Poster 1

BACTERIA AND ANTIMICROBIAL RESISTANCE IN THE ORAL FLORA OF SHARKS: GUIDANCE FOR ANTIBIOTIC THERAPY FOR SHARK BITE VICTIMS

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Presenter: Nathan R. Unger, PharmD

Objectives: Florida consistently boasts the highest number of shark attacks in the world, accounting for nearly one-third of all incidents in 2013. Although these bites within Florida waters are rarely fatal, victims of severe bites are at risk for subsequent infection due to entry of bacteria from the shark's oral cavity into the open wound. The objective of our study was to identify the bacteria and level of antibiotic resistance in the mouths of live sharks.

Methods: Sharks were caught in the waters off the coast of Florida and the Bahamas. Captures took place between February 2013 and May 2014. The oral cavity of the shark was swabbed along upper and lower teeth and gums using a remote swabbing tool with a BBL™ CultureSwab™ Plus attached to the end. All swabs underwent standard microbiological work-up with identification of organisms and reporting of antibiotic susceptibilities using an automated microbiology system.

Results: A total of 33 sharks were swabbed. An average of 2.52 ± 1.77 bacteria isolates were identified per shark, similar amongst the different species. Gram-negative bacteria, making up 73% of all isolates, were significantly ($p = 0.003$) more common than gram-positive bacteria. The most common organisms were *Vibrio spp*. (22%), *Enterobacter spp*. (10%) and *Pseudomonas spp.* (10%). Nearly 50% of all bacteria were resistant to at least one antibiotic, with 23% of bacteria resistant to more than three antibiotics. Gram-negative bacteria susceptibility was highest for meropenem (98%), piperacillin/tazobactam (98%), levofloxacin (97%), tobramycin (95%), and ceftazidime (93%). Gram-positive bacteria were routinely susceptible to vancomycin (100%), fluoroquinolones (100%) and tetracycline (95%).

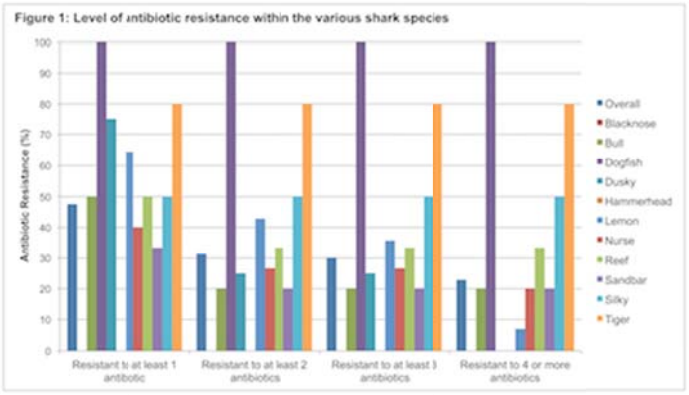
Conclusions: Recommended empiric antimicrobial therapy for severe shark bites should encompass a combination of a fluoroquinolone, piperacillin/tazobactam or ceftazidime plus doxycycline.

Table 1: Comparison of the oral bacterial content and antibiotic resistance amongst several different shark species

Species (n)	No. of bacteria	p-value*	Gram-positive bacteria, %	Gram-negative bacteria, %	p-value*	No. of resistant antibiotics per sample	p-value*
Blacknose (1)	2	0.973	50	50	0.594	0	0.075
Bull (3)	3.33 ± 2.31 (-0.22-3.08)		20	80		1.86 ± 2.06 (0.2-2.75)	
Dogfish (1)	2		50	50		5.5 ± 0.71 (6.35-7.33)	
Dusky (2)	2 ± 0		25	75		1.25 ± 1.26 (0.77-3.24)	
Hammerhead (2)	2 ± 0.71 (-0.26-1.5)		60	40		0	
Lemon (4)	3.5 ± 3 (-0.16-3.3)		21	79		1.83 ± 1.6 (0.09-1.17)	
Nurse (6)	2.63 ± 1.86 (-0.09-1.97)		27	73		1.54 ± 2.09 (0.1-2.22)	
Reef (4)	1.5 ± 1 (-0.25-1.85)		0	100		3.17 ± 4.58 (1.14-8.47)	
Sandbar (6)	2.5 ± 1.52 (-0.07-1.61)		33	67		2.11 ± 2.31 (0.11-2.45)	
Silky (2)	2.5 ± 3.54 (-1.297.49)		0	100		2.75 ± 3.4 (2.08-8.75)	
Tiger (2)	2.5 ± 2.12 (-0.774.49)		20	80		5.8 ± 3.63 (1.33-7.7)	
Overall (33)	2.52 ± 1.77 (-0.021.21)	N/A	27	73	N/A	2.26 ± 2.53 (0.01-1.15)	N/A

All values represent mean± SD (95% CI) unless otherwise noted
*Analysis conducted using the one-way ANOVA, a p-value of less than 0.05 was considered significant

Figure 1: Level of antibiotic resistance within the various shark species



Poster 2

CHARACTERISTICS OF THE BIOFILM PRESENT IN ENDOTRACHEAL TUBES

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Presenter: James Bardes

Objectives: This study aims to elucidate the microbiata within the biofilm of ETT and compare them to standard BAL cultures.

Methods: This was a prospective, observational study performed at a University, Level 1 trauma center ICU. 40 ETT were collected at extubation. Biofilms were quantified from a standardized point on the ETT. Biofilm microbiata were indentifed using DNA microarrays. BAL cultures were based on clinical lab data. $p<0.05$ was considered significant.

Results: 40 ETT were evaluated. All had biofilm. Mean ventilator time was 137 hours. 16 patients had a diagnosis of pneumonia. The most common biofilm results were: Candida (10), Enterococcus species (10), S. aureus (9) and coag negative Staph (4). The most common culture results from BAL were: Candida (10), Staph species (5), Strep species (5) and Enterococcus (5). Only 9 of 40 had congruence between mircobiata of the biofilm and the BAL.

Analysis was performed based on predominant species found in the biofilm. Candida was most common, the biofilm covered a mean area of 32.47% of the standardized sample. Staph aureus was second, with a mean biofilm area of 29.15%. Enterococcus was third, with mean area of 28.2%. ANOVA analysis was performed for the 6 most common species with no difference between groups, $p=0.44$. ANOVA analysis comparing hours of intubation for the same 6 found no difference, $p=0.98$.

Analysis between hours intubated and stage of the biofilm also showed no significant difference, $p=0.34$. Analysis comparing biofilm stage and diagnosis of pneumonia and showed no correlation. Analysis comparing hours of intubation and pneumonia found no correlation, $p=0.28$.

Conclusions: Comparison between microbiata of biofilms and BAL show divergence in 78%. The microbiata of ETT biofilm is very diverse. There is no relationship between biofilm stage and pneumonia. This supports previous studies that there is no correlation between biofilm stage or pneumonia with duration of intubation.

Notes

Poster 3

HYDROPHOBIC MODIFICATION OF ALGINATE DEMONSTRATES STRONG HEMOSTATIC CAPABILITIES

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Presenter: Mayur Narayan, MD, MPH, MBA, FACS, FICS

Objectives: Alginate is a biocompatible polysaccharide commonly used in the pharmaceutical, biomedical, food, and cosmetic industries. Though lyophilized alginate rapidly absorbs water, it is not an effective hemostat. The purpose of this study was to attempt to increase hemostatic capabilities of alginate by hydrophobic modification (hm) . Previous studies have illustrated that hm of biocompatible polysaccharides enhances hemostatic effect as well as cellular adhesion. We hypothesized that hm alginate would demonstrate significant hemostatic effect.

Methods: 15 Yorkshire swine were randomized to receive either hm alginate pads (n = 5), unmodified alginate pads (n = 5), or standard Kerlix^{TM} gauze dressing (n = 5) for hemostatic control. Following splenectomy, a 6 mm punch arterial puncture of the femoral artery was made. Wounds were allowed to freely bleed for 30 seconds at which time dressings were applied and compressed for 3 minutes in a randomized fashion. Fluid resuscitation was given to preserve the baseline mean arterial pressure. Wounds were monitored for 180 minutes after arterial puncture, and surviving animals were euthanized.

Results: Blood loss for the hm-alginate group was significantly less than control groups ($p =< 0.0001$). In addition, eighty percent of hm-alginate pads were able to sustain hemostasis for the full 180 minutes with only one pad whereas control groups of unmodified alginate and Kerlix^{TM} gauze dressings were not able to achieve even initial hemostasis.

Conclusions: Hm alginate dramatically increases hemostatic effect when compared to unmodified alginate and Kerlix^{TM} gauze leading to decreased blood loss and sustained hemostasis. This is a similar result that has been previously described by our group when hydrophobically-modifying chitosan. When taken in conjunction, both works suggest that hydrophobic-modification of polymers can significantly increase their hemostatic capabilities.

Notes

Poster 4

THE SYNERGISTIC EFFECT OF CLOSTRIDIUM DIFFICILE TOXINS ON THE INTESTINAL BARRIER AND REMOTE INFLAMMATORY RESPONSES

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Presenter: Lawrence N. Diebel, MD

Objectives: The pathogenesis of *Clostridium difficile* colitis is closely linked with the elaboration of two exotoxins; toxin A and toxin B. There is controversy about the relative importance and the specific roles of these two toxins in the severity of colonic disease and the development of systemic complications. We compared the relative effects of toxin A, toxin B and toxin A+B on toxin penetration of the intestinal epithelial barrier and subsequent PMN activation and lung microvascular injury in an *in vitro* model.

Methods: HT29-MTX mucus producing colonic epithelial cell (IEC) monolayers were established in transwell plates. Toxin A, toxin B or toxins A and B were added to the apical chamber. Basal chamber supernatants were collected at intervals. Transepithelial passage of the toxins was determined using an ELISA. The effect of the basal chamber supernatants from IEC exposed to toxin(s) vs. direct toxin exposure on PMN activation and lung microvascular injury (HMVEC) were determined.

Results: Basal chamber concentration of toxins were 2.9 ± 0.5 for toxin A, 5.3 ± 1.0* for toxin B and 3.2 ± 0.6 and 9.4 ± 1.3*# for toxin A/B respectively (*$p<0.001$ vs. toxin A, #$p<0.001$ vs. toxin B alone) at 3 hours.

Conclusions: There were direct and indirect effects of *C. diff*. toxins on PMN activation and indices of HMVEC injury in this model. *C. diff*. toxin A facilitates the translocation of toxin B into the basal (systemic) side of IEC monolayers. The study supports the importance of both toxins in the pathogenesis of intestinal barrier injury and systemic inflammation *in vivo*. This study suggests that measurement of *C. diff.* toxins in systemic blood may have prognostic significance.

Results: mean ± S.D., N = 5 for each group

	PMN			HMVEC	
	O2- (nmol/well)	CD11b (MFI)	Apoptosis (%)	Perm. (nmol/cm^2/hr)	ICAM-1 (MFI)
No toxin	6.0±0.3	93.2±2.2	4.6±0.4	0.34±0.1	9.3±1.1
Direct tox exposure					
Tox A	8.2±1.0	102.4±4.8	5.9±0.3*	0.38±0.1	12.9±1.2*
Tox B	10.0±0.8*	110.3±5.0*	6.2±0.6*	0.44±0.2*	14.3±1.5*
Tox A/B	11.3±2.0*	112.9±5.9*	6.9±0.4*	0.50±0.2*	15.2±2.0*
IEC sups.					
Tox A	32.4±1.2*#	268.4±5.3*#	10.8±1.0*#	0.66±0.2*#	34.6±3.8*#
Tox B	40.4±1.8*#	280.1±6.1*#	14.9±0.9*#	0.72±0.3*#	36.6±2.9*#
Tox A/B	51.3±2.2*#	332.4±6.6*#	23.8±1.2*#	0.86±0.4*#	48.9±4.0*#

*p<0.001 *vs.* No toxin, #p<0.001 vs. direct toxin exposure.

Poster 5

THE VALUE OF LIVE TISSUE TRAINING FOR COMBAT CASUALTY CARE: A SURVEY OF CANADIAN MILITARY PERSONAL DEPLOYED IN THE AFGHANISTAN CONFLICT

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Presenter: Michael J. Kim, MD, MA

Objectives: The optimum method for training military personnel for combat casualty care is unknown. In particular, there is debate regarding the merits and ethics of live animal tissue training (LTT). While both LTT and inanimate simulation are currently used for pre-deployment training, the efficacy of these models has not been established

Methods: Canadian military personnel, deployed to Afghanistan between 2006-2011, were surveyed retrospectively regarding their experience with combat casualty care and pre-deployment training. Inanimate simulators were used prior to early rotations. In later years, personnel received a combination of training including inanimate simulators and live porcine models. Of those deployed multiple rotations, there was a cohort who performed life-saving skills after receiving only inanimate simulation training, and could compare with their field experience after later training including LTT. Ratings of competence after pre-deployment training were compared using Student's T-Test.

Results: Of 38 respondents, 20 were deployed on multiple rotations. Respondents performed life-saving skills on 89% of rotations. Self-perceived competence ratings were significantly higher for those who trained with live tissue (Table 1). Of respondents deployed on both early and late rotations, 15/17 felt the latter training was more worthwhile. In addition, 16/17 individuals felt that LTT training should be added to inanimate simulation. Narrative comments reiterated the benefits of adding LTT to other training.

Conclusions: Amongst experienced Canadian military personnel, LTT is considered essential pre-deployment preparation. Individuals who experienced only inanimate simulation prior to active duty reported feeling more competent on the battlefield after the addition of live tissue models. LTT appears to be an effective training tool for life-saving skills.

	N	Range (5=highest score)	Mean	±SD	Median	Mode
Perceived competence after simulation	38	1 – 5	3.28*	0.99	3	3
Perceived competence after addition of LTT	31	4 – 5	4.92*	0.28	5	5
Preparedness to save lives after addition of LTT	28	3 – 5	4.64	0.56	5	5
Should LTT continue to be part of pre-deployment training?	37	3 – 5	4.76	0.60	5	5

*($p<0.05$)

Table1: Ratings of perceived competence and preparedness following each method of pre-deployment training

Poster 6

RACIAL DISPARITIES IN THE MANAGEMENT OF ACUTE ABDOMINAL PAIN IN THE EMERGENCY DEPARTMENT: A NATIONWIDE EXAMINATION

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Presenter: Adil A Shah, MBBS

Objectives: Single center studies provide conflicting data regarding the presence of race-based disparities in the management of pain in the Emergency Department (ED). Our objective is to use a national sample to investigate the relationship between race and differential use of analgesia in the ED.

