methods: Using the Microsoft randomization feature, we evaluated medical and financial information on 100 violently injured individuals who met our VPP eligibility criteria. Costs were then expanded to estimate for the entire eligible population in that year. We converted hospital charge data to total direct cost (cost to charge ratio). VPP annual budget includes salaries, travel and supplies. The three-year recidivism rate of the VPP was calculated. Extrapolated costs determined potential savings of an expanded VPP.

Results:Total hospital cost of the 100 subjects was $4,860,000. Average cost was $49,000. Our VPP recidivism rate was 11% (N=145). The VPP served 58 clients in 2007 with a budget of $168,000. The table demonstrates current savings and expanded savings using an extrapolated cost model with an 11% recidivism rate. 83% of our victims were uninsured, or insured by public funding sources such as Medicaid.

	No VPP	VPP Current	Expanded Cost Savings
Clients per year	200	58	200
Recidivism rate	36.6%	11%	11%
# of recidivists	73	6	22
Cost of recidivists	**$3,547,581**	$291,582	1,069,134
VPP cost savings	0	$680,358	2,478,447
Program costs	0	$168,135	579,800
Net savings	0	**$512,223**	**1,898,647**

Conclusions: Recidivism was reduced substantially from historical figures. If we prevent just 3.5 reinjuries, our VPP would be cost neutral. If we expand we could save $2.6 million, mostly in taxpayer dollars. Violence prevention should be part of the fabric of trauma centers. It reduces recidivism and is cost effective by saving public funds.

Poster # 90

TRAUMA RECIDIVISM DUE TO INTERPERSONAL VIOLENCE AT AN URBAN, LEVEL-1 TRAUMA CENTER: A 22-YEAR REVIEW

Todd W Costantini, MD, Amelia Simpson, BS, Dale Fortlage, BA, Vishal Bansal, MD, Raul Coimbra*, MD, PhD. University of California, San Diego School of Medicine.

Introduction: Trauma recidivism is a well recognized problem in urban trauma centers. The objective of this study is to characterize patients repeatedly admitted to the trauma service due to injury from interpersonal violence to better incorporate this population of high risk patients into our prevention programs.

Methods: A retrospective trauma registry review identified all patients with multiple admissions to our urban, Level-1 Trauma Center between January 1, 1987 and December 31, 2008. Patients admitted multiple times due to interpersonal violence (assault, gunshot wound, stab wound) were identified. Demographic data, injury mechanism, ICU and hospital length of stay (LOS), need for operative intervention, and mortality were analyzed. Admission toxicology results were reviewed for each patient.

Results: During the 22-year study period, recidivists accounted for 1254 admissions by 592 unique patients. Of those trauma recidivists, there were 145 patients (24.5%) admitted multiple times as a result of interpersonal violence (295 admissions). Compared to all other trauma recidivists, recidivists due to interpersonal violence were younger (33.5 v. 43.2 yrs, $p<0.0001$) and more likely to be male (91.7% v. 81.9%, $p<0.01$). Recidivists due to interpersonal violence were also more likely to require operative intervention (36.3% v. 22.9%, $p<0.001$) and required more ventilator days ($p=0.01$), however, there was no difference in ICU LOS, hospital LOS, or mortality. Positive toxicology screening was more common in trauma recidivists due to interpersonal violence (73.9% v. 24.6%, $p<0.0001$), with significantly higher use of drugs other than alcohol. Recidivists due to interpersonal violence incurred greater than $8 million in hospital charges.

Conclusion: Trauma recidivists due to interpersonal violence are more likely to be young males with a very high incidence of drug use. In-hospital education targeting this at-risk population of patients should be incorporated into prevention programs at urban trauma centers.

Poster # 91

THE IMPACT OF LOW LEVEL FALLS IN THE ELDERLY

Nirav Y Patel, MD, Kimberly J Lombard, BS, Cecile J D'huyvetter, RN, MSN, Thomas H Cogbill*, MD, Michelle A Mathiason, MS. Gundersen Lutheran Health System.

Background: One third of Americans over age 65 fall each year; 10% of these result in injuries requiring hospitalization. Outcomes for low level (<5ft) falls are poorly defined. Our objective was to determine the morbidity and mortality of these injuries in the elderly.

Methods: Our prospective trauma registry was queried for all patients > 70 years of age hospitalized after falls from <5 ft. The following variables were retrospectively reviewed: demographics, Injury severity score (ISS), fall mechanism, length of stay (LOS), discharge disposition, mortality, Functional Impairment Measure (FIM), at discharge and independence status at 1-year. Statistical analysis included chi square and t-tests.

Results: From January 2005 through December 2008, 379 patients met inclusion criteria. Mean age was 83.1 years (range, 70–101), 70% were female. Median ISS was 9.5 (range, 1–34). Falls occurred indoors in 65% and were caused by slip, trip, or loss of balance in 92%. Median LOS was 4.4 days (range, 1–26). 14.5% required ICU admission. Overall 30-day and 1-year mortality rates were 11.1% and 23%, respectively. Of those who survived past 30 days, 74.5% were discharged to a skilled nursing facility and 25.5% to home. Median FIM at discharge was 10. Of the 323 patients who lived independently before their fall, 180 (55.7%) did so at 1-year. Data for patients aged = 85 years were compared to those aged 70 –84 (Table).

	70-84 years	= 85 years	p-value
30-day mortality	7.5%	16.3%	0.007
1-year mortality	20%	33.8%	0.005
Independent living at 1 year	64.9%	44.4%	0.001

Conclusions: Low level falls result in significant mortality and loss of independence in patients >70 years old. Outcomes are markedly worse among patients aged = 85 years. Effective strategies for reducing the impact of this frequent injury in the elderly population must focus on well designed fall prevention measures.

Poster # 92

INITIAL OUTCOMES FOR A SCREENING, BRIEF INTERVENTION, AND REFERAL TO TREATMENT (SBIRT)PROGRAM IN A LEVEL ONE TRAUMA CENTER

Mark Cipolle*, MD, PhD, Chaz Molins, MSW, LCSW, James Reed, PhD, Joan Pirrung, APN, Glen Tinkoff*, MD. Christiana Health Care System.

Introduction: It is well known that alcohol use is a major contributor to injury. Our trauma team employs a full-time SBIRT counselor. This study examines our initial experience and outcomes with SBIRT at a large, non-university, level one trauma center.

Methods: This study was conducted between February 2008 and December 2009. Data collected included: age, sex, ethnicity, admission blood alcohol concentration (BAC), mechanism of injury, discharge disposition, insurance status, and compliance with a safe, or no, drinking agreement at 1 month, 6 months and 1 year. Chi Square was used.

Results: 701 patients were referred to the SBIRT counselor, 14.7% did not meet criteria for intervention, and 19.5% refused to be interviewed. Comparing the SBIRT population to the general trauma population, males were over-represented, 73.4% vs. 64.2% ($p<0.001$) and Hispanics were under-represented, 4.8% vs 7.4% ($p=0.036$). Caucasians (73.0% vs. 70.3%) and African-Americans (20.1% vs. 18.7%) had similar representation between SBIRT and the general trauma population. The mean age was 40.0±15.0. BAC was checked in 582 patients with a mean of 0.142±0.10. The 3 most common mechanisms of injury were MVC (33.3%), fall (24.8%) and assault (11%). Most (77.6%) were discharged to home, the remainder going to a skilled facility. Of the 399 patients eligible for follow-up, 304 agreed to low risk consumption and 95 agreed to AA or counseling. Gender, ethnicity, insurance status and age had no bearing on follow-up compliance with the agreement.

	1 month	6 month	1 year
Eligible for follow-up	399	215	113
Unable to reach	111	78	31
Compliant	254	120	75
Non compliant	34	17	7

Conclusion While we were unable to reach about 30% of the patients for follow-up, those that were contacted had compliance rates of 88-92% with the safe, or no, drinking agreement. Future work will be aimed at improving follow-up and determining the effect of SBIRT on trauma recidivism.

Poster # 93

CONCEAL AND CARRY LAW: FRIEND OR FOE TO VIOLENCE PREVENTION

Christine Nichols MD, Stephen Helmer PhD, James M Haan MD*. St. Francis Via Christi.

Background: Various states have implemented conceal and carry (CC) permits for handguns. Rational includes potential decrease in personal violence due to perception that victims will likely be armed. This study examines the 2.5 years before (BCC) and after (ACC) enacting a liberal CC law in the modern era.

Methods: Retrospective trauma registry and chart review from a level 1in a state enacting a liberal CC law. CC permit process consisted of a weekend course including firearm proficiency/safety but no documented need for a concealed weapon. Patient data included age, sex, race, injury severity score (ISS), blood pressure, estimated blood loss (EBL), transfusion requirements (trans), need for ICU admission (ICU), need for mechanical ventilation (vent), insurance status (Unins for uninsured) and mortality. Significance was evaluated with Chi square, t-test, ANOVA and Fischer's test where appropriate.

Results: There was a statistically significant increase in total admissions (129 vs. 149 patients). There was no significant difference in age, sex, race, or need for OR. Severity of injury experienced a statistically increased severity of injury based on ISS, trans, EBL, ICU and vent -see Table 1 with mortality nearly tripled. Interesting, the percentage of uninsured patients doubled (30 to 60%). All with p</= .05.

Conclusion: Overall number of penetrating injuries and severity of injury dramatically increased following enactment of a liberal conceal and carry law. Interestingly there was a dramatic increase in uninsured victims- whether this is due to shooting by armed citizens or increased availability of firearms to criminals is unclear and requires further study.

Table 1

	ISS	Trans	ICU	Vent	EBL	Mortality	Unins
BCC	9	1.8 unit	28%	11%	406cc	9%	30%
ACC	13	5.5 unit	40%	22%	946cc	21%	60%

Poster # 94

OUTCOMES OF ALCOHOL USE IN ELDERLY TRAUMA PATIENTS

Marissa De Freese, MD, Kevin M Schuster, MD, Lewis J Kaplan*, MD, Adrian Maung, MD, Michael Ditillo, MD, Felix Lui, MD, Dirk Johnson, MD, Kimberly Davis*, MD. Yale New Haven Hospital.

Introduction: Alcohol use is common among younger trauma patients however the rates of alcohol use in the rising number of elderly trauma patients are not well established. We hypothesize that alcohol use confers a worse prognosis and a different spectrum of injury in elderly trauma patients.

Methods: The trauma registry at an ACS verified, state designated urban Level I trauma center was queried for admitted trauma patients over the age of 55 from 01/07- 12/09. Data abstracted included demographics, mechanism of injury (MOI), injury severity score (ISS), and outcomes including survival, disposition, and length of stay (LOS). A positive blood alcohol (BAC (+)) was considered for all values > 20mg%; BAC (-) indicates values < 20mg%. Univariate analysis was with Mann-Whitney U, t-test and chi-square and multivariate analysis was with linear and logistic regression with significance for $p<0.05$.

Results: 175 of 2446 patients (7%) were identified as BAC (+). The mean age was lower, 67.6±9.7 vs. 76.4±11.9 ($p<0.001$) but the ISS was higher 11.02±9.2 vs. 9.59±7.7 ($p=0.048$) than in BAC (-). Mortality (7.5% BAC (+) vs. 7.2% (BAC (-)) was similar as was median LOS 3.0 days vs. 4.0 days. BAC (+) were more often injured away from home ($p<0.001$; OR 1.724 (95% CI 1.264-2.347)) and in a MVC ($p=0.033$; OR 1.583 (95% CI 1.034-2.423)). BAC (+) more often required endotracheal intubation ($p<0.001$ OR 2.548 (1.552-4.128)) and critical care monitoring ($p<0.001$ OR 2.764 (95% CI 2.021-3.781)) but were less likely to develop an in-hospital complication ($p=0.019$ OR 0.648 (95%CI 0.450-0.933)). After controlling for the effects of age and ISS, BAC (+) were less likely to be discharged home ($p<0.001$ OR 2.344 (95% CI 1.623-3.386).

Conclusion: Elderly patients with BAC (+) were more likely to be injured in MVCs and away from home. Higher rates of admission to an intensive care unit and discharge to a rehabilitation facility were all more common with the BAC (+) group and likely increased costs.

Poster # 95

MEDIUM AND LONG-TERM QUALITY OF LIFE IN ICU SURVIVORS WITH SEVERE THORACO-ABDOMINAL TRAUMA AND DAMAGE CONTROL LAPARATOMY

Marisol Badiel, MD, MSc, Carlos Ordonez, MD, Laura Rodri-guez, Medical Student, Isabel Galvan, Medical Student, Susan Garci-a, Medical Student, John Montes, Medical Student, Mauricio Gonzalez,Medical Student, Natalia Salazar, Medical Student, Juan Carlos Puyana*, MD. Instituto de Investigaciones Clinicas.

Background: There is insufficient information regarding long term outcome and quality of life in trauma patients who survive damage control (DC) interventions after severe thoraco-abdominal trauma (TAT)

Objective: We measured patient-reported outcome following surgical management with DC using a quality of life instrument.

Methods: Survivors discharged between 3 and 18 months after severe TAT were contacted after obtaining approval by our institutional IRB. We excluded patients with neurotrauma. We applied self-response version EuroQoL questionnaire (EQ-5D) and visual analog scale (EQ-VAS: 0 (worst health) – 100 (best health). EuroQoL it is based on a descriptive system that defines health in terms of 5 dimensions: mobility, self-care, usual-activities, pain/discomfort and anxiety/depression. Each dimension has 3 levels of response: no problems (level 1), some problems (level 2) severe problems (level 3).

Results: Thirty four patients were contacted. Mean±SD age was 31.8±11.6 yrs, Male were 88.2% and penetrating trauma occurred in 79.4%. Mean±SD in severity scores were: ATI 24.4±9.6, ISS 28.1±8.5 and APACHE II 20±6. The median time from discharge was 12 months (IQR 6-15 mo). The EQ-5D dimensions in which the largest proportion of patients reported severe problems were usual-activities (work, study) and pain/discomfort 14,7% and 5,9% respectively as shown in the table. Main reason of discomfort was the presence of surgical scar in the abdomen. Median EQ-VAS score was 90 (IQR 70-100).

Conclusions: Survivors of severe trauma and DC, reported acceptable quality of life with minimal limitations with social functioning. A prospective study should assess Quality of Life in these patients from hospital discharge and systematically over time.

Level of perceived problems (%)	Mobility	Self-care	Usual activities	pain/discomfort	anxiety/ depression
1 (Mild or none)	73,5	85,3	61,8	50	61,8
2 (Moderate)	25,5	14,7	23,5	44,1	35,3
3 (High)	0	0	14,7	5,9	2,9
All (n=34)	100	100	100	100	100

Poster # 96

A NEW PARADIGM FOR PEDIATRIC DROWNING PREVENTION

Catherine Dudick MD, Monica Titus BSN, Christopher Baker* MD. Atlanticare Regional Medical Center.

Background: Drowning ranks as the leading cause of unintentional injury related death in children 0-4 years despite traditional prevention strategy. The literature documents both an 88% protective effect of formal swimming instruction in the 1-4 age group and the ability of infants and toddlers to learn aquatic survival skills. Therefore, the purpose of this study was to implement a new prevention strategy that might decrease the incidence, morbidity, and mortality of unsupervised water exposures in infants and toddlers.

