Scrubs and Camouflage: Last Stop Before War – Impact of Military & Civilian Burn Providers Working and Training Together at a High-Volume Civilian "Verified" Burn Center

Friday, November 3
7:45-8:00 am

Author and Co-authors:	Luis E. DeRosa, BSN, RN, EMT-P; Doreann DeArmas, ARNP Jackson Memorial Burn Center at University of Miami, Miami, FL

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe the significance of the US Army Trauma Training Center and UM/JMH Burn Center's impact in training surgical teams in burn care. ▪ Discuss team response by forward surgical teams and civilian staff members for all Burn patients. ▪ Examine the relationship between military and civilian staff members as it relates to the care of burn patients.

Abstract:	The University of Miami / Jackson Memorial Hospital's Ryder Trauma Center opened in 1992 and is one of a few stand-alone trauma centers in the nation. Since 2001, the training staff of the Army Trauma Training Center (ATTC) has trained as many as 11 forward surgical teams (FST) in 2-week rotations per year so that the teams are ready to perform their mission in a deployed setting. The ATTC instructors consist of a specially selected 10-person team made up of active duty personnel from the Army Medical Department and are assigned to the University of Miami/Jackson Memorial Hospital Ryder Trauma Center in Miami, Florida. In March 2008, the UM/JMH Burn Center received notice of successful verification by the American Burn Association (ABA). The UM/JMH Burn Center & US Army partnership has been an alliance that has been refined and polished over time. This collaboration is as unique as it gets. For one, the UM/JMH Burn Center is located within a stand-alone trauma center which is a rarity. Secondly, the ATTC is the only trauma training program of its kind in the country. During this training the FST's are fully immersed in the UM/JMH Burn Center caring for some of the most critical burns in the acute setting. These teams are under direct supervision of ATTC instructors who are experts in the area of trauma and burns. But as part of a mutual agreement, before the ATTC Instructors can train teams, they are required to participate in a formal orientation with expert civilian staff members in the trauma & burn resuscitation units. With the military being at the forefront of modern burn medicine, this blending of military and civilian personnel has provided a unique atmosphere for innovation and education in the areas of burn care. To begin with, while using the ABA protocols as our guideline of care, the UM/JMH Burn Center responds to every burn victim that comes through our rescue doors exactly the same - no matter the burn percentage or financial situation. The FST's also have the same philosophy when responding to patients – same clinical approach every time. From first-hand experience, I can tell you that the civilian staff members have adopted this same approach when responding to burn patients. Since ATTC's inception, the UM/JMH Burn center staff members have had front row access to the newest innovation in burn care thanks to the military. But the same goes for the FST's, while training here in Miami they are exposed to the latest treatment provided by their civilian counterparts. The military is known for structure and accountability. With that

	being said, this style of team dynamics when treating burns has crossed over into our civilian staff members. This paper seeks to answer the question: Does this military / civilian relationship have any impact on burn outcomes or treatment processes? Results: This is a work in progress Outcomes: This is a work in progress. **References and Resources:** Valdiri, L. A., Andrews-Arce, V. E., & Seery, J. M. (2015). Training Forward Surgical Teams for Deployment: The US Army Trauma Training Center. Critical Care Nurse, 35(2). doi:10.4037/ccn2015752
Disclosure:	Luis DeRosa – No Relevant Financial Relationships to Disclose Doreann DeArmas – No Relevant Financial Relationships to Disclose

Approval of Initial Burn Residency Site for Occupational Therapists

Friday, November 3
8:00-8:15 am

Author and Co-authors:	Sydney J. Thornton, OT; Heather S. Dodd, MSOT North Carolina Jaycee Burn Center at University of North Carolina Hospitals, Chapel Hill, NC

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe how to develop a burn residency program for therapists. ▪ Discuss burn therapists' competencies during the acute and rehabilitative phases of burn care.

Abstract:

Introduction: On November 25, 2015, the American Occupational Therapy Association, Inc. recognized the University of North Carolina Health Care, Chapel Hill, N.C., as an approved AOTA Residency Site in the area of Burns. This is the first Burn Residency Program approved for Occupational Therapists in the United States. The development of this residency is the culmination of years of planning to train Occupational Therapists in the treatment of a burn injury during acute hospitalization and throughout the burn rehabilitation process.

Methods: Development of the burn residency incorporated the Burn Rehabilitation Therapist Competency Tool, developed by the ABA Rehabilitation Committee in 2011, and criterion for acquiring a Board Certification in Physical Rehabilitation through the AOTA. The ABA committee developed the competency tool using a "staged, multi-method approach and input from more than 25 experts in the burn rehabilitation community to develop competency standards" for burn therapists. This competency tool is intended for entry level therapists engaging in burn treatment. Evaluation methods for each resident's performance are completed at these competency stages.

Results: The residency offers a program of study for one year to advance the knowledge and clinical skills of an Occupational Therapy practitioner in the focus area of burn care. The residency program includes a curriculum of study; mentored service delivery with clients; involvement in scholarly and/or professional activities; program evaluation and offers resources to achieve program goals.

Residency benefits include development of an environment of instruction and teaching collaboration integrated with and partnered with the Division of Occupational Science, University of North Carolina, Occupational Therapy at a graduate school level.

The program offers 13 didactic modules of assigned length and content over the course of the 12 month residency. Each module has learning objectives and assignments, didactic instruction, focused clinics, mentored clinic, practice framework, and board certification components.

The AOTA Residency Site approval is for 10 years, expiring in 2025. The initial resident completed the course of study in December 2015, and the second resident completed the program in December 2016. Currently the third OT Burn Resident is progressing through the didactic modules and will complete the course of study in December 2017. Applications for the 2018 OT Burn Resident will be reviewed in the

	fall of 2017. At the completion of each residency the fully trained resident will have achieved knowledge and clinical skills in burn rehabilitation according to Occupational Therapy practice standards and in compliance with the ABA Burn Therapist competencies. **References and Resources:** Prochazka Mark, Thornton S. and Dodd HS. Enabling Life Roles After Severe Burns, Intervention Strategies to Enable Participation Ways of Living. Christiansen C and Matuska K (eds). AOTA Press 4th edition 2011: 349-378.
Disclosure:	Sydney J. Thornton – No Relevant Financial Relationships to Disclose Heather S. Dodd – No Relevant Financial Relationships to Disclose

Standardizing Essential Performance Criteria for Burn Nurses

Friday, November 3
8:15-8:30 am

Author and Co-authors:	Elizabeth A. Mann-Salinas, PhD, MSN; Krystal Valdez-Delgado, BSN, RN; Debra Flores, MPA, RN; Patricia Colston, MSN, RN; Sarah Shingleton, MS, RN; Michael Barba, MSN, RN; Nicole Caldwell, BA, RN United States Institute of Surgical Research, Ft. Sam Houston, TX

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Demonstrate current evidence-based educational practices used to help nurses transition to burn specialty. • Identify key aspects of burn nursing skills requiring competency validation. • Advocate for the development of burn skill validation and certification programs.

Abstract:	**Introduction**: Burn nursing is a rigorous field of practice which requires specialized patient management and extensive wound care expertise. Additionally, training opportunities are limited due to the small number of burn facilities within the United States. While other nursing specialties have been successful in distinguishing specialized providers though nursing certifications programs (i.e. Board Certified (RN-BC)) which clearly outline specialty expectations, there is no such certification program available for burn nurses to further validate these unique provider skills. The American Burn Association (ABA) is on a path to develop a Burn Nursing Certification Program. In support of this ongoing effort, our burn center's education department identified the need to outline clear performance guidelines required from new nurses transitioning into burn specialty at our facility. **Method**: The Vermont Nursing in Partnership (VNIP) Clinical Transition Framework served as the foundation for this project. Using the Competency Outcome and Performance Assessment (COPA) Model, two burn care nurse educators and an experienced burn nurse (over 40 years of combined burn experience) lead this initiative and created individual learning guides for the burn intensive care (BICU) and the burn progressive care (BPCU) units. Each learning guide consisted of performance statements, competency objectives, and learning/teaching resources. Prior to implementation, a nurse scientist with extensive burn experience evaluated the content of each document to ensure consistency with current practice. The final draft was reviewed by a subject-matter expert in VNIP education principles to further ensure that the content was presented according to evidence-based practices. These performance measures were aligned with the ABA-sponsored Burn Nursing Competency Initiative (BNCI) results of the eDelphi project to define the essential domains of burn nursing. **Results:** A total of 10 learning guides were developed for the BICU and 7 for the BPCU. Each learning guide consisted of 7-30 competency objectives, for a total of 209 BICU and 118 BPCU identified competency objectives. Three learning guides, containing 39 competency objectives, were dedicated solely to wound care management. By outlining content, the nursing education department was able to modify and develop learning/training opportunities to ensure all vital content was provided. In 2016, this content was utilized for 15 new BICU nurses who simultaneously transitioned into the unit. **Conclusion:** Implementation of learning guides has ensured each nurse meets the

	performance guidelines outlined by our facility. This standardized content with clear performance objectives and evidence based resources allowed preceptors and unit managers to track individual nurses' burn care ability throughout the transition process. These resources can be easily adapted to other burn centers to ensure standardization of nursing competency aligned with the domains of burn nursing defined through the BNCI project. **References and Resources:** http://www.vnip.org/
Disclosure:	Elizabeth A. Mann-Salinas – No Relevant Financial Relationships to Disclose Krystal Valdez-Delgado – No Relevant Financial Relationships to Disclose Debra Flores – No Relevant Financial Relationships to Disclose Patricia Colston – No Relevant Financial Relationships to Disclose Sarah Shingleton – No Relevant Financial Relationships to Disclose Michael Barba – No Relevant Financial Relationships to Disclose Nicole Caldwell – No Relevant Financial Relationships to Disclose

Temporal Trends of Firefighter Crude Mortality Rates: Trauma on the Decline but Cardiovascular Events Remain Prevalent

Friday, November 3
8:30-8:45 am

Author and Co-authors:	Steven A. Kahn, MD[1]; Carlos Siordia, PhD[2] [1]Arnold Luterman Regional Burn Center at University of South Alabama Medical Center, Mobile, AL [2]Centers for Disease Control and Prevention, Morgantown, WV

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Understand that trauma related firefighter fatalities are decreasing but CV-related fatalities remain constant. ▪ Understand that younger and volunteer firefighters are at higher risk for trauma related deaths.

Abstract:	**Background:** Firefighter (FF) fatalities are frequently investigated by public health researchers. Trauma and cardiovascular disease related fatalities have been identified as important target areas for prevention. The United States Fire Administration (USFA) provides a high-standard data source for FF fatalities. The specific aim of this analysis was to explore the 1990-2016 temporal trends of FF fatalities to determine high risk groups and targets for safety related education, outreach, training, and interventions. **Methods:** Publicly available USFA information on FFs and total number of deaths per-year published by the National Vital Statistics System (NVSS) were used to compute crude-rates per million deaths by year and 13 categories for the following attributes: age; work status; cause and nature of death. All FF fatalities from 1990 to 2016 (27 years) were used in the analysis except for 2001, which was excluded due to the 341 deaths during 9/11. An SAS MACRO was created and used for extracting FF information from a text file containing information from the USFA PDF booklet. Crude rates were compared from the 1990-2009 (early period) and 2010-2016 (recent period). Multinomial logistic regression was used to determine predictors of death in firefighters by age group (≤45 yrs old and >45) and by work status (career vs volunteer). **Results:** During the study period, 3159 FF fatalities were extracted from the database. Total firefighter crude-rate mortalities are on the decline between the 1990-2009 and 2010-2016 (35 vs 47.4 FF deaths/million, p<0.0001). Firefighters ≤45 yrs old were less likely to die in the 2010's than in the 1990s-2000's, (13.7 vs 24.7 FF deaths/million, p=0.0002). Trauma related deaths also decreased between the periods (13.1 vs 8.1, p=0.0003) while CV-related deaths remained constant (19.4 vs 19.5, p=0.24). Regression analysis determined that volunteer firefighters were more likely to die from burns (OR 1.7, CI:1.2-2.4, P<0.0001) and trauma (OR 1.8, CI:1.5-2.2, p<0.0001) than career firefighters. Younger firefighters were also more likely to die from burns (OR 10.4, CI 6.9-15.6, P<0.0001) and trauma (OR 6.5, CI:5.4-7.8, p<0.0001). **Conclusions:** Although overall and trauma related firefighter fatalities are on the decline after 2010, younger firefighters and volunteer firefighters are more likely to suffer mortality from burns and trauma. Cardiovascular disease related fatalities have remained constant throughout the entire 27-year study period and represent an important target for prevention, screening, and treatment. Future research should

	continue to make use of high-standard data sources to enumerate details of FF fatalities and measure changes induced by interventions. **References and Resources:** Kahn et al. J Burn Care Res. 2017 Jan/Feb;38(1):e83-e88
Disclosure:	Steven Kahn – No Relevant Financial Relationships to Disclose Carlos Siordia – No Relevant Financial Relationships to Disclose

Quantitative Analyses of Burn Scars: Selecting Non-invasive Instruments for Clinical Evaluations

Friday, November 3
8:45-9:00 am

Author and Co-authors:

Heather M. Powell, PhD[1]; Molly Baumann, MS[1]; Danielle DeBruler, MS[1]; Steven Boyce, PhD[2]; Rebecca Coffey, RN, PhD[1]; J. Kevin Bailey, MD[1]
[1]The Ohio State University, Columbus, OH
[2]Shriners Hospitals for Children, Cincinnati, OH

Objective:

Upon completion of the lecture, attendees should be better prepared to:
- Examine multiple methodologies for quantitatively assessing scar properties.
- Discuss pros and cons of each methodology/instrument.
- Describe protocols for integrating quantitative assessments into standard practice.

Abstract:

Introduction: Burn scars remain problematic despite the vast number of treatment modalities available. To adequately evaluate the efficacy of current and emerging anti-scar technologies, scar assessment must be carried out in a systematic, objective manner using non-invasive instruments with low potential for user bias.

Methods: In this IRB-approved study, scar height, texture, color and biomechanics were evaluated using non-invasive, quantitative instruments. Three independent investigators evaluated burn scars in both humans and in porcine burn models. One scar site per subject (n = 10) was marked for analysis and assessed by each investigator. Each investigator conducted three measurements per site to evaluate with inter- and intra-user variability. Scar color was assessed using digital image analysis, commercially available spectroscopy equipment for skin analysis, the Vancouver Scar Scale (VSS) and the Patient and Observer Scar Assessment Scale (POSAS) observer evaluation. Biomechanical analysis was performed using two different commercially available non-invasive biomechanical devices along with the VSS and POSAS. Scar height and texture were assessed using a 3D scanner, conventional molding/casting combined with digital image analysis along with VSS and POSAS.

Results: Speed of color analysis was significantly reduced ($p < 0.05$) with the commercially available instrument; however this had a small area of assessment and was slightly more expensive than the digital analysis. Reliability of erythema quantification was superior with the commercially available equipment but was not significantly improved over digital image analysis for the quantification of pigmentation. The more valid instrument for biomechanical analysis was heavily dependent on scar properties and required users to undergo significant training before intra-user reproducibility was achieved on the same scar. Scar thickness and texture were most effectively and reproducibly performed using the conventional mold/cast technique at a cost several orders of magnitude less than commercial 3D scanning equipment.

Conclusions: Each type of non-invasive analysis of scars requires instrument-specific considerations to assure consistent operational procedures and validity of data for each measurement end point. With selection of the most reliable, most rapid technique for each measurement type, a complete quantitative analysis of scar properties can be carried out in under 20 minutes.

Disclosure:	Heather M. Powell – No Relevant Financial Relationships to Disclose Danielle DeBruler – No Relevant Financial Relationships to Disclose Molly Baumann – No Relevant Financial Relationships to Disclose Rebecca Coffey – No Relevant Financial Relationships to Disclose Steven Boyce – No Relevant Financial Relationships to Disclose J. Kevin Bailey – No Relevant Financial Relationships to Disclose

Sweet or Sour? Real-World Experience with Honey in the Burn Center

Friday, November 3
9:00-9:15 am

Author and Co-authors:	Sarah K. Shingleton, MS, RN; Jennifer M. Gurney, MD; Jamison S. Nielsen, DO; Alexandra J. Helms, BSN, RN; Charlotte J. Gadomski, BSN, RN; Leanna M. Thompson, BSN, RN; Charles K. Thompson, PA; Booker T. King, MD; Leopoldo C. Cancio, MD United States Army Institute of Surgical Research, Burn Center, Ft. Sam Houston, TX
Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Discuss the benefits of honey dressings and potential impacts on burn wound healing. ▪ Consider the types of wounds and stages of healing appropriate for honey dressings in the burn center. ▪ Describe simple techniques to make honey dressing application easier.
Abstract:	**Background:** Honey is a non-toxic product of nature that is anti-microbial, antifungal and may promote healing. Several FDA-approved honey dressings (HD) are available in the U.S.; however, there are limited data on actual experience or its use in modern U.S. Burn Centers. Our burn center recently began using HD in a gel formulation and experienced several challenges including application, dressing maintenance and limited options in dressing size or unit volume. The purpose of this Performance Improvement project was to implement the use of HD in our burn center utilizing an evidence-based, systematic approach and to evaluate our experience. **Methods:** The FOCUS-PDCA model was utilized. The team, led by a Clinical Nurse Specialist, identified process variations and formulated an improvement plan. Burn centers in the U.S. and Canada were contacted and informally surveyed via telephone concerning their use of HD. Clear guidelines and a standard order set were developed; interactive education was provided. Product evaluations were completed by staff who participated in dressing application. Descriptive statistics were utilized. **Results:** HD use for acute and chronically open burn wounds was reported by 13/105 U.S. and Canadian burn centers (11%) with 4 centers reporting use for burns >10% total body surface area (TBSA). Six centers reported pain and burning upon application. Recommendations were to perform daily dressing changes by impregnating large sheets of petrolatum gauze or a similar primary dressing with pre-warmed honey gel or paste and cover with an outer dressing such as 2-ply gauze, roller gauze, or a foam dressing. Evaluation of HD is currently ongoing; thirty-three product evaluations have been completed thus far for 23 individual patients who have received HD in our burn center. Overall, 52% of staff recommend to continue using HD in our burn center (17/33) while 18% do not (6/33); 10 staff are undecided. Staff comments include that honey “appears to work well”, was “easy to apply with” petrolatum gauze, and “seems to help in circumstances where other treatments have not”. However, staff feel that dressing preparation was “tedious and time consuming”, would be more effective if “manufactured in a roll” or larger sizes, and that the dressing “causes pain”. Staff found that a tongue depressor is helpful in spreading the honey, frequent glove changes must be anticipated and to have all supplies and dressings pre-prepared prior to application. As a result of this project, the burn center is currently in the process of obtaining HD in pre-impregnated sheets and rolls that will improve

	the application process. **Conclusions:** HD are currently being used in a limited number of U.S. and Canadian burn centers. Despite feedback that HD are challenging to use, staff reported improved eschar removal and benefits when other treatments had failed. Pain is important to consider and alternative dressings should be placed if the patient does not tolerate HD. **Implications for Practice:** Larger, better-designed trials are warranted to establish benefits of honey on wound healing. Honey has been shown to be a safe and effective treatment for a variety of wounds, to decrease bio-burden and to effectively sterilize wounds. Natural, raw honey is readily available throughout the world and is a practical wound care option in resource-poor environments.
Disclosure:	Sarah K. Shingleton – No Relevant Financial Relationships to Disclose Jennifer M. Gurney – No Relevant Financial Relationships to Disclose Jamison S. Nielsen – No Relevant Financial Relationships to Disclose Alexandra J. Helms – No Relevant Financial Relationships to Disclose Charlotte J. Gadomski – No Relevant Financial Relationships to Disclose Leanna M. Thompson – No Relevant Financial Relationships to Disclose Charles K. Thompson – No Relevant Financial Relationships to Disclose Booker T. King – No Relevant Financial Relationships to Disclose Leopoldo Cancio – Coinventor of Burn Navigator – Licensed by the U.S. Army to Arcos, Inc. for commercial production

ABA President's Address

The ABA At 50. Contributions Over 5 Decades And Transformation For The Future

Friday, November 3
9:15 – 9:45 am

Author:	Linwood R. Haith, Jr., MD, FACS, FCCM President, American Burn Association Director, Nathan Speare Regional Burn Treatment Center Crozer Chester Medical Center Upland, Pennsylvania

Objectives:	Upon completion of the lecture, attendees should be better prepared to: • Appreciate the advances in burn care made by the ABA over the past 50 years. • Comprehend the reorganization and structure of the ABA. • Grasp the necessity and importance of ABA regionalization. • Recognize the importance of face-to-face communication as well as familiarization with other innovations in education.
Abstract:	For five decades the ABA has provided global leadership in burn care. The original purpose of the ABA was to provide for study and research in the treatment and prevention of burns, to provide a forum for presentation of such knowledge, to foster training opportunities in burns and to encourage publications. The ABA has continually transformed into our current organization with its mission: "dedicated to improving the lives of everyone affected by burn injury". This presentation will describe the five ABA core pillars: including quality of care, prevention, education, research and member services. The importance of ABA regionalization will also be discussed. Additionally, the importance of face-to-face meetings as well as newer modalities of providing education will be discussed.
Disclosure:	No Relevant Financial Relationships to Disclose

Coke with a "K" - Oral Administration of Injectable Ketamine During Burn Wound Dressing Changes

Friday, November 3
10:15-10:30 am

Author and Co-authors:	Alicia C. Lintner, CRNP[1]; Virginia Scott, RN[1]; Brittany Mullens, PharmD[1]; Kaitlin McGinn, PharmD[2]; Steven A. Kahn, MD[1]; [1]Arnold Luterman Regional Burn Center at University of South Alabama Medical Center, Mobile, AL [2]Auburn University, Harrison School of Pharmacy Mobile Campus, Mobile, AL

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Recognize that orally dosed ketamine is a safe and useful adjunct to sedation during burn wound dressing changes.

Abstract:

Introduction: Pain control during dressing changes is an integral part of patient centered care after burn injury. Pain associated with wound care not only leads to decreased patient satisfaction but also an increased incidence of post-traumatic stress disorder (PTSD). Intravenous ketamine is often utilized to provide analgesia and sedation and has been shown to decrease PTSD. The downside to this method is that most hospitals consider it conscious or deep sedation and require the patient to be NPO, and require an attending to be present during the entire period of sedation. Oral ketamine wafers and tablets have been used as a safer alternative in other countries, but are not currently available in the United States. The purpose of this study is to describe a series of patients who received injectable ketamine via an oral route during wound care.

Methods: This was a retrospective review of patients that received orally administered injectable ketamine over a 6 week period. Injectable ketamine mixed in 30 cc of cola was orally administered at doses ranging from 0.5-4 mg/kg along with 1-2 mg midazolam to aid amnesia and prevent a dysphoric reaction. Hemodynamic monitoring was performed according to institutional protocol for moderate sedation. In addition to ketamine and prophylactic midazolam dosage, narcotics (morphine equivalents) and benzodiazepine dosage was quantified during the wound care episode and compared to what was given in the prior wound care session without ketamine. Adverse events such as hemodynamic instability, desaturation, and need for intubation were also tracked, along with dysphoric reactions. Patients were asked to rate their overall satisfaction (scale of 1-10) with the wound care "pre-ketamine" and "with ketamine" as well. Differences in opioid/benzodiazepines administered and satisfactions scores were compared between "pre ketamine" and "with ketamine" dressing changes with a paired Student's T-test. Morphine equivalents were also tabulated and analyzed with the wound care in the day subsequent to ketamine administration (post-ketamine) to determine if the changes between "pre" and "with" time dependent as wounds improved during the course of healing.

Results: Five patients were given oral ketamine, with a mean initial dose of 160±54 mg. Patients received ketamine a median of 3 times during their hospitalization (range 2-9 administrations). Mean narcotic dosage was significantly higher in the "pre-ketamine" compared to the initial "with ketamine" dressing changes (74±34 vs 29±19 mg morphine equivalents, $p<0.05$). With the subsequent "post ketamine" wound care episode, patients showed a trend an increase in opioid requirements when ketamine

	was not utilized, (29±19 vs 46±17mg morphine equivalents, p=0.16). Mean midazolam dose showed a nonsignificant decrease from 4.25±2.2 to 3.4±1.9 mg. Satisfaction scores showed a significant increase from 4 to 8 for the “pre” vs “with” groups ($p<0.01$). No adverse events were noted during sedation, but one patient reported a mild dysphoric reaction. **Conclusions:** Oral administration of injectable ketamine results in a significant reduction of narcotics during burn dressing changes without an increase in other sedatives such as benzodiazepines. In addition, ketamine resulted in improved patient satisfaction during wound care. Preliminary data suggests that it is not only effective, but also safe. Ketamine is a promising agent for burn wound care and needs to be further studied in regard to both oral and intravenous administration **References and Resources:** https://www.ncbi.nlm.nih.gov/pubmed/8817596 http://rsds.org/wp-content/uploads/2015/02/2015-efficacy-safety-oral-ketamine.pdf
Disclosure:	Alicia Lintner – Unlabeled use: Ketamine was given orally, it’s an off label use Virginia Scott – No Relevant Financial Relationships to Disclose Brittany Mullens – No Relevant Financial Relationships to Disclose Kaitlin McGinn – No Relevant Financial Relationships to Disclose Steven Kahn – No Relevant Financial Relationships to Disclose

Retrospective Medical Records Review of Hospitalized Adult Burn Patients: Factors Impacting Length of Hospital Stay

Friday, November 3
10:30-10:45 am

Author and Co-authors:	Susan L. Smith, PhD, ARNP; Michael Cheatham, MD; Howard G. Smith, MD; Sherrina Stewart, MSN Orlando Health, Orlando, FL

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Identify modifiable causes for increased length of stay or delay in hospital discharge.