Methods: The National Hospital Ambulatory Medical Care Survey (NHAMCS) 2006-2010 was queried for adult ED patients (≥16 years) with a diagnosis of non-traumatic abdominal pain using the classification system recently published by the American Association for Surgery of Trauma (AAST). Multivariate analyses, adjusting for age, gender, race, insurance status, pain score on presentation, hospital location and ownership, and triage status (emergent, urgent, semi-urgent and non-urgent) were performed to determine associations between race and the following outcomes: administration of analgesics, use of narcotic analgesics, ED length of stay (>6hrs), and in-patient admission. An additional analysis that stratified for pain on presentation was also performed.

Results: We analyzed 8,179 visits, weighted to represent 30,944,039 ED visits. Of these 69.6% were female, 61.8% were Non-Hispanic white, 20.9% were Non-Hispanic black, and 13.7% were Hispanic. Multivariate analyses revealed that, non-Hispanic black patients had a decreased odds of receiving analgesia (OR: 0.73; 95% CI: 0.65-0.82) compared to non-Hispanic white patients. This trend was consistent across moderate and severe pain categories. Non-Hispanic black and Hispanic patients were more likely to have a prolonged ED stay (ORs [95% CI]: 1.60 [1.39-1.83] and 1.61 [1.38-1.86], respectively) and less likely to be admitted to the hospital (ORs [95% CI]: 0.81 [0.68-0.98] and 0.76 [0.62-0.95], respectively).

Conclusions: Analysis of this national sample of patients corroborates the presence of racial disparities in the management of abdominal pain in the ED.

Race/Ethnicity	Odds Ratio [95% Confidence Interval] of Receiving Analgesic (Non–Hispanic White patients as referent group)			
	Any Analgesic			
	All Patients (n=30,944,039)	Mild Pain (1-3) (n=2,329,024)	Moderate Pain (4-6) (n=8,010,151)	Severe Pain (7-10) (n=15,196,256)
Non-Hispanic Black	0.73 [0.64-0.82]*	0.94 [0.58-1.51]	0.69 [0.54-0.88]*	0.74 [0.62-0.88]*
Hispanic	0.91 [0.79-1.04]	0.60 [0.36-1.01]	0.91 [0.70-1.17]	0.89 [0.73-1.10]
Non-Hispanic Others	0.77 [0.62-0.96]*	1.08 [0.50-2.37]	0.57 [0.37-0.85]*	0.76 [0.54-1.05]
	Narcotic Analgesics			
	All Patients (n=30,944,039)	Mild Pain (1-3) (n=2,329,024)	Moderate Pain (4-6) (n=8,010,151)	Severe Pain (7-10) (n=15,196,256)
Non-Hispanic Black	0.78 [0.69-0.89]*	0.89 [0.51-1.54]	0.73 [0.56-0.94]*	0.80 [0.68-0.96]*
Hispanic	0.86 [0.74-0.99]*	0.82 [0.46-1.47]	0.82 [0.63-1.08]	0.83 [0.68-1.01]
Non-Hispanic Others	0.78 [0.62-0.98]*	1.24 [0.52-2.97]	0.65 [0.41-1.02]	0.72 [0.51-0.99]*

[(n) represents weighted frequencies for each column]

Table: Odds of administration of analgesics by race/ethnicity groups, compared to Non-Hispanic white patients (reference group), with further stratification by baseline pain severity (* represent results that are statistically significant).

Poster 7

DEFINING RISK FACTORS FOR ACUTE GANGRENOUS CHOLECYSTITIS

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Presenter: Seda Bourikian, BS

Objectives: Acute gangrenous cholecystitis (AGC) is a medical emergency that carries a mortality rate of up to 22%. The diagnosis is challenging which is problematic since delayed surgical treatment results in complications. The objective of the present study is to define risk factors for detection of this disease

Methods: A retrospective chart review of all patients admitted to an emergency general surgery service from January 2009 to April 2014 who underwent cholecystectomy was performed. Specimen reports were retrospectively evaluated with an attending pathologist to identify patients with AGC and patients with cholecystitis without necrosis (CN). Age, length of stay, comorbidities, mortality, pre-operative bilirubin, lactate and vital signs were compared between the two groups.

Results: A total of 489 patents underwent cholecystectomy during the study period. 464 patients were found to have CN and 25 patients were found to have AGC. Mortality was significantly higher in the patients with AGC compared to those with CN (16 % vs 0.86% p=0.003). Patients with AGC where older (55.8 vs 40.8 years p=0.001) and had a statistically significant higher bilirubin (1.96 vs. 0.89 p=0.001). Diabetes was more common as a comorbidity in patients with AGC (32% vs 6.7% p=0.003). Interestingly, lactate, obesity and systolic blood pressure lower than 100 were not significantly different between the groups. Logistic regression analysis showed that increased age, male gender and presence of diabetes were strongly associated with the development of AGC.

Conclusions: Acute gangrenous cholecystitis carries an increased mortality compared to cholecystitis without necrosis. Older patients with diabetes and elevated bilirubin should be suspected of having AGC. Validation of these risk factors prospectively could be of benefit in creating a score for early identification of this disease.

Notes

Poster 8

THE SURGICAL ACUITY SCORE - SMALL BOWEL OBSTRUCTION (SAS - SBO) — STANDARD CLASSIFICATION FOR THE SEVERITY OF SBO IN EMERGENCY GENERAL SURGERY (EGS)

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Presenter: Yaser Baghdadi, MD

Objectives: The AAST developed a scoring system to standardize the severity of SBO based on anatomic criteria without consideration for the entirety of the patient's clinical situation. Therefore, we created a scoring system that incorporates the patient's physiologic status and pre-existing comorbidities along with anatomic criteria. We hypothesized that it would have a greater association with key outcomes than the anatomic score alone

Methods: Patients ≥18 years admitted for acute SBO between 7/2009-9/2011 were identified. The anatomic, physiologic, and comorbidity scores (Table) were squared and added to calculate the SAS-SBO. Area under the receiver operating characteristic curves (AUROC) was used to compare the SAS-SBO to the anatomic score alone for extended LOS (>75th percentile), complications, and 30–day mortality

Results: A total of 208 patients (mean age 65 ± 17 years) were identified of whom 100 underwent exploration (48%). Complications were encountered in 67 patients (32%), extended LOS (>13 days) in 50 (24%) and early death (30-day mortality) in 15 (7%).The median (interquartile range) anatomic score was 1 (1-2), physiologic score 1 (0-1), and comorbidity score 1 (0-2) for a SAS-SBO of 5 (2-13). Greater mean SAS-SBO were associated with surgical exploration (14 vs 5), complications (14 vs 7), extended LOS (15 vs 7), and 30-day mortality (19 vs 8) (all $p<.01$). AUROC demonstrated closer associations between SAS-SBO and outcomes than the anatomic score alone: complications (0.78 vs. 0.74), extended DOS (0.75 vs. 0.74) and 30-day mortality (0.86 vs. 0.63)

Conclusions: The SAS-SBO is a reliable tool to categorize severity of SBO and has a stronger association with key clinical outcomes than the AAST anatomic score alone. This tool should enhance standardization between institutions and requires validation in a prospective, multi-institutional study

Table: The Surgical Acuity Score - Small Bowel Obstruction (SAS - SBO)			
Points	**Anatomic**	**Physiologic**	**Comorbidity**
0	Normal	Normal	Charlson 0
1	Partial SBO with conservative management	SIRS	Charlson 1-2
2	Required surgical operation	Sepsis	Charlson 3-4
3	Required surgical operation in setting of strangulation with no bowel resection	Severe sepsis	Charlson 5-6
4	Required surgical operation in setting of strangulation requiring bowel resection	Septic shock	Charlson 7-8
5	Required surgical operation in settingof strangulation and perforation	Multiple organ dysfunction syndrome	Charlson ≥9
SIRS: Systemic Inflammatory Response Syndrome SAS-SBO = $(\text{Anatomic Score})^2 + (\text{Physiologic Score})^2 + (\text{Comorbidity Score})^2$			

Poster 9

A PRACTICAL SCORE FOR THE DIAGNOSIS OF CHOLECYSTITIS IN PATIENTS PRESENTING TO THE EMERGENCY DEPARTMENT (ED) WITH RUQ PAIN

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Presenter: Daniel Dante Yeh, MD

Objectives: The Tokyo Guidelines (TG13) have been proposed as a diagnostic aid in the evaluation of possible cholecystitis. We sought to test the accuracy of TG13 in a cohort of patients presenting to the ED with RUQ pain and attempt to develop a novel practical score.

Methods: We conducted a retrospective study of 308 patients undergoing evaluation of right upper quadrant (RUQ) pain at an academic tertiary referral hospital between June 2010 and January 2014. Final pathologic diagnosis was used as the gold standard confirmatory test. Signs, symptoms, ultrasound characteristics and laboratory findings were analyzed for specificity, sensitivity, predictive value, and overall accuracy.

Results: Eight predictive factors were found to be useful in making the diagnosis of acute cholecystitis based on a multiple logistic regression model. Their importance, according to the regression coefficients, was determined as follows: presence of gallstones, gallbladder (GB) thickening, distended GB, clinical Murphy's sign, RUQ tenderness, nausea/vomiting, ultrasonographic Murphy's sign, and WBC>11. Based on the magnitude of the independent effect, we devised a practical diagnostic score to aid in the diagnosis of cholecystitis (TABLE). A total score >= 5 had a PPV of 97% for cholecystitis while a total score <3 had 96% NPV for cholecystitis. Our overall accuracy was 90%. By comparison, the accuracy of the Tokyo Guidelines (TG13) diagnostic criteria for suspected and definite diagnosis of acute cholecystitis were 65% and 67%, respectively.

Conclusions: We have developed a new practical score to aid in the diagnosis of cholecystitis in patients presenting to the ED with RUQ pain which performs better than the TG13. This novel score should be externally validated prior to widespread adoption.

	Points
Cholelithiasis	2
US Distended GB	2
Nausea/vomiting	1
RUQ Tenderness	1
Sonographic Murphy's sign	1
Leukocytosis WBC > 11	1
GB wall thickening	2
Murphy's sign	2
Total Score	**12**

Poster 10

NEGATIVE AND NONTHERAPEUTIC LAPAROTOMIES IN EMERGENCY SURGERY

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Presenter: Steven Allen, MD

Objectives: Surgical emergencies offer a significant diagnostic challenge to acute care surgeons as the patients are often unexaminable or too unstable to image. To operate comes with the risk that the diagnosis is ultimately not a surgical one or that the situation is entirely unsalvageable. Negative (NEG) or nontherapeutic (NT) laparotomies (ex lap) are known to occur, however the incidence and consequences of these cases are not well described in the emergency surgery service (ESS) population. We aim to describe the incidence of NEG and NT ex lap's in our ESS population and their clinical circumstances and consequences.

Methods: A retrospective review of an ESS registry from July 2010 to January 2014 of all emergent ex lap was performed. Demographics, comorbidities (PEC), hemodynamics, labs whether therapeutic (THER), NT (abnormal findings identified but not amenable to or requiring intervention) or NEG (intra-abdominal findings grossly normal) were recorded. Outcomes studied were complications, length of stay and mortality.

Results: 430 patients had an emergent ex lap. The incidence of NT and NEG ex lap was 7% with 53% referred from the Cardiac ICU after cardiac procedures. Those with NT and NEG ex lap were older, had lower blood pressure and higher lactate levels than the THER group. Mortality was higher in NT and NEG (41.4%) compared to the THER (12.5%). 71% of those who died in the NT and 100% who died in the NEG group came from the CTICU. Those who died in NT and NEG, the time from consultation to death was shorter than those who underwent a THER laparotomy (Table 1).

Conclusions: The incidence of NT and NEG ex laps is small but often occur in gravely ill patients with conditions that make the diagnosis and treatment of surgical issues difficult and require diagnostic confirmation for a surgically correctable issue. Modalities such as gasless laparoscopy may help to confirm a surgically amenable diagnosis and may reduce NT and NEG ex lap.

	THER (n=400)	NT (n=14)	NEG (n=16)	P
Age: Mean ± SD	57.2 ± 18.1	67.0 ± 17.2	60.1 ± 16.6	0.07
Gender: % male	48.5	57.1	66.7	ns
PEC's: Mean ± SD	1.9 ± 0.7	2.1 ± 0.5	1.9 ± 0.6	ns
Systolic BP: Mean	127.4 ± 47.2	111.8 ± 25.2	96.6 ± 30.6	0.056
Temp: Mean ± SD	98.2 ± 3.3	98.3 ± 1.9	98.0 ± 2.6	ns
BMI: Mean ± SD	28.6 ± 8.6	26.2 ± 6.6	28.7 ± 8.2	ns
WBC: Mean ± SD	12.9 ± 7.5	16.0 ± 8.0	17.1 ± 10.8	ns
Lactic acid: Mean ± SD	3.3 ± 3.9	7.0 ± 4.5	7.6 ± 5.0	0.002
HLOS	18.1 ± 24.2	10.6 ± 8.8	17.3 ± 15.7	ns
Time of consult to death (median days)	10	4	3	0.0004
Mortality (%)	12.5	Combined mortality: 41.4%		0.0001
		50.0	33.3	

Table 1.

Poster 11

THE IMPACT OF ACUTE CARE SURGERY ON APPENDICITIS OUTCOMES: RESULTS FROM A NATIONAL SAMPLE OF UNIVERSITY AFFILIATED HOSPITALS

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Presenter: John C. Madore, BS

Objectives: Acute appendicitis is the most common indication for emergency general surgery (EGS) in the US. We examined the role of acute care surgery (ACS) on interventions and outcomes for acute appendicitis at a national sample of university-affiliated hospitals.

Methods: We surveyed senior surgeons responsible for EGS coverage at University HealthSystems Consortium (UHC) hospitals, representing >90% of university-affiliated hospitals in the US. The survey elicited data on resources allocated for EGS during 2013. Responses were linked to UHC outcomes data by unique hospital identifiers. Patients treated at hospitals reporting hybrid models for EGS coverage were excluded. Differences in interventions and outcomes between patients with acute appendicitis treated at ACS hospitals vs. hospitals with a traditional on-call model were analyzed using univariate comparisons and multivariable logistic regression models adjusted for patient demographics and clinical acuity.

Results: We found 122 hospitals meeting criteria for analysis where 2,565 patients were treated for acute appendicitis. 48% of hospitals had an ACS team (N =1414), and 52% had a traditional on-call model (N=1151). Hospitals with ACS models were more likely to treat minority patients with greater severity of illness than traditional models. (Table 1) Patients treated at ACS hospitals were more likely to undergo laparoscopic appendectomy. (Table 2) In multivariable modeling of patients who had surgery (N=2,258), patients treated at ACS hospitals had 1.84 [95%CI 1.47-2.31] greater odds of undergoing laparoscopic appendectomy.

Conclusions: In an era when laparoscopic appendectomy is increasingly accepted for treating uncomplicated acute appendicitis, particularly in low risk patients, it is concerning that patients treated at non-ACS hospitals are more likely to undergo traditional open surgery despite having less severity of illness at the time of presentation.