Methods: Our trauma center offered water safety education for caregivers of children 6 months to 6 years delivered in the context of one-on-one aquatic self rescue instruction.

Results: 14 children aged 10-73 months (average 28.1 months) were enrolled in aquatic self rescue classes given by certified instructors, Monday through Friday for 5-10 minutes daily. After an average of 24.7 lessons (range 15-33) over a period of 6 weeks, 12 children (85%) could independently roll to their backs and float unassisted. 9 of 12 children over 12 months of age (75%) could independently execute a swim-float-swim sequence to get to the stairs or pool wall. No adverse events occurred during the study period. Surveys documented that after lessons, parents felt compelled to be "more vigilant" with their children around water and they properly identified appropriate supervision, not swimming ability, as the most important aspect of drowning prevention.

Conclusion: This is the first pediatric drowning prevention initiative that is hospital-based, involves active participation of the child, and educates the caregiver during lessons. Increased vigilance decreases the likelihood of an unsupervised submersion event and the skills learned enable a child buy precious time should he/she end up in the water alone. If trauma centers coordinate such programs, we expect to track and document a decline in the recalcitrant drowning rates of those children at greatest risk.

Poster # 97

INJURY PATTERNS AND CLINICAL FEATURES OF SKATEBOARD RELATED INJURIES IN ADOLESCENTS AND ADULTS WITH EMPHASIS ON HEAD TRAUMA

Imad S. Dandan*, MD, Gail T. Tominaga*, M, Kathryn B. Schaffer, MP, Jess F. Kraus, PhD, Frank Coufal, MD, A. Brent Eastman*, MD. Scripps Memorial Hospital.

Purpose: We report new epidemiological and clinical features of skateboard (SK) related injuries in older teenagers and adults with emphasis on head injuries (HI) and their severity, exposures involved and management.

Methods: Patients > 15 years of age treated at one Level II Trauma Center with a SK related injury were identified using the Trauma Registry. Medical records were reviewed; data were stratified on non-admission (N-adm) vs admission (adm) status. HI patients were further evaluated for GCS, AIS, ISS, LOS, anatomic location.

Results: Over 9.75 years, 473 patients met study criteria with 36.2% adm pts. There was no statistical trend in annual adm/N-adm occurrence ($p=0.538$), for HI occurrence in adm patients ($p=0.700$) over the study period, and in HI hospital adm rate by gender ($RR=1.20$, $p=0.255$). Adm HI patients were more likely to be injured during down hill high speed maneuvers than non-HI adm patients ($X^2=13.78$, $p=0.03$). LOS was not related to HI/non-HI injury status or age $\geq$ 30 years but almost 20% of HI patients were hospitalized for $\geq$ 7 days. ISS > 9 was more common for HI vs non-HI injured adm patients ($OR=6.75$, $p< 0.0001$) and only those with a HI had an ISS $\geq$ 16. HI patients were more likely to be transported by air or ground ambulance ($OR=11.48$, $p< 0.0001$) than non-HI persons. More head HI were in the occipital region than expected by chance ($X^2=31.17$, $p<0.00001$) and these injuries were more likely to have a head-AIS > 4. Alcohol use was not related to the HI adm rate ($RR=1.209$, $p=0.327$) or the distribution of HI by anatomic location ($X^2= 1.94$, $p=0.584$). Acute neurosurgical intervention was necessary in about 10% of patients.

Conclusion: Skateboarding can no longer be considered an innocuous recreational activity with over 75% of adm patients having significant HI. The nature of the activity and resulting anatomic location of the HI suggests that much more must be done to prevent falls especially impacts to the back of the skull. Pre-hospital triage protocols may need to be adjusted to ensure evaluation at an Emergency Department with neurosurgical coverage.

Poster # 98

THE IMPACT OF A MATURE MASSIVE TRANSFUSION PROTOCOL (1:1:1) ON MAJOR HEPATIC INJURIES: DOES IT INCREASE ABDOMINAL CLOSURE RATES?

Chad G Ball, MD, Christopher J Dente*, MD, Andrew W Kirkpatrick, MD, Amy D Wyrzykowski, MD, Jeffrey M Nicholas*, MD, Beth Shaz, MD, Kevin B Laupland, MD, Gary A Vercruysse, MD, Jeffrey P Salomone*, MD, Elijah Dixon, MD, Brian H Williams, MD, Grace S Rozycki*, MD, David V Feliciano*, MD. Emory University.

Objective: Massive transfusion protocols (MTP) utilizing high plasma and platelet ratios for exsanguinating trauma patients are increasingly popular. Patients with major liver injuries can typify the need for massive resuscitation, immediate hemorrhage control, damage control procedures, and an open abdomen. Unfortunately, current MTP-related literature is limited to describing mortality and morbidity among patients with mixed patterns of injury. The primary goal of this study was to identify the specific effects of a formal MTP on patients with major liver trauma.

Methods: All patients with grade 3, 4 or 5 liver injuries who required a massive blood transfusion were analyzed. Patients with high plasma:red blood cell:platelet ratio (1:1:1) transfusions (2007-2009) were compared to those injured preceding the implementation of an institutional MTP (2005-2007). Standard statistical methodology was employed.

Results: Of the 60 patients with major liver injuries, 35 (58%) underwent resuscitation following implementation of a formal MTP. Patient and injury characteristics (age, gender, mechanism, ISS, hemodynamic stability, presenting base deficit, concurrent injuries) were similar between cohorts ($p>0.05$). Implementation of a formal MTP significantly improved plasma:red blood cell:platelet ratios, and decreased crystalloid fluid resuscitation ($p<0.05$). Rapid improvements in early acidosis and coagulopathy were superior in the MTP group ($p<0.05$). More patients in the MTP cohort underwent primary abdominal fascial closure ($p<0.05$). Mean time to fascial closure was 4.2 days. This was most pronounced for grade 4 liver injuries (75% vs. 14%). The overall survival rate for major liver injuries was not affected by MTP initiation ($p>0.05$).

Conclusions: The implementation of a formal MTP using high plasma and platelet ratios resulted in substantially increased rates of abdominal wall approximation. This was concurrent to a decrease in the volume of crystalloid fluid delivered during the initial resuscitation.

Poster # 99

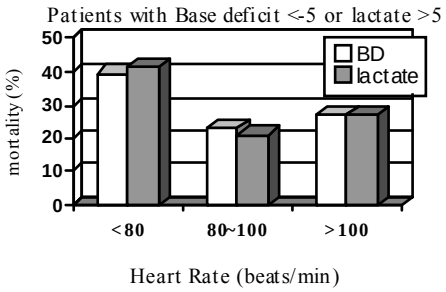
DISCREPANCY BETWEEN HEART RATE AND HYPOPERFUSION IS A PREDICTOR OF MORTALITY IN TRAUMA PATIENTS

Yasuaki Mizushima, MD; Yoshiaki Takahashi, MD; Masato Ueno, MD; Hiroaki Watanabe, MD; Kazuo Ishikawa*, MD; Tetsuya Matsuoka, MD. Osaka prefectural Senshu Critical Care Medical Center.

Background: Tachycardia is an important early sign of shock in trauma. Although the base deficit (BD) and lactate reflect are indicative of hypoperfusion and have been shown to predict mortality, some cases show a discrepancy between the heart rate (HR) and the BD or lactate; the prognosis in such cases is poor. The objective of this study was to examine whether the inability to mount tachycardia after hypoperfusion is associated with increased mortality.

Methods: Retrospective data were collected on 1921 patients admitted to our trauma center. Mortality was compared with different levels of BD, lactate and HR on admission. Multivariate logistic regression was used to identify the significant risk factors for mortality.

Results: There was significant increased mortality in patients with BD < -5 or lactate > 5 (mmol/l). Among the patients with hypoperfusion (BD < -5 or lactate > 5), those with normal HR (HR < 80) was associated with a higher mortality rate than those with tachycardia (HR 80~100 or HR > 100). However, systolic blood pressure (SBP) was not significantly different between the different HR groups. Logistic regression analysis revealed that the discrepancy between HR and indicators of hypoperfusion (Dis BD: BD < -5 and HR < 80, or Dis lac: lactate > 5 and HR < 80) are independent predictors of mortality after controlling for age, SBP, ISS, head AIS, HR, and BD or lactate (Dis BD: OR, 2.9; 95% CI 1.2–7.2; p < 0.05 and Dis lac: OR, 8.0; 95% CI 3.2–19.7; p < 0.01, respectively).



Conclusion: Inability to mount tachycardia in the presence of hypoperfusion is associated with poor prognosis, independent of injury severity, SBP, and head injury. Discrepancy between the HR and indicators of hypoperfusion (HR< 80 and BD < -5 or lactate > 5) could be considered as a predictor of mortality in trauma patients.

Poster # 100

IMPLEMENTATION OF A MASSIVE TRANSFUSION PROTOCOL IN A LEVEL I TRAUMA CENTRE: IMPROVED COAGULATION, REDUCED INFECTION RATES AND FASTER BLOOD PRODUCT ADMINISTRATION

SJM Kamphuis, LMG Geeraedts Jr, MD, SK D'Amours, MD, E Caldwell, RN BA RM Psych Cert, T Greenfield, MD, MJA Parr, MB BS, G Tweeddale, MD, D Rosenfeld, MD, Z Balogh*, MD. Liverpool Hospital.

Purpose Outcomes following major trauma with massive transfusion may be improved by using a massive transfusion protocol (MTP) facilitating rapid resuscitation with packed red blood cells (PRBC), fresh frozen plasma (FFP) and platelets (PLT) in a well-defined ratio. The aim of this study was to compare patient outcomes, laboratory values and coagulation profile before and after introduction of the MTP in a level I Australian trauma centre with a target ratio of PRBC:FFP:PLT 1:0.6:0.6. In addition, amounts of blood product administered and time intervals were determined.

Methodology In a retrospective study of prospectively collected data from massively transfused (=10 PRBC in 24 hours) trauma patients before and after implementation of a MTP outcome parameters (mortality, complications, laboratory values, coagulation profile), usage of blood products and time intervals were determined.

Results A total of 8407 trauma patients with major injuries were admitted over the eight years of the study. Ninety-nine patients underwent massive transfusion and were included in the study, 54 in the pre-MTP group and 45 in the MTP-group.

The time to administration of the first blood product was reduced (79 vs. 37 minutes, p=0.042) after introduction of the MTP. In the MTP group, there were fewer infections (28 vs. 13, p=0.021). In the MTP group, normalization of markers of coagulation occurred more rapidly than in the pre-MTP group: prothrombin time at 6 hours (15.65 vs. 13.85, p=0.048), pH at 6 hours (7.34 vs. 7.39, p=0.008), platelets at 24 hours (91.89 vs. 112.71, p=0.017) and haemoglobin at 24 hours (93.2 vs. 102.5, p=0.030).

Conclusions Implementation of a MTP in an Australian level I trauma centre was associated with reduced time to administration of the first blood product, reduced infection rates and more rapid improvement of markers of coagulation.

Poster # 101

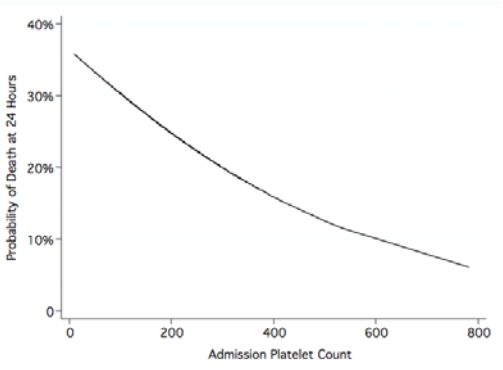
A NORMAL PLATELET COUNT IS NOT ENOUGH: THE IMPACT OF ADMISSION PLATELET COUNT ON OUTCOME IN SEVERELY INJURED TRAUMA PATIENTS.

Lisa M Brown, MD, Mariah Call, BS, M Margaret Knudson*, MD, Mitchell J Cohen*, MD.
University of California, San Francisco.

Background: Recent studies have shown that platelets play a central role in hemostasis after trauma. However, the platelet count of most trauma patients does not fall below the commonly taught "normal range" (100K-450K), and as a result, little attention has been paid to admission platelet count as a predictor of outcome. The purpose of this study was to examine the relationship between admission platelet count and outcome after trauma.

Methods: We conducted a retrospective cohort study of 389 massively transfused trauma patients. Regression methods and the Kruskal-Wallis test were used to test the association between admission platelet count and 24 hr mortality and units of PRBCs transfused.

Results: For every 50K increase in admission platelet count, the odds of death decreased 17% at 6hrs (p=0.03, 95% CI 0.70-0.99) and 14% at 24hrs (p=0.02, 95% CI 0.75-0.98). The probability of death at 24 hrs decreased with increasing platelet count (Figure). For every 50K increase in platelet count, patients received 0.7 fewer units of blood within the first 6 hrs (p=0.01, 95% CI -1.3- -0.14) and one less unit of blood within the first 24 hrs (p=0.002, 95% CI -1.6 - -0.36). The mean number of units of PRBCs transfused within the first 6 hrs decreased with increasing platelet count, 19 ± 12 (0-100K), 16 ± 10 (101K-200K), 14 ± 10 (201K-300K), and 15 ± 11 (≥301K), p=0.001.



Conclusions: Admission platelet count was inversely correlated with 24 hr mortality and transfusion of PRBCs. Our results suggest that a "normal" platelet count may be insufficient after severe trauma, and as a result, these patients may benefit from a lower platelet transfusion threshold. Future studies of platelet number and function after injury are warranted.

Poster # 102

IMPACT OF CRYSTALLOID TO PRBC RATIO IN PATIENTS WITH EXSANGUINATING PENETRATING ABDOMINAL INJURIES: THE CONUNDRUM OF RESUSCITATION

Marie E Unruh, MD, Norman E McSwain Jr*, MD, Peter Meade, MD MPH, Alan B Marr, MD, Lance Stuke, MD MPH, John P Hunt*, MD MPH, Christopher C Baker*, MD, Juan C Duchesne, MD. TULANE UNIVERSITY SCHOOL OF MEDICINE.

Introduction: High transfusion ratios of FFP:PRBC have been associated with increased survival in patients receiving massive transfusion. We hypothesize that minimizing the amount of intra-operative crystalloids in combination with high FFP:PRBC transfusion ratio will convey a survival benefit in patients with exsanguinating penetrating abdominal injuries (EPAI).

Methods: 9 year retrospective study of patients with penetrating abdominal injuries at a Level 1 Trauma Center who received > 20 units of PRBC in the operating room. Intra-operative ratio for FFP: PRBC was analyzed and placed in three separate categories, High (>1:2), Mid (1:4-1:2) and Low ratio (<1:4) groups. Impact on mortality was compared.

Results: Intra-operative High ratio FFP: PRBC conveyed a 32% overall survival benefit when compared to Low ratio (p=0.009). Patients that received a High ratio FFP: PRBC had less intra-operative crystalloids (Crystalloids: PRBC ratios= 1: 3.4 vs. 1:1.1, p=0.001) when compared to Low ratio group. Logistic regression showed that an inverse Crystalloid: PRBC ratio in relation to High FFP:PRBC ratio conveyed a survival benefit (OR; 95% CI: 0.11 (0.01-0.59), p=0.001).