Abstract:

Introduction: Burn length of stay has been historically estimated as one day per percent total body surface area. In addition to burn size and depth, several other factors have been accepted as contributing to length of stay, such as age, gender, weight and presence of inhalation. Quality of care is adversely impacted by extended length of stay and wound healing complications and family interactions were specifically noted to suffer from unexpected and protracted hospital stays. Prior studies did not consider the impact of challenging social situations, despite this being one of the specific criteria, according to the American Burn Association, for transfer to a burn center.

Methods: Retrospective medical records review of adult burn patients admitted to the burn surgery service from January 01, 2017 to March 31, 2017 examining variables impacting length of inpatient hospital stay by extracting de-identified demographic data to include: past medical history, pre-existing conditions, comorbidities, complications, burn size (total body surface area-TBSA), burn wound treatment and funding source(s) impacting hospital length of stay for burn patients admitted to the burn surgery service.

Findings: Though our findings continue to support burn size, age and presence of inhalation as correlating with extended hospitalizations, we found that social issues, such as homelessness, health care funding and discharge support systems significantly impacted hospital length of stay. Location of burn injury, as it affects independent function, also played an important role.

Implications: By documenting factors that influence length of stay or delay hospital discharge, it is hoped that we can identify variables that are potentially modifiable to facilitate a safe, efficient and timely discharge process.

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Disclosure:

Susan Smith – No Relevant Financial Relationships to Disclose
Michael Cheatham – No Relevant Financial Relationships to Disclose
Howard Smith – No Relevant Financial Relationships to Disclose
Sherrina Stewart – No Relevant Financial Relationships to Disclose

Reading Tea Leaves: Markers for Infection in Patients with Burn Injuries Using a Sepsis Algorithm

Friday, November 3
10:45-11:00 am

Author and Co-authors:	Jeffrey W. Williams, PA-C[1]; Christopher K. Craig, PA-C[1]; James H. Holmes, IV, MD[1]; Jeffrey E. Carter, MD[2] Wake Forest Baptist Health, Burn Unit, Winston-Salem, NC[1] LSU HSC, New Orleans, LA[2]

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Recognize that sepsis in burn injured patients continues to be challenging. ▪ Procalcitonin may play a role in an algorithm for detecting sepsis in a burn injured patient.

Abstract:

Introduction: A large burn injury leads to hypermetabolism and inflammatory mediators and results in the standard SIRS criteria becoming the baseline for burn injured patients. After 24 hours, the major cause of death in burn patients is multiple organ dysfunction syndrome (MODS). Infection has been noted to precede MODS in 83% of burn patients with reported sepsis mortality in burn patients of 28-65%. Early recognition and treatment of infection has been shown to decrease mortality from sepsis. In July 2014, we implemented an algorithm designed to rapidly identify adult burn patients with an infectious process.

Methods: All adult (≥18 years old) admissions between July 1, 2014 and June 30, 2016 were reviewed. Patients receiving a lactic acid and/or procalcitonin lab to screen for sepsis were further evaluated using other physiologic and lab data as sepsis markers. A patient was considered positive for sepsis if one of the following occurred: a positive blood culture (>10^5 colony forming units), a positive bronchoalveolar lavage (>10^5 colony forming units) or radiologic imaging indicated either an infectious process or was consistent with an infectious process.

Results: There were 634 adult admissions during the two year period with 54 patients developing sepsis (8.5%) and 18 sepsis related deaths (33.3%). The AUC for sepsis markers was calculated as follows: procalcitonin 0.719, lactic acid 0.505, WBC 0.620, temperature 0.533, platelets 0.641 and glucose 0.538.

Conclusions: Infection is the leading cause of death in burn patients and early recognition continues to be a challenge. Our data indicates procalcitonin has a role in a burn sepsis detection algorithm. Further research is indicated using procalcitonin combined with other sepsis markers to increase the sensitivity of a burn sepsis detection algorithm.

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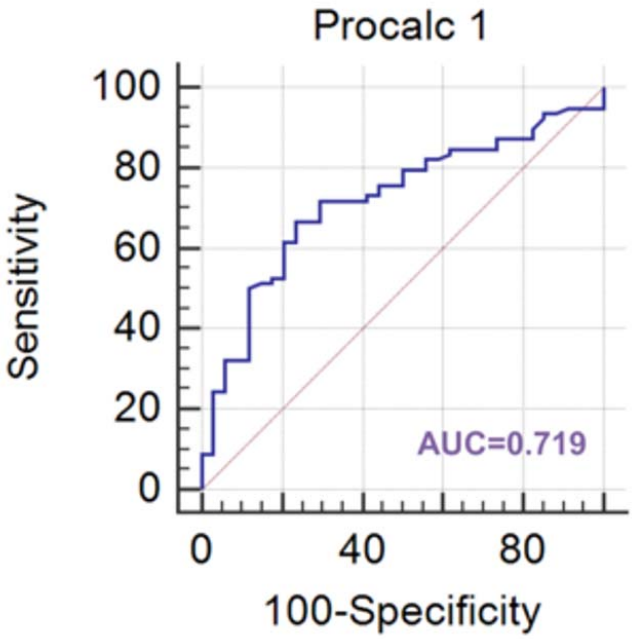
2. J Burn Care Res. 2013 Jan-Feb;34(1):31-43. Novel predictors of sepsis outperform the American Burn Association sepsis criteria in the burn intensive care unit patient. Mann-Salinas EA1, Baun MM, Meininger JC, Murray CK, Aden JK, Wolf SE, Wade CE.

Disclosure:	Jeffrey W. Williams – No Relevant Financial Relationships to Disclose Christopher K. Craig – No Relevant Financial Relationships to Disclose James H. Holmes – Stock: ABT; ABBV; PermaDerm Jeffrey E. Carter – No Relevant Financial Relationships to Disclose



Evaluating Nutrition Practices in Mechanically Ventilated Patients at a Large Burn ICU

Friday, November 3
11:00–11:15 am

Author and Co-authors:	Rita M. Gayed, PharmD; Nicholas Barker, PharmD; Rachael Williams, MD; Juvonda Hodge, MD; Walter Ingram, MD Grady Health System Burn Center, Atlanta, GA

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Identify barriers to delivering prescribed enteral nutrition in the critically ill burn patient. ▪ Discuss strategies to mitigate EN interruptions and optimize EN in the hypermetabolic burn patient.

Abstract:	**Introduction:** Nutrition is a major cornerstone in the care of the critically ill burn patient. ASPEN guidelines recommend early initiation of EN and advancing feeds to > 80% of goal within 48-72 hours from admission. Despite high metabolic demands of the burn patient and the resultant need for optimizing nutrition, there are many barriers to achieving these goals which may affect patient outcomes. The objective of this study was to evaluate enteral and parenteral nutrition practices in the ICU, barriers to achieving nutrition goals as well as patient outcomes. **Methods**: This was a retrospective chart review from 2013 through 2016 of adult patients admitted to the burn ICU secondary to inhalation injury and/ or 20% or greater TBSA burns requiring mechanical ventilation who received enteral (EN) and/ or parenteral nutrition (PN) during their ICU stay. The primary outcome was percent of prescribed goal EN rate received over the first two weeks from admission. Secondary outcomes included time to initiation of EN, time to reaching goal EN, causes of EN interruption, incidence of PN use (in place of or in addition to EN), duration of PN, ICU and hospital lengths of stay, incidence of bacteremia, and in-hospital mortality. **Results**: Fifty one patients met inclusion criteria, all of which had large TBSA burns. Over the first 2 week period from admission, patients received 26% of the prescribed EN. EN was initiated at 48 hours from admission, and goal EN rate was achieved by 91 hours. EN was most commonly interrupted for planned surgeries, some of which were completed while others had to be rescheduled, followed by receipt of vasopressors and elevated gastric residuals. Due to these interruptions, all patients were prescribed PN during the first 4 weeks of admission, and 73% of patients received overlapping EN and PN for a median of 6 days. Median ICU and hospital lengths of stay were 43 days each. Thirty nine percent of patients had a documented bacteremia, and in-hospital mortality was 39%. **Conclusions**: Our results show that repeated EN interruptions led to significantly less nutrition delivery via the gut, which in turn increased PN use. These results are prompting discussion and change regarding uptitration of EN to goal, time of NPO status prior to burn surgery as well as EN restart post surgery, sufficient burn team OR time to complete cases as scheduled, volume based feeding to make up for EN downtime, as well as vasopressor and gastric residual cutoffs for holding EN.

Disclosure:	Rita Gayed – No Relevant Financial Relationships to Disclose Nicholas Barker – No Relevant Financial Relationships to Disclose Rachael Williams – No Relevant Financial Relationships to Disclose Juvonda Hodge – No Relevant Financial Relationships to Disclose Walter Ingram – No Relevant Financial Relationships to Disclose

Effectiveness in Achieving Total Caloric Needs by Overestimation in Enteral Nutrition Ordering

Friday, November 3
11:15-11:30 am

Author and Co-authors:

Emily S. Garcia, MSN, RN, CCRN[1]; Jenna Kesey, MSN, RN, FNP-BC, CWS[1,2]; Sharmila Dissanaike, MD[2]
[1]Timothy J. Harnar Burn Center, Lubbock, TX
[2]Texas Tech University Health Sciences Center, Lubbock, TX

Objective:

Upon completion of the lecture, attendees should be better prepared to:
- Investigate enteral nutrition delivery in thermally injured patients.
- Identify potential challenges in meeting daily caloric needs in critically ill patients.

Abstract:

Introduction: Burn patients are particularly vulnerable to complications of malnutrition, which increases morbidity, mortality, length of stay and hospital cost. Algorithms have been developed to ensure optimum nutrition delivery, however, we face challenges in achieving prescribed rates.

In 2015, we demonstrated that patients were receiving approximately 10% less tube feedings than the documented calories delivered and 20% less than their estimated needs. We decided to routinely prescribe ten percent more than the patient's estimated needs, in an effort to correct this deficit and provide adequate nutrition.

Background: In September of 2016, we adapted our tube feeding algorithm to estimate the patient's calculated caloric needs and then prescribe ten percent above this calculation as the goal rate.

Methods: Patients receiving enteral tube feeding from January – June 2017 were included. The measured volume delivered, as indicated on the pump, was recorded every 24 hours and compared to the nursing, physician and dietician documentation from the medical record. Variables were compared using Excel.

Results: Twenty-eight patients were included for a total of 73 patient days. The average age was 48 years, 86% were men; mean TBSA 24%, one inhalation injury, two wounds, and seven necrotizing soft tissue infections. The volume delivered was 7% less than what was charted and 13% less than the prescribed caloric volume. Due to the overestimation intervention, when comparing the volume delivered to the patient's estimated needs, 94% of the patient's daily caloric need was met. The standard enteral nutrition formula used at this center provides 1.5kCal/ml resulting in an average of 152kCal deficit per day.

Utilizing ANOVA data analysis, it was found when comparing the volume delivered to the prescribed caloric volume (overestimation), we are feeding patients 13% less than the ordered rate ($p < 0.01$). When comparing the volume delivered of tube feeds to the patient's calculated needs, we provided 94% of their total caloric needs, which does not show to be a statistically significant difference as determined by a one way ANOVA ($F(1,144) = 3.25$, $p=0.07$). Out of the 73 patient days, there were 25 occurrences of mild overfeeding with an average of 6.49% (0.51-38.75) over the estimated need being delivered.

	Conclusion: Overestimating the ordered caloric volume has proven to be an effective intervention to ensure adequate enteral nutritional delivery without adding extra burden to nursing staff or overfeeding patients. This intervention could be easily applied to all patients receiving enteral nutrition via tube feeding pump.
Disclosure:	Emily Garcia – No Relevant Financial Relationships to Disclose Jenna Kesey – No Relevant Financial Relationships to Disclose Sharmila Dissanaike – No Relevant Financial Relationships to Disclose

Effects of Obesity on Burn Resuscitation

Friday, November 3
11:30-11:45 am

Author and Co-authors:	Jennifer D. Rosenthal, RN; Audra Clark, MD; Stephanie Campbell, BSN, RN; Melanie McMahon, BSN, RN; Steven E. Wolf, MD; Brett A. Arnoldo, MD; Herbert A. Phelan, MD University of Texas Southwestern Medical Center, Parkland Regional Burn Center, Dallas, TX

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Discuss the impact of body mass index (BMI) on the first twenty-four hour fluid resuscitation in order to mitigate complications due to over resuscitation.

Abstract:

Introduction: Obesity is a common condition in the United States, and its effects on resuscitation after severe burn are not well understood. Formulas to calculate 24-hour resuscitation volumes incorporate weight which, in obese patients, often leads to excessive fluid administration and potential complications such as pulmonary oedema, extremity or abdominal compartment syndrome, and longer mechanical ventilation. Our objective was to evaluate the impact of body mass index (BMI) on the 24-hour fluid resuscitation after severe burn.

Methods: A retrospective cohort study of adults 18 years and older admitted to the Burn ICU from January 2014 to March 2017 with >20% total body surface area (TBSA) burn was conducted. Demographic data, resuscitation volumes, urine output, and outcome data were collected. All were resuscitated with a computerized decision support system, and classified into four groups based on body mass index: normal weight (BMI <25), overweight (BMI 25-30), obese (BMI 30-40) and morbidly obese (BMI >40). Subject- and burn-specific characteristics between the groups were compared.

Results: One-hundred forty-five patients were included. Mean age, weight, and BMI were 47 + 16.7 years, 88.4 + 21.7 kg, and 29.2 + 6.8, respectively. Median TBSA burn was 33% [IQR 23.5-49.5%]. 74.5% of subjects were male, and 6.2% had concurrent inhalation injury. Demographics and injury characteristics were similar across BMI groups. Resuscitation volumes exceeded the predicted Parkland formula volume in the normal and overweight groups, but were less than predicted in the obese and morbidly obese categories. Univariate analysis revealed higher BMI was associated with less volume per kilogram (cc/kg) in the first 24 hours when looking at normal weight (238.5±139.4), overweight (156.6±95.1), obese (150.8±95.8), and morbidly obese patients (126±55.2) ($p<0.001$). No statistical significance was found in 24-hour urine output between groups ($p=0.08$). Increasing BMI was not associated with increased use of renal replacement therapy or mortality. On multivariate analysis, only TBSA and age were independent predictors of hospital mortality ($p<0.001$).

Conclusions: Increasing BMI is associated with lower fluid resuscitation volumes when computer decision support is used. Further, increasing BMI was not found to increase the use of renal replacement therapy or in-hospital mortality. The use of actual body weight for resuscitation volume calculations may lead to over-resuscitation of obese patients if fluid rates are not titrated regularly to address fluid responsiveness.

	References and Resources: Nehemiah T. Liu et al (2017). The impact of patient weight on burn resuscitation. Journal of Trauma and Acute Care Surgery. Published ahead of print. doi: 10.1097/TA.0000000000001486
Disclosure:	Jennifer D. Rosenthal – No Relevant Financial Relationships to Disclose Audra Clark – No Relevant Financial Relationships to Disclose Stephanie Campbell – No Relevant Financial Relationships to Disclose Melanie McMahon – No Relevant Financial Relationships to Disclose Steven E. Wolf – No Relevant Financial Relationships to Disclose Brett A. Arnoldo – No Relevant Financial Relationships to Disclose Herbert A. Phelan – No Relevant Financial Relationships to Disclose

The Impact of Custom Compression Garment Wear Time on Global Scar Outcomes

Friday, November 3
11:45 am – 12:00 noon

Author and Co-authors:	David Roggy, RN; Cassandra Rush, DPT; Jill Comstock, OTR; Rajiv Sood, MD Richard M. Fairbanks Burn Center at Eskenazi Health Hospital, Indianapolis, IN
Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Discuss how scar thickness and pliability are affected by pressure therapy wear time. ▪ Recognize how patients' satisfaction with burn scars change over time with use of pressure garments.
Abstract:	**Introduction:** Despite the fact that custom compression garments are considered a standard of care in the treatment of burn scars, there continues to be conflicting evidence regarding the effectiveness of pressure therapy on burn scar outcomes. As stated in a recent Best Evidence Statement (Sharp et al., 2015), pressure therapy is indicated to help improve erythema and scar thickness, but has not been proven to help improve scar pliability. A meta-analysis by Anzarut et al., (2009) reports that pressure garment therapy does not alter global scar scales and questions the beneficial impact of this treatment modality. Existing prospective studies do not address the very important issue of how much time participants wore their garments, nor do the studies include the perspective of the patient and their satisfaction with this treatment method. This study seeks to gather qualitative and quantitative data for the first year following a burn injury and determine the impact that custom compression garment wear adherence has on global scar outcomes. **Methods**: This ongoing IRB approved prospective study collected scar outcome data from adult patients treated at the Richard M. Fairbanks Burn Center who underwent excision and autografting beginning in December 2014. Computer based tools assessing scar pliability, thickness, and patient and observer scar assessment tool (POSAS) were completed to autografted areas and uninjured skin for baseline measurements prior to initiation of custom pressure garments (CPG). These measurements were performed at week 6, 3 months, 6 months, 9 months and 12 months following initiation of CPG. The subjects were asked to track and self-report the average daily wear time of their CPG. All patients received two sets of CPG measured and fit by Burn Therapists exerting approximately 22-28 mmHg every 12 weeks. These CPG are issued free of charge to all of our patients regardless of participation in the study. **Results:** The study included 76 patients (male = 52; female = 24) with 84 measured sites. In the evaluation of our data, we noted a correlation with garment wear of fifteen hours or greater per day was a variable that appeared to impact outcomes. We divided our study group into two groups, those that wore their CPGs less than fifteen hours per day (Group A) and those that wore their CPGs 15 hours per day or more (Group B). Conclusions are based on 9 month follow up results, with a sample size of 21 subjects. As seen in Table 1, Group A was more satisfied with their scars except in relation to scar pain, and both groups reported improved satisfaction with scar appearance and function regardless of garment wear time. Group B demonstrated a greater improvement from baseline scores in all aspects of

the POSAS scale. As seen in Table 2, pliability was greatly improved in Group B and the difference in pliability at 9 months between the groups was statistically significant. Scar thickness was maintained in Group B where Group A experienced a 14.9% increase in scar thickness.

Conclusions:
In this report, we see significant improvement in scar pliability with CPG wear of fifteen hours per day or greater. We also observed maintenance of scar thickness with garment wear time of fifteen hours per day or greater. Both of our groups rated their satisfaction with scars similarly, however greater improvement in POSAS scores were noted with CPG wear of fifteen hours per day more. No definitive conclusions can be made at this time related to the small number of patients but our results show CPG wear of minimally fifteen hours per day can impact scar thickness and pliability as the scar matures.

Disclosure:

David Roggy – No Relevant Financial Relationships to Disclose
Cassandra Rush – No Relevant Financial Relationships to Disclose
Jill Comstock – No Relevant Financial Relationships to Disclose
Rajiv Sood – Speaker's Bureau: Avita; Vericel

Table 1 **Patient and Observer Scar Assessment Scale (POSAS)**

	Patient		Patient Overall		Observer		Observer Overall		Itch		Pain	
	Baseline	9 Months Post CPG Initiation	Baseline	9 Months Post CPG Initiation	Baseline	9 Months Post CPG Initiation	Baseline	9 Months Post CPG Initiation	Baseline	9 Months Post CPG Initiation	Baseline	9 Months Post CPG Initiation
Group A - CPG Wear < 15 Hours / Day	36.0678	24.77778	6.736842	5.333333	22.9322	21	4.431034	4	6	4.33333	4.172414	2
Group B - CPG Wear > 15 Hours / Day	38.26087	23.16667	7.318182	4.4	23.04348	18.8333	4.913043	2	6.043478	4.166667	4.521739	3
pValue	0.4901	0.6303	0.346	0.1736	0.9328	0.1321	0.1402	1	0.9531	0.7949	0.577	0.0488

Table 2

	Pliabilty				Scar Thickness		
	Normal Skin	Baseline Scar	9 Months Post CPG Initiation		Baseline	9 Months Post CPG Initiation	Percentage of Change
Group A - CPG Wear < 15 Hours / Day	0.4624	0.2965	0.1854	Group A - CPG Wear < 15 Hours / Day	1807.2	2076.9	14.9%
Group B - CPG Wear > 15 Hours / Day	0.3496	0.2648	0.3578	Group B - CPG Wear > 15 Hours / Day	1697.1	1711	0.8%
pValue	0.0387	0.3959	0.0001	pValue	0.9455	0.4305	0.0617

Bromelain Based Enzymatic Eschar Removal - Summary of Pediatric Clinical Experience

Friday, November 3
1:30-1:45 pm

Author and Co-authors:	Yaron Shoham, MD; Yuval Krieger, MD; Eldad Silberstein, MD; Alexander Bogdanov-Berezovsky, MD Soroka University Medical Center, Be'er Sheva, Israel

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Discuss the possible advantages of Bromelain based enzymatic eschar removal in the pediatric population

Abstract:

Introduction: Early eschar removal is a cornerstone of burn care. Excisional debridement followed by autografting is the preferred standard of care (SOC) but is associated with extensive surgery and potential complications. Bromelain Based Debridement (BBD) is approved for use in adults in Europe, Israel and Argentina, and is currently an investigational product in a phase III clinical trial in the US. Additionally, a multicenter pediatric phase III trial is also ongoing. The aim of this review is to summarize the clinical trial results regarding the efficacy of BBD as a debriding agent and its impact on the surgical burden, long-term cosmesis and function in the pediatric population.

Methods: Phase II trial: Seventy-seven children under the age of 18 suffering from deep partial thickness (DPT) to full thickness (FT) burns were treated with BBD in a prospective, single arm, single-center trial. Data was retrospectively retrieved and analyzed for efficacy of enzymatic eschar removal and surgical burden.
Phase III trial: Thirty-three children under the age of 18, suffering from DPT to FT burns were treated with BBD or SOC as part of a multinational, multi-center, open label, randomized, controlled clinical trial. Seventeen of these children were treated with BBD and 16 were treated according to SOC. Early end points included time to complete debridement, need for surgical excision and percentage of burn autografted. Long-term evaluation of scarring and quality of life was also performed.

Results: Phase II data demonstrates that BBD efficiently removed the eschar in 92% of the areas treated, and only 34% of the debrided areas required skin-grafting. Graft take after enzymatic debridement was 94.1%. The rest of the areas healed by spontaneous epithelialization. Complete wound closure occurred after 21.4±16.5 days. Phase III data demonstrates that BBD efficiently removed the eschar (100% vs. 93.8% in SOC), significantly reduced the time to complete eschar removal (0.9±0.7 days vs. 6.5±5.9 days in SOC, $p<0.001$), the need for excisional surgery in all wounds (20.7% vs. 78.0% in SOC, $p< 0.0001$), and the area of DPT burns excised (7.9% vs. 73.3% in SOC, $p< 0.0001$). The need for autografting in DPT wounds (21.7% vs. 31.8% in SOC) and area autografted in DPT wounds (6.1% vs. 24.5%) were lower in the BBD group but did not reach statistical significance. Scar quality, quality of life and adverse event rates were similar in both groups.

Conclusions: Phase II data demonstrated the efficacy of BBD as an enzymatic debriding agent. Phase III data further demonstrated that enzymatic debridement resulted in earlier eschar removal, reduced need for and extent of surgery compared

	with SOC while achieving comparable long-term results in children with deep burns. **References and Resources:** Rosenberg L, Krieger Y, Bogdanov-Berezovski A, Silberstein E, Shoham Y, Singer AJ. A novel rapid and selective enzymatic debridement agent for burn wound management: a multicenter RCT. Burns 2014;40:466–74.
Disclosure:	Yaron Shoham – MediWound Ltd: Investigator Yuval Krieger – No Relevant Financial Relationships to Disclose Eldad Silberstein – No Relevant Financial Relationships to Disclose Alexander Bogdanov-Berezovsky – No Relevant Financial Relationships to Disclose

Implementation of Music Therapy for Pediatric Patients at an ABA Verified Burn Center

Friday, November 3
1:45-2:00 pm

Author and Co-authors:	Stephanie M. Epstein, MM, MT-BC, NICU-MT Holtz Children's Hospital, Jackson Memorial Burn Center, Miami, FL

Objective:

Upon completion of the lecture, attendees should be better prepared to:
- Examine different types of music interventions used by a music therapist during burn care to decrease pain perception and improve compliance with medical care.
- Recognize the impact of music therapy on both patients and staff in burn care.

Abstract:

Introduction: Pain management and compliance with care are two of the main concerns in burn care, particularly with pediatric patients. While physical sensation is a significant aspect of pain, the mental and emotional components play significant roles in the perception of pain as well. One of the most painful and traumatic events during burn treatment is debridement and dressing changes. Non-pharmacological methods of pain control, such as music therapy, can have profound effects on the perception of pain.