Table 1. Characteristics of patients with acute appendicitis treated at 122 University HealthSystems Consortium Hospitals based on type of care model for emergency general surgery patients. (N=2,565)

Patient Characteristics	**Non-ACS model (N=1151)**	**ACS model (N=1414)**	***p* value***
Female	533 (46.3)	622 (44)	0.2404
Age (years)			0.0011
18-25, N (%)	238 (20.7)	346 (24.5)	
26-45, N (%)	407 (35.4)	549 (38.8)	
46-65, N (%)	373 (32.4)	397 (28.1)	
66-85, N (%)	116 (10.1)	114 (8.1)	
>85, N (%)	17 (1.5)	8 (0.6)	
Race			0.0125
White, N (%)	771 (67)	887 (62.7)	
Black, N (%)	102 (8.9)	187 (13.2)	
Hispanic, N (%)	189 (16.4)	237 (16.8)	
Asian, N (%)	53 (4.6)	60 (4.2)	
Other, N (%)	36 (3.1)	43 (3)	
Insurance			<0.0001
Private, N (%)	572 (49.7)	680 (48.1)	
Medicaid, N (%)	165 (14.3)	215 (15.2)	
Medicare, N (%)	158 (13.7)	160 (11.3)	
Other Government, N (%)	18 (1.6)	31 (2.2)	
Other, N (%)	100 (8.7)	76 (5.4)	
Uninsured, N (%)	138 (12)	252 (17.8)	
Severity of Illness			0.1608
Minor, N (%)	601 (52.2)	702 (49.6)	
Moderate, N (%)	507 (44)	637 (45)	
Major, N (%)	41 (3.6)	68 (4.8)	
Extreme, N (%)	2 (0.2)	7 (0.5)	

Table 2. Interventions and Outcomes of patients with acute appendicitis treated at 122 University HealthSystems Consortium Hospitals based on type of care model for emergency general surgery patients.

	Non-ACS model	**ACS model**	***p* value***
Intervention			
Open appendectomy, N (%)	224 (19.5)	167 (11.8)	<0.0001
Laparoscopic appendectomy, N (%)	795 (69.1)	1072 (75.8)	<0.0001
Open appendectomy + IR drain, N (%)***	—	—	
Laparoscopic appendectomy + IR drain, N (%)***	—	—	
IR drain only, N (%)	19 (1.7)	29 (2.1)	0.4570
None, N (%)	112 (9.7)	143 (10.1)	0.7475
Hospital LOS (days) mean, (SD)	2.88 (3.2)	2.97 (3.9)	0.5733
ICU LOS(days) mean, (SD)**	3 (5.5)	4.7 (9.1)	<0.0001
Total number complications (mean)	1.2	1.03	0.0765
Any major complication, N (%)	16 (1.4)	13 (0.9)	0.8271
In-hospital mortality, N (%)***	—	—	

*Pearson chi-squared test of association or non-parametric tests of comparison of means
**Including only the patients who had ICU stay
***N<10

Poster 12

VITAL CAPACITY PREDICTS PULMONARY COMPLICATIONS AFTER RIB FRACTURES

Thomas W. Carver, MD, David J Milia, MD*, Chloe Somberg,
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Medical College of Wisconsin

Presenter: Thomas W. Carver, MD

Objectives: Traumatic rib fractures are associated with significant morbidity. Vital capacity (VC) assesses pulmonary function; however, there is limited data linking VC to patient outcomes. Our objective was to determine if VC predicted complications and disposition in patients with rib fractures.

Methods: We conducted a retrospective chart review of all patients with fractured ribs admitted to a level 1 trauma center over a four year period. Patients were excluded if no VC was performed within 48 hours of admission. Data collected included demographics, hospital/ICU length of stay, epidural, discharge disposition to home versus rehab or skilled nursing facility (SNF), mortality, and average daily vital capacity (percent of predicted). A VC <30% was set as a predictor of morbidity. Pulmonary morbidity was defined as pneumonia, need for intubation, or ICU transfer. Statistic analysis was performed using Cox modeling and logistic regression.

Results: Of 801 patients with rib fractures, 683 had VC performed within 48 hours. Average age was 53, median ISS 13 (9-18) and median LOS was 5 days. Most (72%) were discharged home with 26% sent to rehab. Nine patients died (1%) and 10% had a pulmonary morbidity. Every 10% increase in VC increased the likelihood of discharge home by 28% and decreased the risk of discharge to rehab/SNF by 26%. If VC was >50% on day 2 there was a significantly lower risk of pulmonary morbidity (p=0.017). Compared with VC <30%, a VC of 30-40, 40-50, and >50% had significantly lower likelihood of discharge to rehab/SNF, 46%, 74%, and 71%, respectively.

Conclusions: Patients with fractured ribs and a VC <30% have significant risk for pulmonary morbidity. Higher average daily VC is associated with an increased likelihood of discharge home and lower pulmonary morbidity. VC identifies those at risk for complications and may help direct resource utilization. A prospective study is necessary to confirm these findings.

Notes

Poster 13

PIC SCORE: AN INNOVATIVE INITIATIVE TO IMPROVE OUTCOME FROM CHEST WALL INJURY AT A LEVEL I TRAUMA CENTER

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Presenter: Shawn M. Terry, MD, FACS

Objectives: To develop a valid, practical, and effective clinical assessment scale (PIC Score) applicable to non-intubated chest wall injury patients to facilitate understanding of treatment goals, monitor incremental progress, and promote communication among patients, all members of the trauma care team, and patients' support networks. This scale will be bundled into an electronic treatment Power Plan (PIC Protocol) designed to standardize approach to chest wall injury patients, trigger early detection of treatment failure and initiate immediate, multi-modal intervention to arrest any respiratory status deterioration in order to improve outcomes for non-intubated chest wall injury patients.

Methods: Retrospective review of our first 100 non-intubated chest wall injury patients treated via PIC Protocol and comparison of these results to 100 case-matched prior chest wall injury patient outcomes as identified in our Level I trauma registry databank query of the last four years. Initiative elements included: admission and assessment protocols, patient education, PIC flow sheet, in-room patient progress board. Compliance was assessed daily.

Results: Compliance with protocol was 98% (98/100pts). Unanticipated transfer to higher level of care for respiratory status decline was reduced by 57% ($p=0.02$). Length of stay was reduced by 0.7 days ($p=0.06$). Discharge destination to home was improved by 13% ($p=0.07$).

Conclusions: Application of institution-developed PIC Protocol Chest Wall Injury Initiative improved patient outcomes for non-intubated chest wall injury patients. Respiratory deterioration necessitating level of care transfer was significantly reduced. There were favorable trends toward earlier discharge and discharge to home. Review of additional enrolled patients will be necessary to determine if PIC protocol application achieves significance in all care measures evaluated.

Notes

Poster 14

CONTACT ISOLATION IS ASSOCIATED WITH VENOUS THROMBOEMBOLISM IN TRAUMA PATIENTS

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Presenter: Robert A. Ferguson, DO

Objectives: Contact isolation (CI) is a series of precautions used to prevent the transmission of medically significant infectious pathogens in the healthcare setting. Our institution's implementation of CI includes limiting patient movement to the assigned room. Our objective was to define the association between CI and venous thromboembolism (VTE) at our Level I trauma center.

Methods: Our institution's prospective trauma database was retrospectively queried for all patients admitted to the trauma service between January 1, 2011 and December 31, 2012. Data including demographics, injury severity score (ISS), pre-existing medical conditions, and VTE development were collected. CI status data were obtained from our institution's infection control database. Chi-square was used to examine the unadjusted relationship between CI status and VTE. As the groups were not equivalent, logistic regression was then used to examine the relationship between CI and VTE while adjusting for relevant covariates including gender, age, ISS, and co-morbidities.

Results: Of the 4,423 trauma patients admitted during the study period, 4,317 (97.6%) had complete records and were included in subsequent analyses. 251 (5.8%) of the patients were on CI. VTE occurred in 44 (17.5%) patients on CI vs. 141 (3.5%) patients who were not isolated ($p < 0.0001$, odds-ratio 5.9 [95% CI 4.1-8.5], Table 1). Using logistic regression to adjust for patient risk factors, this relationship remained highly significant ($p < 0.0001$, with an odds-ratio of 3.3 [95% CI 2.2-4.9], Table 2).

Conclusions: CI, ISS, age, male gender, and obesity were associated with VTE. After adjustment for other risk factors, CI remained most strongly associated with VTE. Although any medical intervention may come with unintended consequences, the risks and benefits of CI in this population need to be re-evaluated. Further study is planned to identify opportunities to mitigate this increased VTE risk.

	No Contact Isolation (n = 4,066)	Contact Isolation (n = 251)	p
Age	45 (36)	60 (32)	<0.0001*
ISS	9 (13)	17 (13)	<0.0001*
VTE, %	3.47	17.53	<0.0001*
Obesity, %	6.17	8.37	0.1837
Gender, % Male	65.54	62.15	0.2761

* p<0.05

TABLE 1. Comparison of Patients with Contact Isolation vs. No Isolation

Factor	Estimate	Std Error	p	Odds Ratio
Contact Isolation	0.5934	0.1022	<0.0001*	3.2769
Obesity	0.4266	0.1238	0.0006*	2.3469
Male Gender	0.3713	0.0968	<0.0001*	2.1015
ISS	0.0751	0.0065	<0.0001*	1.0779
Age	0.0165	0.0040	<0.0001*	1.0166
Insulin-Dependent DM	-0.0059	0.1186	0.9605	0.9883
Psychiatric	0.0090	0.1364	0.9472	1.0182
Dementia/Alzheimer's	-0.1764	0.2330	0.4492	0.7028
CVA	-0.0811	0.2733	0.7668	0.8504
Cirrhosis	-0.1733	0.3945	0.6604	0.7070
Cancer	0.1889	0.2729	0.4889	1.4590
Hx Alcohol Abuse	0.1474	0.1369	0.2817	1.3428

* p<0.05

TABLE 2. Patient Factors for the Logistic Regression Model

Poster 15

BIOMARKERS IN TRACHEAL ASPIRATE AS AN EARLY PREDICTOR OF ACUTE LUNG INJURY

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Presenter: Carl Freeman, MD, FACS

Objectives: Up to 30% of patients with multiple traumatic injuries may develop acute lung injury (ALI). The need to be able to predict the development of ALI can be crucial in triage and evacuation of the military trauma patient. We hypothesized that inflammatory markers in tracheal aspirate could predict ALI in the blunt trauma population.

Methods: This prospective observational study was conducted in an academic Level I Trauma Center from November 2010-November 2012. Inflammatory mediators in tracheal secretions and plasma of intubated subjects aged 18-65 years with severe multiple blunt trauma were measured for 4 days post injury. Tracheal and serum samples were analyzed for quantities of tumor necrosis factor (TNF), interleukin 1 beta (IL-1Î²), IL-6, IL-8, IL-10, C-reactive protein, pentraxin 3(PTX3), and activated complement 5 daily for 4 days. The diagnosis of ALI or acute respiratory distress syndrome was made using the international consensus criteria. Comparisons were made from samples collected on the first 24 hours following injury (Day1) between the ALI group (n=6) and the NO ALI group (n=15). Data comparisons were made using non-parametric methods. Significance was determined using the Mann-Whitney test with $p<0.05$ being considered statistically significant.

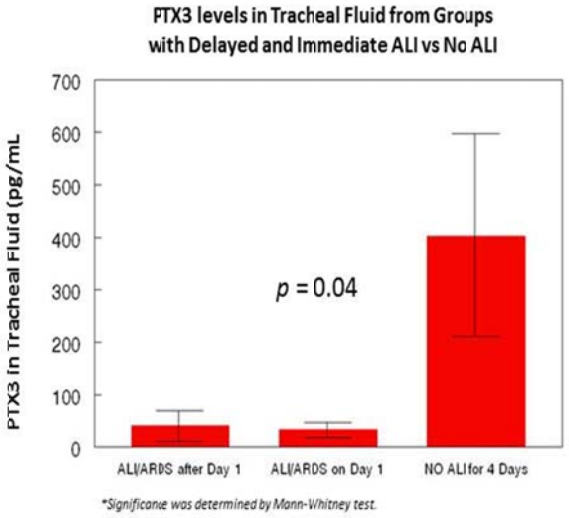
Results: There were no statistical differences in biomarker plasma levels between groups. However, levels of TNF ($p=0.04$), IL-1Î²($p=0.046$), and PTX3 ($p=0.04$) from tracheal aspirates were significantly lower in the group that developed ALI after Day 1 vs. the No ALI group.

Conclusions: The statistically significant differences in three biomarkers in tracheal fluid between groups of trauma subjects (ALI vs. NO ALI) on Day 1 post injury were the key findings of this study. Patients who develop ALI following significant blunt trauma appear to have lower representation of TNF, IL-1Î² and PTX3 in their tracheal aspirate early in their hospital course than subjects with No ALI.

Levels of Inflammatory Mediators in Tracheal Aspirates (Distal to ETT) on Day 1 Following Severe Blunt Trauma[a]

Mediator	IL-β (pg/mL)	TNF (pg/mL)	PTX3 (pg/mL)
Delayed ALI			
Median IQR	5314 1525-8448	161 11-1441	8 2-34
No ALI			
Median IQR	11079 3091-47533	1934 34-4923	184 0-337
p-value ALI vs. N-ALI	0.046	0.04	0.04

[a]Subjects who developed ALI/ARDs on Days 2, 3, or 4 were compared to those who did not develop ALI/ARDS for 4 days. Comparisons were nade using non-parametric methods. Mann-Whitney test used to determine significance.
[b]Denotes p-value <l.05.



Poster 16

PENETRATING CARDIAC INJURIES: YOU MUST LOOK OUTSIDE THE BOX

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Presenter: Peter Chen, MD

Objectives: Penetrating cardiac trauma is highly lethal with mortality rates approaching 70% in patients surviving to the hospital. Delayed recognition/treatment of a cardiac injury places a patient at even greater risk for mortality. The purpose of this study was to define and compare the incidence, severity, and mortality rate of cardiac injuries resulting from penetrating transthoracic or thoraco-abdominal stab wounds (SW) located inside versus outside of the classic cardiac box.

Methods: Patients who sustained thoracic and thoraco-abdominal SW at a single Level I trauma center, from May 2011 to Sept 2013, were identified using our NTRACS database. Data collected included demographics, injury location, admission vitals, ISS, injuries sustained, procedures required, overall/ICU LOS, vent days, complications and mortality. Patients sustaining SW inside the "cardiac box" (Inside) were compared to those with SW outside the borders of the "cardiac box" (Outside). Student's T test was used to compare groups.