	High ratio	**Mid ratio**	**Low ratio**	****p-value***
OUTCOMES	n = 27	n = 21	n = 16	
Overall Mortality	15/27 (56%)	16/21 (76%)	15/17 (88%)	0.009
OR	5/27 (19%)	4/21 (19%)	5/17 (29%)	0.13
Intra-operative Resuscitation				
Mean PRBC (units)	32	31	33	0.79
Mean FFP (units)	26	12	7	0.001
Mean Crystalloids (L)	9.2	17	29	0.003

** *p-value for High vs. Low ratios*

Conclusions: For patients with EPAI, increased mortality was seen in patients with Low ratio FFP: PRBC and inversely High ratio Crystalloids:PRBC. This suggests that minimizing the amount of intra-operative crystalloids given to patients requiring massive volumes of PRBC and FFP can improve survival.

Poster # 103

A SYNTHESIZED RADICAL SCAVENGER, EDARAVONE AMELIORATES ENDOTOXIN-INDUCED PERMEABILITY INCREASE IN PULMONARY ENDOTHELIUM, BUT NOT IN ALVEOLUS EPITHELIUM.

Shiro Mishima, MD, Tetsuo Yukioka*, MD, PhD. Emergency & Critical Care Medicine, Tokyo Medical University.

Objective: Pulmonary endothelium and epithelium play key roles in acute lung injury associated with reactive oxygen species. However, there exists no reliable antioxidant medicine in the clinical situations. Current study examined whether a synthesized radical scavenger, 3-methyl-1-phenyl-2-pyrazolin-5-one (edaravone), ameliorates pulmonary endothelial and epithelial permeability increase in cell monolayer model against endotoxin challenge.

Methods: Human pulmonary artery endothelial cells (HPAEC) or alveolus epithelial cell line (A549) were grown as monolayer on permeable supports in transwell chamber systems One hundred μg/mL of endotoxin (LPS group) or phosphate buffer saline (Control) were administered into the apical chambers of HPAEC or the basal chambers of A549. Another set of chambers was treated with endotoxin and 0.6 mg/mL of edaravone (LPS+ED). To estimate the integrity of cell monolayers, trans-endothelial electrical resistance (TER) was measured. The permeability was assessed by quantifying the trans-monolayer passage of fluoresces in isothiocyanate-labeled dextran (FITC-Dx) at 3 hours after endotoxin challenge.

Results: Both in HPAEC and A549 sets, the percentage changes of mean TER of LPS groups were significantly lower than those of controls (82.5 vs. 90.4% in HPAEC, 79.2 vs. 88.0% in A549, $p<0.05$, ANOVA). Edaravone reversed the TER decrease of the LPS+ED in HPAEC ($p<0.05$), but not in A549. The concentration of FITC-Dx in the basal chamber in LPS group was significantly higher than that of the control (1.5 vs. 2.9 mg/mL, $p<0.05$). The increased permeability of HPAEC monolayer induced by endotoxin was diminished in the LPS+ED group ($p<0.05$). However, the effect of edaravone was not seen in A549 series

Conclusion: Free radical scavenger, edaravone attenuated the monolayer dysfunction mediated by endotoxin in the pulmonary endothelium, but not in the epithelial cell lines.

Poster # 104

HEART RATE COMPLEXITY CORRELATES WITH LACTATE AND BASE EXCESS DURING LETHAL HEMORRHAGIC SHOCK

Shimul Patel, MD, Christopher E White, MD, MSc, Andriy Batchinsky, MD, Charkes E Wade, PhD, John Burns, PhD, Leopoldo Cancio*, MD. US Army Institute of Surgical Research.

Introduction: Arterial base excess (BE) and lactate (LAC) correlate with perfusion status during hemorrhagic shock but require blood draws. We explored the relationship between sample entropy (SampEn), a noninvasive single-scale heart-rate-complexity measure, and both LAC and BE during lethal hemorrhage in conscious sedated swine.

Methods: 12 spontaneously breathing, sexually mature male swine were sedated, instrumented and underwent a controlled hemorrhage to remove 60% of estimated blood volume over 1 hour. Electrocardiogram (EKG) was recorded continuously at 500Hz and analyzed in 200 heart-beat sections at 3 time points: baseline, end hemorrhage (End Hem) and within 20 minutes of death (End Expt). At each time point, SampEn, systolic arterial pressure (SAP), LAC, and BE were recorded. Changes in each variable at End Hem and End Expt were compared to Baseline using one way ANOVA with repeated measures and Dunett's adjustment for multiple comparisons. A Spearman correlation was performed to compare the relationship between SampEn, BE, and LAC.

Results: See Table (*p<.0001). Average survival time was 73 min (range 15-180 min). LAC increased and the other variables decreased at End Hem and End Expt. SampEn correlated significantly with BE (r=0.58, p<.0001) and LAC (r= -0.57, p<.0001).

Variable	Baseline	End Hem	End Expt
SAP mm Hg	144±21	43±15*	39±14*
SampEn	1.6±0.3	1.0±0.2*	1.0±0.3*
BE	6.8±2	-3.3±5*	-9.7±4.6*
LAC	1±0.5	9±4.4*	13.6±4.5*

Conclusions: A decrease in SampEn after bleed correlated with significant decreases in BE and LAC, presaging further decreases in these values and terminal shock. Decreased heart rate complexity as measured by SampEn may thus serve as a noninvasive measure of the presence of severe hemorrhagic shock.

Poster # 105

CHANGES IN TRANSFUSION PRACTICE IN MULTIPLY INJURY BETWEEN 1993 AND 2006: AN ANALYSIS ON 5.389 PATIENTS FROM THE TRAUMA REGISTRY OF THE DEUTSCHE GESELLSCHAFT FÜR UNFALLCHIRURGIE/GERMAN TRAUMA SOCIETY (TR-DGU)

Marc Maegele, MD, PhD, Rolf Lefering, PhD, Arasch Wafaisade, MD, Sigune Peiniger, MD, Bertil Bouillon*, MD, and the AG Polytrauma of the German Trauma Society (DGU).
Department of Trauma and Orthopedic Surgery, IFOM, University of Witten-Herdecke, Cologne (Germany).

Introduction To evaluate transfusion practices in multiply injury and to demonstrate potential changes in the pattern of red blood cell (RBC) transfusions over the last one-and-half decades (1993-2006).

Methods A retrospective analysis using the Trauma Registry of the Deutsche Gesellschaft für Unfallchirurgie/German Trauma Society (TR-DGU) including 29.353 multiply injured patients was conducted. The study population included primary admissions presenting to the emergency room (ER) with clinical and laboratory signs of active haemorrhage (haemoglobin < 9 g/dl, platelets < 90.000/ml, and PT (Quick-value) < 60%). The pattern of RBC transfusions was followed from ER to intensive care unit (ICU) admission. 5.389 patients with complete data sets were analysed.

Results Patients had a mean age of 40,5 (SD 20) years and were predominantly male (67%). All patients were substantially injured as reflected by a mean injury severity score (ISS) of 31,7 (SD 16,3) and in 93,6% the mechanism of injury was blunt. The percentage of patients who received RBC transfusions between ER and ICU admission dropped from 82,1% in 1993 to 50,3% in 2006. Similarly, the percentage of patients receiving mass transfusion (> 10 RBC units) dropped from 51,3% to 17,1%. This decline was accompanied by a decrease in i.) septic complications , ii.) overall hospital stay, and iii.) 30-day mortality.

Conclusion RBC transfusion practices in acute trauma care have changed substantially over the last one-and-half decades. This decline was associated with a lower rate for septic complications and mortality.

Poster # 106

ETHANOL AND BLOOD TRANSFUSION REQUIREMENTS IN BLUNT TRAUMA PATIENTS

Bhairav Shah, MD, David Golay, Leonard Weireter*, MD, Rebecca C Britt, MD, Jay N Collins*, MD, Timothy J Novosel, MD, Scott F Reed, MD, LD Britt*, MD. Eastern Virginia Medical School.

Background: Alcohol intoxication is implicated in approximately one-third of all motor vehicle crashes. The literature is not consistent in describing the effect alcohol has on clinical coagulation defects and the utilization of blood products needed to treat these issues. Thromboelastography (TEG) data has suggested an alcohol related coagulation defect, unfortunately TEG use is limited so the ability to extrapolate from or replicate this data is poor. Our goal was to examine, via retrospective review of our trauma database, relationships between alcohol intoxication (BAC > 0.08 g/dl) and blood product use.

Methods: We performed a retrospective analysis of our Level 1 trauma center registry for blunt trauma patients between the dates of 1/04 and 12/08. Records included in the study had the following criteria: age >18 years old, ethanol measured at arrival to the hospital, ISS calculated and LOS measured. Statistical software was used to look for correlation between transfusion and alcohol level while adjusting for ISS and age.

Results: 3781 patients were seen for blunt trauma between 1/04 and 12/09. 3029 pts had a recorded ethanol level and ISS, 2208 had a BAC < 0.08g/dl while 821 were intoxicated. Non-intoxicated pts were transfused significantly more often than intoxicated pts (11 vs 7.8%) ($p<0.01$), were older 43.1 vs 38.6 years ($p<0.0001$) and more likely to die prior to discharge ($p=0.04$). ISS and LOS were not significantly different between the two groups.

	Non-Intoxicated	Intoxicated
Transfused	242	64
No prbc	1966	757

Conclusions: Although TEG data has suggested alcohol may alter coagulation ability, our data would indicate that alcohol intoxication does not appear to increase the requirement for transfusion. In the face of similar ISS and LOS, non intoxicated patients are more likely to require transfusions and die prior to discharge.

Poster # 107

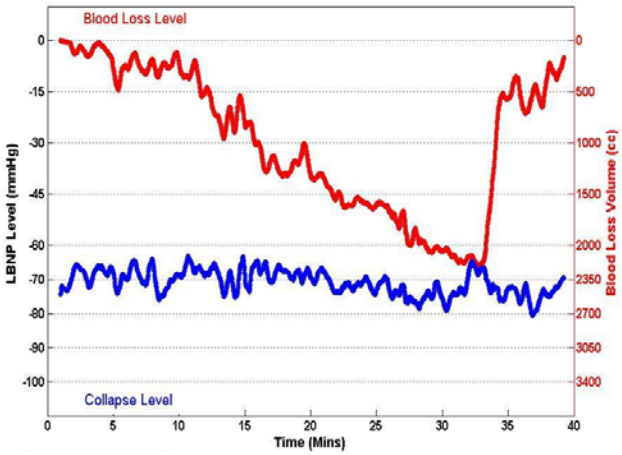
NON-INVASIVE PREDICTION OF ACUTE BLOOD LOSS VOLUME AND CV COLLAPSE

Steven L Moulton*, MD, Jane Mulligan, PhD, Greg Z Grudic, PhD, Kathy L Ryan, PhD, Caroline A Rickards, PhD, Victor A Convertino, PhD. The University of Colorado.

Introduction: Hemorrhage is a leading cause of traumatic death. We hypothesized that state-of-the-art feature extraction and machine learning techniques could detect subtle, hemodynamic changes in patients, and that these changes would be predictive of acute, progressive blood loss before the onset of hypotension and hemodynamic decompensation.

Methods: We exposed 117 healthy humans to progressive central hypovolemia using lower body negative pressure (LBNP) to the point of hemodynamic decompensation. Continuous, non-invasively measured blood pressure waveform data were analyzed. Statistically unbiased accuracy estimates of the resulting models were obtained by building models using 116 subjects and testing on the 117th. This process was repeated 117 times, each time using a different subject. Live experiments were carried out to test the algorithm.

Results: Initial sample size was 30 heart beats, after which a new prediction was made with each new beat. Figure 1 shows the algorithm's *real-time* estimate of LBNP (upper tracing) with the *real-time* prediction of LBNP at which the subject will collapse (lower tracing) from a live experiment. The algorithm accurately predicted when the patient would collapse; i.e. when the upper and lower tracings met. Overall, our method was 96% accurate in estimating the level of LBNP (i.e. blood volume loss); correlation between the predicted and actual LBNP level at which subjects collapsed was 0.96.



Conclusion: Machine modeling can quickly and accurately *estimate* blood volume loss, *predict* the level at which an individual will decompensate, and may provide a *real-time* view of fluid resuscitation effectiveness.

Poster # 108

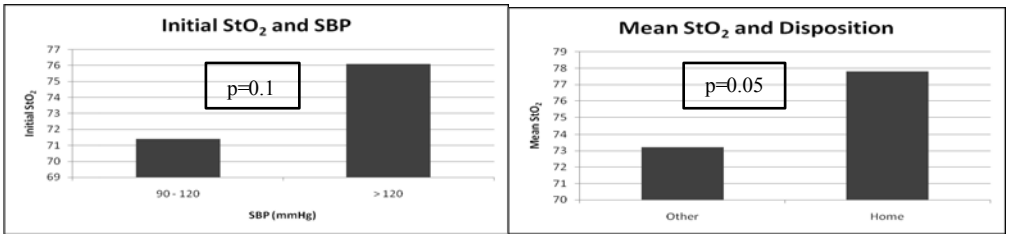
STO2 MONITORING IDENTIFIES ELDERS AT RISK FOR COMPLICATIONS FROM OCCULT HYPOPERFUSION FOLLOWING TRAUMA

David C Griffin, MD, Raminder Nirula, MD MPH*. University of Utah.

Introduction Elderly trauma patients are at increased risk of occult hypoperfusion when compared to younger patients even at SBP >90mmHg. Early invasive monitoring has been proven to improve outcomes but requires central access. Non invasive tissue oxygen saturation (StO2) monitoring predicts the development of MODS in younger trauma patients and we hypothesized that this technology could identify elderly trauma patients with normal vital signs who are at risk for common complications (including death) without the need of invasive monitoring.

Methods Single center, IRB approved, non randomized prospective trial of trauma patients >65 years who had StO_2 levels monitored for the first 24 hours following admission to a ACS COT level 1 Academic Trauma Center. Demographics, vital signs, laboratory data, StO_2 values and outcomes measures including death were examined using multivariate linear regression as well as AUC analysis.

Results 96 patients were enrolled over a 17 month period. Mean age was 77.6 +/- 8 years. Most were white and 52% were female. Mean SBP was 144 +/- 24 mm Hg and mean ISS was 10.8 +/- 7.6. 58% of patients were accepted in transfer. Mortality rate was 4.3% and 29.2% developed any complication prior to discharge.



Conclusion StO_2 monitoring accurately identifies elderly trauma victims with occult hypoperfusion. This is also associated with increased resource utilization.

Poster # 109

GROUP VIB CALCIUM-INDEPENDENT PHOSPHOLIPASE A2 IS ASSOCIATED WITH ACUTE LUNG INJURY AFTER INTESTINAL ISCHEMIA/REPERFUSION IN MICE

Koji Morishita, MD, Saori Mikami, MD, Junichi Aiboshi, MD, Tetsuyuki Kobayashi, PhD, Yasuhiro Otomo, MD*. Tokyo Medical and Dental University,Ochanomizu University.