As defined by the American Music Therapy Association, music therapy is the "clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program." Music therapy provides individualized, outcome-driven interventions targeted toward non-musical goals—in burn care, it can increase compliance in medical care; decrease pain, stress, and anxiety surrounding dressing changes; provide opportunities for emotional expression and coping; and improve compliance during physical and occupational therapies. This presentation will delineate how the interdisciplinary burn team at an ABA verified Burn Center has implemented music therapy in pediatric burn care.

Design: Music therapy provides procedural support during dressing changes by means of singing, instrument playing, music-assisted relaxation, songwriting, and music listening. Given that music therapy is live and adaptable, each session looks different and is tailored to the specific needs of each patient. The music therapist is involved in every step of the dressing change, from debridement, to topical application and wrapping, and redirects the patient away from pain and anxiety. This can be accomplished by singing the patient's favorite song, playing instruments, guiding the patient through deep breathing exercises and guided imagery, and/or songwriting.

Findings and Implications: By utilizing music therapy to divert the patient's attention away from the dressing change and engage them in a preferred activity, patients show fewer signs of behavioral distress (crying, screaming, etc.) and greater compliance with their medical care. Infants often fall asleep by the end of the dressing change. Medical staff also report that patients' exhibit better compliance with dressing changes and that they themselves feel less stress as providers when music therapy is involved.

By incorporating music therapy into the interdisciplinary burn care team, patients may be better able to tolerate procedures with less stress, anxiety, and pain.

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www.musictherapy.org

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Disclosure: Stephanie Epstein – No Relevant Financial Relationships to Disclose

So, You're Getting a Pediatric Burn to the ICU

Friday, November 3
2:00-2:15 pm

Author and Co-authors:	Malissa A. Hill, BSN, RN Grady Health System Burn Center, Atlanta, GA
Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Identify and list various anxieties associated with an extensive pediatric burn admissions. ▪ Describe priorities of care in the burn admission. ▪ Develop positive attitudes toward pediatric admissions. ▪ Identify and rediscover ways of proven pediatric admission successes.
Abstract:	Pediatric burn admission to the Burn ICU. That news strikes anxiety even in the sage and most experienced burn nurse. It's a child and the child is burned. The best way to go about this significant and monumental nursing process is to remain calm and keep laser focused. The pediatric admission and following days can progress smoothly if the burn nurse is positive and focused on pediatric and family care. This discussion for the entire burn team is focused on care for the pediatric patient and family. It will cover the following: • Identification and Prioritizing Care. • Set-Up, cleaning and decontaminating the burn, and stabilization of the pediatric patient i.e., rule of nines, fluid resuscitation, and ventilatory support. • Initial discussion with immediate family members. • Developing a team approach on admitting a pediatric patient to the ED, stepdown or Burn ICU Burn Center. • Proven techniques for the prevention of CAUTI, CLABSI, and VAP. • Developing and instituting a Mock code process for your unit. • Transferring process to a Burn Center. • Child life specialty interventions. • Open discussion and debriefing on pediatric admissions. Exploring, identifying, and relating past pediatric admissions. Remembering we are burn teams and remembering our patients.
Disclosure:	Malissa A. Hill – No Relevant Financial Relationships to Disclose

A Retrospective Look: Merging Pediatric Burns into the Mainstream Pediatric Population

Friday, November 3
2:15–2:30 pm

Author and Co-authors:	Beda Willis, MS, CCLS; Doreann DeArmas, ARNP; Amy Beliveau-Baumer, BSN, RN; Diane Gallinal, BSN, RN Jackson Memorial Burn Center at University of Miami, Miami, FL
Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Recognize the importance of both family-centered care & implementation of a multidisciplinary approach when working with the pediatric burn population. ▪ Reflect on the expansion of Pediatric Burn services at an ABA verified Burn Center.
Abstract:	**Introduction:** At an ABA verified Burn Center, pediatric burn patients remained on the adult units until January 2014, after which they were transitioned into the mainstream pediatric population. This study takes a retrospective look at the expansion of family-centered care offered within the hospital by implementing Child Life, Music Therapy, & Palliative Care in the pediatric burn service. Since the 1920s Child Life Specialists (CCLS) have advocated for parental participation in the course of their child's care which is now the basis for family-centered care. Today, CCLS use a broad range of mechanisms to achieve these goals to include preparation, education, self-expression activities, emotional support for families, and facilitating developmental opportunities. Specialized services provided by Music Therapists (MT) also support patient & family-centered care through the use of music and music-based interventions. Part of pediatric palliative care services also includes a larger focus on quality-of-life. Palliative Care services at this hospital works with the entire family to educate, support, and comfort throughout the disease process with age- and disease-specific activities and resources. It is the availability of these services in pediatric burns that further advances patient & family-centered care. **Objectives:** In collaboration with the multidisciplinary burn team, the CCLS and the burn ARNP developed specific pediatric burn service guidelines that focused on patient & family-centered care. These guidelines aimed to decrease pain perception, increase compliance during medical treatments including physical therapy and occupational therapy. In addition, the team concentrated on assisting both the patient and family understand the diagnosis and medical treatments by developing positive coping skills and addressing ongoing psychosocial needs simultaneously. Using this multidisciplinary approach and providing on-going training helped the caregiver adjust, therefore preventing undue stress and burnout. **Method:** Throughout the 4-year process, CCLS and ARNP provided a variety of services. Initially, areas in need of development were identified and partnership with nurse managers was established in order to integrate nursing to assist with the expansion of services. CCLS provided ongoing developmental needs assessment, establishment of a daily schedule, and co-treatment to address psychosocial needs of the patient and family with the Psychology, Music Therapy, Palliative Care, & Nursing teams. Interventions provided by this multidisciplinary approach encouraged caregiver participation, education of diagnosis/care, and served as a platform to allow caregivers to ask for help and address feelings of distress and hopelessness. Other resources included the development of the Pediatric Family Support Group and expansion of the School Re-Entry & Community Education programs within the hospital.

Findings: Based on observations, pictures and videos, and feedback from staff and family, a multidisciplinary, family-centered approach improved patients' ability to comply and cope with medical treatments and long-term hospitalization. This expansion of burn services, has allowed for growth of community education by including outpatients in Fire Safety events.

Conclusions: The inclusion of pediatric burn patients within the mainstream pediatric population and standardization of CL, MT & palliative care services has allowed this unique patient population to receive the compulsory medical and psychosocial care specialized for their inimitable needs. The nursing staff has had a hands-on approach to creating improved training & educational opportunities for hospital staff and other medical professionals.

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Disclosure:

Beda Willis – No Relevant Financial Relationships to Disclose
Doreann DeArmas – No Relevant Financial Relationships to Disclose
Amy Beliveau-Baumer – No Relevant Financial Relationships to Disclose
Diane Gallinal – No Relevant Financial Relationships to Disclose

Impact of Primary Payer Status on Outcomes Among Patients with Burn Injury: A Nationwide Analysis

Friday, November 3
2:30-2:45 pm

Author and Co-authors:

Heather Peluso, DO, Resident[1], Marwan Abougergi, MD[2]; Julie Caffrey, DO[3]
[1]University of South Carolina/Greenville Health System, Greenville, SC
[2]Catalyst Medical Consulting, Simpsonville, SC
[3]Johns Hopkins Bayview Medical Center, Baltimore, MD

Objective:

Upon completion of the lecture, attendees should be better prepared to:
▪ Discuss the impact of patient insurance on treatment outcomes among patients with burn injury.
▪ Recognize that insurance status does not affect mortality or morbidity among patients with burn injury.
▪ Recognize that insurance status is a determinant of resource utilization among patients with burn injury.

Abstract:

Introduction: Insurance has been shown to affect treatment outcomes in multiple medical and surgical conditions. No studies have addressed the impact of insurance on outcomes among patients with burn injuries. Therefore, our aim was to study the relationship between insurance type and important outcomes in this patient population.

Methods: This was a retrospective cohort study using the National Inpatient Sample (NIS) 2014. The NIS is the largest publically available all-payer inpatient database in the United States. Inclusion criteria were a principal diagnosis of burn injury. Exclusion criteria were age less than18 years, superficial burn, and non-urgent admission. Type of insurance was divided into Medicare, Medicaid, private insurance, and uninsured. For all outcomes, patients with private insurance were taken as the reference to which all other patients were compared. The primary outcome was inpatient all-cause mortality. Secondary outcomes were morbidity (septic shock, prolonged intubation) treatment related metrics (time to surgery and time to enteral or parenteral nutrition) and resource utilization (length of stay and total hospitalization costs). The confounders that were collected and adjusted for using multivariate regression analysis were: sex, age, race, Charlson comorbidity index, median income in patient zip code, hospital urban location, region, teaching status, and bed size.

Results: There were 17,585 patients with burn injury included in the study. 29.9% of patients had Medicare, 27.5% of patients had Medicaid, 27.2% of patients had private insurance, and 15.4% were uninsured patients. Mean age was 48 years. 31% of patients were female. Adjusted odds ratios and mean differences are presented in Table 1. Compared to patients with private insurance, patients with Medicaid, Medicare, and patients who were uninsured had similar mortality, septic shock, and prolonged ventilation rates, time to surgery, and time to enteral or parenteral nutrition. Compared with privately insured patients, length of stay was longer for patients with Medicaid and shorter for uninsured patients. In addition, uninsured patients had lower total hospitalization charges compared to patients with private insurers.

Conclusions: Primary payer does not affect mortality or morbidity among urgently admitted patients with burn injury. Patients with Medicaid had longer length of stay and uninsured patients had shorter length of stay compared to patients with private

insurance. Uninsured patients had lower total hospitalization costs compared to patients with private insurance. Therefore, although insurance is a determinant of resource utilization, other demographic and clinical features appear to be more significant in determining treatment outcomes, especially mortality and morbidity.

References and Resources:

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Disclosure:

Heather Peluso – No Relevant Financial Relationships to Disclose
Marwan Abougergi – No Relevant Financial Relationships to Disclose
Julie Caffrey – No Relevant Financial Relationships to Disclose

	Adjusted Odds ratio *+(95% confidence interval)			
	Medicare	Medicaid	Uninsured	Private
In hospital mortality	0.83 (0.51 - 1.35)	1.19 (0.63 - 2.25)	0.93 (0.43 - 2.01)	1.0
Morbidity				
Septic Shock	0.38 (0.15 - 0.97)	2.11 (1.02-4.34)	0.94 (0.37 – 2.38)	1.0
Prolonged mechanical ventilation	1.11 (0.82 - 1.51)	1.68 (1.24 - 2.26)	0.85 (0.58 - 1.24)	1.0
	Adjusted Mean Difference *(95% confidence interval)			
Resource Utilization				
Time from admission to surgery	-1.22 (-3.09 - 0.64) days	0.93 (-0.75 - 2.61) days	-1.59 (-3.21 - 0.02) days	0.0 days
Time from admission to parenteral nutrition	11.55 (0.62 - 215.54) days	1.28 (0.08 - 20.98) days	2.22 (0.12 - 41.30) days	0.0 days

Time from admission to enteral nutrition	0.71 (0.29 - 1.71) days	1.12 (0.54 - 2.35) days	0.96 (0.36 - 2.60) days	0.0 days
Length of hospital stay	-1.40 (-3.32 - 0.52) days	2.80 (0.42 - 5.18) days[+]	-2.78 (-4.89 - -0.67) days[+]	0.0 days
Total hospitalization charges	$628.93 ($-29,928.82 - $31,186.69)	$43,104.82 ($-1,452.56 - $87,662.20)	$-41,262.01 $(-70,782.07 - $-11,741.96)[+]	$0.00

Liposomal Bupivacaine Alleviates Postoperative Donor Site Pain and Limits Hospitalization

Friday, November 3
2:45-3:00 pm

Author and Co-authors:	Phillips Nagsuk, MD, PGY-2; Susan L. Smith, PhD, ARNP; Howard G. Smith, MD Orlando Health, Orlando, FL

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Identify and discuss the benefits on liposomal bupivacaine in the treatment of skin harvest site pain.

Abstract:

Introduction: Skin harvest sites contribute significantly to the overall physical and emotional burden of pain suffered by burn –injured patients. Historically, narcotic analgesia has been the primary treatment approach. Uncontrolled burn pain has been correlated with prolonged length of hospital stay, increased morbidity, such as impaired mobility and contracture formation, poor nutritional intake, delayed wound healing and graft loss. Postoperative donor site pain is often so severe that it necessitates admission to the hospital for administration of intravenous narcotics. Local anesthetics have been utilized to minimize patient's discomfort. Unfortunately the duration of activity is limited. Liposomal bupivacaine is now available as a long-acting local anesthetic, lasting between 48 and72 hours. Liposomal bupivacaine is being utilized in many operative procedures. Currently, there is no literature describing the use of liposomal bupivacaine in the treatment of burn patients. We hypothesis that liposomal bupivacaine can be administered as a local anesthetic to control postoperative pain, thereby eliminating the need for intravenous narcotics and inpatient admission.

Methods: We performed a retrospective review of burn cases incorporating the use of liposomal bupivacaine for postoperative donor site analgesia.

Conclusions: Patients treated with liposomal bupivacaine were all discharged home from the post anesthesia care unit without requiring overnight hospital stay. No increased narcotic analgesic requirement was noted. Beyond the obvious benefit of pain reduction, there was a considerable cost savings.

References and Resources:

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Disclosure:	Phillips Nagsuk – No Relevant Financial Relationships to Disclose Susan Smith – No Relevant Financial Relationships to Disclose Howard Smith – Data Safety Monitoring Board Member: Stratatech

Debridement of Sulfur Mustard Burns: A Comparison of Three Methods

Friday, November 3
3:00-3:15 pm

Author and Co-authors:	David J. Barillo, MD[1]; Claire R. Croutch, PhD[2]; Francis Reid, DVM, MS[2] [1]Disaster Response/Critical Care Consultants, LLC., Mt. Pleasant, SC [2]MRIGlobal, Kansas City, MO

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Understand the complex pathology of cutaneous sulfur mustard injury. ▪ Review several debridement options that are available to treat this injury. ▪ Select an appropriate debridement method based on where care is provided and on number of casualties.

Abstract:	**Introduction:** Sulfur mustard burns differ from thermal burns in that symptoms may not occur for 24 hours or longer after exposure and blisters may continue to develop for several days. Sulfur mustard skin burns are notoriously indolent and slow to heal, and recurrence and breakdown are common following initial healing. The major site of injury is the basement membrane and the major target is the rapidly-proliferating basal epidermal cell. Incomplete debridement at this level is thought to be one cause of indolent healing and recurrence. Graham et al pioneered laser debridement of mustard-damaged cells, and the 2940 nm Erbium-YAG is rapidly becoming a standard of care. Laser debridement may be impractical for field use or during mass-casualty incidents, where saline or antibiotic-soak debridement is more likely to be used. In this study, we compared laser debridement with two conventional methods in a porcine model of deep partial thickness injury. **Methods:** Following Institutional Animal-Use Committee approval, deep dermal sulfur mustard burns were produced in anesthetized Gottingen minipigs (6 pigs per debridement group, 8 lesions per pig) using 10 uL saturated vapor cap exposure time of 90 minutes. Debridement was started 48 hours post injury and consisted of a single laser debridement; 5 days of 5% aqueous mafenide wet-to-wet dressings; or 7 to 12 days of saline wet-to-wet dressings. Following completion of debridement, wounds were treated with silver sulfadiazine daily for 30 days. Wounds were then assessed by histopathology, silver ion analysis and bioengineering methods. Because of the time required for saline and mafenide debridement, thirty-day assessment of wounds occurred at post-exposure day 32 for laser, day 37 for mafenide and day 39 for saline groups. **Results:** All of the sulfur mustard wounds healed well. On completion of the study, there were no significant differences between debridement groups for colorimetry or transepidermal water loss (TEWL). Silver-ion levels in the wounds averaged 22.4 ug/L for the laser group, 11.5 ug/L for the mafenide group and 8.1 ug/L for the saline group. Histopathology was graded on a mustard-specific scale of 1-15 where higher values indicate better healing. Mean histology scores were 13.6 for laser, 13.9 for mafenide and 14.3 for saline. Saline debridement statistically outperformed laser at a 5% level, however the saline group required the longest time for adequate debridement and had 7 more days of healing time compared to the laser group.

Conclusions: All three debridement methods produced satisfactory wound healing. There were no signs of wound infection in any group and antibiotic wet-to-wet debridement showed no advantage over saline debridement alone. Laser debridement has the benefit of requiring a single treatment rather than 5 or 7 days of daily dressing changes. In a mass-casualty scenario, this would represent significant savings of wound-care resources and nursing time. Development of a ruggedized laser for field use should be a countermeasures priority.

Project funded with Federal funds from the Department of Health and Human Services; Office of the Assistant Secretary for Preparedness and Response; Biomedical Advanced Research and Development Authority, under Contract No. HHSO100201300019C.

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Hurst, CG, Petrali, JP, Barillo, DJ, Graham, JS et al: Vesicants. In Tuorinsky, SD ed: Medical Aspects of Chemical Warfare. Washington DC; Borden Institute, Office of the Army Surgeon General, 2008

Disclosure:

David J. Barillo - Unlabeled use: There are no FDA approved drugs or devices for treatment of mustard gas injuries
Claire R. Croutch – No Relevant Financial Relationships to Disclose
Francis Reid – No Relevant Financial Relationships to Disclose

Use of a Lactic Acid Based Biodegradable Skin Substitute in Second-Degree Burn Care

Friday, November 3
3:15-3:30 pm

Author and Co-authors:	Sigrid Blome-Eberwein, MD Lehigh Valley Health Network, Regional Burn Center, Allentown, PA
Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Discuss treatment options for second degree burns. ▪ Discuss cost of various treatment options.
Abstract:	For 2nd degree burns temporary wound coverage has been studied in the past (amniotic membrane, Biobrane®, Transcyte®, Mepithel®) to limit dressing frequency and accelerate healing. Infection and integration into the healing wounds have been major drawbacks, final outcome reports are scarce. The ideal treatment of 2nd degree burns would 1-decrease pain, 2-limit dressing changes,3-allow assessment of healing, 4-prevent infection, 5-accelerate healing, 6-improve long term outcome, 7-save treatment cost. This biodegradable skin substitute seems to fulfill 6 out of the 7 above mentioned requirements. This study was conducted as a retrospective chart review and IRB approval was obtained. Over 3 years 229 patients received Suprathel®, a synthetic copolymer DL-lactide membrane, to their 2nd degree burns. Wound bed preparation was achieved under anesthesia by dermabrasion. Suprathel® was applied after hemostasis. The wound bed was followed through the translucent Suprathel® and fat gauze layers. The dressing separated spontaneously after epithelialization. 97% of burn wounds in this series healed without grafting. Infection rate was 3.49%. Time to epithelialization was accelerated compared to similar wounds that received daily dressing changes and wounds that were placed in Biobrane® or allograft (12.4 days). 10/229 wounds progressed to full thickness in small areas. No integration into wound beds was noted. Pain was rated at 1.5/10 throughout. Long term scarring was less than other treatment series (unpublished data from same author). Application of Suprathel® to 2nd degree wounds offers a simple option with potential for better outcomes and less pain. Although no control group was analyzed for cost, with less frequent dressing changes, less pain medication and lower infection rate, cost can be predicted at least equivalent to current standard of care (cream dressings or other temporary skin substitutes).
Disclosure:	Sigrid Blome-Eberwein – No Relevant Financial Relationships to Disclose

Heterotopic Ossification in Burn Patients: Can It be Prevented?

Friday, November 3
4:00-4:15 pm

Author and Co-authors:	Jay N. Collins, MD; Jack Pyle, BS; Laura Hodge, PharmD; Jesse Burgess, MD Eastern Virginia Medical School, Sentara Norfolk General Hospital, Norfolk, VA

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe the incidence of HO in a burn population. ▪ Discuss possible ways to prevent the formation of HO.

Abstract:	**INTRODUCTION:** Heterotopic ossification (HO) is a poorly understood phenomenon where calcium deposits form in soft tissue where it should not exist. This can result in significant restriction of mobility and can be very debilitating. HO may unexpectedly form in soft tissue after ANY operation, trauma or burns. We have seen an increase in our incidence of HO in our burn population and sought to review our experience. METHODS: We reviewed our burn admissions from January 2010 to May 2017 with a total body surface area (TBSA) greater than 10% for the incidence of HO. All patients were admitted to our burn unit and underwent resuscitation and early burn excision. All received daily physical therapy with active range of motion (AROM) and passive range of motion (PROM) including AROM under general anesthesia each time they went to the operating room. All patients also received Etidronate starting hospital day two. If patients developed stiffness of joints x-rays were obtained to further evaluate. **RESULTS:** We admitted 159 patients admitted with burn TBSA > 10% during the study period. The study population had a mean age 45.1 years, mean TBSA 23% and 71% male. Of these patients, we identified four female and three male patients (4.4%) who developed severe HO. The mean age of the HO group was 44.6 years and mean TBSA 45.0%. The site of HO was the elbow 12, hand 2 and knee 2. Significant reduction in mobility occurred in all. **DISCUSSION:** HO is an uncommon occurrence in burn patients, but when it occurs is severely debilitating. It seems to occur in patients with larger TBSA burns. Etidronate does not seem to reliably prevent HO. We continue with aggressive AROM and PROM for all burn patients and are now using non-steroidal anti-inflammatory medications in hope it reduces the incidence of HO.

Disclosure:	Jay Collins – No Relevant Financial Relationships to Disclose Jack Pyle – No Relevant Financial Relationships to Disclose Laura Hodge – No Relevant Financial Relationships to Disclose Jesse Burgess – No Relevant Financial Relationships to Disclose

Process Improvement: Innovative Use of a Honey Impregnated Sterile Acetate Gauze for Donor Site Healing as Compared to the Standard Treatment for Improved Quality Patient Outcomes

Friday, November 3
4:15-4:30 pm

Author and Co-authors:	Farid B. Mozaffari, MD; Curtis W. Harrison, Jr., MD Cabell Huntington Hospital, Marshall School of Medicine, Huntington, WV

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Determine effectiveness of honey impregnated sterile acetate gauze pad as compared to the standard treatment (control) of bismuth-impregnated petroleum based gauze for treatment of partial thickness skin graft donor sites for quality patient outcomes as assessed by: time of healing, scarring, decreased pain, ease of use, and reduction of infection/complications.

Abstract:

Introduction: Burn center leaders attempt to increase burn wound healing with every modality possible. Burn patients who require skin grafting with resultant graft sites have been treated with the standard bismuth-impregnated petroleum gauze with variable results. The use of the standard treatment often leaves results which are less than desirable such as infection, pseudo-slough, pain, decreased ambulation, prolonged hospital discharges due to increased pain levels requiring intravenous pain medication versus oral suspensions, and scarring. Efforts from the burn center leadership team to reduce these undesirable outcomes has led to an exploration into the history of topical wound care products which complement the body's ability to heal while combating infection, scarring, and increase healing times. The identification of a topical wound care product with the least amount of disruptive quality modality has led to identification of honey as the optimal topical wound care product which provides the purest level of healing properties. Honey has been used since ancient times for wound healing in every civilization. With documentation from the Romans, Egyptians, Assyrian, Chinese and Greek texts discussing the benefits of application to healing and reduction of infection and scarring complications noted respectively. In the late 19th century researchers discovered that honey has natural antibacterial qualities. Honey quickly reduces pain and inflammation with its anti-inflammatory properties protecting against damage from bacteria while stimulating tissue repair and regeneration. Components of honey include the peroxidase enzyme which forms hydrogen peroxide when in contact with water giving the honey an antibiotic quality assisting in its antibacterial qualities. The level of purity based on the monofloral honey product is directly correlated to its medicinal effects on wound healing. Manuka honey is a monofloral honey produced in New Zealand from the nectar of the manuka tree. This monofloral honey harbors the methylglyoxal (MGO) and Leptosperin components which are the active components specific to the monofloral manuka honey provide the dominant healing and regenerative properties of Manuka honey. Manuka honey assists with autolytic debridement by increasing the plasmin activity by inhibiting plasminogen activator inhibitor (PAI), which digests the fibrin clot, loosening slough and necrotic tissue attached to the wound bed. Also, osmotic action draws lymph fluid into the wound further assisting in loosening debris and necrotic tissue for easy removal and decreased adherence to the wound bed. Manuka honey has bioactive properties that include anti-inflammatory, antimicrobial, antibacterial, stimulation of autolytic debridement, improvement of ph balance, increased exudate absorption, control odor, and its ability to provide balance moisture. In addition, the use of honey

has not been reported to cause the development of resistant bacteria even in subsets of bacteria showing resistance to silver.

Methods/Design:

Study design: Single-center, retrospective, controlled feasibility trial completed in 2016-2017.

Sample size: 15-20 patients anticipated to be enrolled in the study.

Indication for study participation: Treatment of partial thickness skin graft donor sites.