Results: 109 patients were identified (51 Inside, 58 Outside). Overall incidence of cardiac injury (CI) was 7%. Demographics, avg admission vitals, CI rate/mortality and LOS were similar between the two groups. ISS was higher in the Inside group.(Table 1) The majority of Outside SWs were in the left hemithorax and below the nipple line. (Table 2) If the patient did not arrive in extremis, the presenting vitals were similar regardless of the presence of a CI.(Table 1) The overall mortality for patients with CI was 38% (40% Inside, 33% Outside). All deaths from CI were in patients who arrived in extremis.

Conclusions: This study shows that evaluation of the precordium must be performed in all patients who sustain any left sided thoracic or thoraco-abdominal SW regardless of vital signs and whether the wounds are located within the classic cardiac box. Improvements in time to diagnosis and treatment in these patients may lead to improved outcome.

		Outside (N = 58)	Inside (N=51)
Gender	M	56 (97%)	51 (100%)
	F	2 (3%)	0 (0%)
Average Age (years)		30 +/- 12	33 +/- 15
Average ISS		9 +/- 8	13 +/-12*
Average Admission	SBP (mmHg)	137 +/-20	117 +/- 46
	HR (bpm)	83 +/-18	83 +/- 34
	RR (bpm)	21 +/-7	19 +/- 7
	GCS	15	13 +/- 4
Average	LOS (days)	4 +/- 3	4 +/- 4
	ICU LOS (days)	0 +/- 1	1 +/- 2
	Vent Days	0 +/- 1	0 +/- 1
Cardiac Injuries		3 (5%)	5 (10%)
Mortality from Cardiac Injury		1 (2%)	2 (4%)
		Cardiac Injury (Not in Extremis)	No Cardiac Injury
Average Admission	SBP (mmHg)	117 +/-23	130 +/- 30
	HR (bpm)	92 +/-9	94 +/- 26
	RR (bpm)	20 +/-4	20 +/- 7

*P<0.05

Table 1: Patient demographics, admission (with and without CI) and disposition data.

Location of Stab Wound	Number of patients	Number of Cardiac Injuries Found
Left Hemi-thorax Lateral to Mid-clavicular line	31	3
Right Hemi-thorax Lateral to Mid-clavicular line	19	0
Both Right and Left Sides Lateral to Mid-clavicular line	7	0
Below Nipple line	34	3

Table 2: Distribution of SW locations for patients with Outside the box SWs

Poster 17

THE INCIDENCE OF PULMONARY EMBOLISM AFTER COMBAT RELATED TRAUMATIC AMPUTATION IS HIGHER THAN WE THOUGHT: AN ANALYSIS OF 366 COMBAT CASUALTIES

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Presenter: Matthew Tadlock, MD

Objectives: The incidence of pulmonary embolism (PE) after traumatic amputation (TA) is 1.3% in civilians and 3.7% in a recent analysis of 103 combat amputations. Our goal was to determine PE incidence and risk factors in a large cohort of combat amputees.

Methods: The Expeditionary Medical Encounter Database and chart review were used to identify and abstract data from patients suffering a TA proximal to the wrist or ankle. All patients presenting to a Navy Role 2 or 3 facility from January 2009-December 2011 who underwent surgical amputation within 48 hours of injury were included. Patients were followed for 12 months after injury. . PE risk factors were identified utilizing multivariable logistic regression.

Results: During the 3-year study period, 426 suffered a TA. Of the 366 with adequate records for review, 99.5% were male, 97.5% suffered a blast injury and 94.5% were injured in Afghanistan. Mean age was 24.3, median Injury Severity Score 21 and 86.9% received chemical prophylaxis. PE incidence was 16% (59), of which 20% had a concomitant DVT. The DVT rate was 16% and PE and/or DVT was found in 28%. Those with at least one above knee amputation had a higher PE rate compared to those with only lower level amputations (21% vs. 12.3%, $p<0.04$). Massive transfusion (> 10 units) with packed red blood cells and/or fresh whole blood (PRBC/FWB) occurred in 64.2%. As transfused PRBC/FWB units increased, so did the PE incidence (table 1). Upon multivariable analysis, only units of PRBC/FWB transfused (Odds Ratio 1.24, 95% CI, 1.07-1.45) was associated with PE identification (table 2).

Conclusions: The incidence of post-injury PE in this large cohort of combat amputees is significantly higher than previously described and highest in those with above knee amputations. However, only increasing units of blood transfused was independently associated with PE identification.

Units of RBC + FWB	Number of Patients	% DVT	% PE
0 to 3 units	59	5% (3)	7% (4)
4 to 9 units	72	8% (6)	9% (8)
10 to 19 units	118	14% (17)	22% (26)
20+ units	117	28% (33)	18% (21)
Total	366	16% (59)	16% (59)

Table 1: Blood Transfusion and PE/DVT Incidence ($p<0.01$)

	Univariate Analysis P value		Logistic Regression OR (95%CI)	
Independent Variable	*DVT*	*PE*	*DVT*	*PE*
Multiple Amputations	0.01	0.01	--	--
Above Knee Amputation	<.01	0.09	--	--
Through Knee Amputation	--	--	--	--
Injury Severity Score	<.01	0.06	**1.04 (1.02-1.07)**	--
Head AIS>2	--	--	--	--
Pelvic Fracture	<.01	0.04	--	--
Blood units (square root)	<.01	<.01	--	**1.24 (1.07-1.45)**
Ventilator Days	<.01	0.05	**1.10 (1.01-1.20)**	--

Table 2: Risk Factors For PE and DVT

Poster 18

SEX BASED THROMBOELASTOGRAPHY DISPARITIES POST-INJURY: INDEPENDENTLY DIFFERENT EARLY ON BUT WHY?

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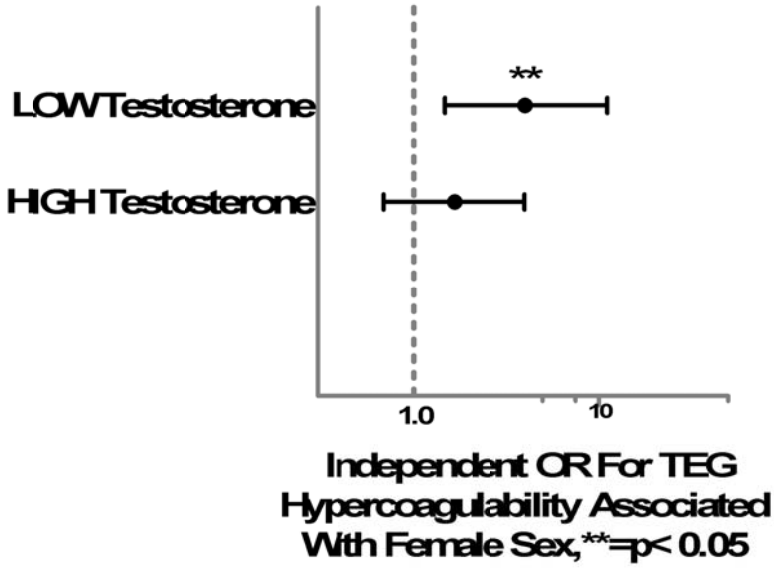
Presenter: Tiahuna Zhou, BS

Objectives: The beneficial use of thromboelastography (TEG) to adequately detect coagulopathy and direct blood component transfusion during resuscitation has been demonstrated. Despite this evidence, little is known regarding male and female differences in TEG measurements and the mechanisms responsible for disparities post-injury. We hypothesized there would be significant differences in TEG parameters with females being more hypercoaguable due to sex hormone differences.

Methods: Data were derived from a prospective cohort study designed to characterize mechanisms responsible for sex based outcome differences post injury. Blunt injured patients requiring ICU admission were included. Isolated TBI, cord injury or patients on anticoagulation were excluded. TEG parameters (r, k-time, alpha angle, MA, G, LY30) and sex hormone levels (estradiol, total testosterone) were obtained <6 hrs and at 24 hrs post injury.

Results: Males and females in the study cohort (n=208) were similar in injury severity, presenting vitals, GCS, 24 hour resuscitation/transfusion needs and presenting INR. Regression analysis demonstrated female sex was independently associated with hypercoaguable TEG parameters at 6 hours (R, k-time, MA, G) and at 24 hours (k-time, alpha angle) after controlling for important confounders. TEG based hypercoagulability in females was present irrespecitve of age (>/< 50yoa) and early estrogen levels (high/low). TEG based hypercoagulability in females was no longer apparent when early testosterone levels were elevated.

Conclusions: Independent disparities exist in TEG parameters across males and females post-injury. These differences were apparent early and remained persistent with females demonstrating a hypercoaguable phenotype. The data suggest that early testosterone rather than age or estrogen levels may be play a role in these independent TEG based disparities across males and females post injury.



Independent OR For TEG Hypercoagulability Associated With Female Sex,**=p< 0.05

Poster 19

RDW: A RELIABLE PREDICTOR OF EMERGENCY SURGERY OUTCOMES

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Presenter: Elizabeth McDonald

Objectives: Red Cell Distribution Width (RDW), a routine component of the complete blood count (CBC) has been shown to predict outcomes in general medical, critically ill, and trauma populations. We evaluated its predictive ability in patients undergoing emergent operative intervention.

Methods: The operative logs for all acute care surgeons at a single center over two years were queried. RDW on presentation and post–operative day one, clinical presentation characteristics, operative intervention, comorbidities, complications, and mortality were abstracted from the medical record. Presenting RDW and change in RDW to post-operative day one were compared to mortality and complications. Univariable and multivariable linear and logistic regression were applied where appropriate.

Results: Among 239 patients the average age was 41, 144 were male and 49 operations were for trauma. On presentation 22 were hypotensive, 78% met at least one criterion for sepsis and 40% met two or more. RDW on presenting CBC was lower for survivors (12.62 vs. 14.38; $p = 0.002$) and higher for those with complication (13.13 vs. 12.45; $p=0.008$). There was no difference in RDW for those with infectious complications (12.72 vs. 12.62; $p = 0.757$). After controlling for comorbidities and shock presenting RDW remained predictive of mortality (OR 1.27 per unit increase in RDW, 95%CI 1.01 – 1.60) and morbidity (OR 1.15 per unit increase in RDW 95% CI 0.99 – 1.34). The effect was similar for emergency general surgery and trauma patients. Change in RDW also predicted mortality (0.83 vs. 0.33; $p= 0.005$) and complications (0.45 vs. 0.27; $p=0.042$) however this correlated with and was likely driven by transfusion of red blood cells ($r=0.230$, $p=0.004$).

Conclusions: RDW is a readily available parameter predictive of survival and complications for emergency surgical procedures. Change in RDW also predicts outcome but may reflect transfusion of potentially aged red blood cells.

Notes

Poster 20

MASSIVE HEMORRHAGE CONTROL - A RE-EVALUATION OF AVAILABLE MODERN TOURNIQUETS

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San Antonio Military Medical Center

Presenter: Nicholas M. Studer, MD, EMT-P

Objectives: Extremity tourniquets are proven to reduce mortality from hemorrhage, a leading cause of preventable battlefield death both historically and in the current conflicts in Southwest Asia. The intent of this study was to evaluate the ability and confidence of typical enlisted field medical providers to control massive hemorrhage using four extremity tourniquets sold to the U.S. Government: the Combat Application Tourniquet (CAT), SOF Tactical Tourniquet-Wide (SOFTT-W), Military Emergency Tourniquet (MET), and Ratcheting Medical Tourniquet (RMT).

Methods: A convenience sample of 39 at a Regional U.S. Air Force Hospital participated. An initial survey of prior experience and training was completed followed by skill evaluation using a crossover design where participants applied four devices in random order for time to the KForce Hemostatic Wound Trainer. Finally, participants completed a Likert-scaled survey of confidence and preference on each device. These data were analyzed by ANOVA and Studentâ€™s T-tests.

Results: Less than 1 in 6 in this cohort had used an extremity tourniquet on a live patient. This group averaged only 7 prior training opportunities with extremity tourniquets, with 8/39 reporting either a single iteration or no previous training. In practical application, the CAT scored highest in successful applications (39/39, $p<0.041$). It also scored highest in subjective rating of user confidence (4.69/5, $p<0.026$) and best design (4.36/5, $p<0.042$). Although participants applied the RMT fastest (mean 31 seconds, $p<0.01$), the successful application rate was only 21/39.

Conclusions: Currently available extremity tourniquets would benefit from continued refinement. Of the four devices tested, the CAT demonstrated superiority in this population with no failures to initially control hemorrhage. Military medical personnel would benefit from increased and more realistic training on lower extremity tourniquet application.

Table 1. Successful Application of Tourniquets to Stop Lower Extremity Hemorrhage

Tourniquet	Success Rate	Mean Time To Apply (seconds)
CAT	100.00%	52.3
MET	89.70%	50.9
RMT	55.30%	31.0
SOFFT-W	87.20%	44.8

Note: Results in blue are statistically significant. Time to apply includes only successful trials.

Table 2. Mean Subjective Ratings of Tourniquets After Testing

Tourniquet	CAT	MET	RMT	SOFTT-W
Confidence	4.69	3.90	3.82	4.28
Efficacy	4.23	3.36	3.18	4.00
Design	4.36	3.18	3.21	3.92
Overall	4.10	2.92	2.87	3.79

Note: Results in blue are statistically significant. Likert-scaled data above are scored from 1 to 5 with 5/5 representing a perfect score and 1/5 being very poor.

Poster 21

INTRA-ABDOMINAL PACKING WITH COMBAT GAUZE™ DURING DAMAGE CONTROL LAPAROTOMY: A SAFETY ANALYSIS

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Presenter: Rachel L. Choron, MD

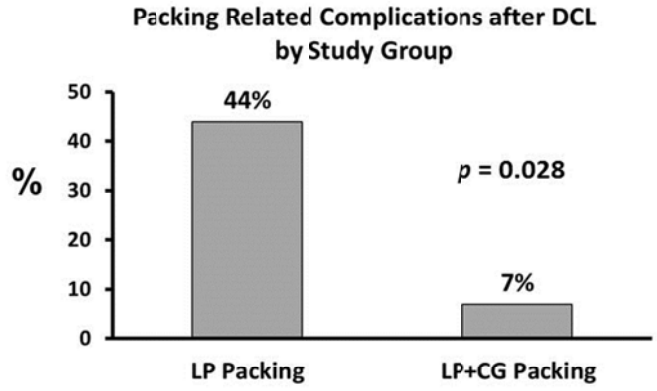
Objectives: Intra-abdominal packing with laparotomy pads (LP) is a common method for hemorrhage control in critically injured patients. Combat Gauze™ ([CG] Z-Medica QuikClot®), a kaolin impregnated hemostatic agent, in addition to LP, may improve hemorrhage control. While CG packing has been proven effective in a swine liver injury model, CG remains unstudied for human intra-abdominal use. We hypothesized that CG packing during damage control laparotomy (DCL) is safe and effectively controls hemorrhage.