Introduction: Intestine exposed to ischemia/reperfusion (I/R) produces a variety of inflammatory mediators. These mediators enter into the systemic circulation through the mesenteric lymph duct, leading to lung injury. Our studies have demonstrated that post-hemorrhagic shock mesenteric lymph contains biologically active lipids, such as lyso-phosphatidylcholine and lyso-phosphatidylethanolamine with linoleic acid and arachidonic acid. We speculate that the possible enzyme involved in the production of these lipids is group VIB calcium-independent phospholipase A_2 (iPLA$_2$ γ). Therefore, the purpose of our study was to determine the role of iPLA$_2\gamma$ on acute lung injury following intestinal I/R with 6E-*(bromomethylene)*tetrahydro-3R-(1-naphthalenyl)-2H-pyran-2-one (BEL), iPLA$_2\gamma$ specific inhibitor.

Methods: Male C57BL/6 mice were anesthetized intra-peritoneally and then cannulated into jugular vein. After laparotomy, 30 minutes of intestinal ischemia followed by 2 hour reperfusion (I/R group) were done. Sham group was performed the same procedure without intestinal I/R. Evans blue dye (EBD) was injected 90 minutes after reperfusion and 30 min later, lungs and proximal ileum were harvested. The concentration of EBD was measured by EBD method. In the next study, mice were given 100uM BEL (BEL group) or dimethyl sulphoxide (DMSO group) intra-peritoneally one hour before anesthesia. Animals were exposed to intestinal I/R in the same manner as mentioned above.

Results: Intestinal I/R significantly increased vascular permeability in lung (84.8 + 5.0 ug/g of tissue wt), compared to sham group (50.8 + 4.5 ug/g of tissue wt). In next experiment, BEL induced significant decrease in lung injury (BEL: 56.7 + 2.9; DMSO: 77.0 + 4.7 ug/g of tissue wt), but not intestinal injury (BEL: 49.0 + 4.8; DMSO: 48.8 + 6.0 ug/g of tissue wt).

Conclusions: BEL attenuates pulmonary vascular permeability following intestinal I/R. iPLA$_2\gamma$ may be related to the pathogenesis of acute lung injury.

Poster # 110

ADRENAL INSUFFICIENCY IN THE ELDERLY TRAUMA PATIENT

Nicholas H Carter, BA, Sean F Monaghan, MD, Daithi S Heffernan, MD, Matthew S Kozloff, MD, Shea C Gregg, MD, Michael D Connolly, MD, Charles A Adams, Jr*, MD, William G Cioffi*, MD. Rhode Island Hospital/Alpert Medical School of Brown University.

Objective: The prevalence and impact of adrenal insufficiency (AI) in elderly trauma patients is uncertain. A recent study suggests that treating AI in trauma patients reduces mortality by as much as 50%. Many of the causes of AI are more commonly found in elderly patients. Therefore, we hypothesize that age over 65 is associated with AI in trauma patients.

Methods: The trauma registry of a Level I trauma center was reviewed to identify patients who had undergone testing for adrenal insufficiency between January 1, 2003 and January 1, 2008. A diagnosis of AI was established if a patient's random cortisol was less than 20 mcg/dL or if cosyntropin stimulation testing produced an increase in cortisol of less than 9 mcg/dL. Rates of AI diagnosis and outcomes were determined for three age groups: >65, >50, and 18-50.

Results: 1709 blunt trauma patients were included, of whom 29 (1.7%) were tested for AI and 20 (1.2%) were diagnosed with or treated for AI. Patients older than 65 were more likely to be diagnosed with AI than patients under 65 (2.3% vs. 0.78%; $p=0.022$). In addition, the group of patients older than 50 were also more likely to be diagnosed with AI than patients under 50 (2.3% vs. 0.3%; $p<0.001$). Both groups of older patients were significantly more likely to be tested for AI than patients under 50 (3.5% > 65, 3.4% > 50, 0.4% < 50; $p=0.002$ and $p<0.001$, respectively). In patients older than 50, AI was associated with a mortality rate of 82% compared to 21% in patients not diagnosed with AI ($p<0.001$) despite no significant difference in rate of head injuries. Adrenal insufficiency in patients over 65 is associated with 100% mortality.

Conclusion: AI is much more commonly diagnosed in elderly trauma patients and is associated with significantly increased mortality. Awareness of AI in this population, starting at age 50, can help guide clinical decision-making.

Poster # 111

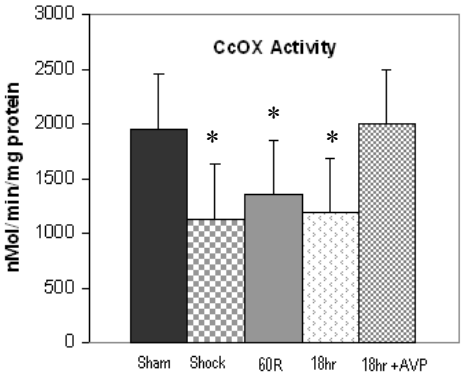
RESUSCITATION OF HEMORRHAGIC SHOCK WITH VASOPRESSIN RESTORES LIVER CYTOCHROME OXIDASE ACTIVITY

Carrie A Sims*, MD, Yuxia Guan, BS, Julia Rosenbloom, MD, Jose Pascual, MD, Baback Sarani*, MD, Lance Becker, MD, Patrick Reilly*, MD, CW Schwab*, MD. University of Pennsylvania.

Introduction: Severe hemorrhagic shock (HS) is associated with the development of a vasopressin (AVP) deficiency in severely injured trauma patients. In addition to its vasopressor qualities, AVP plays a key role in mitochondrial metabolism. Cytochrome oxidase (CcOX), the final oxidase of the electron transport chain, is particularly vulnerable to HS and reperfusion. We hypothesized that AVP supplementation during the resuscitation of decompensated HS would preserve CcOX activity.

Methods: Using a model of decompensated HS, Sprague-Dawley rats were bled to a MAP of 40 mmHg until the blood pressure could not be maintained without fluid infusion. A MAP of 40 mmHg was maintained by incrementally infusing 40% of the shed blood volume in Lactated Ringer's (LR) (Shock). Animals were then resuscitated with 4 X the total shed volume in LR over 60 minutes (60R) plus either AVP (0.5 units/kg bolus + 2 units/kg/hr) or a similar volume of LR. Animals were followed post-resuscitation for 18 hrs (18h +AVP or 18hr). Control animals (Sham) were not hemorrhaged. Animals were sacrificed at each time point (Sham, Shock, 60R, 18hr, 18hr +AVP; n=5 per group). Liver mitochondria were harvested and analyzed spectrophotometrically for CcOX activity. Data were analyzed using a Mann U Whitney test ($p<0.05$, * significant).

Results: HS and resuscitation were associated with significantly impaired CcOX activity. AVP supplementation improved post-resuscitation blood pressure (18hr: 75±4 mmHg vs 18hr +AVP: 86±12 mmHg, $p<0.05$) and ameliorated CcOX dysfunction seen 18 hrs post-resuscitation.



Conclusions: Using AVP during the resuscitation of HS improves hemodynamics 18hrs post-resuscitation and preserves mitochondrial function.

Poster # 112

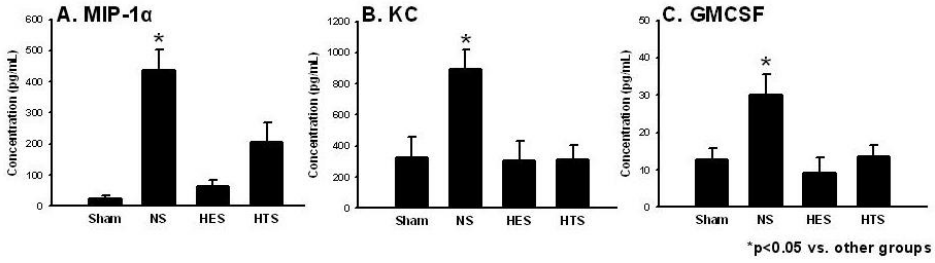
CRYSTALLOID RESUSCITATION EXACERBATES SYSTEMIC INFLAMMATION FOLLOWING COMBINED HEMORRHAGIC SHOCK AND TRAUMATIC BRAIN INJURY IN MICE

Amy T Makley, MD, Eric M Campion, MD, Lou Ann W Friend, RVT, Warren C Dorlac, MD, Jay A Johannigman*, MD, Alex B Lentsch, PhD, Timothy A Pritts, MD, PhD. University of Cincinnati Department of Surgery.

Objective: Traumatic brain injury (TBI) and hemorrhage remain the two most common causes of mortality following trauma, often occurring in a combined injury pattern. Optimal resuscitation must adequately restore perfusion but avoid exacerbation of dysfunctional inflammation which may contribute to later morbidity and organ damage. We hypothesized that crystalloid infusion following combined TBI and hemorrhage would worsen inflammation and organ injury as compared to colloid or hypertonic saline.

Methods: Mice underwent moderate TBI by weight drop followed by hemorrhage via femoral arterial cannulation and withdrawal of blood to a SBP of 25 mmHg for 1 hour. Mice were resuscitated with 0.9% normal saline (NS), 6% Hetastarch (HES), 3% hypertonic saline (HTS) to a goal SBP of 80 mmHg. Serum was collected for analysis by ELISA and vascular leak in jejunal samples was determined by Evans blue technique.

Results: Mice resuscitated with NS demonstrated increased levels of macrophage inflammatory protein-1α (MIP-1α), keratinocyte-derived chemokine (KC), and granulocyte monocyte colony stimulating factor (GMCSF) compared to mice resuscitated with HES or HTS (Figure). Mice resuscitated with NS exhibited significantly increased vascular permeability in the intestine compared to mice resuscitated with HTS (data not shown).



Conclusion: Mice resuscitated with saline demonstrated significantly increased levels of inflammatory mediators and capillary leak compared to mice resuscitated with HTS or colloid. Crystalloid resuscitation may exacerbate systemic inflammation and organ dysfunction following combined hemorrhage and TBI.

Poster # 113

HEMORRHAGIC SHOCK INDUCES ISOLATED TRANSIENT PLATELET DYSFUNCTION IN RHESUS MACAQUES

Paul F Hwang, MD, Eric Elster, MD, Douglas Tadaki, PhD, Michael Tiller, MD, Darren Fryer, BS, Crystal Leonhardt, Forest R Sheppard, MD, Sponsoring Member: Ernest E Moore*, MD.
Naval Medical Research Center.

Introduction: Bleeding is a major cause of death in patients with traumatic injuries. In response, resuscitation strategies have incorporated empiric treatment(s) of coagulopathy. However, the effect of acute traumatic hemorrhage on coagulation remains unclear. To further elucidate its acute effect on coagulation and evaluate interventions, we developed a closed abdomen model of uncontrolled hemorrhage in Rhesus Macaques.

Methods: Laparoscopically, 60% left hepatectomies were performed in Rhesus Macaques without hemorrhage control, CO_2 was vented and operative ports removed immediately following injury (T=0 min). During T=15-120 min post-injury, 20cc/kg NS was administered. Hemostasis was achieved and blood loss quantified at T=120 min. Subsequently, monitoring continued for 480 min post-injury. Physiologic data, Rotation Thromboelastometry (ROTEM®), arterial blood gases and CBCs were collected. Analysis: paired sample T-test ($p<0.05$ significance); results: Mean±SEM.

Results: Model induced $\geq$ Class III hemorrhagic shock within 15 min (?MAP: 22.3mmHg±7.4, $p=0.029$), with 34.65%±4.36 blood loss at T=120. At all timepoints, rotational thromboelastograms (rTEG) were normal. rTEG subanalysis demonstrated no alteration in coagulation factor or fibrin function from baseline. K increased and α-angle and MA decreased from pre-injury. These were observed during T=150-240 min post-injury ($p<0.05$). Platelet decrease was significant at T=360.

Conclusions: Acute hemorrhagic shock does not result in abnormal fibrin or coagulation factor function as determined by rTEG; however a transient impaired platelet function is induced. These findings are consistent with and elaborate on previous clinical reports dating to the Vietnam War. Empiric treatment of existing fibrin or coagulation factor defects during initial resuscitation is not supported and potential utility of early platelet aimed intervention suggested. Further investigation is warranted in this model and clinically, to include more severe hemorrhage/shock and response to therapy.

Poster # 114

Laser Doppler Imaging for Early Detection of Hemorrhage

Meghann L Kaiser, MD, Allen Kong, MD, Earl Steward, BS, Matthew Whealon, BS, Madhukar Patel, BS, David B Hoyt, MD*, Marianne E Cinat, MD*. University of California, Irvine.

Objective: Laser Doppler Imaging (LDI) is a noninvasive means to measure blood flow through the superficial skin capillary plexus using flux units. Our objective was to determine the ability of Laser Doppler Imaging (LDI) of the skin to detect and quantify rapid, severe hemorrhage.

Methods: 5 Yucatan mini-pigs (25–35 kg) underwent controlled hemorrhage of 25cc/kg blood over 20 min. Median flux of a 10x10cm area of the lower abdomen was measured at 2 min intervals from initiation of hemorrhage to resuscitation with concurrent measurement of HR, systolic blood pressure (SBP), and MAP. Avg correlation (ρ) of LDI, HR, SBP, and MAP with blood volume lost was calculated. Sensitivities, specificities, positive predictive values (PPV) and negative predictive values (NPV) of a 5 unit change in flux, HR, SBP, and MAP were determined.

Results: Avg time to a change of 5 units in flux following start of hemorrhage was 2.4 min. This was significantly faster than time to change in HR (19.2 min. $p<0.05$), and showed a trend towards more rapid identification of hemorrhage relative to changes in SBP (3.2 min, $p=0.157$) and MAP (3.6 min, $p=0.083$). Flux changes occurred at smaller % total blood volume lost than HR (3.94% vs 28.8%, $p<0.05$), and trended towards smaller volume identification than SBP (4.88%, $p=0.180$) and MAP (5.36%,$p=0.102$). Correlation (ρ) of blood volume lost to flux was -0.974, HR 0.346, SBP -0.978, and MAP -0.975. Sensitivity, Specificity, PPV and NPV for identification of blood loss are depicted below.

	Sensitivity	p*	Specificity	p*	PPV	p*	NPV	p*
Flux	0.726		0.938		0.485		0.984	
HR	**0.176**	**0.043**	0.932	0.893	**0.149**	**0.043**	**0.950**	**0.043**
SBP	0.488	0.068	0.967	0.225	0.547	0.345	0.970	0.080
MAP	**0.331**	**0.042**	0.978	0.080	0.568	0.715	**0.962**	**0.043**

***p-value of indices vs flux

Conclusion: Laser Doppler Imaging is a sensitive, specific and early means to detect and quantify severe hemorrhage.

Poster # 115

Factors associated with mortality in massively transfused trauma patients

Sigrid Burruss, MD, Areti Tillou*, MD, Jonathan Hiatt*, MD, Henry Cryer*, MD. University of California, Los Angeles.

Background: Increased usage of fresh frozen plasma (FFP) and packed red blood cells (PRBC) with long storage times associated with current massive transfusion protocols may place injured patients at risk.