Design: **Treatment Arms:** Partial Thickness Skin Graft Donor study sites were identified for each patient. The donor site was divided equally by Burn Physician. All patients received both honey impregnated sterile acetate gauze pad and Control to equal parts of the skin graft donor sites, to be identified in the following manner:

Treatment	Study Site
Treatment 1 – Honey gauze pad	Study Site A
Treatment 2 – Control	Study Site B

Procedures and Assessments:

Subjects were enrolled and will be followed for 12 months following honey impregnated sterile acetate gauze pad application. Assessments for each visit are as follows:

- Treatment (Day 0): Screening, pre-procedure evaluation, measurement and photography of burn, pain scale assessment, honey pad and control application and wound dressing, assessment for adverse events (AEs)
- Short-term Follow-up (Day 7 through 14, and Day 21): Pain scale assessment, measurement and photography of donor site, wound dressing, assessment for adverse events (AEs)
- Long-term Follow-up (Month 6, Month 12): Pain scale and scarring assessment, measurement and photography of donor site, wound dressing, assessment for adverse events (AEs)

Primary Endpoint: The primary healing endpoint of this study was the time to complete healing, defined by 95% epithelialization, as assessed at 3 weeks. The primary scarring endpoint of this study was the degree of scarring as assessed by the Vancouver Scar Scale at 12 months.

Secondary Endpoints:

- Subject reported perception of pain using the Visual Analog Scale (VAS) for the adult population and Wong-Baker FACES® Pain Rating Scale or FLACC Behavioral Pain Assessment Scale
- To assess scarring at 6 months using the Vancouver Scar Scale
- Evaluation of safety as defined by number and frequency of related adverse events

Results/Findings: During the study period 20 patients were successfully enrolled and completed the study with the following findings:

Treatment	Study Site	Time to healing	Pain	Scarring
Treatment 1 – Honey gauze pad	Study Site A	equal	0	N/A
Treatment 2 – Control	Study Site B	equal	17	N/A

Treatment	Study Site	Easey of use	Infection	Complications
Treatment 1 – Honey gauze pad	Study Site A	20	0	0
Treatment 2 – Control	Study Site B	0	0	0

Conclusions/Implications: The development of this study was to determine the effectiveness of the honey impregnated sterile acetate gauze pad as compared to the standard treatment (Control) of bismuth-impregnated petroleum based gauze for the treatment of partial thickness skin graft donor sites as assessed by time of healing, scarring, decreased pain, ease of use, reduction of infection/complications. Per the above results and findings, the efficacy of the use of a monofloral manuka honey impregnated sterile acetate gauze pad provided the objective data to show the use as beneficial to burn patients treated with partial skin graft donor sites.

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2. Molan, Peter. (2014). “The debriding action of honey on wounds.” Poster Presentation at the New Zealand Conference of Primary Health Care Nurses.
3. Seckman, A. & Cooper, R. (2013). “Understanding how honey impacts on wounds: an update on recent research findings.” *Wounds International, 1*(4), 20-24.

Disclosure:

Farid B. Mozaffari – No Relevant Financial Relationships to Disclose
Curtis W. Harrison – No Relevant Financial Relationships to Disclose

A Multicenter Feasibility Study of an Automated Bedside Glucose Monitoring System in the Burn Intensive Care Setting

Friday, November 3
4:30-4:45 pm

Author and Co-authors:

Joshua S. Carson, MD[1]; Tera Thigpin, BS[1]; Rachel Karlnoski, PhD[2]; David Smith, MD[2]; David Mozingo, MD[1]
[1]Shands Burn Center at University of Florida Health, Gainesville, FL
[2]University of South Florida, Tampa, FL

Objective:

Upon completion of the lecture, attendees should be better prepared to:
▪ Discuss the need for glucose monitoring technology capable of higher frequency assessment.
▪ Describe a new glucometry technology designed to provide bedside high frequency bedside monitoring and demonstrate its accuracy.

Abstract:

Background: Maintenance of euglycemia has been clearly shown to improve a wide range of important outcomes in burn patients. The systemic response to thermal injury creates a particularly pronounced hyperglycemia refractory to all but extremely high doses of insulin. Given the distinct lability of burn-associated hyperglycemia, insulin regimens aggressive enough to achieve tight control of hyperglycemia currently carry prohibitively high risks of catastrophic hypoglycemia. Tight glycemic control in burn patients is currently limited by our inability to reliably identify rapid changes in glycemic status using conventional glucose-monitoring.

The Optiscan Continous Glucose Monitoring System (Optiscan CGMS) is a novel point-of-care testing system which uses optical-spectroscopy to rapidly determine glucose concentration in very small volume blood volumes without need for recalibration. The system is designed to function as a fully integrated bedside monitor, tracking serum glucose levels through 0.2mL blood samples which it collects in automated blood draws off of conventional central venous access devices. This technology represents the potential to facilitate safer ultra-intensive glycemic control by allowing higher-frequency blood-glucose monitoring than feasible with currently available technology.

Our objective is to assess the accuracy of glucometer portion of the Opticscan CGMS in the burn ICU setting.

Methods: We studied the diagnostic accuracy of the OPTISCAN CGMS in an observational study conducted at two major academic burn centers. Patients presenting to the involved burn centers were screened and recruited for enrollment on admission. Inclusion criteria included age over 18, burns sizes >/= 6% and </= 40% total body surface area. Study protocol was approved by institutional review boards, and informed consent was obtained from all patients (or their surrogates) prior to enrolment into the trial.

Blood samples were drawn from central venous access lines at regular intervals throughout the day for up to three days, with the samples split into two paired-aliquots. The paired aliquots were taken immediately to an on-unit lab space and assayed blood glucose levels using the Optiscan CGMS (in “lab-only” mode) for one aliquot and the gold standard Yellow Springs Instrument (YSI) for the other. The CGM and YSI values were blinded from clinicians. Patient treatment followed existing hospital protocols.

CGM accuracy was assessed by calculating the Mean Absolute Relative Deviation (MARD) between CGM and (gold-standard) YSI reported values in matched samples.

Clinical efficacy was determined by identifying all CGMS values that differed from YSI reference values by >20%, and projecting the impact of these variances on clinical decision making. Results were than plotted along a Clarke Error Grid (CEG). (See figure for explication of CEG)

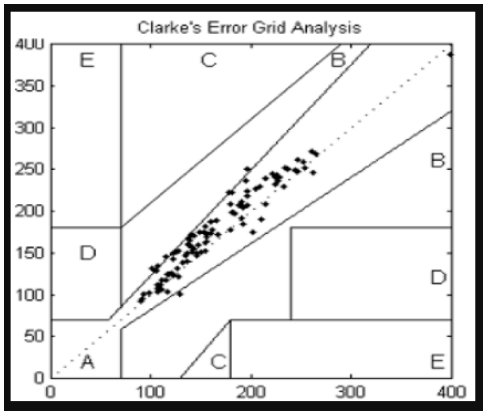
Results: A total of 10 patients were enrolled, five from each center. A total of 97.2% and 100% of the results obtained with GCM were within 25% and 30% of the corresponding YSI reported value, respectively. 100% of data points were in CEG zones A and B (A zone = 85%, B Zone= 15%). The mean absolute relative deviation (MARD) between the GCM and YSI results was calculated to be 9%, which meets the FDA standard of < 10% for clinical glucometers.

No device related adverse events were observed.

Conclusion: These results indicate that a GCM system can provide safe and accurate bedside assessment of blood glucose levels. Therefore, the Optiscan GCM system has the capacity to provide accurate high-frequency blood glucose level monitoring.

Applicability of Research to Practice: Real-time automated bedside glucose monitoring and trending may help improve glucose control and avoid harmful episodes of hyperglycemia, hypoglycemia or glycemic variability, while freeing up nurses to focus on patient care. By increasing the feasibility and safety of ultra-tight glycemic control, such a system could conceivably allow for significant improvement in a wide range of outcomes in burn care.

• Clarke's Error Grid Analysis of Optiscan CGMS Measured Glucose Levels as Compared to YSI Measured Values in Paired Specimen. Y-axis represents Glucose Values obtained by Optiscan CGMS, and X-axis represents Glucose Values obtained by YSI.
• Labeled regions constructed as follows -- Region A are those values within 20% of the reference sensor, Region B contains points that are outside of 20% but would not lead to inappropriate treatment, Region C are those points leading to unnecessary treatment, Region D are those points indicating a potentially dangerous failure to detect hypoglycemia or hyperglycemia, and Region E are those points that would confuse treatment of hypoglycemia for hyperglycemia and vice versa.



Disclosure:

Joshua Carson – No Relevant Financial Relationships to Disclose
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David Smith – No Relevant Financial Relationships to Disclose
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Utilization of Laser for the Modification of Burn Related Complications

Friday, November 3
4:45-5:00 pm

Author and Co-authors:	Tracee Short, MD Baton Rouge General Burn Unit, Baton Rouge, LA

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe the various laser platforms available for scar augmentation. ▪ Examine photographs of treated scars and recognize the noted improvements. ▪ Determine how laser could be incorporated into your current treatment algorithm for burn scar augmentation.

Abstract:

The adoption of current burn guidelines has improved mortality and decreased risks of infection therefore allowing more burn survivors to return to their previous means of living. This is how the 6 R's of burn care came about rescue, resuscitate, recovery, rehabilitation, restoration, research. We cannot just focus on surviving but thriving in their new skin. Hypertrophic scarring and contractures are a consequence for burn wounds and skin grafting; as are pruritis, prolonged erythema, and ingrown hairs. In the past, these conditions were treated with serial excisions, regrafting, and rotational flaps. But as of 1984, the options expanded when physicians began looking at the use of LASER (light amplification stimulated emission of radiation) on hypertrophic burn scars. Advances continue to be made throughout the decades since. Previous practice had recommended scar wait to be mature before augmentation. This is being fought one patient at a time.

This project is a case series of patients treated at the Baton Rouge General Burn Unit that entered the laser reconstruction program post burn injury. Patients were treated from 5 months to 81 years and as soon as 8 weeks post injury to 24 years post injury. Multiple laser platforms were used to treat the myriad of complaints. This is a photographic demonstration of visual improvement and an objective account of functional improvement from therapist visits.

The results demonstrate that majority of scars are amenable to augmentation using various laser platforms. The outcomes indicate improved aesthetic outcomes, range of motion and patient satisfaction. Objective measurement tools were not utilized, as they are not available.

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Disclosure:	Tracee Short – No Relevant Financial Relationships to Disclose

Light-Based Treatment of Burn Scars: Initial Experience with Early Treatment

Friday, November 3
5:00-5:15 pm

Author and Co-authors:	J. Kevin Bailey, MD; Heather M. Powell, PhD; Rachel Penny, PA; Rebecca Coffey, PhD, CNP, RN The Ohio State University, Wexner Medical Center, Columbus, OH

Objective:

Upon completion of the lecture, attendees should be better prepared to:
▪ Describe the relative level of certainty regarding the clinical science behind the use of light-based therapy in the management of burn scars.
▪ List potential complications of the use of light-based therapy in the management of burn scars.
▪ Identify any risks posed by the early use of light-based therapy in the treatment, or potential prevention of burn scars.

Abstract:

Introduction: The use of lasers to modify burn scars has advanced from a novel technique to a viable strategy that enjoys growing support. Unfortunately, the use of the pulsed-dye laser (PDL) and fractional CO2 (FXCO2) laser has accelerated beyond a clear understanding of optimal timing and energy settings. As part of our burn center's efforts to elucidate the mechanisms of change in burn scars treated with light-based therapy, we have identified improvements in the burn scars in a porcine model and tolerance of split-thickness grafts of laser therapy applied much sooner after grafting than reported elsewhere. We conducted a review of our experience with light-based treatment of burn scars, including some cases of early treatment (during the acute admission).

Methods: The routine access to PDL and FXCO2 lasers was initiated in December of 2015 at our burn center. An IRB-approved review of our clinical experience and program development was conducted. We identified 50 patients who had completed therapy, including four patients who were treated during the acute admission. We examined the incidence of complication (n=1), the Vancouver Scar Scale, the Patient Observer Scar Assessment Scale, and the patient tolerance of treatment.

Results: Initial outpatient clinic treatments were restricted to use of the PDL. FXCO2 treatment was combined with other surgical procedures under general anesthesia. On review, we found that 4 patients were treated during their initial hospitalization as effective compression therapy could not be offered. The FXCO2 was used in three of these patients and PDL in one. In over 106 treatments, there were two cases of blistering (with PDL) and one case of lost skin graft (PDL). Use of both the PDL and FXCO2 was not associated with any complications when applied during the acute admission. Furthermore, towards the end of the period we had gained confidence in treating scars with the FXCO2 in the outpatient burn clinic.

Conclusions: The use of both the PDL and FXCO2 lasers can be conducted safely during the acute admission. Further studies are warranted to objectively document salutary clinical effects. The only significant complication, graft loss, occurred in the outpatient setting with PDL and is likely not solely the result of the laser treatment. FXCO2 is also well tolerated in the outpatient setting.

	References and Resources: http://www.ncbi.nlm.nih.gov/pubmed/24767715
Disclosure:	J. Kevin Bailey – Research support to University: Milliken Heather M. Powell – Research support to University: Milliken Rachel Penny – No Relevant Financial Relationships to Disclose Rebecca Coffey – No Relevant Financial Relationships to Disclose

Ascertaining Caregivers' Beliefs Regarding the Role of Palliative Care in the Burn Unit

Friday, November 3
5:15-5:30 pm

Author and Co-authors:

Rachael Williams, MD; Mack Drake, DO; Ashima Lal, MD
Emory University, Grady Burn Center, Atlanta, GA

Objective:

Upon completion of the lecture, attendees should be better prepared to:

- Define the role of palliative care and hospice services in the burn intensive care unit.
- Recognize inherent bias that may influence palliative care utilization.

Abstract:

Introduction: There is abundant literature regarding the role of palliative care in surgical intensive care units (ICU). However, the role of palliative care in the burn intensive care unit is not well defined nationally and locally. This study seeks to determine a range of caregivers' beliefs regarding the role of palliative care in the burn unit. This study seeks to identify inherent bias regarding palliative care involvement in the burn unit and to identify knowledge gaps regarding the perceived and actual functions of a palliative care service. This study will ultimately assist us in developing future protocols for consulting palliative care and barriers to consultation.

Methods: We conducted a survey of caregivers including burn unit, palliative care staff, and family members. The range of providers surveyed included nursing, pharmacy, occupational therapy/physical therapy, residents, attending physicians, social workers, and child life specialists. We obtained 95 total surveys. In addition, we conducted a retrospective chart review of 12 burn ICU patients in whom the palliative service was involved. Statistical analysis including means, standard deviations, and p values were calculated.

Results: Surveys were returned by 95 caregivers. The majority of surveys were completed by nursing staff (n=44) and residents (n=28). Of note ICU family members comprised 6 of the returned surveys. Providers (38%) felt that a burn ≥60% TBSA was the clinical parameter that should trigger a palliative care consult, irrespective of co-morbidities. We found that 49% of caregivers felt that the word "palliative" had a negative connotation. Conversely, the majority of family members did not think the word "palliative" had a negative connotation. (83%, n=6). Of the family members that were survived 83% had prior experience with palliative care and hospice services.
Our retrospective chart review identified 12 patients from 2014-2017 in whom palliative care was consulted. The majority (58%) of the consults occurred from 2016-2017. The average age of the patients in whom palliative care was consulted was 59.5 ± 18 years with a mean TBSA of 23 ± 27 percent. At baseline, the mean Karnofsky performance status of the patients was 30 ± 19.7 percent. The average Charleston co-morbidity index was 1.75 ± 1.4.

Conclusions: We found that our palliative care consult utilization has seen an upward trend in recent years. Also our consultations, in contrast to our survey results, seemed to be driven by patients' co-morbidities rather than TBSA involved. Interestingly, patients' family members had a more positive view of palliative care than medical providers. Amongst medical providers, the majority felt that burns ≥60% TBSA should trigger a palliative care consult at our institution. In the future we would like to distribute a survey nationally. Locally, we would like to use these responses to implement a

	quality improvement project in which we develop protocols for consulting palliative care medicine. **References and Resources:** Nelson JE, Puntillo KA, Pronovost PJ, et al. In their own words: Patients and families define high-quality palliative care in the intensive care unit. Crit Care Med. 2010;38:808–818
Disclosure:	Rachael Williams – No Relevant Financial Relationships to Disclose Ashima Lal – No Relevant Financial Relationships to Disclose

Use of Antifactor-Xa Levels for Thromboprophylaxis in Burn Patients

Saturday, November 4
7:30-7:45 am

Author and Co-authors:

Dalbir K. Bahga, BS, MS-IV[1]; Charles A. Karcutskie, MD[2]; Sarah A. Eidelson, MD[2]; Anish B. Papiadpu, MBBS[2]; Carl I. Schulman, MD, MSPH, PhD[2]

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Objective:

Upon completion of the lecture, attendees should be better prepared to:

▪ Describe how the guidance of thromboprophylaxis is used in trauma patients and compare that to the burn population.

▪ Discuss the implications and influence of Anti-Xa guided dosing in thromboprophylaxis after burn injuries.

Abstract:

Introduction: Antifactor-Xa (anti-Xa) levels have gained interested for the guidance of thromboprophylaxis in trauma patients. Burn injury is a unique type of injury that involves distinct differences in physiologic responses. There is little data describing the use of anti-Xa levels in burn patients.

Methods: Retrospective review of 54 patients admitted to the intensive care unit after sustaining burn injuries between 1/2015-1/2017. Patients were included if they received enoxaparin guided by anti-Xa levels. Control patients were those with guided dosing and blunt or penetrating trauma. In these patients, enoxaparin 30mg BID subcutaneous was started. An anti-Xa peak level was drawn after the third dose. If subprophylactic (<0.02 IU/mL), each dose was increased by 10mg. This process was continued until a prophylactic level or a maximum dose of 60mg BID was reached.

Results: Of the 54 burn patients reviewed, 28 received enoxaparin guided by anti-Xa peak levels. The initial prophylactic rate after the first level was 17.9% (n=5). The overall prophylactic rate throughout the hospital stay was 64.3% (n=18). Comparing this to the trauma population, 33.3% (n=66) achieved prophylactic levels initially, with an overall prophylactic rate of 52.5% (n=102) throughout the hospital stay. Comparing the burn vs trauma patients, 46.4% (n=13) and 19.2% (n=38) achieved prophylactic levels with increased doses of enoxaparin based on anti-Xa levels. This achievement was significantly more successful in burn patients (p=0.001). The average enoxaparin dose in the burn patients achieving prophylactic anti-Xa levels was 44mg BID.

Conclusions: Anti-Xa guided dosing of enoxaparin is significantly more effective in reaching prophylactic levels after burn injury when compared to blunt or penetrating trauma. Anti-Xa guided dosing or higher initial dosing of enoxaparin after burn injury may provide more appropriate thromboprophylaxis.

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Disclosure:

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Charles A. Karcutskie – No Relevant Financial Relationships to Disclose
Sarah A. Eidelson – No Relevant Financial Relationships to Disclose
Anish B. Papiadpu – No Relevant Financial Relationships to Disclose
Carl I. Schulman – No Relevant Financial Relationships to Disclose

Survey of National and Local Practice Patterns of Compression Therapy Timing for Burn Patients in the United States

Saturday, November 4
7:45-8:00 am

Author and Co-authors:	Saurabh Mehta, MS-III; Rebecca Coffey, PhD, MSN, CNP; Heather M. Powell, PhD; Larry M. Jones, MD; J. Kevin Bailey, MD The Ohio State University, Wexner Medical Center, Columbus, OH

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe the most frequently stated goal times for application of compression therapy in the United States. ▪ Reflect on the possibility that there may be a discrepancy between any burn units stated goal, and the reality of when compression is applied. ▪ List two potential contributors to delayed application of compression therapy.

Abstract:	**Introduction:** Compression therapy (CT) has been a mainstay of treatment for patients suffering from scars secondary to thermal injury. The utility of this therapy has been debated, and multiple therapy factors including magnitude of pressure, fatigue of garments, timing of application, and patient compliance, may be responsible for the variation on outcomes. As a result, we sought to identify the most common clinical practices for timing of compression therapy initiation. **Methods:** Following IRB approval, 126 U.S. burn centers were identified and contacted requesting completion of a 17 question online survey. Locally, study subjects were identified from all outpatients treated between March 1, 2014 and December 31, 2015. **Results:** The majority of respondents believed that pressure therapy is beneficial and stated the goal time of application is 2-4 weeks (51%). After the garments are ordered, 60% of centers estimate that it takes 2-4 weeks for them to arrive. At our burn center we ascribed to a goal time to application of 4-6 weeks, and we examined 108 patients who had garments ordered. Ninety-three patients were measured for garments, and 71 patients received their garments. The mean number of days between the date of original burn injury and garment order placement was 64.6 days and 55 days between the date of order and date of delivery for all patients. **Conclusions:** The current study identified that although the national reporting of time to garment application is estimated to be 2-4 weeks at the majority of burn centers, we found our center to be in excess of 16 weeks, offering an opportunity for process improvement. It also raises the possibility of an incongruity between goals and practice at other centers.

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Disclosure:	Saurabh Mehta – No Relevant Financial Relationships to Disclose Rebecca Coffey – No Relevant Financial Relationships to Disclose Heather M. Powell – No Relevant Financial Relationships to Disclose Larry M. Jones – No Relevant Financial Relationships to Disclose J. Kevin Bailey – No Relevant Financial Relationships to Disclose

Epidemiological Observation of Patient Demographics Predicts Mean Arterial Pressure Long-Term After Burn Injury

Saturday, November 4
8:00-8:15 am

Author and Co-authors:

Alvand J. Sehat, BA, Medical Student; Audra Clark, MD; Kevin DeSpain; Steven Wolf, MD
University of Texas Southwestern Medical Center, Dallas, TX

Objective:

Upon completion of the lecture, attendees should be better prepared to:
▪ Recognize and consider epidemiological factors on the prognosis of burn trauma recovery in regards to cardiovascular health.

Abstract:

Background: The predictors of quality of life and recovery from burn trauma can be related to gender, ethnicity, and total body surface area (TBSA) of burn. Few studies have shown how patient demographics can be a predictor of cardiac health in a long-term post burn injury.

Methods: A retrospective chart review of 150 patients treated from June 2012 to December 2014 was performed and the results subjected to a mixed variate model analysis.

Results: Over a period of 90 days, patients with a TBSA between 20%-39% had a mean arterial pressure (MAP) that was higher by 7.37 mm Hg compared to patients with 40%-100% TBSA ($p < 0.0001$). Black patient's MAP was higher by 3.74 mm Hg compared to Whites ($p = 0.0150$). Female patient's MAP was lower by 3.46 mm Hg compared to males ($p = 0.0173$).

Conclusion: In conclusion, 90 days after burn injury, black and male patients had increased MAP.

Tables and Figures follow References

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Disclosure:

Alvand Sehat – No Relevant Financial Relationships to Disclose
Audra Clark – No Relevant Financial Relationships to Disclose
Steven Wolf – Merck Manual Contributor: Merck

Tables and Figures

Table 1. Patient Characteristics

	n (%) or [SD]
Median age	46.5 [18.7]
Gender	
Female	35 (23.3)
Male	115 (76.7)
Race/ethnicity	
Black	25 (16.7)
Hispanic	26 (17.3)
Other	3 (2.0)
White	96 (64.0)
Pressors given?	
No	100 (66.7)
Yes	50 (33.3)
Hypertension meds pre-hospitalization?	
No	134 (89.3)
Yes	16 (10.7)
Hypertension meds given in hospital?	
No	45 (30.0)
Yes	105 (70.0)
Median TBSA	31.5 [21.6]
20%-39%	92 [61.3]
40%-100%	58 [38.7]
Median baseline systolic pressure	138.5 [33.5]
Median baseline diastolic pressure	80.5 [22.9]
Median baseline MAP	103.3 [24.0]
Median baseline heart rate	98.0 [23.4]

Abbreviations: SD, standard deviation; MAP, mean arterial pressure; TBSA, total body surface area

Table 2. Difference in mean arterial pressure (MAP). This table presents mixed model results for individual patient characteristics while controlling for time since baseline. Each 1 mm Hg increase in baseline MAP increased the follow-up MAP by 0.15 mm Hg ($p < 0.0001$). Females had a MAP that was lower on average by 3.46 mm Hg compared to males ($p = 0.0173$).

	Difference in MAP (95% CI)	***p***
Baseline MAP (per increase of 1 mm Hg)	0.15 (0.10, 0.20)	<0.0001
Age (per increase of 1 year)	-0.07 (-0.14, -0.001)	0.0452
Gender		
Female	-3.46 (-6.29, -0.62)	0.0173
Male	reference	
Race/ethnicity		
Black	3.74 (0.45, 7.03)	0.0597
Hispanic	-1.60 (-4.82, 1.62)	
Other	-2.00 (-10.63, 6.63)	
White	reference	
Pressors given?		
No	6.70 (4.27, 9.13)	<0.0001
Yes	reference	
Hypertension meds pre-hospitalization?		
No	-1.82 (-5.79, 2.16)	0.3678
Yes	reference	
Hypertension meds given in hospital?		
No	-1.93 (-4.81, 0.94)	0.1851
Yes	reference	
Median TBSA		
20%-39%	7.37 (4.98, 9.76)	<0.0001
40%-100%	reference	
Heart rate (per increase of 1 BPM)	0.07 (0.03, 0.11)	0.0006

Abbreviations: MAP, mean arterial pressure; CI, confidence interval; TBSA, total body surface area; BPM, beats per minute

Table 3. Difference in mean arterial pressure (MAP). This table presents the results from the best-fit multivariate mixed model analysis of MAP over time. Given otherwise equivalent patient characteristics, patients had a MAP that was 0.08 mm Hg lower than patients who were 1 year younger (p = 0.0258). On average, patients given pressors had a MAP that was 3.64 mm Hg more than patients who were not given pressors (p = 0.0061).