Methods: A retrospective review (2011-2013) at an urban, Level-I Trauma Center of all DCL patients with intentionally retained packing was performed. Clinical characteristics, intraoperative and postoperative parameters, and outcomes were compared with respect to packing type (LP vs. LP+CG). To focus on "packing related" complications (defined as enteric fistulae, organ/space infections, or anastomotic leaks), patients who died within 24 hrs were excluded. A $p \leq 0.05$ was significant.

Results: Of 51 patients who underwent DCL with retained packing, 39 survived 24 hrs. When LP (n=25) and LP+CG (n=14) patients were compared (Table), no difference in age, mechanism, GCS, ISS, initial hemodynamic and resuscitation parameters, or operative findings was detected (all $p>0.05$). After a median of 2 days and 4 units of blood products transfused from initial packing until final abdominal closure in both groups, 72% of LP and 57% of LP+CG patients ($p=0.482$) developed any complication. Importantly, packing related complications were more common in LP than LP+CG patients (Figure, $p=0.028$) including organ/space infections (LP, 28%; LP+CG, 7%) and anastomotic leak (LP, 27%; LP+CG, 0%).

Conclusions: While we were unable to prove that the addition of CG to standard LP packing improved hemorrhage control, our postoperative complication analysis does suggest that CG may be safely utilized for intra-abdominal packing during DCL.

Clinical Characteristics Compared with Respect to Combat Gauze™ Packing			
	LP Packing (n=25)	**LP + CG Packing** (n=14)	***p* value**
Age (years)	35.4 ± 16.8*	35.0 ± 12.8*	0.939
Penetrating Injury Mechanism	12 (48%)	8 (57%)	0.741
Initial Glasgow Coma Score	11.0 ± 5.3	11.7 ± 5.0	0.681
Injury Severity Score	22.4 ± 10.8	18.6 ± 11.1	0.305
Massive Transfusion Protocol Activation	16 (64%)	10 (71%)	0.7334
Initial OR Estimated Blood Loss (mL)	1500 (500 – 2250)**	1500 (950 – 7750)**	0.289
Initial OR Systolic Blood Pressure Nadir (mmHg)	85.5 ± 20.9	72.6 ± 39.8	0.196
Initial OR Temperature Nadir (°F)	95.1 ± 1.5	95.1 ± 2.1	0.898
Initial OR pH Nadir	7.21 ± 0.1	7.24 ± 0.1	0.437
Solid Organ Injury	14 (56%)	6 (43%)	0.515
Mean Injury Grade	3.3 ± 1.5	3.0 ± 1.1	0.679
Major Vascular Injury	5 (20%)	6 (43%)	0.156
Mean Injury Grade	3.0 ± 1.4	3.0 ± 1.1	1.000
Enteric Injury	18 (72%)	8 (57%)	0.482
Mean Injury Grade	2.8 ± 1.2	2.2 ± 0.9	0.155
Total Blood Products, Initial Laparotomy to Closure (units)	4.0 (1.5 – 8.0)	4.0 (2.0 – 6.0)	0.718
Total # of Laparotomies per Patient	2.0 (2.0 – 3.5)	2.5 (2.0 – 3.3)	0.761
Days until Abdominal Closure	2.0 (1.0 – 4.5)	2.0 (2.0 – 5.0)	0.392
Total Postoperative Complications	18 (72%)	8 (57%)	0.482
Ventilator Days	11.4 ± 9.6	11.1 ± 6.5	0.906
ICU Length of Stay (days)	16.0 ± 10.0	17.1 ± 8.2	0.710
Hospital Survival	24 (96%)	14 (100%)	1.000
*Mean ± Standard Deviation **Median (25th – 75th Percentile)			



Poster 22

WASTE OF PLASMA: AN UNINTENDED CONSEQUENCE OF PREDEFINED RBC: PLASMA RATIOS

Erik W. Streib, MD*, Ben L. Zarzaur, MD, MPH*
Indiana University

Presenter: Erik W. Streib, MD

Objectives: Recent military and civilian trauma center experience indicates a benefit to resuscitation of patients in hemorrhagic shock using predefined ratios of red blood cell(RBC) to thawed plasma(TP). Massive transfusion protocols(MTP) have evolved using predefined ratios of RBC and TP. Over time the suggested ratio has decreased to 1:1. Because the shelf life of TP is much lower than RBC, there may be wastage of TP. The purpose of this study was to examine the evolution of MTP towards 1:1 and to determine if there has been an increase in waste of blood products.

Methods: A retrospective cohort of adult trauma patients admitted to an urban level 1 trauma center from 2008-2014 was formed by merging the MTP activation database and the trauma registry. The study period was divided into 4 time periods based on changes to MTP practices (Table 1). Waste of blood product was defined as a unit that was prepared but not transfused during MTP, and could not be used for another patient before expiration. Cost estimates were made using current cost per unit of blood product. Comparisons were made between periods before and after adjusting for patient level factors.

Results: 212 MTP activations were included. During period 1, the RBC:TP ratio was 3:2. In all subsequent periods, it was 1:1. There was an increase in TP waste in each study period after this change (Figure 1). After adjusting for patient and injury characteristics, this association remained. Decreasing the number of MTP sets prepared by the blood bank in period 4 did not reduce TP waste. Cost of this waste was $9774 in 2013.

Conclusions: Changing an MTP RBC:TP ratio to 1:1 has resulted in increased waste of TP. Each change toward the goal of hemostatic resuscitation further increased waste without a subsequent decrease in mortality. This is both expensive and results in loss of a scarce resource. Future studies on patient focused TP usage compared to predefined ratios is recommended.

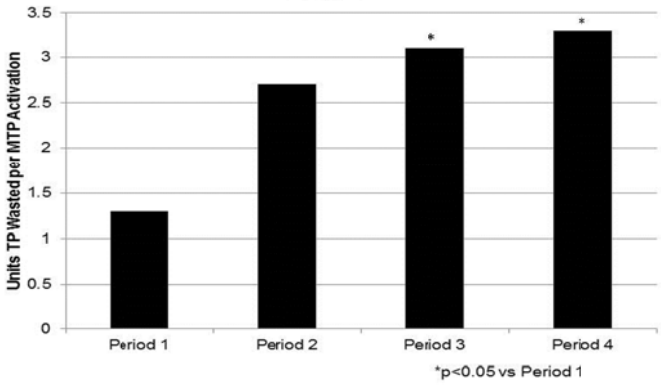
Table 1

Period	Contents of MTP set			RBC:TP Ratio	#sets prepared	Change
	RBC	TP	PLT			
1	6	4	1 every other set	3:2	2 in addition to issued	n/a
2	6	6	1 every other set	1:1	2 in addition to issued	Change in RBC:TP ratio
3	6	6	1 every other set	1:1	2 in addition to issued	TXA protocol added, MTP education
4	6	6	1 every other set	1:1	1 in addition to issued	Decrease number of sets blood bank prepares in excess of current use

MTP, massive transfusion protocol; RBC, red blood cells; TP, thawed plasma; PLT, apheresis unit of platelets; TXA, tranexamic acid

Table 1: Changes to MTP during the study time periods

Figure 1



Results: Plasma waste per MTP activation during the study time periods

Poster 23

HTEE MEASURED SVC INDEX: A USEFUL TOOL FOR PREDICTING FLUID RESPONSIVENESS IN THE TRAUMA PATIENT

Brett M. Howard, MD, Amy Christie, Dudley Benjamin Christie, MD*, Dennis W. Ashley, MD*
Mercer University at Medical Center of Central Georgia

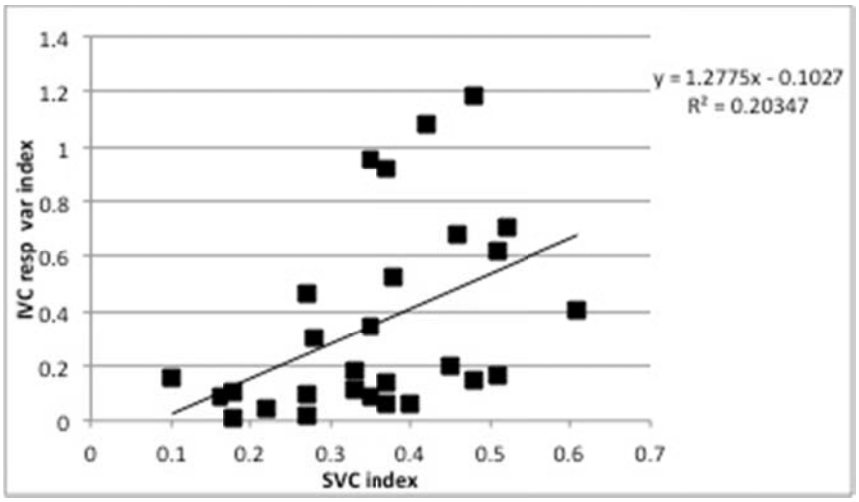
Presenter: Brett M. Howard, MD

Objectives: Both transthoracic echocardiography (TTE) and continuous transesophageal echocardiography (hTEE) may be used for rapid evaluation of hemodynamics in the critically ill trauma patient. TTE captured inferior vena cava (IVC) collapsibility can be useful in determining patient fluid responsiveness. Similarly, hTEE allows for serial measurements of the superior vena cava (SVC) collapsibility and estimation of fluid responsiveness. No studies have evaluated whether SVC and IVC measurements are comparable in estimating resuscitation needs. The objective of this study was to determine if hTEE captured SVC index is comparable and therefore an alternative tool to IVC respiratory variability index (IRVI) in predicting fluid responsiveness.

Methods: Critically ill trauma patients in the ICU of a Level 1 Trauma Center were followed from January- May 2014. Where hTEE was performed for hemodynamic monitoring purposes using Imacor hTEE (ZuraEVOZT1000), a surgical intensivist simultaneously performed TTE exams using Sonosite (MTurbo/2007-2012). SVC max. and min. areas were obtained for calculation of SVC index. IVC diameters, Dmax at end inspiration and Dmin at end expiration, were acquired to calculate IVC respiratory variation index (IRVI).

Results: 28 comparing examinations were obtained. When IRVI predicted fluid responsiveness in the ventilated trauma patient, the simultaneously obtained SVC index also predicated fluid responsiveness. ANOVA, regression, and concordance statistics compared the SVC and IVC measurements ($p < 0.05$).

Conclusions: We have shown a statistically significant correlation between SVC and IVC indices of fluid responsiveness in the mechanically ventilated trauma patients. Our data supports the use of hTEE captured SVC index for fluid responsiveness particularly in those trauma patients in which IVC measurements are difficult to obtain or may be unreliable.



Scatter plot comparing IVC and SVC indices.

Poster 24

RECURRENCE AND COMPLICATION RATES IN ACUTE CARE SURGICAL PATIENTS UNDERGOING VENTRAL HERNIA REPAIR WITH ABSORBABLE BIOSYNTHETIC MESH

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Presenter: Jimmi Mangla, MD

Objectives: Permanent synthetic mesh offers lower overall recurrence rates (≈5% vs. 30%), but biologic prostheses have been increasingly utilized for hernia repair, especially in contaminated operative fields. The purpose of this study was to evaluate our experience in patients undergoing Ventral hernia repair (VHR) using absorbable biosynthetic mesh (BIO-A®).

Methods: All patients undergoing an open VHR using BIO-A® mesh at a single institution from August 2011 to May 2013 were reviewed retrospectively. Patient demographics, early and late wound complications, post-operative outcomes, re-intervention, and recurrence rates were analyzed.

Results: Thirty five patients underwent an open VHR (17 intra-peritoneal, 12 Rives Stoppa, and 6 pre-peritoneal underlay) using BIO-A® mesh. The median age was 61 and median follow-up was 18.5 months. Overall recurrence rate was 31.4%. The median time to recurrence was 7 months. There was no difference in risk of recurrence versus operative wound classification (p=0.55) or location of mesh placement (p=0.48). Table 1 shows demographics and preoperative factors. Table 2 shows the outcome variables in all subgroups. There is no difference in recurrence probability between the clean and clean-contaminated *versus* contaminated and dirty groups (Figure 1) (p=0.73).

Conclusions: BIO-A® mesh prosthesis use is associated with early and high recurrence rates regardless of operative wound classification and location of prosthetic placement. Controlled studies and comparisons with permanent synthetic prostheses are needed to clarify the potential role of BIO-A® in acute care surgery.

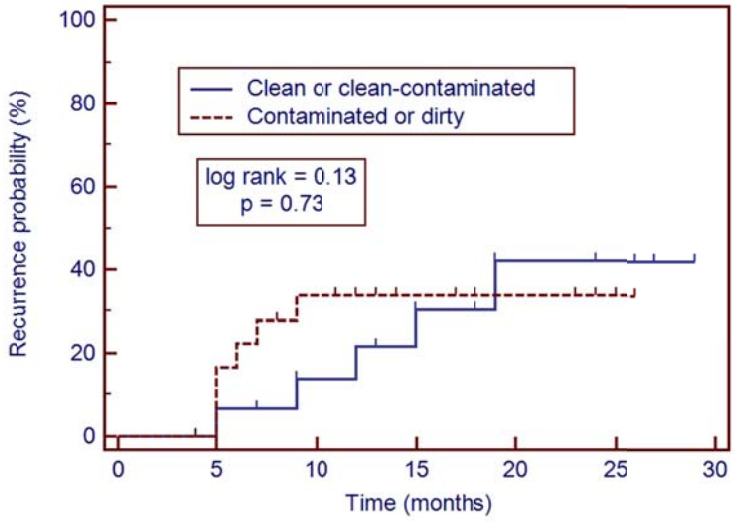

Figure 1 shows Kaplan Meier curve for probability of hernia recurrence and wound classification grouped into two groups (Clean + Clean-contaminated *vs* contaminated + dirty).