Methods: We evaluated factors associated with mortality in 158 consecutive pediatric and adult patients with blunt and penetrating injury receiving >10 units of blood during their hospitalization between 6/2006 and 6/2009.

Results: Of 158 patients, 102 survived and 56 died. Variables significantly different (P<.05) between survivors and non-survivors by univariate analysis were (X+SD): Injury Severity Score (ISS:26+10 vs. 35+10), initial blood pressure (BP: 87+30 vs. 63+45), Glasgow Coma Score (GCS: 12+5 vs. 7+5), total PRBC units received (18+14 vs. 29+24), number of PRBC units stored > 30 days (0.8$\pm$2 vs. 2.5$\pm$5) and transfusion of >30 units PRBC in the first 6 hours. Nonsignificant variables included time to first unit of FFP (p=0.67), FFP:PRBC ratio (p=0.55), platelet:PRBC ratio (p=.43), mismatched FFP (p=0.92) and number of nonleukoreduced PRBC units (p=0.48). Multivariate logistic regression model predicting mortality is shown:

Variable	OR	95% CI	P value
Age	1.039	1.015, 1.064	0.001
ISS	1.078	1.027, 1.132	0.002
BP	0.987	0.974, 0.999	0.049
GCS	0.831	0.753, 0.918	0.000
Total PRBC	0.973	0.942, 1.00	0.092
# PRBC units stored >30 day in 1st 6 hr	1.262	1.036, 1.538	0.021
Received >30 units of PRBC in 1st 6 hr	45.83	3.633, 578.0	0.003

Conclusion: After adjusting for age, ISS,BP, GCS and total PRBC, transfusion of >30 units of PRBC and the number of units stored for >30 days transfused in the first 6 hours were independent mortality predictors, while FFP or platelet:PRBC ratio, FFP mismatch, time to first FFP, and nonleukoreduction of PRBC units were not. FFP is safe, but blood stored for >30 days should not be used in massively transfused injured patients.

Poster # 116

To Transfuse or Not to Transfuse? TEG (Thromboelastogram) is the Question.

Beth Ballinger, MD, John Osborn, MSc, Martin Zielinski, MD, Kathryn Robinson, RN, CNP, Donald Jenkins*, MD, Henry Schiller*, MD, Debra Anderson, RN, CAISS, CSTR, Carol Immermann, RN, Myung Park, MD. Mayo Clinic.

Introduction: TEG is a whole blood coagulation assay that provides a comprehensive overview of the clotting process. At our rural Level 1 trauma center, TEG was adopted to direct blood component transfusion, but is not yet included in our institutional transfusion guidelines. We reviewed our experience with TEG to determine whether it triggered transfusion therapy contrary to institutional guidelines.

Methods: Trauma patients undergoing TEG who were admitted between July 2008 and June 2009 were identified via the trauma registry. Patient demographics, transfusion data, and results of TEG, standard coagulation assays (PT/INR/aPTT), and platelet counts were reviewed. Transfusions driven by TEG were compared to transfusions based on standard assays per our institutional transfusion guidelines. Data are presented as mean±SD; univariate analysis was performed with $p<0.05$ = significance*.

Results: 32 patients (24 men, 8 women; average age 53.6±25; 3 deaths) were identified. Average ISS and head AIS were 22±15 and 2.7±1.3. 32% of PT/INR and 31% of aPTT assays were abnormal, but did not trigger transfusion. Mean units transfused were: RBC 1.9±3.8 (range 0-19), FFP 2.3±3.5 (range 0-14), and platelets 0.7±0.9 (range 0-3). All platelet counts were within normal range, yet 48% of these patients received platelet transfusion. 68 TEG were performed (mean 2.1±1.7 per patient, range 1-10); maximum amplitude (MA) was abnormal in 29.4%. 75% of patients received platelets when MA was abnormal, but only 8.3% received platelets when MA was normal ($p<.0009$). No transfusion of any other blood product could be correlated with significance to any standard assay or other TEG component.

Conclusion: This is the first report to confirm that, in the face of normal platelet counts, the MA component of TEG detects a hypocoagulable state in the trauma patient which drives transfusion therapy. Despite 1/3 of standard assays being abnormal, assay-driven institutional guidelines did not trigger transfusion therapy. TEG is the answer.

Poster # 117

INTRA-OPERATIVE CLOSE RATIO RESUSCITATION WITH PLATELETS DOESN'T IMPROVE SURVIVAL IN PATIENTS WITH TRAUMA-INDUCED COAGULOPATHY

Juan C Duchesne, MD, James M Barbeau, MD, JD, Tareq Islam MD, MPH, Peter Meade MD, MPH, Alan B Marr MD, Lance Stuke MD, MPH, John P Hunt* MD, MPH, Christopher C Baker* MD, Norman E McSwain Jr* MD. TULANE SCHOOL OF MEDICINE.

Background: Intra-operative Hemostatic Resuscitation (IHR) with 1:1 FFP to PRBC ratio conveys a survival advantage in patients with trauma-induced coagulopathy (TIC). Similar outcomes have been described when a ratio of 1:1:1 for FFP to Platelets (PLT) to PRBC is achieved within initial 6 hours after injury. We hypothesize no survival advantage when IHR strategy of 1:1:1 for FFP to PLT to PRBC is compared to IHR of 1:1 for FFP to PRBC in patients with TIC.

Methods: Ten year retrospective review of trauma patients with diagnosis of TIC upon arrival to ED with intra-operative requirement >10 units of PRBC. TIC was defined as initial INR >1.2 in the presence of tissue hypoperfusion (base deficit >-6). Patient characteristics and outcomes were compared between IHR strategies for 1:1 versus 1:1:1.

Results: Total of 51 and 76 patients with a diagnosis of TIC, received IHR 1:1 and 1:1:1 ratio respectively. Patient demographics and mean operative time 129 minutes (SD ± 62) vs. 137 (SD ± 49) were similar for IHR 1:1 vs. 1:1:1 respectively. There were no differences in OR mortality (8.9% vs. 9.2%, p= 0.38); 30 day mortality (32% vs. 33%, p=0.86) and TICU LOS (11 vs. 15 days, p=0.48) for IHR of 1:1 vs. 1:1:1 respectively. In multivariate analysis IHR of 1:1:1 didn't convey a survival advantage when compared to 1:1, p=0.61 (OR; 1.15 [0.67-1.99]).

	1:1 (n:51)	1:1:1 (n:76)	p-value
Pre-op INR (SD)	1.45 (.80)	1.39 (.38)	0.22
Post-op INR (SD)	1.12 (.77)	1.07 (.21)	0.31
Pre-op PLT count	173,000	195,000	0.34
Post-op PLT count	119,000	109,000	0.47

Conclusion: Although evidence exist to support a resuscitation strategy of 1:1:1 ratio for FFP to PLT to PRBC within first 6 hours after injury, IHR with 1:1:1 ratio does not convey a survival advantage when compared to 1:1 ratio of PRBC to FFP in patients with TIC. Further analysis is needed to adopt a 1:1:1 IHR in patients with TIC. Target oriented resuscitation strategies in TIC patients needs further investigation.

Poster # 118

THE EFFECT OF INDUCED HYPOTHERMIA ON SYSTEMIC INFLAMMATORY MARKERS DURING HEMORRHAGIC SHOCK

Timothy Browder*, MD , Laura Boomer, MD, Remy Lambert, BS, Shelley Cocks, MS, Deborah Kuhls*,MD, John Fildes*, MD. University of Nevada School of Medicine.

Objective: The addition of induced hypothermia as a resuscitative method during hemorrhagic shock has been shown to improve survival. Theories for this benefit include decreases in metabolic requirements, apoptosis and reactive oxygen species. This experiment was conducted to measure the effects of induced hypothermia on systemic inflammatory markers.

Methods: Male Sprague-dawley rats were hemorrhaged over 10 minutes, maintained at a MAP of 40 mmHg and assigned to 3 groups(n=9/group). 1) Normothermic shock: core temperature 36-37C, 2) Mild induced hypothermia: core temperature 34-36C, and 3) Moderate induced hypothermia: 30-33C. Hypothermia was induced using a cooling blanket and maintained during the shock period. Sham animals were cannulated, maintained normothermic and not hemorrhaged. At the end of the shock period serum levels of IL-1α, IL-1β, TNF-α, IL-4, IL-6, IL-10 and IL-12 were analyzed using ELISA.

Results: Induced hypothermia caused a significant decrease in the pro-inflammatory markers IL-1α, IL-6 and TNF-α ($p=<0.01$) compared to normothermia. Mild hypothermia decreased inflammatory markers to a greater degree than moderate hypothermia.

Conclusions: Induced hypothermia during hemorrhagic shock attenuates the systemic inflammatory response. These findings suggest that the addition of mild hypothermia to shock resuscitation may offer greater protection than normothermia or moderate hypothermia.

Poster # 119

An analysis of intrathoracic packing with temporary chest closure versus definitive closure in patients with metabolic exhaustion after trauma thoracotomy

Jennifer L Lang, MD, Richard P Gonzalez, MD*, Kim N Aldy, MS, Elizabeth Carroll, BS, Geoffrey Funk, MD, Alexander L Eastman, MD, Cassandra Q White, MD, Herb A Phelan, MD.
UT-Southwestern Medical Center.

Introduction: Many surgeons avoid damage control techniques after thoracotomy for trauma due to concerns about packing's effects on intrathoracic pressure and infectious risks. We hypothesized that intrathoracic packing with temporary chest closure (PTCC) would yield higher-than-expected survival for trauma thoracotomy patients with metabolic exhaustion, while definitive chest closure (DCC) would exhibit predicted survival rates.
Methods: This was a retrospective review by two urban level I centers of patients who: 1)underwent emergent trauma thoracotomy, 2)received >10 units (U) packed red blood cells (PRBCs) before intensive care unit (ICU) arrival and/or sustained a cardiac arrest prior to starting chest closure, and 3)survived to ICU arrival. Demographic/physiologic data, chest closure method, and thoracic complications were gathered. Trauma Injury Severity Scores (TRISS) were used to calculate survival probability for PTCC and DCC. Data are reported as medians [interquartile ranges]. Nonparametric statistics were utilized.
Results: Sixty one patients met inclusion criteria. Both PTCC (n=17) and DCC (n=44) were severely injured (ISS=35 [25, 42] vs 29 [19, 45] and PRBC=16.5 U [12.3, 25.5] vs 15 U [11, 23], respectively (p=ns)). Patient demographics were similar except for cardiac arrest prior to starting chest closure (PTCC 82% vs DCC 48%, p=0.04). No significant differences were seen in survival for the overall samples (PTCC=47% vs DCC=57%), nor for observed:expected (O:E) survival in 13 PTCC and 30 DCC patients meeting criteria for TRISS (PTCC O-46%:E-39%, DCC O-53%:E-57%). No significant differences were found for PTCC and DCC thoracic infectious (24% vs 25%) or hemorrhagic (18% vs 14%) complications. Surprisingly, peak inspiratory pressures on ICU arrival were markedly better after PTCC (20 cm H20 [18, 31]) than DCC (32.5 cm H20 [28, 37.5], p=0.003).
Conclusion: Concerns about PTCC are not borne out (infections are unaffected and peak pressures are actually lower, possibly due to greater pleural volume from an open chest wall and skin-only closure). However, no significant survival benefit was seen with PTCC.

Poster # 120

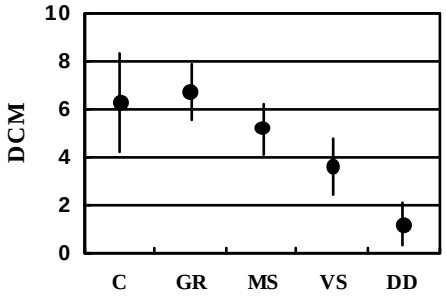
HEAD COMPUTED TOMOGRAPHIC MEASUREMENT AS AN EARLY PREDICTOR OF OUTCOME IN PATIENTS WITH HYPOXIC-ISCHEMIC BRAIN DAMAGE

Hitoshi Yamamura, MD, Junpei Takamatsu, MD, Futoshi Nagashima, MD, Hiromasa Yamamoto, MD, Yasumitsu Mizobata*, MD. Osaka City University, School of Medicine.

Objective: This study aims to evaluate whether the difference in head computed tomographic (CT) measurements (Hounsfield Units, HU) of the cerebral cortex (CC) and cerebral medulla (CM) can be used as a predictor of neurological outcome in patients with hypoxic-ischemic brain damage.

Methods: We evaluated 58 patients who had been resuscitated from cardiac arrest and had undergone head CT analysis within a few hours of restoration of spontaneous circulation. We divided the patients into the following 4 groups according to the Glasgow Outcome Scale (GOS); Good Recovery (GR group: n=10), Moderate or Severe Disability (MS group: n=6), Vegetable State (VS group: n= 18), and Dead (DD group: n= 24). Twenty patients with normal head CT findings served as controls (C). We obtained the HU measurements of the CC and CM at 6 points (bilateral frontal, temporal, and occipital lobe) We assessed the correlation between the GOS and the HU difference of the CC and CM (DCM). One-way analysis of variance (ANOVA) was used to calculate the statistical significance. Data are shown as the mean ± SD.

Results: The cause of cardiac arrest was cardiogenic shock (n= 23), airway obstruction (n=19), and other factors (n= 16). The DCM in the C and GR groups was significantly higher than that in the MS ($p < 0.01$), VS ($p < 0.001$), and DD ($p < 0.001$) groups. The DCM in the MS group was significantly higher than that in the VS group ($p < 0.001$).



The DCM in the VS group was significantly higher than that in the DD group ($p < 0.001$).

Conclusion: This study suggests that the DCM may be used as an early predictor of neurological outcome in patients with hypoxic-ischemic brain damage.

Poster # 121

OUTCOME PREDICTION MODEL FOR SEVERE TRAUMATIC BRAIN INJURY

Jiro Iba,MD, Tomoyoshi Mohri, MD, PhD, Osamu Tasaki, MD, PhD, Kazuhisa Yoshiya, MD, PhD, Tadahiko Shiozaki, MD, PhD, Hiroshi Ogura*, MD, PhD, Yasushi Nakamori, MD, PhD, Satoshi Fujimi, MD, PhD, Toshimitsu Hamasaki, PhD, Yasuyuki Kuwagata, MD, PhD.
Depertment of Traumatology and Acute Critical Medicine, Osaka University Graduate School of Medicine.

Background: Although some predictive models for trauma have been proposed**,** a mathematical model with high predictive value for severe traumatic brain injury has not been established yet. The purpose of this study is to create an outcome prediction model for severe brain injury and to examine the predictive value with external validation.

Method: Two hundred forty eight patients of severe traumatic brain injury with Glasgow Coma Scale score of <9 were admitted to two Critical Care Medical Centers from 1997 through 2009. The predictive model was derived from the former series of 130 patients. Fourteen candidate prognostic variables possibly related to outcome were evaluated. Outcomes in all cases were assessed prospectively at 6 months after injury according to the Glasgow Outcome Scale. Stepwise multivariate logistic regression analysis was used to identify independent risk factors for a poor prognosis and to find the best subset of variables for prediction. We also performed external validation of the developed model with the latter series of 118 patients.