	Difference in MAP (95% CI)	***p***
1/time (days)	1.52* (0.85, 2.19)	<0.0001
Baseline MAP (per increase of 1 mm Hg)	0.11 (0.60, 0.16)	<0.0001
Age (per increase of 1 year)	-0.08 (-0.14, -0.01)	0.0258
Gender		
Female	-3.25 (-5.94, -0.56)	0.0183
Male	reference	
Race/ethnicity		
Black	4.37 (1.30, 7.43)	0.0150
Hispanic	-1.58 (-4.53, 1.37)	
Other	1.54 (-6.31, 9.39)	
White	reference	
Pressors given?		
No	3.64 (1.06, 6.22)	0.0061
Yes	reference	
Hypertension meds pre-hospitalization?		
No	-4.36 (-8.01, -0.72)	0.0194
Yes	reference	
Median TBSA		
20%-39%	6.77 (4.28, 9.25)	<0.0001
40%-100%	reference	
Heart rate (per increase of 1 BPM)	0.08 (0.04, 0.12)	0.0001

*The change in MAP over time should not be read as increasing by 1.52 mm Hg for every day. This is because time is not linearly related to MAP; rather, it appears to have a multiplicative inverse relationship wherein MAP starts off high but quite quickly levels off. The change in MAP from one day to the next can calculated by:

$$\Delta MAP = 1.52 \times \frac{1}{day+1} - 1.52 \times \frac{1}{day}$$

$$\Delta MAP = (\frac{1.52}{day+1} \times \frac{day}{day}) - (\frac{1.52}{day} \times \frac{day+1}{day+1})$$

$$\Delta MAP = \frac{1.52day}{day^2+day} - \frac{1.52day+1.52}{day^2+day}$$

$$\Delta MAP = \frac{1.52day - (1.52day+1.52)}{day^2+day}$$

$$\Delta MAP = \frac{-1.52}{day^2+day}$$

For example, from day 1 to day 2, MAP decreased by 0.76 mm Hg on average (-1.52/[1^2+1]), while from day 2 to day 3, MAP decreased by 0.25 mm Hg on average (-1.52/[2^2+2]).

Abbreviations: MAP, mean arterial pressure; CI, confidence interval; TBSA, total body surface area; BPM, beats per minute

Figure 1

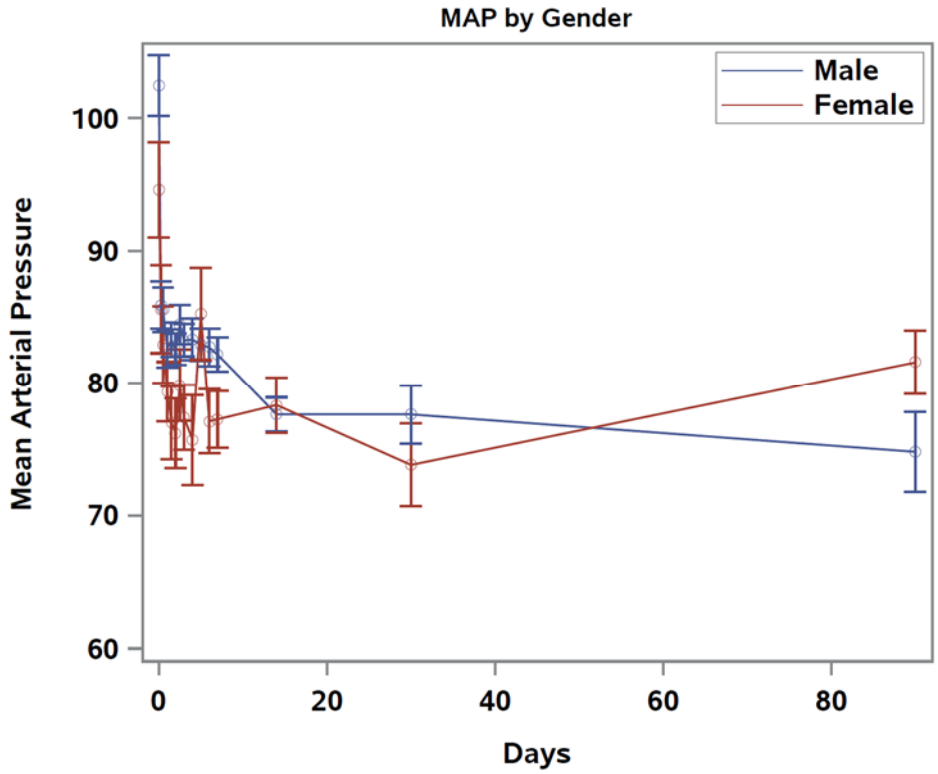


Figure 2

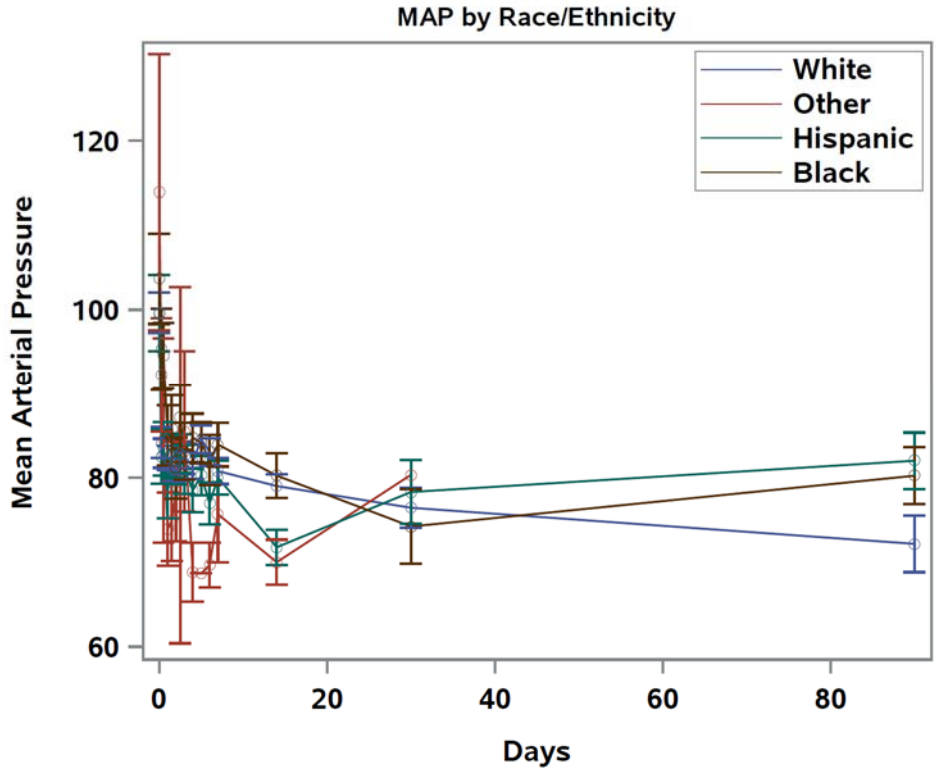


Figure 3

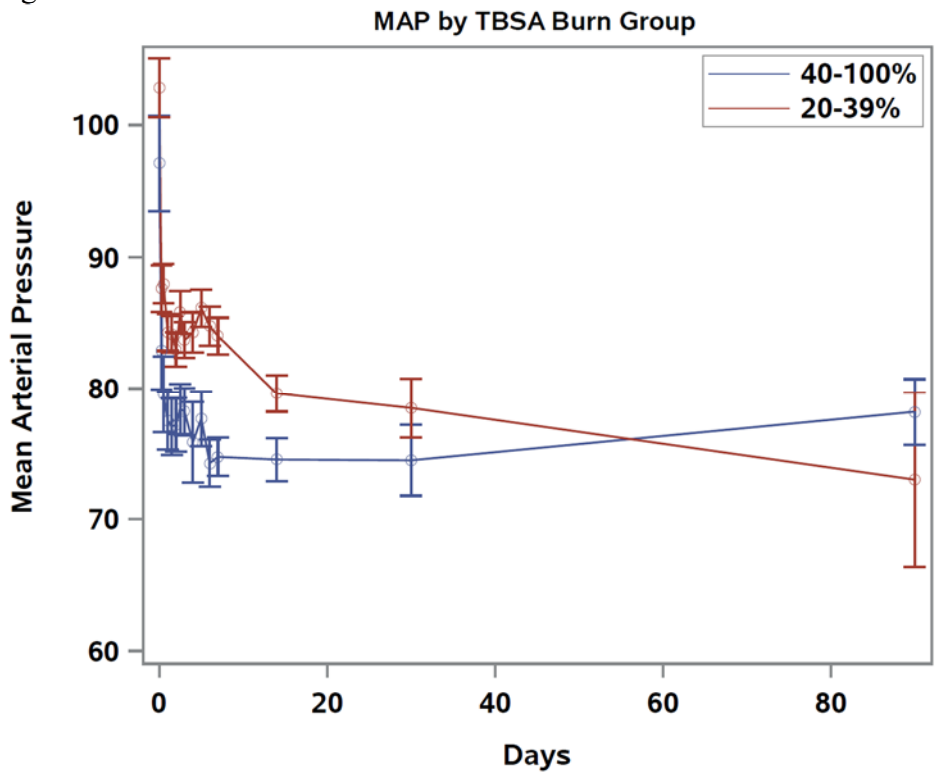


Figure 4

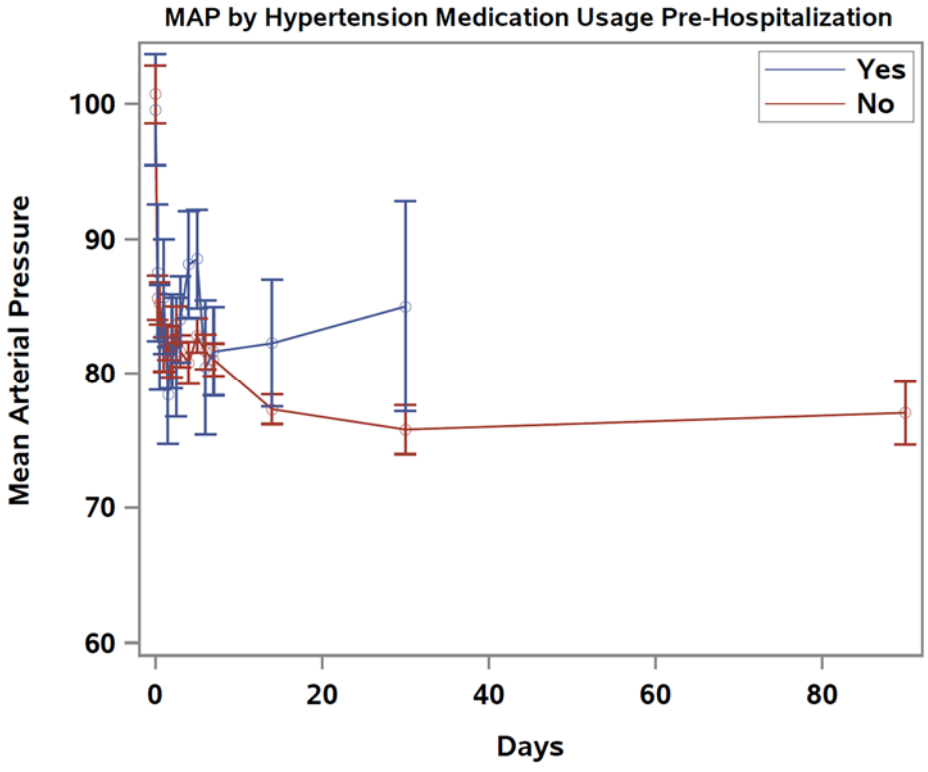
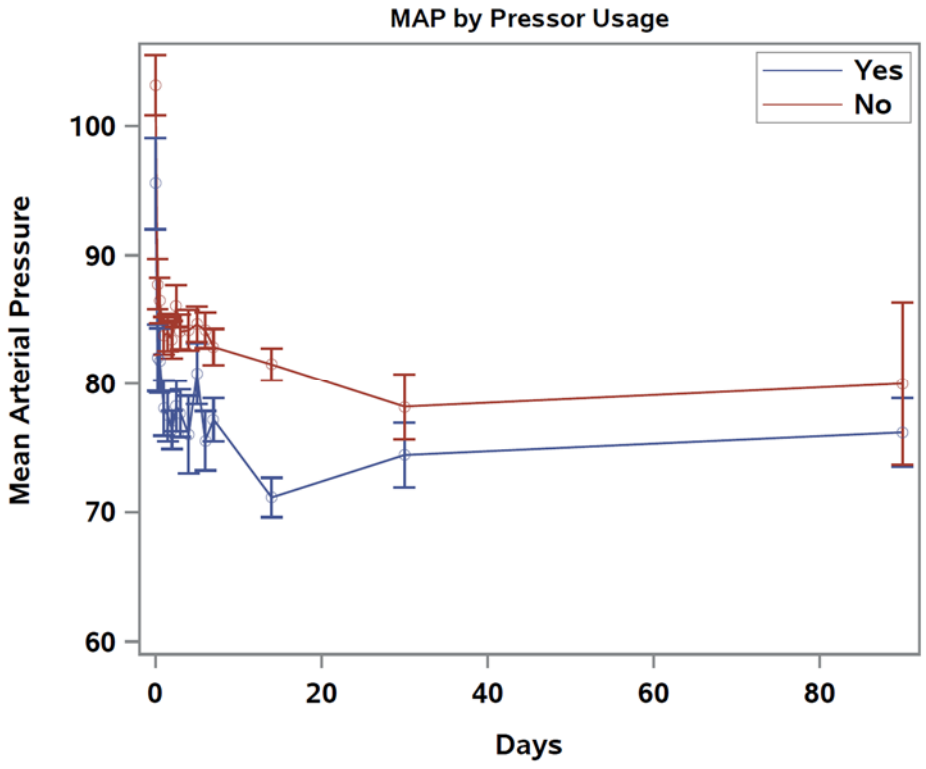


Figure 5


MAP by Pressor Usage
Yes
No
Mean Arterial Pressure
100
90
80
70
60
0
20
40
60
80
Days

The Cross-Leg Flap: A Salvage Option for Distal Leg and Foot Burn Injuries when Free Flaps Fail

Saturday, November 4
8:15-8:30 am

Author and Co-authors:

Christina N. Canzoneri, BA, MS-IV; Christopher Stewart, Medical student; Blaine Smith, Medical student; Courtney El-Zokm, MD; Tonya George, PA-C, PhD; Todd Huzar, MD; Matthew Greives, MD; Daniel Freet, MD
McGovern School of Medicine at the University of Texas Health Sciences Center, Houston, TX

Objective:

Upon completion of the lecture, attendees should be better prepared to:
▪ Recognize the cross-leg flap as a safe and effective alternative for closure of lower extremity burn wounds and limb salvage in patients who are poor candidates for free flap closure or for patients in whom a free flap has been tried and has failed.

Abstract:

Introduction: Deep burn injuries of the lower leg and foot with exposed vital structures, such as tendon and bone, remain a major challenge for reconstructive surgeons. Although free flaps have become a mainstay treatment for complicated lower extremity defects, there are certain instances in which the cross-leg flap is an appropriate alternative. The success of free flap operations depends on the presence of healthy recipient vessels. In cases without a suitable recipient artery and vein the free flap may not be a viable option. Here we present a single institution's experience using the cross-leg flap for coverage of deep lower extremity burn wounds in which a free flap had been tried and had failed or was not an option. It is our intention to revisit the cross-leg flap as a safe and viable option for limb salvage when other options for wound closure in the lower extremity have not been successful.

Methods: An IRB approved (HSC-MS-16-0056) retrospective chart review was performed to identify patients who had undergone cross-leg flap reconstruction at a single institution over the course of ten years. The charts of patients who had undergone cross-leg flap procedures were reviewed. The primary outcome of interest was wound closure with secondary outcomes being the return to preinjury level of function and/or the ability to ambulate. Photos were collected from the clinic records of the Division of Plastic Surgery at the University of Texas Health Sciences Center at Houston.

The surgical technique followed the standard procedure as described by Hamilton. The defect was debrided and the margin was freshened. After proper preoperative marking, the flap was incised on three sides, raised in the subfascial plane, transposed, and then sutured over the defect of the contralateral leg. If possible, preservation of sural nerve and short saphenous vein was achieved at the donor site. The pedicle remained undivided for three to four weeks. During this time, the patient was immobilized with an external fixator to prevent shearing forces from interrupting the neovascularization of the flap. In the second stage, the pedicle was divided and the flap was inset, allowing closure of the defect. The donor site of the flap and residual uncovered areas were then covered with a split thickness skin graft.

Results: Three patients matching the above criteria were identified. Their charts were reviewed. All patients were male. Two patients had wounds resulting from high voltage electrical injuries and one patient had a wound resulting from a flame injury. The adaptation of flaps to the recipient site, wound closure, cosmetic outcome, and

	functionality were all acceptable. All three flaps performed were viable after division; none required major secondary procedures. All wounds closed within the first two months post-injury. All patients are able to ambulate well without assistance two months after the cross-leg flap was divided and inset. **Conclusion:** The cross-leg flap remains a safe and viable option for closure of lower extremity burn wounds and limb salvage in patients who are poor candidates for free flap closure or for patients in whom a free flap has been tried and has failed. **References and Resources:** -Stark RB. The cross-leg flap procedure. Plast Reconstr Surg. 1952;9(3):173-204. -Grabb WC. Grabb's Encyclopedia of Flaps. 3rd ed. Little, Brown: 2008. -Kamath BJ, Varghese T, Bhard P. A Modified Cross Leg Flap for Large Triangular Defects of the Foot and Ankle. The Foot & Ankle Journal. 2008;1(8):21-4. -Serafin D, Georgiade NG, Smith DH. Comparison of free flaps with pedicled flaps for coverage of defects of the leg or foot. Plast Reconstr Surg. 1977;59(4):492-9. -Morris AM, Buchan AC. The place of the cross-leg flap in reconstructive surgery of the lower leg and foot: a review of 165 cases. Br J Plast Surg. 1978;31(2):138-42.
Disclosure:	Christina N. Canzoneri – No Relevant Financial Relationships to Disclose Christopher Stewart – No Relevant Financial Relationships to Disclose Blaine Smith – No Relevant Financial Relationships to Disclose Courtney El-Zokm – No Relevant Financial Relationships to Disclose Tonya George – No Relevant Financial Relationships to Disclose Todd Huzar – No Relevant Financial Relationships to Disclose Matthew Greives – No Relevant Financial Relationships to Disclose Daniel Freet – No Relevant Financial Relationships to Disclose

A Medical Mystery: Unexplained Renal Failure in Burn Patients

Saturday, November 4
8:30-8:45 am

Author and Co-authors:	Harrison Lands, BA, Medical Student; David B. Drake, MD University of Virginia, Charlottesville, VA

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Reflect on the use of products that are labeled as "non-toxic" by the FDA. ▪ Recognize that serum osmolality can be a useful tool to diagnose polyethylene glycol poisoning. ▪ Consider that in large surface area burns, repetitive application of Furacin Soluble Dressing can be absorbed percutaneously to reach systemic circulation.
Abstract:	**Background:** In the late 1970s, emergence of resistant bacterial strains to the topical antimicrobial silver sulfadiazine occurred at the University of Virginia Medical Center. In the search for an alternative topical antimicrobial with known coverage of *Pseudomonas aeruginosa*, Furacin Soluble Dressing was substituted. After this change in practice, some burn patients experienced an unexpected toxicity syndrome of hyperosmolality, metabolic gap acidosis, hypercalcemia, and ultimately renal failure. **Methods:** Examined published and unpublished manuscripts and case reports, as well as conducted personal interviews with primary sources. **Results:** A surprising toxicity syndrome developed in burn patients which were traced to the polyethylene glycol base of Furacin Soluble Dressing. This substance was absorbed through the burn wounds, metabolized, and resulted in a toxicity syndrome leading to renal failure. **Conclusions**: In a search for an antimicrobial with an improved spectrum against Pseudomonas, a Federal Drug Administration-approved product was used to treat large surface area burns. The burn community should be cautious when using products that may be approved as non-toxic for small surface area application, as they may have unexpected medical side effects when used with large surface area burns. **References and Resources:** 1. Bruns, David E., David A. Herold, George T. Rodeheaver, and Richard F. Edlich. "Polyethylene Glycol Intoxication in Burn Patients." Burns 9.1 (1982): 49-52. 2. Herold, David A., George T. Rodeheaver, William T. Bellamy, Lois A. Fitton, David E. Bruns, and Richard F. Edlich. "Toxicity of Topical Polyethylene Glycol." Toxicology and Applied Pharmacology 65.2 (1982): 329-35. 3. Hunt, Donald F., Anne B. Giordani, Gerald Rhodes, and David A. Herold. "Mixture Analysis by Triple-Quadrupole Mass Spectrometry: Metabolic Profiling of Urinary Carboxylic Acids." Clinical Chemistry 28.12 (1982): 2387-392.
Disclosure:	Harrison Lands – No Relevant Financial Relationships to Disclose David Drake – No Relevant Financial Relationships to Disclose

Severe Hand Burns in the Pediatric Population

Saturday, November 4
8:45 – 9:00 am

Author and Co-authors:	Amy D. Hazzard, BS, Medical Student; Michael J. Feldman, MD Evans-Haynes Burn Center, Virginia Commonwealth University School of Medicine, Richmond, VA
Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Discuss the complexity of care required to treat severe hand burns in the pediatric population. ▪ Recognize the multidisciplinary team at a certified burn center is necessary to provide appropriate care to pediatric patients with severe hand burns.
Abstract:	Pediatric patients are susceptible to hand burn injuries due to their propensity to explore the environment. The treatment of these burns has not been widely published. We performed a retrospective chart review of eight patients that were identified with severe hand burn at VCU Health Evans-Haynes Burn Center. We evaluated mechanism of injury, total body surface area, hand related length of stay, number of hand related procedures, and total amount of skin graft. We also reviewed reconstructive procedures, complications, and hand therapy that occurred. Overall, patients with greater total body surface area required longer hand related length of stay, greater number of hand procedures, and greater number of procedures under general anesthesia. The amount of time splinted did not vary greatly based on total body surface area burned. Those with greater areas burned required greater amounts of full thickness skin graft. Reconstructive surgery was necessary in all but one patient and complications, including infections and contractures requiring release occurred in most patients. Hand therapy was involved for each patient. Through our review we demonstrated that the care of pediatric burn patients with severe hand injury requires a well-developed multi-disciplinary team approach. We feel that this is best delivered through a verified burn center. **References and Resources:** Liodaki, Eirini, Tobias Kisch, Karl L. Mauss, Oezge Senyaman, Robert Kraemer, Peter Mailander, Lutz Wunsch, and Felix Stang. "Management of Pediatric Hand Burns." Pediatric Surgery International 31.4 (2015): 397-401. Feldmann ME, Evans J, O S-J. “Early Management of the Burned Pediatric Hand.” Journal of Craniofacial Surgery. 2008;19(4):942-950.
Disclosure:	Amy Hazzard – No Relevant Financial Relationships to Disclose Michael Feldman – No Relevant Financial Relationships to Disclose

Alan R. Dimick, MD, Lecture

Modulation of the Hypermetabolic Response to Burn Injury

Saturday, November 4
9:00 - 9:30 am

Author and Co-authors:	David N. Herndon, MD, FACS Chief of Staff and Director of Research Shriners Hospitals for Children – Galveston Professor of Surgery Jesse H. Jones Distinguished Chair in Burn Surgery Chief of Burn Services University of Texas Medical Branch Galveston, Texas
Objectives:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe the determinants for successful burn treatment ▪ Describe clinical signs/symptoms and clinical tests that indicate hypermetabolism ▪ Describe the treatment modalities to attenuate the burn response of hypermetabolism
Abstract:	In patients with severe burns, hypermetabolism and muscle protein catabolism persist long after the wound is closed. Protein breakdown continues for at least 12 months after severe burn. Hallmarks of the hypermetabolic response are a massive elevation of energy expenditure, a nearly two-fold increase in cardiac output, tachycardia, elevation of serum catecholamines, muscle wasting and general weight loss. In growing children, there is a growth arrest for almost a year after injury major burn injury. Children with a burn size of >80% TBSA have a growth delay for years after injury and long-term osteopenia. In order to attenuate and to reverse this severe metabolic response, support includes starting enteral nutrition as early as six hours post-burn and maintaining environmental temperatures of at least 30°C throughout hospitalization for prevention of radiant energy losses. Catecholamine antagonists such as propranolol have been shown to be a powerful modulator of post-burn metabolism by acceleration of wound healing, reduction of cardiac work, attenuation of hypermetabolism and post-burn hepatomegaly, and

	reversal of muscle-protein catabolism. Anabolic agents such as growth hormone, oxandrolone, insulin, diet, exercise and others, have been used in pediatric and adult burns to accelerate healing, attenuate muscle catabolism, increase lean body mass and restore normal production of constitutive proteins. In the past three decades, randomized prospective clinical studies have demonstrated the efficacy of interventions to mitigate the hypermetabolic response. However, a continuous and critical re-evaluation of all aforementioned aspects of acute and long-term therapy regimens, the design of new molecular methodologies and animal models to study the underlying pathophysiological mechanisms, the conduct of tightly controlled multi-center clinical studies with the use of new drugs, and an ongoing education of all levels of burn care providers are all needed to further improve the quality of life of burn survivors.
Disclosure:	No Relevant Financial Relationships to Disclose

Inhalant Abuse and Burn Injury: "Huffing" A Killer of Skin Cells in Addition to Brain Cells

Saturday, November 4
10:00-10:15 am

Author and Co-authors:	Todd Bierman, MD, PGY-3; Steven A. Kahn, MD Arnold Luterman Regional Burn Center at University of South Alabama Medical Center, Mobile, AL

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Recognize the deleterious effects. ▪ Discuss the need for quick intervention. ▪ Describe the demographics and patterns of injuries surrounding huffing.