Table 1: Demographics and Preoperative Factors

Demographic Variable	All VHR	Intraperitoneal	Rives Stoppa	Preperitoneal
n	35	17	12	6
Age (yrs)	61	65	59	55
Males (%)	4209	47.1	47.1	33.9
Median BMI	34.9	35.6	31.9	33.4
BMI>30 (%)	65.7	64.7	66.6	66.6
Diabetes (%)	25.7	23.5	25	33.3
Smoking(%)	14.3	17.6	8.3	16.7
MRSA(%)	14.2	11.7	16.7	16.7
Number of Previous Abdominal Operations Median (Range)	3 (1-10)	3 (1-6)	2.5 (1-10)	3 (1-4)
Patients with Previous Hernia Repair(%)	57.1	29.4	33.3	33.3
Operative Field (%)*	25 (71.4)	13 (75)	9 (76.5)	3 (50)
• Clean	10	4	3	3
• Clean Contaminated	5	2	2	1
• Contaminated	8	4	3	1
• Dirty	12	7	4	1

VHR: Ventral Hernia Repai· *(Clean-Contaminated, Contaminated or Dirty)

Table 2: Outcome Variables

Outcome Variable	All VHR	Intraperitoneal	Rives Stoppa	Preperitoneal
n	35	17	12	6
Median Follow-up Months (Range)	18.5 (4-29)	13(4-27)	16.5 (4-26)	17 (12-29)
Median LOS (days)	8	8	12	4
Early Wound Complications Rate(%)	17.1	5.9	41.7	0
Late Wound Complications Rate(%)	28.6	41.2	16.7	16.7
Overall Recurrence Rate(%)	31.4	23.5	33.3	50
Time to Recurrence Months (Range)	7 (5-19)	7 (5-19)	6.5 (5-9)	12 (5-15)

VHR: Ventral hernia Repair LOS: Length of Stay

Poster 25

EVALUATING THE CONSISTENCY OF PERFORMANCE METRICS AMONG TRAUMA CENTERS CARING FOR INJURED CHILDREN

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Sunnybrook Health Sciences Center

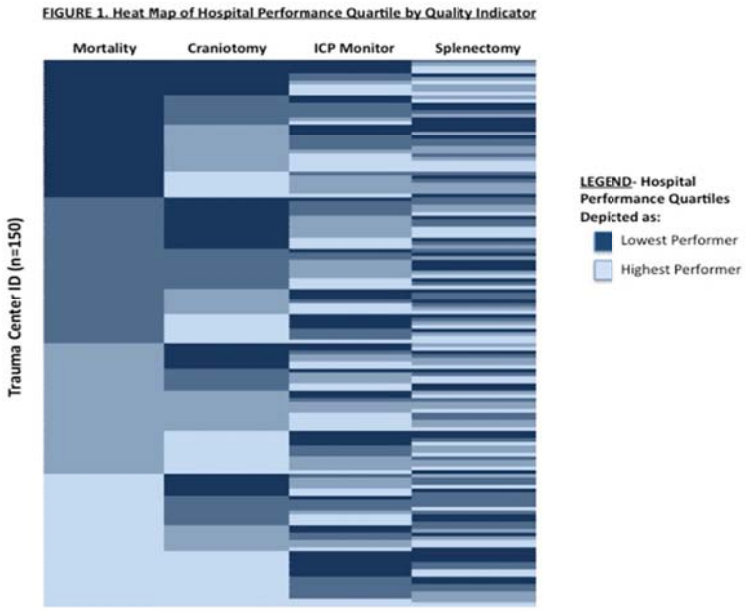
Presenter: Chethan Sathya, MD

Objectives: Several indicators of quality pediatric trauma care have been proposed including low trauma-related mortality, low splenectomy rates after blunt splenic injury (BSI), liberal use of ICP monitors after severe traumatic brain injury (TBI), and high craniotomy rates after severe subdural/epidural hematomas. It is not known if center level performance is consistent in each of these metrics. We sought to evaluate whether center performance in one quality metric predicted similar performance in another.

Methods: We reviewed children ≤18 years old with an injury AIS≥2 treated from 2010-2011 at 150 trauma centers participating in the Trauma Quality Improvement Program (TQIP). Multi-level modeling was used to determine hospital-specific adjusted odds ratios for each quality indicator. Hospitals were ranked into quartiles of odds ratios for each indicator, with quartile 1 and 4 representing low and high performers, respectively. A heat map, which color codes each center based on quartile of performance, was generated to visually depict consistency across each indicator. Kappa statistics were used to test multiple pairwise agreements between indicators and the overall agreement between all four indicators.

Results: Among 84,880 children evaluated, 1320 died, 3603 had BSI, 3503 had severe TBI, and 1286 had an epidural/subdural. Although some agreement between mortality and craniotomy rates was apparent (Figure 1), there was a general lack of concordance among indicators. Kappa statistics showed slight pairwise agreement when comparing mortality and craniotomy rates (0.17(0.02, 0.32)), however, the overall kappa for all four indicators was not significant (-0.012(-0.07, 0.06)).

Conclusions: Trauma centers that are high or low performers in one area do not always perform similarly in other domains. This lack of consistency needs to be considered when developing composite measures of overall hospital performance.



Heat map where dark blue represents low center performance and lighter blue represents high center performance within each quality indicator

Poster 26

THE MODIFIED RANKIN SCORE PREDICTS RETURN TO WORK POST- INJURY

Anirudh Kohli, MD, Daniel Spielman, Dordaneh Sugano, Andrew Lederman,
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Sheldon H. Teperman, MD*, Melvin E. Stone Jr., MD*
Jacobi Medical Center

Presenter: Anirudh Kohli, MD

Objectives: Return to work is a primary metric of functional outcome post-injury. While several studies have examined factors predicting return to work, this data is injury specific, e.g., traumatic brain injury, and has limited clinical utility. The modified Rankin Score (mRS) is a validated and simple measure of physical disability used to assess rehabilitation after stroke. A score of 5 has severe disability and 0 is asymptomatic. We began a performance improvement project to determine how many patients returned to work and in what physical capacity after being discharged from the trauma service. We hypothesized that the mRS could be used to predict patients who returned to work post-injury in a general trauma population.

Methods: The trauma registry was queried for all patients 18-65 years old discharged from June 30, 2012 to July 1, 2013. Exclusion criteria included: prior physical and/or neurocognitive deficits, unemployment, non-English speakers. Patients were contacted by phone survey and asked about employment and their present physical ability to determine the mRS. Patients who had returned to work (RTW) were compared to those who had not (noRTW). Multivariate analysis with de-identified patient data was used to identify independent predictors of return to work with significance $p<0.05$

Results: There were 185 patients who met inclusion criteria with a mean follow-up of 13.5 months. RTW and noRTW groups were similar except the RTW had lower median age, LOS, mRS (Table 1). Multivariate analysis revealed that a mRS of 2 or less was associated with a significant increased return to work (OR 11.65, $p<0.001$) (Table 2).

Conclusions: To our knowledge, this is the first study to apply the modified Rankin Score to predict return to work post-injury. Our performance improvement project shows that the mRS independently predicts a patient's return to work and a patient with a Rankin score of 2 or less is 12 times more likely to return to work.

Demographics	Patients who returned to work	Patients who did not return to work	p Value
Number	133	52	
Age, years (IQR)	33.7(25.9,46.4)	43.1(33.5,54.8)	0.002
Gender			0.205
Male (%)	97(72.9%)	33(63.5%)	
Race			<0.001
White (%)	27(20.3%)	8(15.4%)	
Black (%)	31(23.3%)	29(55.8%)	
Hispanic (%)	40(30.1)	7(13.5%)	
Other (%)	35(26.3%)	8(15.4%)	
Mech of Injury			0.148
Blunt (%)	112(84.2%)	48(92.3%)	
Penetrating (%)	21(15.8%)	4(7.7%)	
Disposition			<0.001
Home (%)	114(85.7%)	32(61.5%)	
Acute Rehab (%)	17(12.8%)	14(26.9%)	
Long Term Rehab (%)	2(1.5%)	6(11.5%)	
Median ISS Score (IQR)	5(4,10)	5(4,10)	0.574
Median LOS (IQR)	4(2,7)	7(4,11.8)	<0.001
Median Rankin Score (IQR)	1(0,2)	2(2,3)	<0.001
Complications (%)	9(6.8%)	14(26.9%)	<0.001

Table 1 Demographics and Characteristics of Patients Who Returned to Work Versus Those Patients Who Did Not Return To Work Post-Injury

Co-variables	OR	95% CI	p Value
Age	0.949	0.916-0.984	0.004
Gender			0.658
Female (Ref)			
Male	0.808	0.313-2.081	
Race			0.001
White (Ref)			
Black	0.178	0.051-0.621	0.007
Hispanic	1.321	0.337-5.168	0.69
Other	1.466	0.371-5.8	0.585
Mech of Injury			0.244
Blunt(Ref)			
Penetrating	2.418	0.547-10.684	
Rankin score </= 2	11.646	3.548-38.226	<0.001
ISS	1.018	0.957-1.083	0.574
LOS	1	0.981-1.02	0.975
Disposition			0.117
Home (Ref)			
Acute Rehab	0.331	0.108-1.018	0.054
Long Term Rehab	0.304	0.034-2.746	0.289
Complications	0.386	0.091-1.644	0.198

Table 2 Multivariate Analysis to Show Independent Predictors For Returning to Work Post-Injury

Poster 27

IMPROVING UNDER TRIAGE IN A RURAL LEVEL 1 TRAUMA CENTER: ESTABLISHING A STANDARDIZED TOOL FOR THE CRITICAL TRAUMA DECISION

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Johnson City Medical Center

Presenter: Carol Jones, APN

Objectives: Imprecision in a trauma triage system results in under triage (UT), ineffective resource utilization and increased mortality. The objective of this project was to improve patient care and UT rates by implementing revised Trauma Team (TT) activation guidelines using a standardized method; the Value Optimization System (VOS).

Methods: Data was analyzed over a 2.5 year period. Beginning in 2012, baseline UT rates were retrospectively measured by chart review of pre-hospital mechanism of injury (MOI) and anatomy of injury compared to the level of TT activation. Activation guidelines were improved to emphasize ground level falls, special populations and low volume/high risk MOI. A VOS/LEAN PI team initiative (Rapid Improvement Event) was implemented in Jan 2013 to include daily concurrent chart review comparing revised TT guidelines to pre-hospital information. NTRACS registry data was utilized to compare ISS to TT activation levels.

Results: Following revision of activation criteria and VOS Team collaboration, the UT rate decreased from 35% (2012), 10%(2013) to 3.9%(2014). For 2012 deaths, 60% included TT activations, 79% of which had ISS >15; in 2013, 62% included TT activation; 64% had ISS >15. The percentage of all traumas >ISS 15 with no TT activation was 21.5 % in 2012 and 21% in 2013. Overall death rate decreased from 3% to 2% by end of the study period.

Conclusions: Using a standardized, system wide method (VOS) to revise and implement TT guidelines, a marked decrease in UT (35% to 3.9%) and decreased mortality at our Level 1 rural trauma center were noted. The success of this standardized method may offer a rapid solution for other trauma centers faced with high UT rates and contribute to improved resource utilization and, most importantly, lower trauma mortality. Further analysis of non-surgical trauma admissions as well as increased TT activations are required.

Notes

Poster 28

EVALUATION OF THE MILITARY ACUTE CONCUSSION EVALUATION (MACE) TO SCREEN FOR MILD TRAUMATIC BRAIN INJURY IN A CIVILIAN TRAUMA POPULATION

Melvin E. Stone Jr, MD*, Saman Safadjou, Benjamin Farber, Nerissa Velazco, Jianliang Man, Srinivas H. Reddy, MD*, Roxanne Todor, Sheldon H. Teperman, MD*
Jacobi Medical Center

Presenter: Melvin E. Stone Jr, MD

Objectives: Mild traumatic brain injury (mTBI) comprises 75% of over 1.5 million traumatic brain injuries annually. There exists no consensus on point-of-care screening for mTBI. The Military Acute Concussion Evaluation (MACE) is a quick and easy test used by the U.S. Army to screen for mTBI; however, its utility in civilian trauma is unclear. It has two parts: a history section and the Standardized Assessment of Concussion (SAC) score (0-30) previously validated in sports injury. As a performance improvement project, our institution sought to evaluate the MACE as a concussion screening tool that could be used by house staff in a general civilian trauma population.

Methods: From June 2013 to May 2014, patients 18 to 65 with suspected concussion were given the MACE within 72 hours of admission to our urban Level I trauma center. Patients with a positive head CT were excluded. Demographic data and MACE scores were recorded in prospect. Concussion was defined as loss of consciousness (LOC) and/or post-traumatic amnesia (PTA); concussed patients were compared to non-concussed. Sensitivity and specificity for each respective MACE score was used to plot a receiver operating characteristic (ROC) curve. A ROC curve area of 0.8 was set as the benchmark for a good screening test to distinguish concussion from non-concussed.

Results: There were 84 concussions and 30 patients non-concussed. Both groups were similar; however, the concussion group had a lower mean MACE score than the non-concussed (Table1). Table 2 shows sensitivity/specificity for a range of MACE scores used to plot the ROC curve. ROC curve area was only 0.65.

Conclusions: The MACE had a lower mean score for patients with concussion, defined by LOC and/or PTA. However, the low ROC curve area of 0.65 highly suggests the MACE alone would be a poor screening test for mTBI in the general civilian trauma population.

	Non-Concussed	Concussion	P-Value
Age (Mean±SD)	36.9±13	36.1±13	0.77
Gender (M/F %)	76.7/23.3	76.2/23.8	0.95
Admission GCS (Mean±SD)	14.9±0.2	14.8±0.4	0.11
Injury Severity Score (Mean±SD)	5.1±5.9	4.3±4.6	0.52
Total MACE Score (Mean±SD)	25.9±2.7	23.5±4.8	**0.001**
Time to evaluation (Mean – Hours)	21.5±15	23.6±14	0.48
Education level %			
Grad School	6.7	6.2	
College	23.3	32.1	0.66
High School	53.3	40.7	
Other*	16.7	21.0	
Language %			
English	86.6	81	
Spanish	6.7	16.6	0.24
Other	6.7	2.4	
Mechanism %			
Assault	20.0	23.8	
Fall from Height	13.3	6.0	
Fall from Standing	3.3	11.9	
MVC**	10.0	7.1	0.14
MCC‡	30.0	31.0	
Pedestrian Struck	10.0	17.9	
Others	13.3	2.4	

** MVC: Motor Vehicle Collision, ‡ MCC: Motorcycle Collision, * Patients who did not complete high school

Table 1. Demographics/Characteristics of MACE Study Groups: Concussed and Non-Concussed

≤ MACE Score	Sensitivity	Specificity
22	28.5%	93%
23	36.9%	90%
24	40.4%	80%
25	40.4%	80%
26	47.8%	77.7%
27	69%	53%
28	83.3%	20%

*Area under ROC curve is 0.65

Table 2. Concussion Screening Sensitivity and Specificity for each MACE Score and To Generate Receiver Operator Characteristic Curve (ROC)*

Poster 29

DEFINING THE CERVICAL SPINE CLEARANCE ALGORITHM: A SINGLE INSTITUTION PROSPECTIVE STUDY OF OVER 9000 PATIENTS

Therese M. Duane, MD, FACS*, Andrew J Young, MD, Poornima Vanguri, MD, Luke Wolfe, MS, Judith Katzen, RN, Jinfeng Han, RN, Julie A. Mayglothling, MD*, James Whelan, MD, Michel Aboutanos, MD, MPH*, Rao R. Ivatury, MD*, Ajai K. Malhotra, MD*
Virginia Commonwealth University

Presenter: Therese M. Duane, MD, FACS

Objectives: There is variability in the approach to cervical spine (c-spine) clearance. This study provides an evidence-based algorithm that allows for timely removal of collar, appropriate spine consultations, and optimal use of imaging.