Results: Age, light reflex (LR) on admission, intracranial pressure (ICP) and extensive subarachnoid hemorrhage (ext-SAH) on CT scan were detected as prognostic indicators. According to these results, the statistical model for outcome prediction was developed as follows. Pu = exp(B)/1 + exp(B) (Pu: the probability of an unfavorable outcome, exp(B): exponential function of B, B = 0.066*age(year) + 0.058*ICP(mmHg) + 2.85*ext-SAH(1 or 0) – 2.349*LR(1 or 0) – 2.472. Twenty six patients (22%) had a favorable outcome and 92 patients (78%) had an unfavorable outcome in the validation data set. Area under the curve of the model was 0.957, with a 95% CI of 0.925-0.990. If 0.658 was taken as cut off value, sensitivity was 91.3% (84/92), specificity 92.3% (24/26), positive predictive value 97.7% (84/86), negative predictive value 75.0% (24/32) and total predictive value was 91.5% (108/118).

Conclusions: Our outcome prediction model was shown to have high predictive value.

Poster # 122

ADMINISTRATION OF AUTOLOGOUS INCUBATED BONE MARROW STROMAL CELLS INTO CEREBROSPINAL FLUID IN SPINAL INJURY PATIENTS: A PILOT STUDY

Toshio Nakatani*, MD, Masaaki Iwase, MD, Fukuki Saito, MD, Yuji Maeda, MD, Hiroyuki Tsuchiya, MD, Taichi Ikedo, MD, Tomohisa Omura, MD, Osamu Iiji, MD, Kenji Matsumoto, MD, Akihiko Hirakawa, MD, Yoshinori Murao*, MD, Yoshihisa Suzuki, MD, Masanori Fukushima, MD, Chizuka Ide, MD. Kansai Medical University.

Objective: To determine the safety and feasibility of intrathecal administration of incubated autologous bone marrow stromal cells (BMSCs) for acute spinal injury treatment.

Methods: Five patients with tetraplegia due to cervical spinal injury, who meet the eligibility criteria were registered under written informed consents. Iliac bone marrow was obtained during the cervical stabilization with iliac bone graft, which underwent within three days after the injury. BMSCs were incubated and multiplied reaching a cell count of 10^6. The quality and ability of the cells were verified with surface markers and neurite extension test. BMSCs were administered into the cerebrospinal fluid by lumber puncture within 3 weeks. Neurologic function was evaluated according to the American Spinal Injury Association Impairment Scale (AIS) and the motor scores. The initial scores were evaluated at administration of BMSCs, later than unstable phase.

Results: Results at 6 months are summarized in the table. Motor function was remarkably improved in the first three cases, but not in the latter two cases with extensive spinal cord damage. No deleterious effect due to the cell administration was observed.

age/ sex	spine injury	size of the lesion	AIS		motor score		present activity
			initial	6M	initial	6M	
35/m	C5:D+F	62x8 mm	A	A	6	17	drive wheel chair
59/m	C6:D	23x6 mm	B	D	5	71	walk without assist
45/m	C4:D+F	38x6 mm	C	D	13	71	standing with harness
23/m	C2,3:F C5:D+F	near disruption	A	A	6	8	wrist extension
51/m	C4-6:D+F	65x9 mm	A	A*	3	3*	no improvement*

D, dislocation; F, Fracture; *, determined at 4 months

Conclusion: This study shows that intrathecal administration of BMSCs is safe, feasible, and potentially beneficial. We have to accumulate in the number of cases so that the committee of members from outside our study group can evaluate the effectiveness and safety of this clinical trial on the more secured base.

Poster # 123

ERYTHROPOIESIS-STIMULATING AGENT ADMINISTRATION IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY: A PROSPECTIVE STUDY

Peep Talving, MD, PhD, Thomas Lustenberger, MD, Bernardino C Branco, MD, Leslie Kobayashi, MD, Lydia Lam, MD, Kenji Inaba, MD, Demetrios Demetriades, MD, PhD*. Keck School of Medicine, Dept. of Surgery, Division of Acute Care Surgery (Trauma, Emergency Surgery and Surgical Critical Care).

Introduction: Recent clinical and experimental evidence indicates that erythropoiesis-stimulating agent (ESA) administration following severe traumatic brain injury (sTBI) is associated with improved neurological outcome and survival. Nevertheless, prospective evaluation of the effects of ESA in patients sustaining sTBI is lacking.

Methods: Prospective observational study of all patients admitted to the surgical intensive care unit (SICU) of a level I trauma center from January 2008 to December 2009 sustaining sTBI (head AIS = 3). Propensity scores were calculated to match patients who received ESA within 30 days after admission [ESA (+)] to patients who did not receive ESA [ESA (-)]. Matching criteria included age, gender, injury mechanism, vital signs on admission, AIS for all body regions, ISS, specific intracranial injuries, surgical interventions, and in-hospital anemia (hemoglobin<10 g/dL). Outcomes included in-hospital morbidity and mortality.

Results: During the 2-year study period, 704 patients with sTBI were admitted to SICU. Of those, 47 patients (6.7%) received ESA. After matching in a 1 to 1 ratio, ESA (+) and ESA (-) patients had similar age, mechanisms of injury, vital signs on admission, AIS, ISS, and specific intracranial injuries. ESA (+) patients experienced significantly more ventilator days (12.5 ± 9.3 vs. 6.8 ± 8.9; p=0.007), a longer SICU length of stay (15.9 ± 9.9 vs. 9.5 ± 9.8; p=0.004), and more SICU free days (8.1 ± 11.4 vs. 3.5 ± 5.0; p=0.015). There was no statistically significant difference in the incidence of deep venous thrombosis (2.1% vs. 2.1%; p=1.00) and pulmonary embolism (4.3% vs. 4.3%; p=1.00) comparing the two study cohorts. In-hospital mortality, however, was significantly lower for ESA (+) patients compared to their ESA (-) counterparts (10.6% vs. 29.8%; p=0.035).

Conclusion: Erythropoiesis-stimulating agent administration demonstrated a significant survival advantage in patients with severe TBI. Further prospective randomized studies are warranted to validate this survival benefit.

Poster # 124

EFFECTIVENESS OF DECOMPRESSIVE CRANIECTOMY FOR THE TREATMENT OF SEVERE TRAUMATIC BRAIN INJURY

Masato Ueno, MD, Yasushi Hagihara, MD, Hirotaka Yamamoto, MD, Shota Nakao, MD, Koji Idoguchi, MD, Kazuo Ishikawa*, MD, Yasuaki Mizushima, MD, Tetsuya Matsuoka, MD.
Osaka Prefectural Senshu Critical Care Medical Center.

Background: Mild Hypothermia (MH) was enforced as a method of controlling the intracranial pressure (ICP) in severe traumatic brain injury (STBI) so far, but the result was unfavorable. Therefore, since the year 2000, for patients with evacuate intracranial mass or increased ICP, we have performed decompressive craniectomy (DC) with hematoma removal followed by management with normothermia for 48 hours after the operation.

Objective: This study was designed to examine the treatment strategy and the prognosis in STBI at our institution, and clarify the effectiveness of DC.

Patients & Methods: We performed a retrospective review of 53 patients who were transferred to our hospital for acute subdural hematoma and/or contusional hemorrhage and were treated with DC between January 2004 and December 2008. Patients who met the following criteria were excluded: less than 6 years old, any extracranial injury with abbreviated injury scale (AIS) score over 3, cardiopulmonary arrest, and presence of shock. We compared the 53 patients to 27 patients under similar condition who were treated with mild hypothermia in our hospital in the 1990's.

Results: There was no statistical significance in age, sex, Glasgow Coma Scale (GCS) score, Injury Severity Score (ISS), provability of survival (Ps) between MH group and DC group. The mortality rate decreased with statistical significance from 66.7% for MH group to 43.4% for DC group. Comparison of the survival cases showed shorter mechanical ventilation days and intensive care units (ICU) management days for DC group. In addition, there were no differences in age, initial GCS score, and pupillary light reflex between good and poor outcomes in DC group. This evidence indicates that our treatment strategy may provide favorable outcome and good functional outcome even in patients with impending brain herniation.

Conclusion: DC brings the improvement of mortality and functional outcome, and it is an effective strategy for the treatment and management of STBI.

Poster # 125

DIABETES IS AN INDEPENDENT RISK FACTOR FOR MORTALITY AFTER ISOLATED TRAUMATIC BRAIN INJURY

Eric J Ley, MD, Areti Tillou, MD, Cherisse Berry, MD, James Mirocha, MS, Marissa K Srour, Ali Salim*, MD. Cedars-Sinai Medical Center.

Background: Hyperglycemia increases mortality following traumatic brain injury (TBI). Exaggerated ketogenesis, which can be associated with Diabetes Mellitus (DM), is neuroprotective after head injury. The effect of DM on mortality after TBI has not been described.

Methods: NTDB version 7 was queried for all patients with isolated moderate to severe TBI (head abbreviated injury score (AIS) = 3 with AIS = 3 for all other body regions). Demographics and outcomes were compared between TBI patients with and without DM. Logistic regression analysis was used to investigate the relationship between mortality and DM.

Results: Overall 51,585 patients with isolated, moderate to severe TBI were analyzed. Mortality was 14.4% and 8.2% in patients with and without DM, respectively ($P < 0.0001$). After multivariable logistic regression analysis, DM was a significant predictor for mortality (OR 1.5, CI 1.29-1.74, $P < 0.0001$). When comparing TBI patients with insulin dependent diabetes (IDDM) to noninsulin dependent diabetes (NIDDM), mortality was 17.1% for IDDM and 13.0% for NIDDM ($P = 0.025$). Although head AIS were similar, patients with DM had a statistically higher GCS at presentation compared to patients without DM (GCS 12.4 v. GCS 10.9; $P<0.0001$).

Conclusion: DM is a significant predictor for mortality after TBI; mortality with IDDM is higher than with NIDDM. Despite recent evidence that suggests ketogenesis is neuroprotective, no benefit was noted in DM patients. Aggressive care is warranted for TBI patients with DM.

Poster # 126

A SAFE AND EFFECTIVE CONSULTATION POLICY FOR MINIMAL HEAD INJURY: SPARING THE NEUROSURGICAL RESOURCE

Eric A Toschlog* MD, Brett H Waibel MD, Steven C Agle MD, Gregory P Schaefer DO, Kimmerle C Cohen MD, K Stuart Lee MD, Michael F Rotondo* MD. East Carolina University.

Introduction: Resources for the Optimal Care of the Injured states that neurosurgeons (NS) should be involved in the care of less severe traumatic brain injury (TBI) "when necessary". Our original consultation policy mandated NS consults for TBI with any alteration in Glasgow coma scale (GCS) score and any CT scan defined intracranial hemorrhage (ICH). In an effort to spare valuable NS resources and in response to a perceived high volume of NS consults with no meaningful NS intervention, we refined our policy to exclude NS consults for GCS 13-15 with small, isolated ICH. The purpose of our study was to evaluate the impact of the policy change on outcomes in this TBI population.

Methods: We queried our NTRACS database for patients post-policy change (2005-10) meeting inclusion criteria of isolated blunt TBI with GCS 13-15 ***and*** a CT defined ICH defined by head and neck (HN) abbreviated injury scale codes. This group was divided into patients with (NC) and without (NO) consults. The groups were compared across demographic and clinical variables using t test[a] and Chi square[b] where appropriate.

Results: 825 patients with GCS 13-15 and ICH were admitted during the study period. Significant differences ($p<0.05$) between the NC and NO groups are shown.

	Age[a] (yrs)	HN AIS[a]	ISS[a]	# AIS HN codes[a]	GCS[a]	Craniotomy[b]	Death[b]
NC (n=597)	44.3 +29.5	3.82 +0.63	15.6 +4.7	1.8 +0.9	14.8 +0.4	69 (11.6%)	32 (5.4%)
NO (n=228)	39.3 +29.5	3.26 +0.73	11.7 +4.7	1.3 +0.6	14.9 +0.8	1 (0.4%)	2 (0.9%)

Conclusion: The policy resulted in a 30% decrease in NS consultations for the TBI population defined. The policy appears to function safely and effectively; despite similar GCS, craniotomy and mortality were almost exclusively confined to the consultation group. With many centers struggling to recruit and retain neurosurgeons and NS resources at a premium, particularly with private subspecialty coverage, a restrictive consultation policy can be safely implemented and significantly reduce NS workload.

Poster # 127

RELATIONSHIP OF SERUM BIOMARKERS TO DEPTH AND DURATION OF SECONDARY INSULTS FOLLOWING SEVERE TRAUMATIC BRAIN INJURY

Deborah M Stein*, MD, MPH, Allison Lindell, MS, Karen Murdock, PT, Jay Menaker, MD, Kaspar Keledjian, MD, Grant V Bochicchio*, MD, MPH, Thomas M Scalea*, MD. R Adams Cowley Shock Trauma Center, University of Maryland School of Medicine.

Background: Neuroinflammation is a predominant feature of severe traumatic brain injury (sTBI). The management of sTBI focuses on prevention and treatment of intracranial hypertension (ICH) and cerebral hypoperfusion (CH). This study investigated the systemic effects of neuroinflammation and its relationship to clinical measures of disease severity.

Methods: Patients with head AIS>3, age>14, "isolated" TBI, need for intracranial pressure (ICP) monitor, and deemed survivable were prospectively enrolled. Serum and CSF were collected within 24 hours of injury and twice daily for 7 days. Specimens were analyzed by multiplex bead array assays. Pressure times time (PTD) was calculated for 12-hour periods for depth and duration of episodes of ICH (ICP>20mmHg) and CH (cerebral perfusion pressure; CPP<60mmHg). Outcome was measured by Extended Glasgow Outcome Scale (GOSE) at 6 months.

Results: 25 patients were enrolled. Matched CSF was available in 11. Mean head AIS was 4.2±0.7, Marshall score was 2.6±0.7, and admission GCS was 6.3±4.0. Elevated serum and CSF levels of IL-1ß, IL-6, IL-8, IL-10 and TNF-? were found in all patients. Correlations were found between serum levels of IL-8 and TNF-? and PTD of ICH (r=0.44 and r=0.43, p<0.05) and CH (r=0.54 and r=0.25, p<0.05). No correlations between CSF levels and clinical variables were noted. Mean admission and bi-daily levels of IL-8 were higher in patients with poor outcome (GOSE <5).

Mean Daily Values (pg/ml)	Good Outcome n=15	Poor Outcome n=9	*p value*
IL-1b	49.3 ±170.8	6.5 ±15.7	*0.01*
IL-6	108.1 ±172.9	251.6 ±1338.6	*0.17*
IL-8	24.4 ±20.1	95.7 ±383.3	*0.02*
IL-10	66.7 ±163.5	52.7 ±66.4	*0.40*
TNF-a	8.0 ±4.2	11.7 ±13.5	*<0.001*
Peak Admission Values (pg/ml)	**Good Outcome n=15**	**Poor Outcome n=9**	***p value***
IL-1b	65.6 ±246.5	8.8 ±11.4	*0.53*
IL-6	174.6 ±146.4	144.2 ±151.0	*0.63*
IL-8	31.5 ±19.1	67.4 ±57.0	*0.03*
IL-10	106.5 ±287.4	48.8 ±56.3	*0.56*
TNF-a	8.03 ±7.7	9.2 ±4.5	*0.69*

Conclusions: Inflammatory mediators are detectable in the serum of patients with sTBI. Elevated levels of IL-8 and TNF-? in the serum, but not CSF, during episodes of ICH and CH imply there are significant systemic effects of these events. These serum biomarkers are promising as diagnostic or therapeutic targets and have significant implications for the role of inflammatory system manipulation in the management of sTBI.