Abstract:

Introduction: A survey from the National Institute on Drug Abuse suggests that over 20 million Americans have abused inhalants at one point in their life. Volatile chemicals are inhaled or 'huffed' in order to experience a quick intoxication. Volatile substance abuse can be found amongst all age ranges, ethnicities, and social-economical statuses. Products such as glue, gasoline, spray paints, whipped cream canisters, and cleaning fluids are widely available. Inhalant abuse can not only cause liver disease, renal failure, hypoxia, respiratory failure, dysrhythmias, and cardiac arrest; but can also be associated with burn injury. And although there is literature on many of the complications of huffing, there is no mention of association with burns. These burns occur when flammable chemicals combust during the 'huffing' event or frost bite can occur when gas rapidly cools during expansion upon exit from an aerosol can. The purpose of this study is to describe burns that occurred in the setting of inhalant abuse from the National Burn Repository.

Methods: This study was an analysis of National Burn Repository data of burns associated with inhalant abuse between 2003-2012. In order to identify patients for inclusion of the study, the term 'huff', as well as ICD-9 codes were used in the injury event. Demographics, events surrounding injury, injury characteristics, and outcomes were tabulated.

Results: Only 28 patients were identified in the NBR with only one mortality. Ten injuries occurred from a frost bite mechanism, 4 of which passed out. The other 18 patients ignited flammable chemicals with a cigarette (5 aerosol; 13 gas, butane, or lighter fluid). The male to female ratio was 20:8, with the median age being 26 years (IQR 17-32). The median TBSA was 3% (IQR 1-9, max 67.5%) with median 3rd degree burns being 0.1 but did account for an average 6% of the TBSA across all patients. The median hospital stay was 4 days (IQR 1-10), and median ICU stay was 1.5 days (IQR 0-6.5). Of the 28 cases there were 6 reported inhalation injuries and head/neck and hand injuries were seen most often.

Conclusions: Upon review of the NBR for burns related to huffing we were able to determine that this insult occurs most often in younger males. And although the burns were not large in terms of TBSA, they were deep and resulted in serious injury and prolonged hospital stays both of which translate to days off work and high hospital bills.

	References and Resources: National Burn Registry National Institute on Drug Abuse – https://www.drugabuse.gov/drugs-abuse/inhalants
Disclosure:	Todd Bierman – No Relevant Financial Relationships to Disclose Steven Kahn – No Relevant Financial Relationships to Disclose

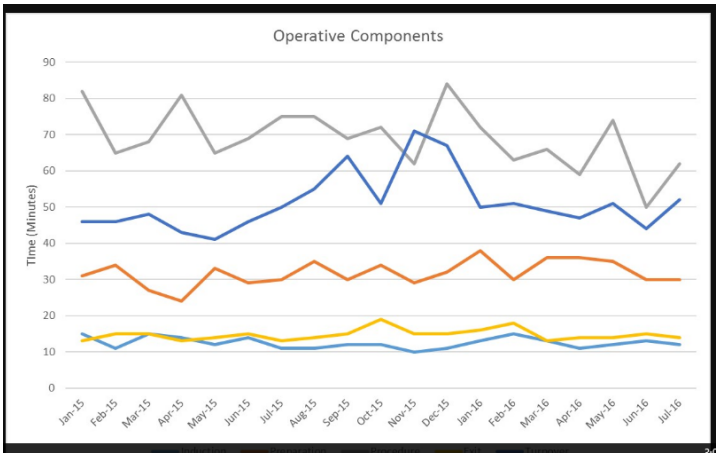
Analysis of Operating Room (OR) Efficiency in a Burn Center

Saturday, November 4
10:15-10:30 am

Author and Co-authors:	Tarik D. Madni, MD, PGY-4; Jonathan Imran, MD; Audra Clark, MD; Brett A. Arnoldo, MD; Herbert A. Phelan, MD; Steven E. Wolf, MD University of Texas Southwestern Medical Center, Parkland Regional Burn Center, Dallas, TX

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Identify bottlenecks in an operating room's work flow. ▪ Recognize, at our institution, only 40% of our total operating time is spent doing the procedure itself. ▪ Consider minimizing preparation and turnover times to minimize non operative time.

Abstract:	**Introduction:** Many operating room (OR) processes can limit productivity and efficiency. ORs are resource-intensive, but revenue generation is high. Improving operating efficiency in the OR, and thus minimizing times outside of the operative procedure, results in increased numbers of operations performed, which reduces operative inventory and provides capacity for other work. Surprisingly, little has been done to identify which OR processes limit downstream activities and decrease efficiency. Here, we aimed to review our burn OR procedures to determine if and where inefficiencies exist. **Methods:** Data for all operations performed in a dedicated Burn OR from 1/1/2015 to 7/31/2016 were reviewed in the electronic medical records of our public, teaching hospital. The total time spent was allocated into the following components: induction (patient in room to end of induction), preparation (end of induction to procedure start), procedure (procedure start to procedure end), exit (procedure end to patient out of room), and turnover (patient out of room to next patient in room). Operative times and work relative value units (wRVUs) generated were summarized. **Results:** A total of 1033 cases were performed. Mean±SD times for each component in minutes were: induction (12.4±7.4), preparation (32.1±15.4), procedure (68.2±42.0), exit (14.7±11.0), turnover (50.5±30.0), total aggregation of components (155.8±65.4). The OR Efficiency ratio of procedure to the total time was 39%. Procedure, turnover, and preparation were the three largest time components of an operation in decreasing order (39%, 29%, 18%). Variation amongst operating components by month are demonstrated in Figure 1. Mean work RVUs per month were 1749.4±411.9. Average RVUs per operating room hour was 11.7±8.5. **Conclusions:** The time spent doing procedures comprises about 40% of the total operational time in a burn OR. Other than the procedure itself, the second and third largest component of an operation were turnover and preparation time respectively.



References and Resources:

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Marjamaa R, Vakkuri A, Kirvela O. Operating room management: why, how and by whom? Acta Anaesthesiol Scand. 2008;52(5):596-600.

Mason SE, Nicolay CR, Darzi A. The use of Lean and Six Sigma methodologies in surgery: a systematic review. Surgeon. 2015;13(2):91-100.

Disclosure:

Tarik Madni – No Relevant Financial Relationships to Disclose
Jonathan Imran – No Relevant Financial Relationships to Disclose
Audra Clark – No Relevant Financial Relationships to Disclose
Brett Arnoldo – No Relevant Financial Relationships to Disclose
Herb Phelan – No Relevant Financial Relationships to Disclose
Steven Wolf – No Relevant Financial Relationships to Disclose

A Comparison of Injury Scoring Systems in Predicting Burn Mortality

Saturday, November 4
10:30-10:45 am

Author and Co-authors:

Barret J. Halgas, MD, Resident[1]; R. Curtis Bay, PhD[2]; Kevin Foster, MD[2]
[1]William Beaumont Army Medical Center, El Paso, TX
[2]Maricopa Integrated Health System, Phoenix, AZ

Objective:

Upon completion of the lecture, attendees should be better prepared to:
- Identify independent risk factors of patient mortality.
- Recognize burn-specific models that predict patient mortality.
- Assess the accuracy of each model.

Abstract:

Introduction: The models most widely used to predict burn patient mortality are the revised Baux score, Ryan, Smith, McGwin, Abbreviated Burn Severity Index (ABSI), Belgian Outcome of Burn Injury (BOBI), and the Fatality by Longevity, APACHE II score, Measured Extent of burn, and Sex (FLAMES). Improvements in critical care have reduced mortality resulting from severe burns, which may affect the predictive strength of older models. We conducted a cross-validation study on all burn patients (n = 114) with TBSA greater than 20% admitted to the Arizona Burn Center between 2014 and 2016. The study compared the accuracy of seven previously validated burn-specific models and one new model derived for our cohort.

Methods: Data were collected on age, ethnicity, gender, total body surface area burned (TBSA), inhalational injury, associated trauma, and injury severity (ISS, APACHE II). The accuracy of each model was tested using logistic regression, preserving the published regression coefficients. Predictive performance of the models was assessed by Receiving Operator Curve (ROC) curve analyses and Hosmer-Lemeshow (H-L) goodness of fit tests.

Results: Age, TBSA, and APACHE II score were found to be significant, independent risk factors for patient mortality in our cohort. The FLAMES model performed best (AUC 0.96) and was comparable to our native model (AUC 0.96). The revised Baux score demonstrated excellent predictive performance (AUC 0.93). The older models, including the ABSI and Smith also performed well (AUC 0.90 and 0.92, respectively). APACHE II alone was slightly more accurate than both the Ryan and BOBI scores.

Conclusions: The most commonly utilized models were validated in our cohort. The revised Baux score was both accurate and easy to calculate, making it clinically useful. The older models demonstrated adequate predictive performance compared with the newer models. Even without key burn parameters, the APACHE II score performed well in critically ill patients with moderate to severe burn injuries.

Disclosure:

Barrett Halgas – No Relevant Financial Relationships to Disclose
R. Curtis Bay – No Relevant Financial Relationships to Disclose
Kevin Foster – No Relevant Financial Relationships to Disclose

Prolonged Allograft Survival in an Immunosuppressed Patient: A Case Report and Systematic Review

Saturday, November 4
10:45-11:00 am

Author and Co-authors:	Chase Burns, MD, Resident; Lesley Wong, MD University of Kentucky Healthcare, Burn Unit, Lexington, KY

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Recognize the application of skin allograft for long-term wound closure.

Abstract:

Introduction: Necrotizing soft tissue infections are treated in burn centers in many institutions due to the need for aggressive surgical debridement, prolonged wound care and critical care management. Wound closure can be staged with cadaveric allograft to allow for optimization of patient factors, both systemically and locally in the wound bed. Vascularized allograft ultimately undergoes rejection and is not considered a permanent solution for wound closure. We present a case of a patient immunosuppressed following kidney-liver transplantation who maintained well-vascularized allograft 19 months post-grafting. The literature is reviewed to understand the science leading to prolonged allograft survival and its potential application to burn patients.

Methods: The electronic medical record for our patient was reviewed. A literature search was performed using key words: prolonged allograft survival, necrotizing soft tissue wound management, post-transplant wound management, immunosuppression and wound healing.

CASE REPORT
A 41 year old male, two years post kidney/liver transplantation, presented with a necrotizing soft tissue infection of his right thigh. He had been maintained on tacrolimus, prednisone and mycophenolate mofetil. Physical exam was noted for fever, altered mental status, crepitus of the right thigh and erythema extending to the abdomen. Fluid resuscitation, surgical debridement and broad spectrum antibiotics were initiated. When all necrotic tissue was excised, the wound was closed with premeshed frozen allograft. At 19 months post-grafting the patient had stable skin coverage.

SYSTEMATIC LITERATURE REVIEW
There are at least four reports of long-term allograft survival in burn patients receiving systemic immunosuppression. An additional six patients underwent placement of skin grafts at the time of renal transplantation from the kidney donor with long-term survival. Shorter periods of allograft survival when used as a bridge to autografting have been described with and without immunosuppression. Multiple animal studies also confirm the possibility of long-term allograft survival.

Conclusions:
Skin, as the largest and most antigenic organ, is difficult to replace in large burns and necrotizing infections. These patients are inherently immunosuppressed which assists with skin allograft survival beyond the typical 5 to 14 days for rejection of vascularized skin. Brown and McDowell, in a landmark article in 1942, described epithelial healing of auto- and allografts as well as the histologic appearance of allograft rejection. We

	present a case of long-term allograft survival in the setting of immunosuppression. In long-term persistence of skin coverage, it has been postulated that the original allograft may act as a framework for host cells to migrate into and replace the donor skin cells. Further research is indicated to determine the mechanism of skin transplant survival and its application for burn patients.
Disclosure:	Chase Burns – No Relevant Financial Relationships to Disclose Lesley Wong – No Relevant Financial Relationships to Disclose

Initial Experience with ReCell for Face Burns

Saturday, November 4
11:00-11:15 am

Author and Co-authors:	Nicholas Walker, MD; Ryan E. Rebowe, MD; Lindsay Allred, MD; James H. Holmes, MD, IV; Jeffrey E. Carter, MD; Joseph A. Molnar, MD, PhD Wake Forest Baptist Health, Winston-Salem, NC
Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe the standard approach to intermediate burn injuries to the face. ▪ Discuss the differences between Non-cultured autologous cell suspension with standard of care treatments for burn injuries
Abstract:	**Introduction:** Intermediate depth facial burns present a particular challenge in burn reconstruction. Superficial facial burns commonly require debridement and allograft placement while full-thickness facial burns commonly require excision and split-thickness autograft placement. This practice often yields variable cosmetic outcomes and requires multiple procedures for definitive wound healing or later reconstruction. We aim to obtain more consistent, improved cosmetic results with our adult and pediatric case series using non-cultured, autologous cell suspension technique. **Methods:** Patients were included in the case series if they were treated with the ReCell device under the compassionate use protocol and with partial-thickness burn injuries to the face treated only with autologous cell suspension. Adult and pediatric patients were included in the series and consented for education and research photograph preoperative, intra-operatively, and post-operatively in compliance with institutional standard of care and study requirements. Institutional historical controls were included from the compassionate use database. Outcomes analysis included objective cosmetic parameters and number of reoperations. **Results:** Non-cultured autologous cell suspension created by the ReCell system can be used for intermediate-deep facial burns to decrease the number of re-operations compared to standard of care with several of these patients with greater than 1 year follow up. In addition, comparable cosmetic results can be obtained with decreased donor site morbidity and potential for improved cosmetic results including repigmentation. **Conclusions:** Non-cultured autologous cell suspension can be used in facial burn injuries to achieve acceptable aesthetic outcomes compared to standard of care with decreased long term reoperation rates.
Disclosure:	Nicholas Walker – No Relevant Financial Relationships to Disclose Ryan E. Rebowe – No Relevant Financial Relationships to Disclose Lindsay Allred – No Relevant Financial Relationships to Disclose James H. Holmes – Stock: ABT; ABBV; PermeaDerm Jeffrey E. Carter – No Relevant Financial Relationships to Disclose Joseph A. Molnar – No Relevant Financial Relationships to Disclose

Impact of a Laser Service Line for Burn Scar on a Dedicated Burn Operating Room's Flow and Productivity

Saturday, November 4
11:15-11:30 am

Author and Co-authors:	Jonathan Imran, MD, Research Fellow; Tarik D. Madni, MD, Research Fellow; Audra Clark, MD, Research Fellow; Jeff Kenkel, MD; John Hoopman, CLSO; Steven E. Wolf, MD; Brett A. Arnoldo, MD; Herbert A. Phelan, MD University of Texas Southwestern Medical Center, Parkland Regional Burn Center, Dallas, TX

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Recognize the value of implementing a laser program for burn scar resurfacing to their existing burn center.

Abstract:

Background: Our group began performing erbium-YAG 2940 wavelength fractional resurfacing of burn scar with billing of a single CPT code 17108 in our Level I burn center's dedicated burn operating room (OR) in January, 2016. The impact of these procedures on the performance of a mature, dedicated burn OR is unknown.

Methods: All burn OR cases performed between January 1, 2015 and December 31, 2015 served as a pre-laser (PRE-LSR) historical control. A post-intervention cohort of laser-only cases (LSR) performed between January 1, 2016 and August 17, 2016 was then identified. Exclusion criteria for LSR were laser operations combined with other burn procedures. PRE-LSR and LSR cases were retrospectively reviewed for OR component times, and work relative value units (wRVU) billed.

Results: Six hundred twenty eight total burn OR cases were done in 2015 (PRE-LSR), while 488 total burn OR cases were done between January 1-August 17, 2016. Of these 488, 59 were LSR (12.1%). Calculated on a monthly basis, significantly more cases were done per day in the LSR era (2.2 + 0.4 cases/day) than PRE-LSR (1.6 + 2.0 cases/day)($p<0.0001$). The LSR group was significantly shorter than the PRE-LSR group for all OR component times (induction, prep, and procedure all $p<0.0001$; transport out, $p=0.01$; room turnover, $p=0.004$). Aggregate OR component time was 79.2 + 33.4 minutes for LSR and 157.5 + 65.0 minutes for PRE-LSR ($p<0.0001$). LSR yielded 6.9 + 3.2 wRVU/hr while PRE-LSR generated 12.2 + 8.9 wRVU/hr ($p<0.0001$).

Conclusion: Despite significantly shorter OR component times and more cases being done per day, laser treatment of burn scar using a single 17108 CPT code cuts wRVUs generated per hour in a mature burn OR roughly in half. Given its apparent clinical benefit, providers need to investigate strategies to ensure the financial viability of a laser/burn scar service line.

Disclosure:

Jonathan Imran – No Relevant Financial Relationships to Disclose
Tarik Madni – No Relevant Financial Relationships to Disclose
Audra Clark – No Relevant Financial Relationships to Disclose
Jeff Kenkel – No Relevant Financial Relationships to Disclose
John Hoopman – No Relevant Financial Relationships to Disclose
Steven Wolf – No Relevant Financial Relationships to Disclose
Brett Arnoldo – No Relevant Financial Relationships to Disclose
Herb Phelan – No Relevant Financial Relationships to Disclose

Classification of Mesh Pattern Scarring after Placement of Meshed and Highly Expanded Split Thickness Skin Grafts – Insights into Etiologies

Saturday, November 4
11:30-11:45 am

Author and Co-authors:	Tyler J. Banachowski, DDS, Resident; Rodney K. Chan, MD San Antonio Military Medical Center, United States Army Institute of Surgical Research Burn Unit, San Antonio, TX

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Categorize and define mesh pattern scarring to facilitate research efforts into etiology and treatment and provide a construct for inter-institution communication to share results.

Abstract:

Introduction: Mesh pattern scarring (MPS) following placement of meshed and highly expanded split-thickness skin grafting (STSG) is a common patient complaint and is a commonly observed sequela following burn injuries treated with excision and grafting. There are several publications that allude to this phenomenon and there are research efforts to try to decrease the appearance and sequelae of meshed pattern scars. However, description and etiology of this presentation in the literature is scant, even as scar assessment tools continue to be developed and refined to track burn patients post-operatively. In this review we will attempt to categorize 3 common patient presentations seen in our population so that we can focus further efforts in elucidating what patient, treatment and post-operative factors contribute to these differences in outcome.

Methods: Retrospective review of de-identified post-operative photographs of meshed split thickness skin grafts was performed.

Results: We have observed three common scar presentations that we have designated into type I, II and III MPS. Type I MPS occurs when the differences in the meshed split thickness skin graft and the interstices are imperceptible to the touch but may be affected by dyschromia. Type II MPS is found when the mesh patterned raised scar is noted to be from the split thickness skin graft donor skin. Type III mesh pattern scarring is found when the raised mesh pattern is within the interstices of the STSG.

Discussion: Possible explanations for this frequent exam finding include but are not limited to: total burn surface area, depth of initial injury and affected tissue types, Fitzpatrick score, anatomic location of the injury, anatomic location of skin donor site, reuse of previous donor sites for harvest, thickness of split thickness skin graft, comorbid conditions, inadequate immediate postoperative care and long term compliance with postoperative regimen.

Conclusion: By identifying differences in split thickness skin graft scars and categorizing our findings, this construct will help guide future study and facilitate inter-institution communication to identify contributing factors to this entity. While the cause of MPS is likely to be multifactorial, categorization of scar patterns with consideration of potential causes will help clinicians to identify prevailing factors in their institutions, will highlight key injury or patient specific factors and refine diagnosis and treatment planning to help optimize patient outcomes.

References and Resources:

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(2) Vancouver scar scale-- Nedelec B, Shankowsky HA, Tredget EE. Rating the resolving hypertrophic scar: comparison of the Vancouver Scar Scale and scar volume. J Burn Care Rehabil 2000; 21: 205-12.

(3) Patient and observer scar assessment scale-- van der Wal MB, Tuinebreijer WE, Bloemen MC, Verhaegen PD, Middelkoop E, van Zuijlen PP. Rasch analysis of the Patient and Observer Scar Assessment Scale (POSAS) in burn scars. Qual Life Res 2012; 21: 13-23.

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Disclosure:

Tyler J. Banachowski – No Relevant Financial Relationships to Disclose
Rodney K. Chan – No Relevant Financial Relationships to Disclose

Eraser Burns: School Supplies Gone Wrong

Saturday, November 4
11:45 am-12:00 noon

Author and Co-authors:	Alap U. Patel, BA, Medical Student; Siham Omer, BA; Derek Bell, MD University of Rochester Medical Center, Rochester, NY

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Understand the role of "social medial challenges" as the cause of burn injuries. ▪ Recognize the susceptibility of children and teens to injury from the eraser challenge.

Abstract:	**Introduction:** "Social media challenges" as a source of burn injuries have been a tough battle to fight in the burn care community. First, there was the hand sanitizer fire challenge, where one would douse their hand in sanitizer, light their hand on fire, and then see how long they could withstand the heat. Then, there was the salt and ice challenge, where you lay salt and ice on your skin and see how long you can withstand the pain. Now, per reports by various news agencies across the country, the infamous eraser challenge is coming back. The challenge is simple. Erase your skin while singing the alphabet (or another song), and the "winner" is the one with the most severe injury. Of the very few papers in the literature on social media trends and burn injuries, none pertain to the eraser challenge. Given this, our project aims to explore the circumstances around social media challenges and the characteristics of eraser burn injuries. **Methods:** This study utilized the popular social media website, Instagram. Instagram was searched with the term, "#eraserchallenge" as well as any derivatives of that search that were suggested by Instagram, most commonly related to incorrect spellings of the word 'challenge'. Additional suggested terms included "#eraserchallengescars" and "#eraserchallengeprt2". **Results**: While the query yielded 537 results, only 181 photos included images of unique scars. Of these, 47 showed scars on the hand, 35 on the forearm, 34 at an unknown skin location, 3 on the forearm and hand, 1 on the face, and 1 on the knee. The majority of these photos did not include faces, making it difficult to approximate age or gender of these eraser challenge participants. Furthermore, Instagram only allows searches of accounts that are not private, and unfortunately it is not possible to determine the total number of eraser challenge burns as not all are posted to social media. **Conclusion:** "Social media challenges," such as the eraser challenge, pose a unique burn injury risk to children and teens, especially those in school. This population is susceptible because they can be easily pressured into participating in this harmful activity. Teachers and parents should be aware of small friction burns on the hands and forearms, and recognize the eraser challenge as a possible cause. We suspect many more injuries exist, but are simply not posted to social media websites such as Instagram. Moving forward, we hope to have burn surgeons assess the TBSA of these injuries to better characterize the severity of injury.

Disclosure:	Alap Patel – No Relevant Financial Relationships to Disclose Siham Omer – No Relevant Financial Relationships to Disclose Derek Bell – No Relevant Financial Relationships to Disclose

An Adjusted Ideal Body Weight Index Formula with FFP Rescue Decreases Fluid Creep During Burn Resuscitation

Saturday, November 4
12:00-12:15 pm

Author and Co-authors:	M. Victoria Purvis, MD, Resident; Lindsay Lindsey BA; Alicia Lintner, CRNP; Virginia Scott, RN; Steven A. Kahn, MD Arnold Luterman Regional Burn Center at University of South Alabama Medical Center, Mobile, AL

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Recognize that the ABWI formula with FFP rescue results in less fluid administration during burn resuscitation compared to the Parkland formula. ▪ Realize this AIBW formula appears to be safe as it shows a trend for less AKI requiring hemodialysis despite patients receiving less fluid volume.

Abstract:

INTRODUCTION: Severe burns require significant volume resuscitation due to capillary leak and loss of fluid barrier integrity; however, “fluid creep” and over-resuscitation is as problematic as under-resuscitation. Obese patients’ prove challenging as adipose tissue has decreased vascularity, and yet this weight is included in traditional crystalloid and colloid-based resuscitation formulae. Recent data has shown FFP restores glycocalyx integrity and reverses capillary leak in shock states. This study compares an adjusted ideal body weight (AIBW) index formula with FFP rescue to historical controls resuscitated with Parkland-based resuscitation and albumin rescue.

METHODS: A retrospective review of > 20% TBSA adult burn admissions from 1/2010-5/2017 was conducted. Patients <17 years old and >79 years old and those who did not survive to 48 hours or who were placed on hospice during this time period were excluded. Historical controls were resuscitated beginning with the Parkland Formula and albumin, periodically titrated to urine output, while the AIBW patients were resuscitated with the ABA Consensus Formula (2-4 cc/kg/%TBSA) and an adjusted body weight index ([ABW-IBW]x0.3+ IBW) with rescue FFP if oliguric for more than 2 hours. Demographics and outcomes were compared with nonparametric statistics.