Methods: A prospective study of all adult blunt trauma patients presenting as trauma team alerts (TTA) at a Level-I trauma center who underwent CT c-spine to diagnose/rule-out c-spine injury (1/08-5/14). Mechanism, demographics and presenting signs/symptoms were documented. Patients with and without c-spine injury were compared and risk factors for fracture and/or ligament injury were identified using regression analysis with p value <0.05 considered significant.

Results: 9232 patients met inclusion criteria. C-spine injury was identified in 588 (6.37%). 574 (6.22%) patients had fractures and 59 (0.64%) had ligament injuries with 14 (0.15%) having ligament injury with no fracture. No patient with a normal CT was found to have an injury. Table 1 shows the independent risk factors for injury. Only 66 TTA patients had none of these risk factors. There were three independent predictors of ligament injury: midline tenderness to palpation (TTP) (2.32; 1.32-4.07, p=0.0033), initial GCS < 15 (MS) (2.36; 1.33-4.18, p=0.0035), and fracture (FX) (37.87; 20.19-71.04). Patients with either TTP or MS had a ligament injury rate of 0.21% and those with FX had a rate of 2.84%. Patients with all three factors had a rate of 20%. Figure 1 demonstrates the algorithm.

Conclusions: All TTA patients should undergo c-spine CT to rule out injury. Most patients will have a normal CT and can have their collars safely removed. A select group of patients will require collars and spine consultation and a smaller subset an early MRI to rule out ligament injury. By instituting this algorithm trauma centers will improve resource utilization and comfort of the trauma patient without sacrificing safety.

	Odds Ratio	Confidence Interval	P value
Tenderness to midline	3.123	2.584-3.774	<0.0001
GCS < 15	2.743	2.249-3.344	<0.0001
Intoxicated	1.329	1.091-1.620	0.0048
Age 65 years	2.529	1.988-3.217	<0.0001
Paresthesias	2.067	1.494-2.861	<0.0012
Headload mechanism	2.221	1.369-3.604	0.0012
High speed MVC	1.410	1.155-1.721	0.0007
Rollover MVC	1.365	1.107-1.682	0.0036
Ejection	2.017	1.587-2.564	<0.0001
Not simple rearended MVC	1.861	1.089-3.181	0.0231
Never sitting up in ED	5.019	3.018-8.348	<0.0001
Never ambulatory at scene	1.453	1.107-1.908	0.0071

Table 1: Risk factors for injury

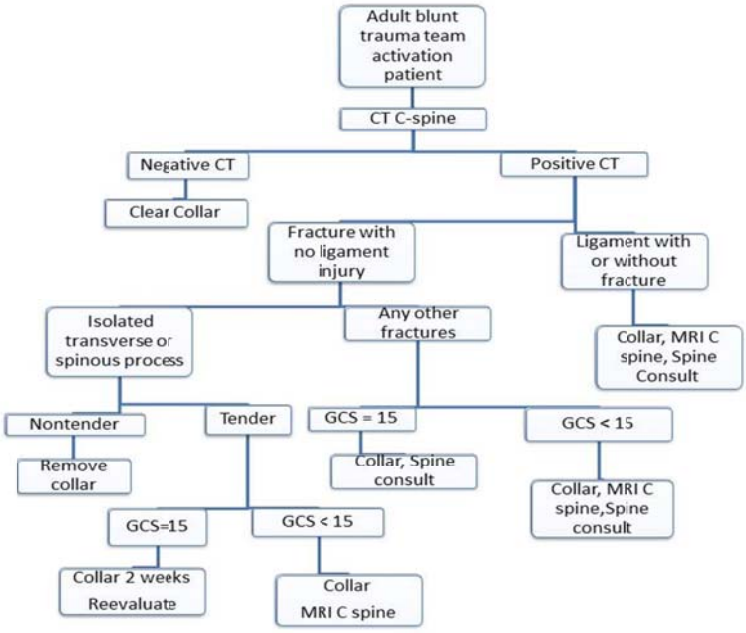


Figure 1: C-spine clearance algorithm

Poster 30

POST DISCHARGE TBI MORTALITY

Gabriel E. Ryb, MD, MPH, FACS*, Christina Greene,
Patricia C Dischinger, PhD, Gordon Smith
University of Maryland School of Medicine

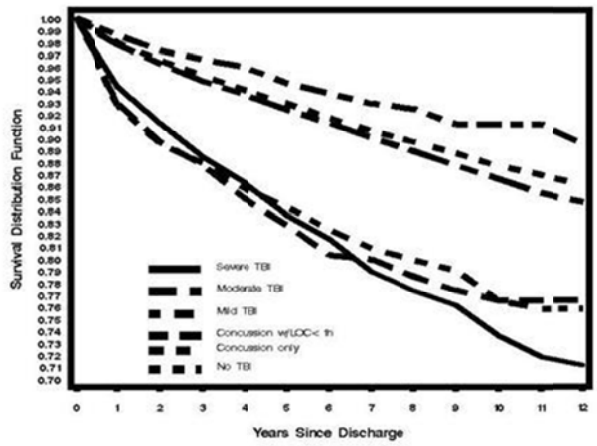
Presenter: Gabriel E. Ryb, MD, MPH, FACS

Objectives: To describe the post discharge mortality (PDM) of TBI patients.

Methods: Blunt injury adults discharged alive from a Level I Trauma Center 7/1995 through 12/2008 were identified in the trauma registry. For those with anatomically identifiable (AI) TBI, severity was determined as "severe", "moderate" and "mild" based on the admission GCS (<9, 9-12, 13-15, respectively). Those without AI TBI were classified as "concussion with loss of consciousness (LOC)", "concussion without LOC" and "no TBI". Determination of death and its date was obtained from the National Death Index through 12/31/2008. Cases dying within 30 days were excluded. Differences in the PDM in relation to TBI severity were determined with Kaplan-Meier curves using the log rank test with adjustment for multiple comparisons. Cox proportional hazard regression(CPHR) was used to adjust for confounders (age, gender, injury severity, mechanism, race and alcohol use). Results were reported as Hazard Ratios (HR) and their 95% CI.

Results: A total of 48,864 cases ["severe" (3.0%), "moderate" (1.2%), "mild" (8.4%), "concussion with LOC" (32.5%), "concussion without LOC" (6.9%), and "no TBI" (48.0%)] were available for analysis. 4,320 deaths occurred during the 12.5 year follow up period (median 5.1 years). Survival analysis (see figure) revealed significant differences among all groups except between the two concussion groups. CPHR using the "no TBI" cases as reference population revealed an increase in all-cause PDM for "severe" TBI [HR 1.85 (1.58-2.18)], "moderate" TBI [HR1.35 (1.09-1.66)] and "concussion with LOC" cases [HR 1.16 (1.01, 1.34)]. Older age, male gender, higher ISS, and black ethnicity were also associated with PDM.

Conclusions: Patients with AI moderate TBI, AI severe TBI and concussions with LOC, but not patients with AI mild TBI, experience higher adjusted PDM than non-TBI patients. Further research should identify the causes of death and possible causal pathways that explain this association.



KAPLAN-MEIER CURVE: SURVIVAL AFTER DISCHARGE BY TBI SEVERITY

	Hazard Ratio (95% CI)
Concussion without LOC	0.86 (0.73-1.02)
Concussion with LOC	1.16 (1.01-1.34)
Anatomical Injury w/ GCS 13+	1.06 (0.95-1.18)
Anatomical Injury w/ GCS 9-12	1.35 (1.09-1.66)
Anatomical Injury w/ GCS<9	1.85 (1.58-2.18)
Positive BAC	1.21 (1.02-1.43)
Unknown BAC	1.10 (1.01-1.20)
ISS 9-15	1.08 (1.00-1.17)
ISS 16-24	1.16 (1.05-1.28)
ISS 25-49	1.42 (1.25-1.61)
ISS 50 +	3.18 (2.30-4.38)
ISS Missing	0.95 (0.78-1.16)
Age 30-44	2.46 (2.15-2.82)
Age 45-54	4.97 (4.32-5.71)
Age 55-64	7.40 (6.39-8.57)
Age 65+	25.47 (22.37-29.0)
Male	1.24 (1.16-1.33)
Other Blunt	0.84 (0.70-1.02)
Other Vehicle	0.58 (0.42-0.80)
Fall	1.87 (1.74-2.01)
Beating	1.64 (1.44-1.86)
Pedestrian	1.23 (1.08-1.41)
Motorcycle	0.71 (0.57-0.89)
Black	1.21 (1.13-1.30)
Other and Unknown ethnicity	0.61 (0.52-0.72)

COX PROPORTIONAL HAZARD MODEL PREDICTING POSTDISCHARGE MORTALITY (YEARS) - (Non-TBI, BAC -, ISS<9, age 18-29, female sex, MVC and White race used as reference)

Poster 31

OCCULT HYPOPERFUSION IS ASSOCIATED WITH MORTALITY FOLLOWING TRAUMATIC BRAIN INJURY

Dennis Kim, William Sheppard, Scott Bricker, Angela Neville, Amy Kaji,
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Presenter: Dennis Kim

Objectives: Although secondary brain injury due to hypotension and hypoxia is known to increase mortality in patients with traumatic brain injury (TBI), the impact of occult hypoperfusion (OH) on outcomes is not well-defined. We hypothesized that OH is associated with mortality following TBI.

Methods: We performed a retrospective analysis of adult patients with TBI directly admitted to our Level I trauma center following a blunt mechanism of injury over a 5-year period (Jan. 1, 2008 - Dec. 31, 2013). Patients with an Abbreviated Injury Scale score ≥3 in more than two body regions were excluded. Patients with OH (defined as an admission arterial blood gas [ABG] lactate ≥2 mmol/L or base deficit ≤-4 mmol/L in the absence of hypotension [SBP ≤90 mmHg]) were compared to patients without OH. Multivariate logistic regression analysis was performed to identify independent predictors of mortality.

Results: Of 518 patients, 311 (60%) met criteria for OH. Patients with OH demonstrated a higher Injury Severity Score (23 vs. 19, $p<0.0001$) and were more likely to present with severe TBI (48% vs. 19%, $p<0.001$) than patients without OH. OH patients also underwent more frequent intracranial pressure monitoring ($p<0.001$) and neurosurgical operative intervention ($p=0.02$). On multivariate analysis, OH was independently associated with mortality (OR=2.61; 95% CI=1.31-5.20, $p=0.006$) (Table 1). Subgroup analysis among patients with both an admission and 24-hour ABG demonstrated that clearance of lactate and base deficit was associated with decreased mortality (OR=0.33; 95% CI=0.11-0.96, $p=0.04$).

Conclusions: OH is common following TBI and associated with increased mortality. In addition to avoiding hypotension and hypoxia, identifying and reversing OH may improve survival in patients with TBI.

Variable	Odds Ratio	95% Confidence Interval	P value
Occult hypoperfusion	2.61	1.31 – 5.20	0.006
Hypotension	2.88	1.33 - 6.27	0.008
Age >40	3.62	1.74 – 7.55	0.001
Warfarin	3.81	1.83 – 12.82	0.03
Severe TBI	6.71	3.51 – 12.85	<0.001
Injury Severity Score ≥25	7.29	3.78 – 14.08	<0.001
Intoxicated*	0.40	0.21 -0.75	0.005
ICP monitor	0.28	0.13 – 0.60	0.001

Other variables: gender, acetylsalicylic acid, clopidogrel, craniotomy/craniectomy, hypoxia
TBI=traumatic brain injury; ICP=intracranial pressure
*Intoxicated (defined as serum alcohol ≥80mg/dL)

Table 1. Predictors of Mortality on Multivariate Regression Analysis

Poster 32

THORACOLUMBAR SPINE CLEARANCE: CLINICAL EXAMINATION IN PATIENTS WITH DISTRACTING INJURIES

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Presenter: Jack Rostas, MD

Objectives: The purpose of this study was to prospectively assess the sensitivity of clinical exam to screen for thoracolumbar spine (TL-spine) injury in awake and alert blunt trauma pts with distracting (dst) injuries.

Methods: During the period from 07/12 to 04/14, all blunt trauma pts >13 years were prospectively evaluated per standard TL-spine exam protocol at a Level 1 Trauma Center. Awake and alert pts with GCS >14 underwent clinical exam of the TL-spine. Clinical exam was performed regardless of dst injuries. Pts with no complaints of pain or tenderness on exam of the TL-spine were considered clinically cleared of injury. Pts with dst injuries, including those clinically cleared and those with complaints of TL-spine pain or tenderness underwent CT scan of the entire TL-spine. Dst injuries were defined as closed head injury, extensive facial fxs, > 2 rib fxs, sternal fxs, intra-abdominal organ injury, pelvic fxs and long bone fxs. Patients with minor dst injuries were not considered to have a dst injury.

Results: 950 blunt trauma pts were entered, 530(56%) of whom had at least one dst injury. 209(40%) pts with dst injuries had a positive TL-spine clinical exam, of whom 101(48%) were diagnosed with TL-spine injury. 321 (60%) pts with dst injuries were initially clinically cleared, in whom 19(6%) TL-spine injuries were diagnosed. No missed TL-spine injuries required surgical intervention with only 5 injuries requiring TL orthotic bracing. This yielded an overall clinical clearance sensitivity of 96% (115/120) for clinically significant TL-spine injury.

Conclusions: In awake and alert blunt trauma pts with dst injuries, clinical exam is a sensitive screening method for significant TL-spine injury. Radiological assessment is unnecessary for safe clearance of the asymptomatic TL-spine in pts with dst injuries. These findings suggest significant potential reduction of both healthcare cost and radiation exposure.

Notes

Poster 33

THE PRIVATE-ACADEMIC SURGEON SALARY GAP

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Presenter: Joseph M. Lopez, MD

Objectives: Every year a new class of surgeons is faced with the question: "Academic practice or private practice?" Both come with advantages and drawbacks. One of the well-known, but least discussed, differences is salary disparity. We seek to quantify the difference in salaries for surgeons entering practice.

Methods: A net present value (NPV) calculation was performed to assess positive and negative cash flows with a 5% discount rate and accounting for inflation for surgeons to assess the benefits and consequences of different careers. Positive cash flows were salary minus federal income tax according to the Medical Group Management Association and the Association of American Medical Colleges. For academic careers, it was assumed that 6 years were spent as an assistant professor and associate professor with the remainder of the career as full professor. Negative cash flows were the principle of student loans and interest at 5% fixed-rate over 25 years.

Results: The average reduction in 5% NPV for an academic surgeon as compared to a private surgeon is 12.8%. The reduction ranged from 4.2% to 25.5%. Neurosurgeons have the largest reduction at 25.5% with trauma surgeons at 23.1%. Pediatric surgeons have the smallest reduction at 4.2% while cardiothoracic, transplant and plastic surgeons also have reductions under 10%.