Poster # 128

Therapeutic Normothermia and Traumatic Brain Injury

Karl Pilson, MD, Shane Hawksworth, Anand Selvam, Eric Mahoney, MD, Kofi Abbensetts, MD, Andrew Glantz, MD, Peter Burke*, MD, Suresh Agarwal*, MD. Boston University Medical Center.

Objective: Mechanical thermoregulation has been used to therapeutically decrease cerebral oxygen consumption; yet, its utility in TBI has yet to be established.

Methods: Retrospective review of all adult patients admitted to a level 1, urban trauma center whose GCS was below 9 and in whom an ICP monitor was placed for greater than 4 days. Patients were divided into two groups, those that received external cooling and those who did not. Temperature, ICP, MAP and CPP measurements were recorded. In house mortality, AIS and ISS scores were reviewed as was pressor and neuromuscular blocking agent usage. When the cooling system was utilized the target temperature was 98 degrees Fahrenheit and utilization of the device in the protocol was variable.

Results: From January 2004 to December 2008, 72 patients met criteria for inclusion: 24 utilized the device and 48 did not. Mean minimum temperature achieved with the device was 97.16 vs. 98.40 without. Mean maximum temperature with the device was 99.71 vs. 100.82 without. Percentage of hours with ICP greater than 15-cm H2O was 51.32% with the device and 46.76% without. Percentage of hours with ICP greater than 20-cm H2O was 34.50% with the device and 28.36% without. CPP measurements were similar with the percentage of hours with a CPP below 60 mm hg. at 14.66% with the device and 13.78% without. Pressors were used 38.04% of hours with the device and 30.45% without. Neuromuscular blocking agents were used 43.48% of the time with the device and only 15.42% without. ISS scores averaged 21.54 with cooling vs. 25.19 without. Average AIS scores were 8.08 in the group utilizing the device and 8.66 without. The in house mortality rate was 50% in the group where the device was used and 20.83% without.

Conclusions: Increased neuromuscular blockade, pressor usage and trend towards increased mortality and ICP was seen in patients who required mechanical thermoregulation, despite non cooled patients being sicker in terms of ISS and AIS. Prospective, randomized trials are warranted to validate these results.

Poster # 129

EARLY DECOMPRESSIVE CRANIECTOMY IMPROVES SURVIVAL IN PATIENTS YOUNGER THAN 65. SHOULD WE BE MORE AGRESSIVE?

Fausto Y Vinces DO, Karl B Pembaur BS, Stephen DiRusso MD, PhD *. Lutheran Medical Center.

Introduction: The beneficial effect of decompressive craniectomy (DC) in the treatment of traumatic brain injury (TBI) remains controversial. In many centers, it is performed as a life saving procedure for a refractory intracranial pressure (ICP). We proposed that early DC can be used in severe TBI patients with good outcomes.

Methods: All patients who underwent a DC at an urban Level I Trauma Center in a three-year period were included in the study. The patients were divided in patients younger and older of 65 years of age. The variables measured were the initial Glasgow Coma Scale (IGCS), survival at 48h and final GCS (FGCS) before discharge to TBI center.

Results: 37 patients were identified 27 (73%) men and 10 (27%) women. Overall mortality was 6 patients (16%). Five of these patients were in the group older that 65. 26 (96%) patients survived in the group <65. One patient in the < 65 was declared brain death within 48h of admission. The mean age for the the group <65 was 40 and the IGCS was 8.76 and the FGCS was 13.2. The mean age for the group >65 was 79.64. The mean IGCS was 4 and the FGCS was 6. In the group >65, four patients (36%) were on anticoagulants.

Conclusions: Early DC resulted in excellent functional outcomes and survival in the group < 65. Previous series had demonstrated a benefit in this subgroup of patients but these studies included medical and ICP management before perfoming a DC as a salvage procedure. Our data demonstrates that young male patients will benefit of an early DC. The improved functional outcomes offered by this procedure when performed in the right setting and patients warrant more investigation. On the other hand, patients >65 who are receiving anticoagulants have a dismal outcome despite early DC and aggressive reversal of anticoagulation.

Poster # 130

IS THERE A DIFFERENCE IN OPERATIVE VERSUS NON-OPERATIVE TREATMENT OF CERVICAL SPINE INJURIES IN THE ELDERLY?

Gail T Tominaga*, MD, Kathryn B Schaffer, MPH, Imad S Dandan, MD, Jess F Kraus, PhD, Marc M Sedwitz, MD, Kevin Yoo, MD, Nick J Weitzel, RN, A Brent Eastman*, MD. Scripps Memorial Hospital.

Objective: We compared operative (OP) vs. non-operative (N-OP) treatment of cervical spine (C-sp) injuries (inj) in patients (pts) $\geq$ 70 years. Our hypothesis is that C-sp inj can be treated operatively in the elderly without increased morbidity and mortality.

Methods: Registry data identified all pts > 70 years (elderly) admitted to one Level II Trauma Center from 2007-2009. Medical records were reviewed and data analyzed.

Results: 774 elderly trauma pts were identified. 81 pts had C-sp inj with 52% males, mean age 82.3 yrs, mean LOS 12.5 days, mean ISS 16.2, associated head injury in 25%, neurologic deficits in 16%, absence of co-morbidities in 2%, anticoagulant and/or antiplatelet (AC/AP) use in 57%. Most common mechanism of inj (MOI) was falls (75%). C2 was the most common level injured (49%) with 28 pts (35%) having multilevel disease and 32 pts (40%) with neck ligamentous (lig) inj. There were 30 pts (37%) in the OP group and 51 (63%) in the N-OP group, one of which had a halo device. Complications occurred in 21 pts (26%). Comparison of the C-Sp OP and N-OP groups showed no significant differences in MOI, ISS or Spine-AIS. There were no differences in the presence of associated head inj, neck lig inj, AC/AP use, complications and co-morbidities except for cancer history (33% v 14%, p=0.031). OP group had more males (70% v 41%, p=0.041), were somewhat younger (80.4 v 83.5 yrs, p=0.037), had more neurologic deficits on admission (30% v 8%, p=0.0081), multi-level inj (50% v 25%, p=0.043), critical cervical stenosis (23% v 8%, p=0.034), and cervical ankylosis (27% v 4%, p=0.030). OP group outcome was statistically different with regard to LOS (20 v 8 days, p<0.000001) with better rate of discharge to home or acute rehab (54% v 30%, p=0.046) and lower mortality (3% v 20%, p=0.027).

Conclusions: Falls, a preventable etiology, continue to be the most common cause of C-sp injury among the elderly. Despite the OP group having more clinical issues on admission, discharge outcomes were more favorable and mortality rates lower than the N-OP group.

Poster # 131

BLUNT THORACIC AORTIC INJURY (BTAI) IN JAPAN: ETIOLOGY, MANAGEMENT,OUTCOME, AND THE REVISED ORGAN INJURY CLASSIFICATION OF THE JAPANESE ASSOCIATION FOR THE SURGERY OF TRAUMA (JAST-OIC 2008)

Naoyuki Kaneko*, MD, Akio Kimura*, MD, Kenji MAtsuura, MD, Hiroshi Kato, MD, Kazuhisa Mori, MD, Hisashi Matsumoto, MD, Mitsuhide Kitano, MD, Tetsuya Matsuoka, MD, Junichi Sasaki, MD, Shinji Ogura, MD, Munekazu Takeda, MD, Junmei Fudoji, MD, Tsunetoshi Araki, MD, Shigeki Kushimoto, MD, Junichi Matsumoto, MD, Hiroyuki Yokota, MD. Tokyo Medical University.

Background: The JAST has developed an original organ injury classification (JAST-OIC) for categorizing thoracic, abdominal and pelvic injuries. The characteristics of the JAST-OIC are as follows: 1) centers around anatomical and morphological classifications, 2) represents injury severity, and 3) indicates management courses. The aims of this paper are to present the JAST-OIC of the aorta revised in 2008 following a retrospective study of 172 BTAI cases treated at 15 major emergency centers during the 12-year period from 1996 to 2007 and report on the etiology, management, and outcome of BTAI in Japan.
Method: The JAST-OIC was revised under the direction of the OIC Committee using data collected by a multi-institutional study of the General Planning Committee of the JAST.
Results: Population: 138 men and 34 women. Mean age: 47 years (range 3-86). Cause of BTAI: motorcycle accident 27%, fall 26%, automobile accident 23%, pedestrian accident 16%, others 8%. Overall mortality was 32%, and mortality in the latter half of the study period during which aortography was eliminated was 25%. The JAST-OIS categories: I (small partial thickness injury (PTI)) including Ia (intimal) and Ib (adventitial); II (dissecting PTI) including IIa (intimal) and IIb (adventitial); and III (full thickness injury) including IIIa (pseudoaneurysm rupture), IIIb (incomplete transection), and IIIc (complete transection). The number of cases, the frequency of conservative management, and the percentage of deaths attributable to BTAI in each category were shown in the table. An endovascular stent (hand-made for each specific patient) was applied in 15 cases (9.6%).
Conclusion: Comparing to the data from the U.S.A., in Japan, fall was a more common cause. The morphology-based JAST-OIC 2008 is acceptable as it accurately reflects the mortality data, but leaves room for discussion of possible classifications of IIb and IIIa.

	Ia	Ib	IIa	IIb	IIIa	IIIb	IIIc
No.	4	2	25	19	54	48	10
Conservative tx (%)	50	50	60	11	19	0	0
Death (%)	0	0	16	26	9	37	80

Poster # 132

INFLUENCE OF LOCALLY APPLIED CYR61 ON MUSCLE RECOVERY AFTER ACUTE COMPARTMENT SYNDROME TREATED BY LIMB SHORTENING AND DISTRACTION PROCEDURE

Sönke Frey, MD, Hendrik Jansen, MD, Lars Eden, MD, Berrin Midik, student, Norbert Schütze, Prof Dr, Rainer Meffert, MD, Prof Dr. Dep. of Trauma, Hand, Plastic and Reconstructive Surgery.

Objective: To examine the influence of cysteine rich proteine 61 (CYR 61) on muscle strength recovery after acute compartment syndrome (aCS) treated by limb shortening and distraction procedure.

Methods: The study was performed with 22 skeletally mature male New Zealand White rabbits (NZW). The NZW rabbits were divided into two equal groups. In both groups an acute CS was generated by 90 min. ischemia and 30 min. of muscle contusion with 100kPa (=10N/ 1cm2) and the limb was shortened by resection of a 10mm bone segment simulating the fracture site debridement. The contralat. leg functioned as the non operated control. The operation was alternated between the left and right leg to avoid systematic error. In the test group a collagen matrix coated with 25µg CYR61 was locally applied circumferent the fracture. In both groups an external fixator was applied and the limb was shortened through resection of a 10mm segmental bone block. Distraction commenced 10 days postsurgery at a distraction rate of 0.5 mm every 12. Compartment pressure was measured until 48h postoperatively. The onset of an aCS was confirmed. Muscle strength was monitored bilaterally prae-trauma and every 5th days until 30 days posttrauma.

Results: After trauma there was an increase of compartment pressure from 7.5±1.4 to 33.9±3 mmHG and a reduction to 11.26±43mmHg post-op. Muscle strength showed a continuous regeneration until 30 days posttrauma. The average muscle strengh recovery of the test group was 86.41±10.29% of the contralat. side and 58±28% in the control ($p=0.05$). Histomorphometric analysis of the tibialis anterior muscle demonstrated a significant differnce in fibrous degeneration in the control of 14.9% compared to 6.3% in the test group ($p<0.05$).

Conclusion: In our study we could demonstrate that locally applied CYR61 influences the muscle regeneration histomorphometrically. Besides, scar tissue formation was reduced and muscle strength improved.

Poster # 133

DEVELOPMENT OF A CT SCORING SYSTEM FOR NECROTIZING SOFT TISSUE INFECTIONS

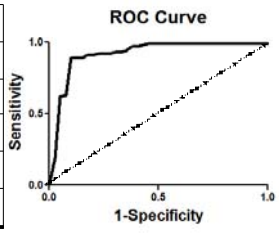
Edward A McGillicuddy, MD, Andrew Lischuk, MD, Kevin M Schuster, MD, Lewis J Kaplan*, MD, Felix Y Lui, MD, SA Jamal Bokhari, MD, Kimberly A Davis*, MD. Yale University School of Medicine, Department of Surgery.

Background: Necrotizing soft tissue infections (NSTI) are associated with significant morbidity and mortality, but a definitive non-surgical diagnostic test remains elusive. Despite the widespread use of computed tomography (CT) as a diagnostic adjunct, there is little data that definitively correlates CT findings with the presence of NSTI. Our goal was the development of a CT-based scoring system to discriminate non-NSTI from NSTI.

Methods: Patients over the age of 17 undergoing CT for evaluation of soft tissue infection (STI) at a tertiary care medical center over a 10 year period (2000-2009) were included. Abstracted data included comorbidities and social history, physical exam, laboratory findings, and operative and pathologic findings. NSTI was defined as soft tissue necrosis in the dictated operative note or the accompanying pathology report. CT scans were reviewed by a radiologist blinded to clinical and laboratory data. A scoring system was developed and the area under the receiver operating characteristic (ROC) curve calculated.

Results: During the study period, 305 patients underwent CT scanning for STI (57% male; mean age 47.4 years). Forty-four patients (14.4%) evaluated had a necrotizing soft tissue infection. A scoring system was retrospectively developed (table). A score greater than 6 points was 86.3% sensitive and 91.5% specific for the diagnosis of NSTI (PPV 63.3%; NPV 85.5%). The area under the ROC curve was 0.928 (95% CI 0.893 to 0.964). The mean score of the non-NSTI group was 2.74.

CT Characteristic	Points
Fascial Air	5
Muscle/Fascial Edema	4
Fluid Tracking	3
Lymphadenopathy	2
Subcutaneous Edema	1



Conclusions: We have developed a CT scoring system that is both sensitive and specific for the diagnosis of necrotizing soft tissue infections. This system may allow clinicians to more accurately diagnose necrotizing soft tissue infections. Prospective validation of this scoring system is planned.

Poster # 134

MANAGEMENT OF FASCIOTOMY WOUNDS - DOES THE DRESSING MATTER?

Sarah E Matt, MD, Laura S Johnson, MD, Jeffrey W Shupp, MD, Tareq I Khirbek, MD, Jack A Sava*, MD. Washington Hospital Center.

Introduction: Fasciotomy is a potentially limb-saving procedure in the management of the ischemic extremity; however, it can increase cost and LOS. We hypothesize that the use of vacuum assisted wound closure or creation of dynamic wound tension ("Jacob's Ladder") will increase rates of primary closure, reducing the need for skin grafting.