RESULTS: Over the 6.5-year period, 145 patients were included in the study. 31 patients received the AIBW formula and 114 patients were included in the control group. There were no significant differences in age or burn size between groups. The AIBW group required significantly less fluid in the first 24 hours than the control group (2.9 cc/kg/%TBSA vs 4.3 cc/kg/%TBSA, $p<0.0001$). The AIBW group also produced significantly less urine (1 vs 1.4cc/kg/hr, $p<0.001$) while showing a trend for less AKI requiring dialysis (3.2% vs 20% $p=0.1$). The AIBW group showed a trend for fewer ventilator days compared to controls (3 vs.6 days, $p=0.25$) and a trend for lower mortality (3.2% vs 20%, $p=0.10$).

CONCLUSION: The AIBW formula with FFP rescue appears to be a safe and effective method of burn resuscitation. AIBW patients received less fluid than traditional Parkland Formula-resuscitated control patients without an increase in acute kidney injury. Preliminary data suggests a trend for fewer ventilator days and lower mortality, but this needs to be further studied in a larger patient population.

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Disclosure:

M. Victoria Purvis – No Relevant Financial Relationships to Disclose
Lindsay Lindsey – No Relevant Financial Relationships to Disclose
Alicia Lintner – No Relevant Financial Relationships to Disclose
Virginia Scott – No Relevant Financial Relationships to Disclose
Steven Kahn – No Relevant Financial Relationships to Disclose

Stakeholder Experiences and Student Perceptions Following Implementation of New Advance Burn Life Support Curriculum

Sunday, November 5
7:30-7:45 am

Author and Co-authors:	Ernest J. Grant, PhD, RN, FAAN; Lori Chrisco, MSN, RN North Carolina Jaycee Burn Center at University of North Carolina Hospitals, Chapel Hill, NC

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe differences between the new ABLS curriculum to the previous ABLS content for clarity and conformity of information. ▪ Describe and report student's perceptions and retention of the new ABLS curriculum.

Abstract:	**Introduction:** Management of the patients with severe burn injuries can be overwhelming to emergency medical providers and hospital staff clinicians. The Advance Burn Life Support (ABLS) course offer a way to alleviate fears and uncertainty among pre-hospital and hospital personnel regarding the initial care needed for the burn-injured patient. Between 2015 and 2016, the ABLS Course was updated to include several new guidelines with a special emphasis on initial resuscitation and modification of the Parkland Formula. This study aims to evaluate ABLS students' perceptions and retention of the new ABLS course format. **Methods:** Students of the new ABLS curriculum were asked to complete a small online survey regarding perceptions of their burn knowledge, skills and burn disaster preparedness. The online survey was emailed to all participants who were certified in an ABLS Provider course taught from January 2017 to July 2017. This online survey included seven questions from a 2014 ABLS survey that addressed students' perceptions regarding estimating TBSA, fluid resuscitation, initial pain medication, inhalation injuries, and the role of a verified burn center. NC state medical disaster officials as well as the North Carolina Office of Emergency Medical Services previously approved a student's perceptions survey in 2014 for assessing ABLS courses. The knowledge gained from that survey was outline in a 2015 research article "Advance Burn Life Support for Day-to-Day Burn Injury Management and Disaster Preparedness: Stakeholder Experiences and Student Perceptions Following 56 Advanced Burn Life Support Courses". We compared the 2014 ABLS student responses to 2017 ABLS student responses as a means of evaluating the new ABLS curriculum. **Results:** We estimated 400 participants will receive the online survey. The 2014 ABLS perceptions' survey had a 56% response rate. We expect to have a similar or better response rate. Demographics and work experiences are also expected to be similar to the 2014 perceptions' survey. We hope to see improvement in the seven perceptions questions with the new ABLS curriculum. **Conclusions:** To be determined - findings and/or concerns will be forwarded to the ABLS Committee for immediate course modification needs or for consideration during the next course revision.

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Disclosure:	Ernest J. Grant – No Relevant Financial Relationships to Disclose Lori Chrisco – No Relevant Financial Relationships to Disclose

Improving Nurse Confidence When Caring for Patients Seeing Their Burn Wounds for the First Time: A Performance Improvement Project

Sunday, November 5
7:45–8:00 am

Author and Co-authors:	Lillian Aguirre, DNP, CNS; Stephanie Beer, LCSW; Sherrina Stewart, MSN; Melanie Guidry, ADN; Kelsea Lydon, BS, C-EMT; Merce Miranda, BSN; Leah McDonnell, BSN Orlando Regional Medical Center, Orlando, FL

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe the deficit the TICU and TSU staff had in common with staff working at other facilities. ▪ Discuss the four phases of Deming's performance improvement cycle. ▪ Discuss the role of "evidence" in planning and interpreting the results for this unit based project.

Abstract:	**Introduction:** After requesting assistance with ambulation to the restroom, a patient in the Trauma ICU (TICU) saw the burn injuries to his face before he could be prepared for what he would see. Needless to say, it was very distressing to the patient and to the staff that witnessed his response. It was an unanticipated event given that patients in this high acuity unit rarely ambulate to the restroom. The clinical nurse specialist (CNS) for Trauma Critical Care was consulted and asked about the practice and training of the nursing staff in the Trauma Step-down Unit (TSU) where the majority of lower acuity burn patients are cared for. The CNS investigated best practices and identified an opportunity to lead both units in a collaborative performance improvement project. The CNS conducted a journal club with nursing staff from both units to discuss the findings of studies pertaining to patients seeing their burn wounds for the first time and the staff's confidence with their ability to prepare them for that experience. The review of the literature demonstrated that most nurses lack formal training in this skill. It also reported that patients want to know about the appearance of their burns and will ask their nurse for that information. (Shepherd & Begum, 2014; Birdsall & Weinberg, 2001; Shepherd, Tattersall & Buchanan, 2014) The TICU and TSU staff in attendance suspected that the experience of the staff in their respective units was the same as that described in the literature. They expressed a desire to conduct and actively participated in a project that would improve upon the staff's ability to assist and support the patients they serve. **Methods:** Deming's Plan, Do, Study, Act (PDSA) cycle for implementing, testing and evaluating improvement strategies was used to guide the performance improvement project for the TICU and TSU. ***Plan****:* A baseline assessment was conducted to verify the staff's training experience and perceptions of their self-confidence with preparing patients to see their burn wound(s) for the first time. The assessment demonstrated that the staff desired and preferred live education that could assist them in developing their confidence in this skill. In response to the request, a live education program was scheduled. The staff's perception of their confidence with the skill would be re-assessed after the education program. ***Do*****:** One of the quarterly mandatory TICU/TSU staff meetings dedicated a half hour for

education presented by a Licensed Clinical Social Worker (LCSW). The presentation included an interactive scenario regarding perceptions and expectations, and re-scripting common phrases to decrease the patient's unrealistic expectations in a clear and supportive manner.
***Study*:** We conducted a retrospective analysis of the assessments submitted by the TICU and TSU staff that reported their level of self-confidence before and six weeks after the LCSW's presentation.
***Act*:** Deficiencies and opportunities that were identified after the study phase were assessed and acted upon.

Results: A majority of the nurses employed in the TICU had previously worked in the TSU. No one had worked in another burn center nor received training on preparing their patients to see their burn wounds for the first time. 57% of those that participated in the assessment desired training. Fifty percent stated they "sometimes" were with a patient seeing their burn the first time, 25% stated they never encountered this situation and 57% wanted training (Table 1). A majority (86%) of the TSU staff had not previously worked at a burn center either; no one had ever received training to help them gain confidence in their ability to assist their patients through this experience. Seventy-seven percent of their staff also wanted training. Forty-two percent of the nursing staff in TSU reported they were often with patients seeing their burns the first time; the remaining 58% stated it occurred sometimes (Table 2).

After the education program 60% of the TICU staff found the program to be helpful but no one had the opportunity to care for a burn patient that had the capacity and/or ability to verbally communicate with the staff. In the absence of that opportunity, 67% of the TICU staff felt they would be more confident in assisting the patient through that process (Figure 1). On the other hand, staff in the TSU had the opportunity to use the skills taught in the program (73%). Eighty-two percent stated the program was helpful and used the techniques they learned (88%) (Table 2). The number of TSU staff that reported a high level of confidence preparing their patient doubled (86%) after they were provided with the education (Figure 1).

Conclusions: The TSU cares for the majority of the burn patients that can communicate, ambulate and encounter the bathroom mirror during their hospitalization. Therefore, it stood to reason that 100% of the TSU staff had encountered a patient seeing their burns for the first time and a greater opportunity to utilize the communication techniques presented at the staff meeting. The TSU employs a high number of new and novice nursing staff; many eventually transfer to work in the TICU after refining and advancing their clinical skills. Three quarters of TICU staff reported that they have assisted burn patients see their burns. However, the low occurrence of burn patients requiring preparation while in the TICU may have accounted for why the staff reported a lower level of confidence (Figure 1).

Engaging staff from both units in all aspects of the project inspired them to remain involved in subsequent activities such as dissemination of the findings, plan of care development and research. As a measure to sustain the improved level of confidence reported by the staff after the LCSW's presentation, it was decided to provide the education during the orientation period of all staff hired on to either unit. A computer based learning module is currently under development. There are also plans for further research pertaining to the patient's perception and experience when seeing their burn wound(s) the first time.

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Disclosure:

Lillian Aguirre – No Relevant Financial Relationships to Disclose
Stephanie Beer – No Relevant Financial Relationships to Disclose
Sherrina Stewart – No Relevant Financial Relationships to Disclose
Melanie Guidry – No Relevant Financial Relationships to Disclose
Kelsea Lydon – No Relevant Financial Relationships to Disclose
Merce Miranda – No Relevant Financial Relationships to Disclose

Trauma ICU		
	Pre- Intervention (%)	**Post-Intervention (%)**
Previously worked in TSU	57	
Worked in another burn center	0	
Received training (anywhere)	0	
Desired Training	57	
Often with patient seeing burn the first time	25	
Sometimes with patient seeing burn the first time	50	
Never with patient seeing burn the first time	25	
Education program was helpful		60
Education program was somewhat helpful		20
Education program was not helpful		20
Have had an opportunity to care for burn patient seeing their wound(s) for the first time after education was provided		0

Table 1

Trauma Step-down Unit		
	Pre- Intervention (%)	**Post-Intervention (%)**
Worked in another burn center	14	
Received training (anywhere)	0	
Desired Training	77	
Often with patient seeing burn the first time	42	
Sometimes with patient seeing burn the first time	58	
Never with patient seeing burn the first time	0	
Education program was helpful		82
Education program was not helpful		18
Have had an opportunity to care for burn patient seeing their wound(s) for the first time after education was provided		73
Have used the techniques presented by the licensed LCSW		88

Table 2

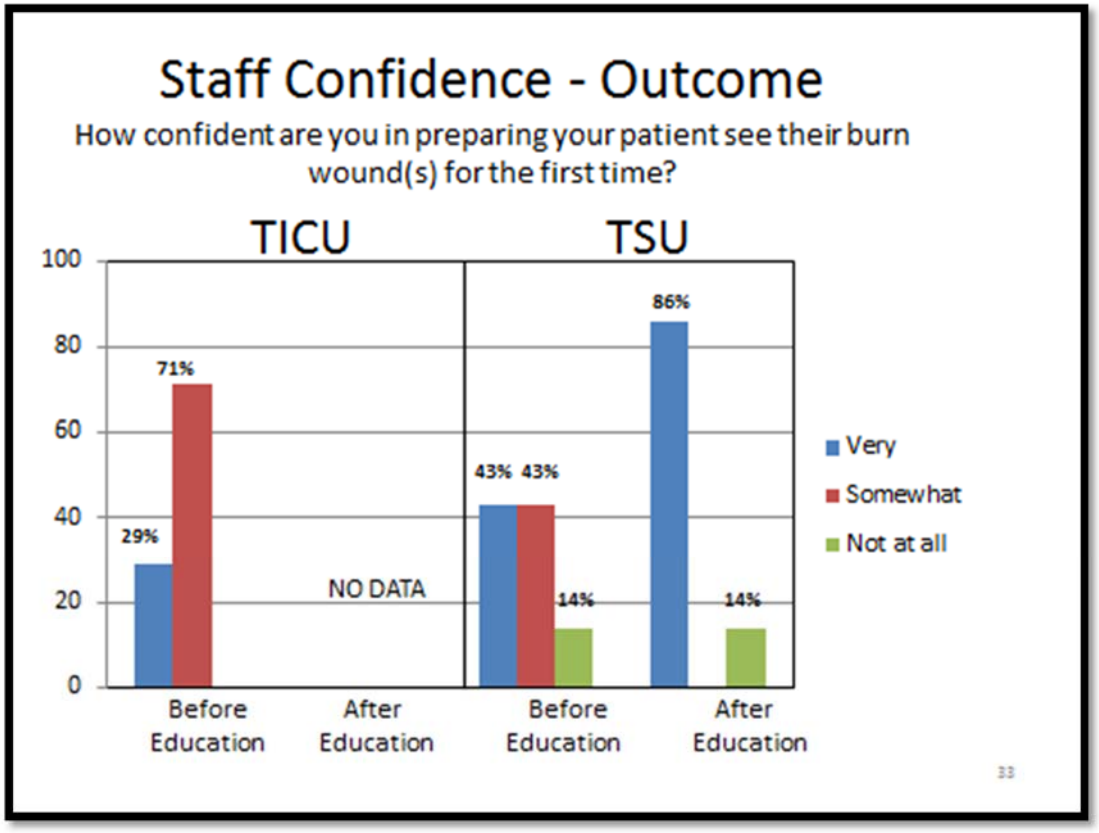

Figure 1

Multidisciplinary Approach to Improving Pain Satisfaction: Utilization of Combination Pharmacotherapy and Procedural Sedation

Sunday, November 5
8:00-8:15 am

Author and Co-authors:	Courtney L. Denton, BSN, RN, PCCN[1]; Tiffany Lord, MSN, RN,CMSRN[1]; Roy Brown, MLIS[2] [1]Evans-Haynes Burn Center at Virginia Commonwealth University Health, Richmond, VA [2]Tompkin-McCaw Library, Virginia Commonwealth University Health, Richmond, VA

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe current practice related use of pharmacotherapy for pain management. ▪ Summarize evidence related to the use of pharmacotherapy in burn patients. ▪ Explain how to implement an individualized ladder approach to pain management in burn population.

Abstract:	**INTRODUCTION:** Pain management is a persistent problem for burn centers globally. In 2015, our burn center received quality indicator scores below benchmark related to patients' satisfaction with pain control. In addition, during a burn center designation site visit, our center was cited for limited procedure room use. Taken as a whole, this information suggested a need to optimize pain management strategies in our burn center. Therefore, the purpose of this evidence-based practice (EBP) project was to examine evidence related to the use, safety, and efficacy of combination pharmacotherapy for pain management in burn patients and apply evidence to our clinical practice in order to improve patient satisfaction with pain control. **Methods:** CINAHL, PubMed, and the Cochrane Library databases were searched using the keywords sedatives, burn, wound care, dressing change, combination therapy and pain management. Fifteen articles were evaluated and eleven articles were selected for inclusion based on level of evidence, quality, and relevance to the purpose of the project. **Results:** The literature reviewed examined a variety of drugs, their uses, limitations, and effect on pain in burn patients. The evidence suggests that combination pharmacotherapy and/or procedural sedation is ideal for achieving pain control. Combination pharmacotherapy includes, but is not limited to benzodiazepines, anxiolytics, sedatives, anti-epileptics, anti-pruritics, and opioids. However, no exact combination for pain control and procedural sedation was proposed. Based on the evidence, our burn center physicians, anesthesia providers, nurses, and pharmacists utilize an individualized approach to combination pharmacotherapy and have increased the use of procedural sedation for wound care in the unit procedure room. As a result, procedure room use increased from 5 to 61 times, between January to September 2015 and October 2015 to June 2016, respectively. Additionally, our quality indicator scores related to patient satisfaction with pain control changed from below to above benchmark. **Conclusions:** The literature reviewed provides consistent evidence supporting the use of combination pharmacotherapy and procedural sedation and recommends using a ladder approach, in which the combination pharmacotherapy is dependent upon the

type of pain and nature of dressing changes. The goal of combination pharmacotherapy is to achieve better pain control while reducing the amount of each individual drug, thus reducing the overall side effect profile. A multidisciplinary approach to combination pharmacotherapy and procedural sedation for pain management in burn centers can improve patient satisfaction with pain control.

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Disclosure:

Courtney Denton – No Relevant Financial Relationships to Disclose
Tiffany Lord – No Relevant Financial Relationships to Disclose
Roy Brown – No Relevant Financial Relationships to Disclose

Patient Factors and Outpatient Pain Control in Patients Discharged From a Regional Burn Center with Minor-to-Medium-Sized Burns

Sunday, November 5
8:15-8:30 am

Author and Co-authors:	Amelia Nichols Alava, BSN, RN; Tera Thigpin; Janet Popp, MSN, RN, CCRN; Laura Roberson, MSN, RN, CCRN; Ashlee Allen, BSN, RN, CCRN; David W. Mozingo, MD; Joshua S. Carson, MD Shands Burn Center at the University of Florida Health, Gainesville, FL

Objective:	Upon completion of the lecture, attendees should be better prepared to: • Explore the efficacy pain control in patients with thermal burns admitted to UF Health post discharge. • Identify non-injury patient factors associated with reported pain.

Abstract:

Introduction: Pain management is an important aspect of burn care. The purpose of this project was to evaluate the current practices effectiveness of the pain management system currently in place at UF Health Shands Burn Center at the University of Florida with the hope of eventually identifying places for improvement. Most of the literature on burn pain is devoted to the problems encountered during the acute/hospitalization phase. Very little empirical data exists on the long-term effects of burn injuries.

Following discharge from our burn center encounter, patients are placed on an outpatient analgesic regimen. These regimens are based either on a protocolized treatment regimen or on clinician projection of pain burden and treatment response. However, the patient's experience of pain after a burn injury depends on many factors, limiting the reliability of either approach.

In this project, we seek to explore the efficacy our discharge pain management plans by performing a retrospective chart review of patients seen in outpatient clinic for follow up.

Methods: IRB approval was granted to perform this project using a HIPAA waiver. A systematic review of all adult patients presenting to UF Health Shands Burn Center clinic between October 1, 2016 and through April 30, 2017 was performed. Inclusion criteria included adult patients with thermal injury involving less than 15% of total body surface are (TBSA) presenting to clinic for initial follow up after treatment at our burn center or associated emergency department. Patients were excluded if they had a non-thermal trauma either as the mechanism of their burn or coincident to it. Data regarding patient demographics, social history and psychiatric diagnoses was collected from each patient's electronic medical record (EPIC) and analyzed for results. Averages were determined as arithmetic mean +/- standard deviation. Differences in reported pain scores between groups were assessed for significance using unpaired two-tailed t-test.

Results: A total of 409 patients were admitted to the UF Health Burn Center at the University of Florida during the study period, with 104 patients meeting criteria for this study. Among the patients studied, mean TBSA of injuries treated was 5%, mean age was 43 (+/- 16) years. 71 (68%) of these patients were male, and 33 (32%) were female. 69 (66%) of patients were insured, 35 (34%) were unfunded. 64 (62%) of patients reported a history of substance abuse, and 40 (38%) had no reported substance abuse history. 27 (26%) of patients had a diagnosis psychiatric disorder prior

	to their injury, whereas 77 (74%) did not. On univariate analysis, the presence of a diagnosed psychiatric injury prior to burn injury was found to have a statistically significant association with higher reported pain scores on initial follow-up clinic visit (5.7 vs 3.6, p=0.02). There was no statistical difference in pain scores associated with gender, insurance status or substance abuse history. (see figure) **Conclusions:** Patients treated for minor-to-moderate sized burns often experience significant pain following discharge from burn centers. In our patient population, patients with a history of psychiatric disease report significantly more pain on outpatient follow up then those without such comorbidities. We intend to further explore this finding and the larger data set to identify ways in which identifiable patient factors could be used to better anticipate and, therefore, prevent uncontrolled pain after discharge.
Disclosure:	Amelia Nichols Alava – No Relevant Financial Relationships to Disclose Tera Thigpin – No Relevant Financial Relationships to Disclose Janet Popp – No Relevant Financial Relationships to Disclose Laura Roberson – No Relevant Financial Relationships to Disclose Ashlee Allen – No Relevant Financial Relationships to Disclose David W. Mozingo – No Relevant Financial Relationships to Disclose Joshua S. Carson – No Relevant Financial Relationships to Disclose

Analysis of Ventilator Associated Pneumonia (VAP) Definitions in a Burn Intensive Care Unit: Is Something Missing?

Sunday, November 5
8:30-8:45 am

Author and Co-authors:	Kristine N. Chafin, MBA, RN, CIC; Sarah J. Murray, MSN, RN, ACNS-BC; Leopoldo C. Cancio, MD United States Army Institute of Surgical Research, Ft. Sam Houston, TX

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Define the difference in definitions between ABA and NHSN. ▪ Define the NHSN criteria for reporting VAP.

Abstract:	**Introduction**: Burn patients are at high risk for infection due to cutaneous thermal injury, inhalation injury as well as treatments such as invasive lines and ventilator support. All critically ill burn patients are under routine infection control surveillance and data is reported to NHSN (National Health Safety Network). Ventilator associated pneumonia is a common infection in critically ill burn patients and is reported to NHSN. However, we determined that clinically documented VAP may not meet the definition for NHSN-reportable VAP. To evaluate this problem in our patients, we performed a review of patients with VAP definitions from the IDSA (Infectious Diseases Society of America) and ABA (American Burn Association). **Methods**: We performed a retrospective chart review of all electronic medical records for burn ICU patients for 2016. Review of charts searched for the word VAP. **Results**: Thirty-one charts were reviewed. Only 6 charts (19%) met the NHSN criteria for VAP. The top five reasons for 25 charts not meeting criteria were no fever, no duration of stability for ventilator settings per NHSN, febrile throughout admission, no ventilator changes and instability too soon after intubation. **Conclusions**: The NHSN and ABA criteria differ, which may result in underreporting of VAP. We should investigate our criteria and find consensus.

References and Resources:

NHSN Definition of VAE, Center for Disease Control.

American Burn Association Practice Guidelines for Prevention, Diagnosis, and Treatment of Ventilator-Associated Pneumonia (VAP) in Burn Patients.

IDSA Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society.

Disclosure:	Kristine N. Chafin – No Relevant Financial Relationships to Disclose Sarah J. Murray – No Relevant Financial Relationships to Disclose Leopoldo C. Cancio – No Relevant Financial Relationships to Disclose

Use of a Digital Care Navigation System Improves Patient Experience at a Regional Burn Center

Sunday, November 5
8:45-9:00 am

Author and Co-authors:	Jennifer E. Kesey, MSN, RN, FNP-BC, CWS; Amanda Venable, MSN, RN, CCRN; John Griswold, MD Timothy H. Harnar Burn Center at Texas Tech University Health Sciences Center, UMC Health System, Lubbock, TX

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Define the impact of digital navigation systems in health care. ▪ Describe positive aspects of digital care navigation systems specific to burn populations.

Abstract:

Introduction: As hospital measures of success continue to shift toward length of stay and readmission reduction, the challenge of providing a smooth transition from acute hospitalization to outpatient therapy has become increasingly more complex and important. Burn centers have been leaders in developing patient and family-centered care models, including models for discharge teaching. Because of the complexity of burn wound management, patients are commonly anxious about how care will be provided in the home environment. Our burn center serves a rural population with few healthcare resources outside of the immediate burn center area. Long-distance travel precludes the ability of patients to receive daily wound care at the burn center necessitating burn care at home. Increasing the length of stay to account for outpatient challenges is not a viable solution due to the current health care market and cost. Engaging patients and families in the discharge process is imperative for a successful transition to the outpatient setting. Using technology to increase patient engagement in their own healthcare is an emerging strategy for healthcare improvement. The burn center is using patient navigation software as a new technology to improve discharge preparedness. Use of navigation software impacts patient satisfaction now affecting reimbursement with the new Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) requirements.

Methods: The study was conducted at a verified regional burn center covering a 300 mile radius geographical region serving adult and pediatric populations. In August of 2016, burn center leadership began investigating a patient navigation software system to solve the problems with discharge and home care of the burn injured patient. The burn team created population specific content for patients based on current literature, standard discharge education, experience, and frequently asked questions from patients. The program was approved in January 2017 and the first patient enrollment was on January 30, 2017.