Conclusions: Academic and private practices have many intangible qualities that cannot be accounted for in our model. Our study demonstrates a lack of equitable income when comparing academic and private practice for different fields of surgery. Market economics may be driving this disparity based upon distribution of supply and demand. Our concerns center upon the large financial liability that surgeons incur due to growing educational debt and longer training. Coupled with changes in income gradients, this could shift physician practices in a short time period and threaten the fiscal viability of certain surgical fields or academic surgical careers.

Profession	Training (Yrs)	Private 5% NPV	Academic 5% NPV	Difference in 5% NPV	% Difference in 5% NPV
Trauma Surgeon	7	$2,028,234.00	$1,647,055.00	$381,179.00	23.14%
General Surgeon	5	$1,899,405.00	$1,711,108.00	$188,297.00	11.00%
General Surgeon	7	$1,723,456.00	$1,566,772.00	$156,684.00	10.00%
Cardiothoracic Surgeon	7	$2,453,976.00	$2,283,863.00	$170,113.00	7.45%
Pediatric Surgeon	7	$2,185,802.00	$2,096,975.00	$88,827.00	4.24%
Plastic Surgeon	6	$2,163,945.00	$2,009,261.00	$154,684.00	7.70%
Vascular Surgeon	7	$2,002,490.00	$1,727,962.00	$274,528.00	15.89%
Neurosurgeon	7	$3,049,108.00	$2,429,427.00	$619,681.00	25.51%
Surgical Oncologist	7	$1,829,603.00	$1,573,230.00	$256,373.00	16.30%
Transplant Surgeon	7	$2,033,974.00	$1,867,463.00	$166,511.00	8.92%
Orthopedic Surgeon	5	$2,582,615.00	$2,327,993.00	$254,622.00	10.94%
			Mean Difference	$246,499.91	12.83%

Academic Private Surgeon Salary Gap

Poster 34

INTIMATE PARTNER AND SEXUAL VIOLENCE IN A LEVEL I TRAUMA CENTER

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Presenter: Tanya L. Zakrison, MD, FRCSC

Objectives: Screening for Intimate Partner and /or Sexual Violence (IPSV) occurs sporadically in trauma centers based on the discretion of the attending physician, nurse or social worker. Additionally, men are screened less than women for IPSV. The objective of this study was to determine the feasibility of screening for IPSV in all trauma patients presenting for treatment.

Methods: We conducted a prospective, pilot feasibility study to examine if trauma patients can be screened for IPSV. Clinical Social Workers screened all consecutive adult trauma patients who met eligibility criteria for IPSV at our Level I Trauma Center. We used a four-item questionnaire that asked respondents how often their partner physically Hurt, Insulted, Threatened with harm, and Screamed at them (HITS). The Screen, Ask, Validate, Evaluate (SAVE) questionnaire was then used for screening for a current or past history of sexual violence. Demographic data were collected and chi squared test was used for categorical data with a $p < 0.05$.

Results: Over a four-month period, 664 patients were treated in the trauma center. Three hundred and ninety nine consecutive trauma patients were approached to complete the survey (62%). There were 191 patients who were successfully screened (75% male, 25% female) with an average age of 40. Of the 191 patients who were screened, twelve did not want to participate in the HITS screening, but did participate in the SAVE screening. Overall, 23 screened patients (13%) were found to be at risk of intimate partner violence and 18 (78%) were men One out of every twelve screened trauma patients (8%) was positive for sexual violence with both men and women equally affected.

Conclusions: Screening for IPSV is feasible and should be incorporated into the screening algorithm for all patients presenting at a Level I Trauma Center. Because men represent a large proportion of positive IPSV screens, they should not be excluded from the screening process.

Notes

Poster 35

WHEN IS DEAD "DEAD"? THE PROBLEM OF CASE ASCERTAINMENT IN ASSESSING TRAUMA CENTRE PERFORMANCE

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Homer Tien, MD*, Avery B. Nathens, MD, PhD, MPH*
Sunnybrook Health Sciences Center

Presenter: James P. Byrne, MD

Objectives: Processes of trauma performance improvement seek to identify patients with modifiable outcomes, hence it is critical to exclude patients from benchmarking or PI efforts who have no chance of survival. The objective of this work was to develop the optimal case definition of "Dead on Arrival" (DOA) to identify who should be excluded from benchmarking efforts in the American College of Surgeons Trauma Quality Improvement Program (ACS TQIP).

Methods: Data were derived from ACS TQIP (2012-13). Three case definitions of DOA were proposed: 1) No signs of life as determined by local providers (NSOL); 2) pre-hospital cardiac arrest (PHCA) as entered into local trauma registries; 3) a proxy (PROXY) for death established by ACS TQIP defined as ED heart rate= 0 AND ED systolic blood pressure= 0 AND Glasgow Coma Scale motor component= 1. Case definitions were compared using standard predictive tests to evaluate specificity, positive and negative predictive values (PPV, NPV) as the goal was to exclude patients who were certain to die but include those who had a chance of survival (hence sensitivity and NPV were not relevant).

Results: During the study period 266,201 patients met inclusion criteria and 9.6% died. For all patients, specificity for any of the criteria was excellent (>99%). Other measures of predictive utility differed by mechanism (Table). NSOL and PHCA had PPVs low enough such that many patients with these criteria would go on to survive (~27% and ~11%, respectively for all patients). By contrast, PROXY had very high predictive utility for death, with just over 1% of patients meeting this criterion going on to survive. NPV did not differ significantly across criteria.

Conclusions: The proxy for "no signs of life" (HR=0, SBP=0 and GCS motor =1) is the most predictive criteria for identifying patients who will likely die and thus can be used to reliably exclude patients from PI and/or benchmarking activities.

	Predictive measure	All	Blunt	Penetrating
Mortality		7.80%	6.80%	17.90%
NSOL	Specificity	99.56%	99.59%	99.21%
	PPV	73.15%	62.71%	89.84%
	NPV	93.13%	93.76%	86.55%
PHCA	Specificity	99.94%	99.95%	99.89%
	PPV	89.53%	86.14%	95.75%
	NPV	93.37%	94.00%	86.59%
PROXY	Specificity	99.99%	100.00%	99.88%
	PPV	98.98%	99.42%	98.53%
	NPV	93.58%	94.03%	88.93%

Poster 36

INJURY SEVERITY SCORE (ISS) FIDELITY IS DEPENDENT ON AUTOPSY DATA

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Julius D. Cheng, MD, MPH*, Paul E. Bankey, MD, PhD*, Ayodele T. Sangosanya, MD*,
Gina Ryan, Nicole A. Stassen, MD, FACS, FCCM*
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Presenter: Roseanna Guzman-Curtis, MD, MPH

Objectives: Trauma centers are facing increased pressure to meet the demands of outcomes-driven health care. Their expected outcomes depend on accurate patient data collection which often relies on incomplete and inaccurate hospital coding data. The purpose of this study was to evaluate whether ISS determinations based on autopsy data differ from and are more accurate than those based on hospital chart data.

Methods: All trauma deaths at a single Level I Trauma Center were identified using our NTRACS database from January 2011 to September 2013. Demographics, injury mechanism, autopsy findings, ED and overall LOS and pre/post autopsy ISS scores were collected. The "pre" ISS was determined using hospital coding and the patient's medical records. The "post" score is an adjusted score based on autopsy findings discussed in a medical examiner (ME) mortality review conference. T-test was used for statistical analysis.

Results: 200 patients were identified. 69(35%) underwent autopsy. Autopsy patients were younger, had shorter ED and hospital LOS and were more likely to have a penetrating injury.(Table 1) The post autopsy ISS changed significantly for the entire autopsy group. On sub-group analysis, the only group with an unchanged ISS was patients with an ED LOS>1 hour. In all other groups, injury mechanism and ED LOS <1 hour, ISS was significantly changed.(Table1) 60% of autopsy patients had a significant ISS classification change, most commonly from minor to very-severe.(Table 2)

Conclusions: This study shows that the addition of autopsy data from the ME is essential for determining the "true" ISS of a trauma patient regardless of injury mechanism. This is even more pronounced in those who have a short ED LOS. Knowing this "true" ISS does little for the deceased patient, but the enhanced information improves data fidelity allowing for true expected outcomes to be determined and compared to national standards.

		Autopsy (N = 69)	No-Autopsy (N=131)
Average Age (years)		39 +/- 22	61 +/- 24*
Average ISS		Pre 12 +/- 14*	27 +/-16
		Post 32+/-17	
Mechanism	Blunt	26 (38%)	129 (98%)*
	Penetrating	43 (62%)	2 (2%)*
Average	ED LOS (hours)	1+/-2	4 +/- 5*
	Overall LOS (days)	2 +/- 4	10 +/- 20*
		Pre-Autopsy Average ISS	Post-Autopsy Average ISS
Overall Group		12 +/-14	32+/-17*
Blunt Trauma (N=26)		12+/-14	40+/-18*
Penetrating Trauma (N=43)		12+/-14	27+/-14*
ED LOS <1 hour (N=53)		9+/-14	33+/-23*
ED LOS >1 hour (N=16)		23+/-10	23+/-14

*P<0.05

Table 1: Age, Average ISS, Mechanism and LOS data for study group. Variation in Pre and Post autopsy ISS change based on mechanism and ED LOS.

Patient ISS Classification Change	Number
None	27 (39%)
Minor to Severe	7 (10%)
Minor to Very-severe	29 (42%)
Moderate to Severe	3 (4%)
Moderate to Very-severe	0 (0%)
Severe to Very-severe	3 (4%)

Minor - ISS 1-9; Moderate – ISS 10-15; Severe – ISS 16-24; Very Severe ISS>25

Table 2: Patient ISS classification change based on autopsy data

Poster 37

WISER WITH AGE? INCREASED PER-SURGEON ELDERLY PATIENT VOLUME IS ASSOCIATED WITH LOWER POST-INJURY COMPLICATIONS

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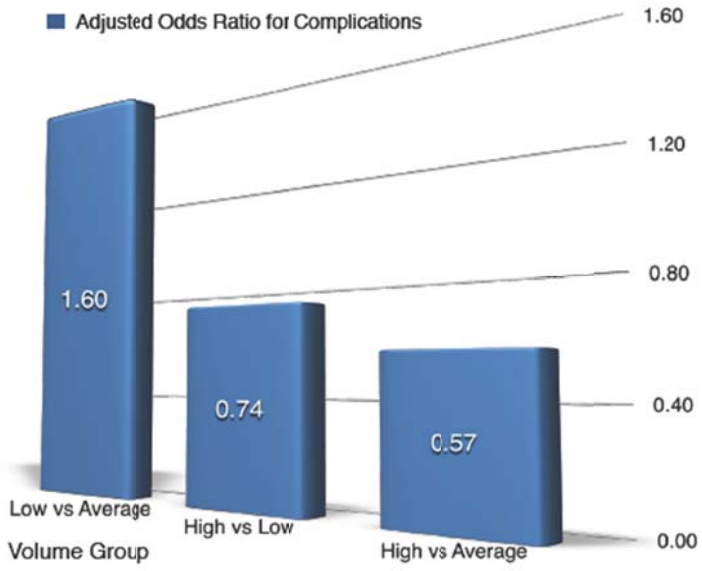
Presenter: Joshua A. Simon, DO

Objectives: The elderly population is the fastest growing age group in the United States with trauma being a significant cause of death and disability. Previous studies have suggested improved outcomes with increased per-surgeon volumes in injured patients. This effect has not been examined in the elderly trauma population. We hypothesized that increased per-surgeon elderly trauma volume would impact outcomes.

Methods: This was a 5 year registry review of elderly patients admitted to a State Level I trauma center. All trauma surgeons were stratified into Low (LV), Average (AV), and High (HV) Volume Groups according to average patient admission/year. The primary outcomes were in-hospital mortality and complication rate. Forward logistic regression was used to analyze the effect of surgeon volume on outcomes.

Results: During the 5 year study period a total of 2,379 elderly patients were evaluated. Mean admission volume per year was 9.8 ± 5.5, 28.8 ± 6.8, and 62.4 ± 9.1 in the LV, AV and HV Groups, respectively ($p<0.001$). The median number of years in practice was not different between the groups. Patients in the HV group were older, had higher Charlson scores, more severe head injuries, and higher injury severity than those admitted by the AV and LV. Need for operative intervention was similar between the 3 groups. Overall complications were significantly higher in patients admitted by the LV and AV Groups (21% vs 18.1% vs 15%, $p<0.027$). Forward logistic regression identified HV to be associated with a lower overall complication rate (HV vs LV AOR 0.57, 95%CI [0.40,0.81], $p=0.002$, HV vs AV AOR 0.74, [0.57,0.97], $p<0.032$). In-hospital mortality was not significantly different between groups.

Conclusions: Our results suggest that overall morbidity of the elderly trauma patient may be impacted by surgeon volume. Further studies identifying the optimal level of surgeon experience should be undertaken.



Adjusted Complication Rate Stratified By Surgeon Volume Groups

Poster 38

TRAUMA CENTER VARIATION IN THE MANAGEMENT OF PEDIATRIC PATIENTS WITH BLUNT ABDOMINAL SOLID ORGAN INJURY

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Terence O'Keeffe, MD, MSPH*, Andrew L. Tang, MD*, Randall S. Friese, MD*,
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Presenter: Arash Safavi, MD, MHSc

Objectives: Non-operative management of hemodynamically stable children with solid organ injury (SOI) has become standard of care. The aim of this study was to identify differences in management of children with SOI treated at adult trauma centers (ATC) versus pediatric trauma centers (PTC). We hypothesized that these patients would endure more operative treatment at ATC compare to PTC.

Methods: Patients younger than 18 years old with SOI (spleen, liver, kidney) who were treated at level I-II ATC or PTC were identified from the 2011-2012 National Trauma Data Bank. The primary outcome measure was the incidence of operative management. Data was analyzed using univariate and multivariate logistic regression analyses.

Results: 6799 children with SOI (spleen: 2375, liver: 2867, kidney: 1557) were included. Spleen procedures were performed more frequently at ATC than PTC (101 (7.7%) vs. 52 (4.9%); P=0.007). After adjusting for potential confounders (grade of injury, age, gender and injury severity score), admission at ATC was associated with significantly higher odds of splenic procedure (OR: 1.5, 95% CI: 1.02-2.25;p=0.03). Only 11 and 8 children underwent kidney and liver procedures respectively. Transarterial embolization (TAE) was performed in 17 patients with spleen, 34 with liver and 14 with kidney trauma. There was no practice variation between ATC and PTC regarding kidney and liver injuries or incidence of TAE.

Conclusions: Operative management for SOI was more often performed at ATC than PTC. The presence of significant disparity in the management of pediatric patients with SOI justifies efforts to standardize treatment on a national basis.

Notes