Methods: The trauma and billing records of a large urban Level I trauma center were used to identify patients who underwent fasciotomy over a 10-year period. Injury characteristics were documented, as well prophylactic vs. therapeutic, wound management and clinical outcomes. Wound management was dictated by surgeon preference, and was categorized as gauze packing (PACK), dynamic tension (DYN), or vacuum sponge (VAC). The main outcome was primary closure vs. need for skin graft. Aspects of the wound management groups were compared using logistic regression, Chi-square and Fisher Exact.

Results: 242 patients had a fasciotomy performed from 2000-2009. The VAC, DYN, and PACK groups were similar in proportion for vascular injury, ISS, those done for prophylaxis, and extremity off fasciotomy. Mechanism, age, and incidence of fracture were different between the groups. While there was a trend towards increased primary closure with DYN (83.33%) in comparison to PACK (67.3%) or VAC (57.63%), these differences did not reach significance. Average LOS was 21days for those receiving primary closure vs. 35 days for those receiving skin graft ($p<.0001$). There was a significant decrease LOS for the DYN group (16 days+3) when compared to PACK (26 days+2) and VAC (28days+3).

Conclusion: In this fasciotomy series of 242 patients no technique of wound management produced a statistically significant improvement in primary closure rate. A trend toward more primary closure was seen in the DYN group. LOS is significantly longer for patients receiving graft as opposed to primary closure. Those patients who were treated with DYN also had a shorter LOS.

Poster # 135

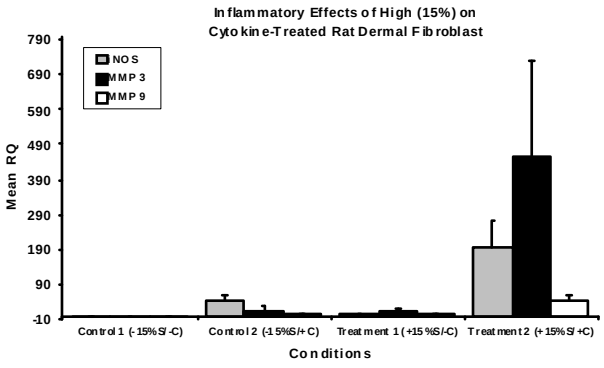
CYCLIC DYNAMIC STRAIN OF HIGH MAGNITUDE IS PRO-INFLAMMATORY IN RAT DERMAL FIBROBLASTS

Holly Sheldon, MD, Peter Burke*, MD, Suresh Agarwal*, MD. Boston University Medical Center.

Objective: To determine whether cyclic dynamic strain of high magnitude (CDSHM) augments the inflammatory response of healing wounds.

Methods: Confluent primary rat dermal fibroblast were grown on collagen treated BioFlex 6-well cultures plates and their response to 15% CDSHM was examined. 4 study groups were of interest: Control 1 (-stretch/-cytokine), Control 2 (-stretch/+cytokine), Treatment 1 (+stretch/-cytokine), and Treatment 2 (+stretch/+cytokine). Cells were incubated in serum-free media for 6-hours then exposed to cytokines (10ng/ml IL-1b, 100ng/mL IL-6, TNF-a) then exposed to 15% equibiaxial stretch in a FlexCell Strain Unit for 24-hours. Equimolar concentrations of RNA was used for rt and srt PCR with specific interest in MMP-3, MMP9, iNOS, and VEGF. RQ values were pooled for each gene of interest. Fold change was calculated as the difference between Control 1 compared to Treatment 1, and Control 2 versus Treatment 2. Statistical analysis was performed by t-test.

Results: There is a statistically significant increase in expression of iNOS, MMP3 and MMP9, when compared to cytokine treatment alone. iNOS, MMP3 and MMP9 increase significantly above baseline ($p<0.05$). VEGF mRNA expression decreases 2.4-fold ($p<0.05$) Stretch alone mitigates the cytokine mediated increase in VEGF mRNA expression.



Conclusion: CDSHM acts as an agonist to cytokine-induced pro-inflammatory response in primary cultures of rat dermal fibroblast. Careful manipulation of negative pressure wound vacuum therapy is needed to prevent tipping of the reparative scale towards matrix degradation.

Poster # 136

BLUNT CEREBROVASCULAR INJURY IS POORLY PREDICTED BY MODELING WITH OTHER INJURIES: ANALYSIS OF NTDB DATA

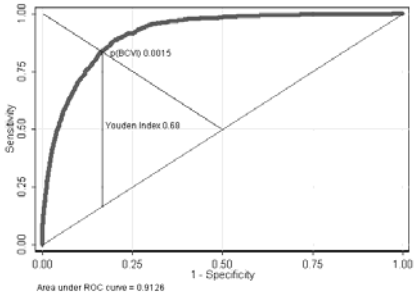
Alan D Cook, MD, John D Berne*, MD, Scott H Norwood*, MD. East Texas Medical Center.

Introduction: Blunt traumatic cerebrovascular injury (BCVI) may portend catastrophic complications if untreated. Whom to screen for BCVI is controversial. The purpose of this study was to develop and validate a prediction score (P_{BCVI}) to identify those at sufficient risk to warrant dedicated screening.

Methods: We conducted a cohort study using data for years 2002-2007 from the National Trauma Data Bank (NTDB). Blunt trauma patients 14 and older were randomly divided into two groups for score creation and validation. Final prediction model included age, sex, Trauma Mortality Prediction Model p(death), any facial injury, cervical spine fracture, cervical spinal cord injury, brainstem injury, skull base fracture, mandible fracture, and chest AIS >3. P_{BCVI} was evaluated using ROC area and the Hosmer-Lemeshow (HL) statistic. The Youden Index estimated the optimal cut-point of the P_{BCVI}.

Results: The cohort numbered 1,398,310 patients, including 2,125 with BCVI. The overall incidence of BCVI was 0.15% (95%CI 0.146% - 0.158%). Cervical spine fracture had the strongest association with BCVI (OR 3.23, $p<0.001$). The ROC for P_{BCVI} was 0.92 and the HL statistic was 27.1, $p=0.003$. The optimal cut-point of P_{BCVI} was 0.00145 (sensitivity 0.89, specificity 0.80) and would miss 116 injuries in our cohort. To identify all BCVI using this model, 99.9% of the cohort would require screening. See Figure.

Conclusions: A model based on the presence of other injuries cannot be used as a stand-alone instrument to determine screening for BCVI. "Optimal" model cut-points are not ideal for all injuries. Clinical suspicion that integrates energy of mechanism and associated injuries remains essential to effectively screen for BCVI and minimize patient risk for a catastrophic missed injury.



Poster # 137

BEDSIDE, IVUS-GUIDED PLACEMENT OF PROPHYLACTIC VENA CAVA FILTERS: A CHEAP, FAST AND SAFE ALTERNATIVE

Alexander L Eastman, MD, MPH, Herb A Phelan*, MD, Stephen T Smith, MD, Stephen S Luk, MD, R James Valentine, MD, Joseph P Minei*, MD. The University of Texas Southwestern Medical Center.

Introduction: Retrievable vena cava filters (RCF) have been used as pulmonary embolus prophylaxis in high-risk trauma/surgical patients who cannot receive anticoagulation. However, it is not clear whether bedside, intravascular ultrasound-guided RCF (iRCF), placed at bedside, while reducing the risk of travel away from the SICU, is time and cost-effective compared to previous fluoroscopically-guided techniques (fRCF). The purpose of this study was to examine the cost, time, and safety factors associated with iRCF placement when compared to fRCF techniques.

Methods: Data was collected prospectively from 214 consecutive patients who underwent iRCF between August 2008 and February 2010 in the T/SICU of a Level I trauma center. These cases were compared to the previous 100 consecutive patients who underwent RCF placement under fluoroscopic guidance in the operating room or IR suite. Collected data included patient demographics, nature of injury, contraindications to standard chemoprophylaxis, procedure time (including patient preparation time), total cost, and procedural complications including RCF malposition

Results: There were no significant differences between the iRCF with fRCF groups in median [IQR] age (47[28,57] vs. 45[26,55], p=ns), gender (64% male vs. 67% male, p=ns), contraindication to chemoprophylaxis or the incidence of malposition. In the iRCF group mean total procedure time was shorter (22.6 vs. 74.9 minutes, $p<.001$), mean total IVCF placement costs were less ($4,195 vs. $6,301, $p<0.001$) and no patient had to leave the protective environment of the T/SICU. This translated to a total single-center savings of more than $328,000/year.

Conclusions: Single-puncture, IVUS-guided, bedside IVCF placement in the T/SICU is expeditious and cost-effective. Additionally, this technique is safe in trauma patients and prevents the risk and difficulty of patient transport from the T/SICU. This might be considered the new standard of care in this patient population.

Poster # 138

ENDOVASCULAR REPAIR FOR ALL BLUNT AORTIC INJURIES (BAI): TAILORING TO THE PATIENT TO REDUCE COMPLICATIONS

Jennifer M DiCocco, MD , Michael J Rohrer, MD, Timothy C Fabian, MD*, Martin A Croce, MD*. University of Tennessee, Health Science Center.

Background: Endovascular management for blunt aortic injury (BAI) lowers morbidity and mortality compared to thoracotomy and open repair. Serious complications including stent graft collapse, stroke, paraplegia, and endoleak rarely occur. Stent grafts were developed to treat atherosclerotic aneurysms in older patients with larger vessels, but younger patients have more acutely angulated arches with smaller aortas and iliac arteries, which may preclude treatment with usual grafts and techniques. Tailoring endovascular repairs to patient anatomy may allow near universal application and fewer complications.
Methods: Consecutive patients with BAI over 34 months were identified. Charts were reviewed for demographics, injuries, vascular anatomy, graft selection, and outcomes.
Results: 30 patients with BAI were identified. All were treated by endovascular repair with no conversions to open. 18 patients were repaired via groin access; 12 required an abdominal approach (table).

		Iliac A. (mm)	Aorta (mm)
Access	Abdominal (12)	**6.6**	23
	Groin (18)	**8.5**	24.4
Stent Type	Thoracic (19)	8.2	**25.8**
	Abdominal (10)	7.3	**20.9**

Those with small iliac vessels had abdominal approaches via transperitoneal aortic exposure and conduit placement. 19 had grafts designed for thoracic aortas; 10 with smaller aortas had grafts designed for abdominal aortas; 1 had abdominal and thoracic graft components. 2 patients had second endovascular procedures to place additional cuffs. 5 complications occurred: 2 iliac injuries, 1 groin hematoma, 1 paraplegia, and 1 brachial thrombus. No outpatient endoleaks or stent migrations were found (mean follow-up 14 months).
Conclusions: Using a variety of endovascular techniques and devices, no endoleaks or graft collapses developed, and we successfully used stent grafts for all BAI. Abdominal approach is needed for patients with small iliac arteries. Follow-up demonstrates that endovascular repair is safe and durable. Only by using a variety of stent grafts and approaches can all BAI be treated by endovascular techniques with minimal complications.

Poster # 139

CHARACTERIZATION OF PULMONARY ARTERY CLOTS IN HIGH RISK TRAUMA PATIENTS: PULMONARY EMBOLUS OR PRIMARY THROMBOSIS?

Alejandro JGarcia MD, James W Dennis MD*, Jonathan H Vu MD & Miren A Schinco MD*.
University of Florida,Jacksonville.

Introduction: The diagnosis and treatment of thromboembolic disease in the high-risk, multi-trauma patient continues to evolve. Despite deep venous thrombosis (DVT)/ pulmonary embolism (PE) prophylaxis protocols, state-of-the-art CT scans identify substantial numbers of blood clots within the pulmonary arteries. This study evaluated the incidence of true PEs vs. pulmonary thrombosis due to other causes.

Methods: The trauma registry of our Level 1 trauma center identified all patients with a diagnosis of PE admitted 1/07-12/09. These occurred despite DVT prophylaxis and placement of prophylactic inferior vena cava filters (>70/year). Attention was paid to the time of presentation and the anatomic location of the PE, the presence of DVT and sepsis.

Results: During the study period, there were 49 diagnosed PEs divided into three groups of patients: (1) Thirty-five (71.4%) classic PE moderate to large, occurring a mean time of 6.6 days following injury and had documented DVT in18 cases. (2) In ten cases (20.4%) the patients were diagnosed with unusual PE with the thrombosis was at the site of primary chest injury located in secondary or tertiary branches, occurred within four days, and there was no DVT found. (3) The remaining four cases (8.2%) had no high risk injury, were found late in the hospitalization, and had no evidence of DVT, but had a history of severe sepsis during their hospitalization. No common organisms were identified, but they were all gram negative bacteria.

Conclusions: Improved high resolution CT technology has resulted in the identification of an increasing number of PEs diagnosed in trauma patients. The etiology of these blood clots within pulmonary arteries is multi-factorial with up to 30% caused by direct injury or possibly sepsis, yet can be mislabeled as a PE. This differentiation is important to determine as anticoagulation can possibly be avoided in this pulmonary thrombosis subset of patients that might be at high risk for bleeding complications. In addition, IVC filters would not be indicated in these cases and should be avoided.

Poster # 140

ROUTINE SURVEILLANCE FOR VENOUS THROMBOEMBOLISM USING DUPLEX SCANS IN TRAUMA PATIENTS IS NOT BENEFICIAL

Scott B Armen*, MD, Robert B Weir Jr, BS, John I Hollenbeck, MD, John H Armstrong*, MD, Darwin Ang, MD, Lawrence Lottenberg*, MD, Larry C Martin*,MD. University of Florida.

Introduction: An aggressive routine screening protocol for venous thromboembolism (VTE) surveillance using Duplex ultrasound scans was implemented and a retrospective review undertaken.

Methods: Admitted trauma patients underwent Duplex scanning of the extremities on days 1-2, 7, 14, and 7 day intervals thereafter. The incidence and timing of VTE and pulmonary embolism (PE) was categorized as was the use of vena cava filters. Standard mechanical and/or pharmacologic VTE prophylaxis was used for all patients.

Results: Over 27 months 2727 adult patients were admitted and 2050 patients were evaluated with 2716 Duplex scans. A total of 50 (2.4%) instances of VTE were detected by Duplex scan and 1 VTE was detected only by CT scan in an iliac vein. There were 26 (1.3%) lower extremity, 21 (1%) upper extremity, and 3 (0.1%) both upper and lower thrombi detected. Nearly all, 20 of 21, upper VTE were associated with central venous catheters (CVC). Despite 2050 Duplex scans done by hospital day 2 only 6 (0.3%) instances of VTE were detected. Patients with VTE underwent an average of 3.6 scans and VTE was detected most commonly by day 16. In addition, 402 patients had IVC filters placed and there were 18 (0.7%) instances of PE, none fatal. Only 2 patients with PE had documented VTE despite having an average of 3.3 Duplex scans. Of these two patients with PE and VTE one demonstrated VTE of the subclavian vein and had an IVC filter in place.

Conclusions: 1) Routine surveillance for VTE using Duplex scans is not beneficial in trauma patients, 2) Upper extremity VTE is almost as common as lower and associated with CVC's, 3) The incidence of PE is low but Duplex failed to detect VTE in the majority of these patients, 4) Optimal timing and risk stratification of trauma patients may better utilize Duplex ultrasound as a screening tool for VTE in trauma patients.