Enrollment in the program involves collecting patient demographic data and contact preferences including phone number and email address. The content is delivered to the patient via text message alerts for smart phone users, voice mail messages for basic mobile phone users, and email. The patient content includes 16 alerts or text/voice messages, 11 emails for all enrollees, and the option of 9 injury specific emails (ex. hand burns, facial burns, lower extremity). The patient also receives a sequence of four survey questions assessing their well-being and comfort with wound care. The information provided is more frequent during the first 14 days after

	discharge. At the end of the 30 day period, the patient becomes inactive and no longer receives messages from the navigation software. The Burn Center standard of care has been to do a discharge phone call within the first seven days after discharge. The patient receives the HCAHPS survey typically 7-14 days after discharge. Discharge phone call response and the HCAHPS survey results will be used to trend improvement in the patient experience. Readmission and complication rates will also be considered in measuring the success of the patient navigation program. **Findings:** Since launching the program, 81 patients have been enrolled in the patient navigation software system. Currently 38 patients are actively getting updates and information from the system. Anecdotally, during discharge phone calls we have noticed better comfort with discharge instructions generally and a decrease in patient confusion about wound care. HCAHPS scores reflect improvement in the score of discharge information from 91.87% average in 2016 to current score of 100%. The HCAHPS question about information regarding symptoms or problems to look for increased from 91% to 100%. The care transition score improved from 62.77% to a current score of 75%. Patients scored their understanding of managing their own health better from 79% to 100%. **Conclusions:** The burn center has experienced a trend toward improvement in patient satisfaction scores with navigation software implementation. The program shows a great deal of promise in improving the transition process from hospital to home care with many potential research opportunities. Digital patient navigation is a novel way to manage the complexities of burn center aftercare. **Implications for Future Research:** Research is ongoing to evaluate the impact of digital navigation systems on patient care and outcomes specifically in burn populations.
Disclosure:	Jennifer Kesey – No Relevant Financial Relationships to Disclose Amanda Venable – No Relevant Financial Relationships to Disclose John Griswold – No Relevant Financial Relationships to Disclose

Burn Injuries Secondary to Seizure: Strategies for Prevention

Sunday, November 5
9:00-9:15 am

Author and Co-authors:	Thao T. Nguyen, PA-C; Rita M. Gayed, PharmD; Julia E. Willis, BSN, RN; Rachael Williams, MD; Juvonda Hodge, MD; Walter Ingram, MD Grady Health System Burn Center, Atlanta, GA

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Identify barriers to compliance with medications. ▪ Strategies for burn prevention secondary to seizure. ▪ Describe outpatient neurological follow up.

Abstract:

Introduction: A significant portion of the American population suffers from seizure disorders. It is estimated that appropriately 2.3 million Americans suffer from this order. A study conducted by Rimmer et. al. in an Arizona burn center published about 10 years ago demonstrated that patients with seizures were more likely to suffer burns related to flame injuries while cooking than the general population. The majority of these patients were found to have sub-therapeutic levels of their seizure medication on admission. This underscores the importance of primary disease control in the prevention of burn injuries. We seek to describe the burn wounds that our patient population with seizure disorders incurs to identify gaps in medication compliance as well as inadequate seizure control in order to develop more targeted prevention efforts of burn.

Study Objectives:
1. To describe the type of burn injuries that our patient with seizure disorders incur
2. To identify patterns of medication compliance
3. To suggest avenues of post-discharge prevention of seizure related burn injuries

Study Design and Methodology: We collected data retrospectively on patients who were admitted to the Grady Memorial Hospital Burn Center following a seizure that contributed to their burn injury between 2009 and 2016. We reviewed 75 patients and excluded those whose burn injury may not have occurred from a true seizure. Exclusion criteria were burns secondary to unwitnessed seizures or syncopal episodes.

Results: Thirty-one patients were admitted (39% female, 61% male) with mean age of 40 years after sustaining a burn during or after a seizure. More than half of the patients were believed to have had the seizure due to antiepileptic agent non-compliance. The most prevalent mechanism of burn was falling into hot surface or liquid while cooking. Most common depth was deep partial thickness or full thickness.

Conclusions:
1. Seizure work up for patients with new onset seizures
2. Barriers to compliance
3. Coordinated transition to outpatient primary are and/or neurology to continue outpatient seizure treatment regimen

Disclosure:	Thao T. Nguyen – No Relevant Financial Relationships to Disclose Rita Gayed – No Relevant Financial Relationships to Disclose Julia Willis – No Relevant Financial Relationships to Disclose Rachael Williams – No Relevant Financial Relationships to Disclose Juvonda Hodge – No Relevant Financial Relationships to Disclose Walter Ingram – No Relevant Financial Relationships to Disclose

Characterization of Variables for Potential Impact on Vancomycin Pharmacokinetics in Thermal or Inhalation Injury

Sunday, November 5
9:15-9:30 am

Author and Co-authors:	David M. Hill, PharmD; Katie Elder, PharmD; William L. Hickerson, MD Firefighters Burn Center at Regional One Health, Memphis, TN

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Recognize vancomycin clearance is augmented as early as two days post burn. ▪ Discuss estimated creatinine clearance correlates with vancomycin clearance. ▪ Describe the TBSA, days since injury and creatinine clearance can help predict total daily dose.

Abstract:

Introduction: It has been shown that patients who experience a thermal injury have altered processes that impact the absorption, metabolism, distribution, and elimination of drugs. To characterize the pharmacokinetics of vancomycin dosing in thermal or inhalation injury as they relate to percent total body surface area burn (TBSA) and days since injury (DSI).

Methods: This retrospective 3 year study included patients with thermal or inhalation injury requiring vancomycin. Patient demographics and course data were collected using the institution's electronic medical record.

Results: Six hundred and fifty four patients were included in the study; 124 remained after exclusion. Clearance (CL) was augmented in patients closer to their date of injury. CL and total daily dose requirements significantly increased with larger percent TBSA injured that was independent of volume of distribution (Vd). Larger TBSA also predicted increased occurrence of renal injury prior to vancomycin initiation. A modified sample set was also analyzed to control for renal dysfunction. Creatinine clearance (CrCl) estimated via the Cockcroft-Gault equation significantly impacted CL and total daily dose. To obtain a goal trough of 15 – 20 mg / L, the average patient in the modified sample with ≥10% TBSA required 64.7 mg / kg / day (or 16.2 mg / kg every 6 hours).

Conclusions: DSI, TBSA, and CrCl can be used to predict faster vancomycin CL and need for higher total daily doses. Augmented pharmacokinetics can occur as early as two days after injury and decrease with time. Acceptable target trough attainment is still lacking and this data should assist in performance improvements for initial vancomycin dosing.

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Disclosure:

David Hill – No Relevant Financial Relationships to Disclose
Katie Elder – No Relevant Financial Relationships to Disclose
William Hickerson – Speaker's bureau: Medline

Beyond the Basics: Decreasing Central Line Associated Blood Stream Infections with a Multidisciplinary Approach

Sunday, November 5
10:00-10:15 am

Author and Co-authors:	Christian L. Turner, BSN, RN[1]; Emily Hoke, PTA[2]; Michael Langston, PhD, BSN[2] [1]University of North Carolina Hospitals, North Carolina Jaycee Burn Center [2]University of North Carolina Hospitals, Performance Improvement and Patient Safety Chapel Hill, NC

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe a multidisciplinary approach to implementing a CLABSI reduction strategy. ▪ Identify components of a CLABSI Prevention Program that address all phases of central line utilization. ▪ Apply tools to establish root cause, analyze gaps, and implement sustainable improvement strategies.

Abstract:	**Introduction:** Central line associated blood stream infections (CLABSIs) are a preventable patient harm that pose significant risk to patients in Burn Centers. CLABSIs can result in longer length of stay, increased mortality, and a significant financial burden for the institution. A 21-bed burn specialty intensive care unit at a large, academic medical center identified a persistent upward trend in CLABSI rates during 2016, with rates peaking in January of 2017 at 35.1 infections per 1000 central line days. The overall CLABSI rate from February 2016 to February 2017 was 11.7 infections per 1000 central line days. With acknowledgement that conventional CLABSI reduction strategies were not sufficiently improving outcomes, an interdepartmental and interprofessional collaboration was established to develop an improvement strategy. Through a partnership between providers, nursing staff, leadership, the Performance Improvement and Patient Safety department, and the Epidemiology department, a cooperative approach to CLABSI reduction was developed. **Methods:** An interprofessional team was gathered to analyze the current state of central line care in the Burn Center. Using quality improvement methodologies, the team assessed the existing knowledge and practice regarding all aspects of central line care, from insertion through removal, and identified root causes of CLABSI occurrence. At all phases of central line utilization, opportunities were identified to improve quality and safety of care. The team focused on interventions extending beyond traditional education and techniques to develop a robust approach to a CLABSI Prevention Program. A staged implementation plan addressed these opportunities requiring coordination and sustained engagement of the multidisciplinary team. **Results**: By addressing gaps in knowledge, resources, and practice, measures of proper central line care improved considerably. Pre-education and post-education staff surveys showed a statistically significant difference about knowledge of correct central line care standards in three of four areas ($p<.02$). Within one month of program initiation, compliance with prescribed central line dressing and tubing maintenance improved by over 30%. This rate of compliance has been sustained for more than 12 weeks with an ongoing monitoring system in place. The team identified and implemented use of superior products for dressing adherence and insertion site

	cleanliness. Additionally, though interdepartmental collaboration, enhanced procedural techniques were developed and a training system was established for continuity of practice. Since implementation, the CLABSI rate is 5.1 infections per 1000 central line days. **Conclusions:** A multidisciplinary approach to CLABSI reduction avoids the pitfalls of discipline-specific interventions. Addressing all phases of care throughout central line utilization with a collaborative team is critical to achieve every opportunity for CLABSI prevention. Patients with burns add an additional complexity to the reduction of CLABSIs. This is both true for issues of insertion and dressing/line maintenance. It is therefore critical for teams in these settings to use their collective knowledge to explore improvement opportunities outside of traditional CLABSI reduction strategies and incorporate plans for measuring and sustaining change. While some interventions will require a longer period of implementation to fully assess the effects, early signs show the collaborative CLABSI Prevention Program has improved safety and quality of care at all stages of central line utilization in this setting.
Disclosure:	Christian Turner – No Relevant Financial Relationships to Disclose Emily Hoke – No Relevant Financial Relationships to Disclose Michael Langston – No Relevant Financial Relationships to Disclose

Burn Rehabilitation Guidelines Following Application of Cultured Epithelial Autografts For Coverage of Large Burn Wounds – One Burn Center's Experience

Sunday, November 5
10:15-10:30 am

Author and Co-authors:	Sarah E. Sabbatini, DPT; Sandra Fletchall, OTR/L, CHT, MPA, FAOTA; William L. Hickerson, MD Firefighters Burn Center at Regional One Health, Memphis, TN

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Discuss the importance of early implementation of therapy intervention by skilled burn therapists following cultured epithelial autograft application to burn patients with large TBSA's. ▪ Recognize the impact early mobilization has on long-term functional outcomes in burn patients following application of CEA's for burn wound closure.

Abstract:

Introduction: Since the first clinical application in 1981 by Connor et al., the use of cultured epithelial autografts (CEA) has been proven an effective alternative to split-thickness skin grafts (STSG) in coverage of burn patients with large TBSA's (>50%). Although minimal research has been done regarding long-term functional outcomes following burn rehabilitation after the application of CEA's, this surgical procedure has helped to decrease mortality rates in massively burn-injured patients with limited donor sites available for adequate wound closure.

As the use of CEA's by burn surgeons becomes more widespread, so does the survival of patients following severe burn injuries. The existence of a dedicated burn therapy team, thoroughly educated in the post-operative care and treatment of CEA's, is essential to the long-term success of these patients and their ability to achieve and maintain pre-burn functional status following their discharge from the burn center.

Method: Early mobilization of burn patients by a skilled burn therapist, following surgical application of CEA's, is an important aspect of post-operative treatment in the BICU setting, and has demonstrated a positive correlation to favorable patient outcomes throughout a patient's continuum of care within the burn center. In this presentation, the therapy guidelines implemented by one burn center's on-site team of burn therapists for treatment of CEA's will be discussed, including the burn therapist's role throughout each stage of the CEA process.

Results: Based on the data collected from three patients, all male with TBSA's >70% having underwent multiple skin grafting procedures including CEA's, the implementation of early mobilization by burn therapists resulted in optimal functional mobility outcomes in patients following extensive burn injuries. Despite the increased risk for shearing due to the physiological structure of CEA's, early positioning and mobility by burn therapists in the BICU did not result in any graft loss among the three patients examined in this discussion; therefore initiation of therapy intervention and implementation of therapy guidelines can begin as early as post-operative day two following application of CEA's without harmful complications related to therapy treatment. After completing specialized inpatient burn rehabilitation within the burn center, all three patients obtained functional mobility skills required for independent living, as well as return to leisure activities.

Conclusion: By establishment of therapy guidelines and early implementation of these guidelines by burn therapists following CEA application in major burn injuries, it has been shown that early mobilization of these patients leads to better long-term functional outcomes without resulting graft loss.

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Disclosure:

Sarah Sabbatini – No Relevant Financial Relationships to Disclose
Sandra Fletchall – No Relevant Financial Relationships to Disclose
William Hickerson – No Relevant Financial Relationships to Disclose

Custom Pressure Garment Cost Does Not Impact Wear Compliance

Sunday, November 5
10:30-10:45 am

Author and Co-authors:	Cassandra D. Rush, DPT, WCC; Jill Comstock, OTR; David Roggy, RN; Rajiv Sood, MD Richard M. Fairbanks Burn Center at Eskenazi Health Hospital, Indianapolis, IN
Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Identify the compliance with custom compression garment wear when the garments are provided free of charge. ▪ Describe the garments which burn survivors tend to wear for a longer time period.
Abstract:	**INTRODUCTION:** The use of custom pressure garments (CPG) are the standard of care to modulate scarring following a burn injury. Although this is a standard of practice in many burn centers, compliance with garment wear remains a challenge. At our burn center, all burn survivors treated in the outpatient burn clinic are screened by the burn therapist for custom compression garments, along with all other therapy modalities. If the survivor was autografted or took longer than 2 weeks to heal and is showing early signs of hypertrophic scar, the patient is assessed for custom compression. These garments are provided to each patient without cost. With each order, the patient receives 2 garments, one to wear while one is being washed. Each garment can be re-ordered every 3 months. **Methods:** A retrospective chart review from 2014 – 2016 of survivors who were no longer receiving CPG was performed. The review focused on CPG reorder to assess CPG wear compliance. The total number of garments issued were analyzed by the type of garment and whether it was re-ordered at the 3, 6, 9, and 12 month time frames. **Results:** There were a total of 754 garment orders included in this review. The most frequently ordered garments were gloves (n=221) and arm sleeves (n=190), followed by lower leg sleeves (n=147). Overall, only 44% of the garments initially ordered were re-ordered at 3 months, only 28% at 6 months, 11% at 9 months, and 4% at 12 months. This shows that of the 754 garments initially ordered, only 330 were being still being worn 3 months later. **Conclusion:** Our standard practice with CPG is for the burn survivor to wear them twenty-three hours of the day for 9 to 12 months. Although these CPG are provided to the survivor at no cost, compliance with the wear of these garments is still a challenge. This data shows that out of pocket expense is not a factor for our patients with CPG wear compliance.
Disclosure:	Cassandra Rush – No Relevant Financial Relationships to Disclose Jill Comstock – No Relevant Financial Relationships to Disclose David Roggy – No Relevant Financial Relationships to Disclose Rajiv Sood – Speaker's Bureau: Vericel; Avita

SLUMS Cognitive Assessment: A Tool for Burn Rehab

Sunday, November 5
10:45-11:00 am

Author and Co-authors:	Mamie G. Clark, OTR/L; Sandra Fletchall, OTR/L, CHT, MPA, FAOTA; William L. Hickerson, MD Firefighters Burn Center at Regional One Health, Memphis, TN

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Identify the rationale for use of SLUMS cognitive assessment with burn population. ▪ Discuss the results of SLUMS and how scoring impacts treatment planning.

Abstract:

Introduction: Research has proven that medical advances have substantially decreased the mortality rate among burn survivors. Literature has reported that burns exhibit more cognitive and problem solving deficits than compared to other patient populations. These cognitive deficits can continue after acute care. Cognitive deficits can impact the multidisciplinary team's approach to treatment planning, discharge placement, and the level of education and follow up patient will require for optimizing long lasting functional outcomes. Methods of quickly assessing cognitive skills were important in this center's burn specific inpatient rehabilitation facility.

Methods: The Saint Louis University Mental Status (SLUMS) assessment is a 30 point test designed to measure memory, orientation, executive function, and attention. The SLUMS was developed by the VA, is verified for burns, and is available at no cost. A retrospective study was completed on patients admitted to the burn specialized inpatient rehabilitation facility between June 2016-June 2017.
Assessment approach was to provide the SLUMS within the first week of admission.

Results: Sixteen patients, aged 24-86, with TBSA ranging from 5%-65% met the inclusion criteria of the retrospective study. Within the first week of inpatient burn rehab, the patients were assessed with the SLUMS by the OT. The patient's SLUMS score facilitated the style of the treatment program provided by the inpatient rehabilitation burn team. Rehab treatment approaches would vary from rote performance and skills with significant family training to activities requiring transference of skills incorporating executive functional skills. 56% of patients scored within the dementia range, 25% scored within the mild neurocognitive range, and 19% scored within normal range. SLUMS assessment approach was cost effective, time efficient, and no patients were harmed.

Conclusions: Cognitive objective assessment with the SLUMS has provided a mechanism for the inpatient rehab burn team to develop a program style to minimize patient and family frustration, while providing a challenging environment for those individuals with higher executive skills. SLUMS scoring also indicated need for increased family and caregiver education with patients scoring lower on assessment requiring more structured discharge planning earlier in their inpatient rehabilitation stay. Presentation will present how the SLUMS score has influenced the style of the center's inpatient burn rehab program. Appropriate program style can minimize patient and family frustration while providing an environment to assist the patient to their highest level of function.

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Disclosure:

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William Hickerson – No Relevant Financial Relationships to Disclose

A Client's Return-To-Work Process Following a Burn Injury: An Occupational Therapist's Role within Burn Centers Verified by the American Burn Association

Sunday, November 5
11:00-11:15 am

Author and Co-authors:	Breanna E. Coleman, OT; Sydney J. Thornton, OTR/L; Heather S. Dodd, OTR/L; Shelley Sehorn, OTR/L; Mark Prochazka, OT/L; Bruce A. Cairns, MD North Carolina Jaycee Burn Center at University of North Carolina Hospitals, Chapel Hill, NC

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Identify the impact of burn injuries for clients returning to work. ▪ Discuss an occupational therapist's role in the return-to-work process for clients who sustain a burn injury. ▪ Examine what best practice principles are utilized by occupational therapists during the occupational therapy process of assessment, intervention, and outcome.

Abstract:

Introduction: According to the World Health Organization (2016), "non-fatal burns are a leading cause of morbidity, including prolonged hospitalization, disfigurement and disability, often with resulting stigma and rejection" (para. 7). Due to complex and dynamic sequelae that follow this type of injury, burn survivors are often faced with challenges in meaningful participation in occupations. In particular, one occupation is frequently impacted by adult burn survivors—work. Through a multi-year overview, researchers found that nearly 28% of individuals who have sustained a burn injury do not return to any form of employment (Mason et al., 2012). Recent burn literature has addressed components of work such as barriers and supports for returning to work as well as importance and value of returning to work following a burn injury. However, a lack of literature currently exists that defines an occupational therapist's role in successfully assisting this population with the return-to-work process. Therefore, the purpose of this study is to identify the best practice principles utilized by occupations therapists to assist clients returning to work following a burn injury. Specifically, the researcher will be investigating the most prevalent tools utilized during the assessment, intervention, and outcome phase of a client's recovery.

Methods: The inclusion criteria included a) occupational therapists practicing within burn centers verified by the American Burn Association, b) individuals who can read the English language. Participants were excluded if they a) practice in another healthcare discipline, b) practice occupational therapy at a non-verified burn center according to the American Burn Association, c) cannot read the English language. Participants completed an electronic survey that inquired about an occupational therapist's role in the return-to-work process for those clients who have sustained a burn injury. Questions included investigation of the participant's demographic information and best practice principles utilized during the assessment, intervention, and outcome phase of the occupational therapy process.

Results: Research in progress at time of submission.

Conclusions: Research in progress at time of submission.

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Reference list has potential to change as research nears conclusion.

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Heather S. Dodd – No Relevant Financial Relationships to Disclose
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Mark Prochazka – No Relevant Financial Relationships to Disclose
Bruce A. Cairns – No Relevant Financial Relationships to Disclose

Chelsea Critical Care Physical Assessment (CPAx): What One Center Has Learned

Sunday, November 5
11:15-11:30 am

Author and Co-authors:	Sandra K. Fletchall, OTR/L, CHT, MPA, FAOTA; William L. Hickerson, MD, FACS Firefighters Burn Center at Regional One Health, Memphis, TN

Objective:

Upon completion of the lecture, attendees will be prepared to:
- Develop an understanding of the use of the CPAx in the burn ICU.
- Develop an awareness of the scoring potential and outcomes with the CPAx.

Abstract:

Introduction: Chelsea Care Physical Assessment (CPAx) was validated for ICU population in 2013 and for burn ICU population in 2015. The CPAx is an assessment utilized by the burn OT and PT's to detect small changes in the burn patient's skills while in ICU. This instrument was developed as a method for therapists to identify the patient's potential small changes made while undergoing pulmonary support, multiple IV's, bowel and bladder management and need for surgical intervention and/or wound/burn dressing changes.

Methods: At this burn center, for those patients requiring ICU placement, especially pulmonary support, the burn therapists initiate the CPAx assessment within the first 5-7 days of admission; which is the recommended protocol for the assessment tool. Thereafter, the CPAx assessment is completed weekly until discharge from the ICU.

The validation of the CPAx, identified a floor and ceiling effect, which makes it inappropriate for use in acute care or an outpatient burn rehabilitation program.

The CPAx assessment requires the therapist to assess the ICU patient's skills in: respiratory function, cough abilities, bed mobility, supine to sit, sitting balance, sit to stand, bed to chair transfer, standing balance, stepping and grip strength. With scoring from 0-5, the patient's non-performance of a task to slight change can be assessed weekly by the burn therapists.

Results: With the implication of the CPAx, greater communication occurred between the burn therapists with nurses, respiratory therapists and with each other. Initially viewed as an assessment to provide justification for the rational of the therapist daily intervention with those patients' experiencing low level of performance, other findings have been noted. As a patient's score data was collected, so was the ICU discharge placement. Following the initial assessment within 5-7 days, weekly CPAx assessments were completed and data maintained.

Conclusion: Current data indicates a potential for the development of a range of scores that can assist with determining placement following ICU. Data continues to be collected and analyzed to note if a correlation continues to be present.

This presentation will provide information on the data collected and analyzed to date, regarding the potential ability of the CPAx scores to assist with ICU discharge placement, i.e, long term acute care hospital, SNF or inpatient burn rehabilitation program.

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A Two-year Retrospective Analysis of the Utilization of a Multidisciplinary Algorithm for Mobilization of the Vented Burn Patient

Sunday, November 5
11:30-11:45 am

Author and Co-authors:	Audrey M. O'Neil, DPT; Cassandra Rush, DPT, WCC; Laura Griffard, OTR; David Roggy, RN; Rajiv Sood, MD Richard M. Fairbanks Burn Center at Eskenazi Health Hospital, Indianapolis, IN

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Discuss guidelines for the safe mobilization of the vented burn patient. ▪ Recognize differences in the mobilization of vented burn patients compared to vented ICU patients.

Abstract:	**INTRODUCTION:** In 2014, our multidisciplinary team developed a mobility algorithm to act as a guideline for the mobilization of vented burn patients, in order to maximize safety and efficiency. A literature review of published early mobility protocols was completed, for both burn and medical/surgical ICU. Stages of mobility were established to encompass the medical complexity of the burn patient. The guidelines were developed by a multidisciplinary team, including representation from nursing education, bedside nursing (NSG), nursing administration, respiratory therapy (RT), burn physical and occupational therapy (PT/OT), therapy management, pharmacy, and a staff physician. This multidisciplinary team became responsible for implementation of the mobility algorithm by January 2015. **METHODS:** A retrospective review of the burn center's admission log was performed to identify all mechanically ventilated patients admitted in 2015 and 2016. Once these patients were identified, Burn Therapy notes were reviewed for the time period in which each patient was identified to be intubated via endotracheal (ET) tube. Patients who did not receive an evaluation by a burn therapist (PT/OT) prior to extubation or death were excluded. Treatments performed during the use of mechanical ventilation via ET tube were recorded and placed in the stage of mobility established by the algorithm. The data was then reviewed and compared to percentage of TBSA, hospital length of stay, and number of days requiring intubation. **RESULTS:** In the 2 years following initial implementation, the Vented Burn Patients Mobility Algorithm was utilized on 55 patients with an average TBSA of 20.8%. 8 out of the 55 patients succumbed to their burn injuries after admission, but were included in the study, due to use of the algorithm during their care. The average time each patient was intubated via ET tube was 7.1 days and the average length of stay was 25 days. No adverse events occurred during treatment with the algorithm. Stage 1: PROM/AROM/Bed Exercises were completed with 100% of patients (n=55). 38% (n=21) of patients progressed to stage 2a: Chair Mode of bed, while 16% (n=9) of patients were dependently transferred to the cardiac chair in stage 2b. 7% (n=14) transferred to the edge of bed, 11% (n=6) stood at the edge of the bed, and 7% (n=4) actively transferred to a chair by means of lateral stepping or stand pivot transfer. In 2 years, only 4% reached Stage 6: Ambulation. The most common limitations to progress through the algorithm were femoral/pedal lines (24%) and medical complications including unstable medical status, orthopedic restrictions, sedation,

agitation, and/or cultured epithelial autograft placement (29%).

CONCLUSION: During 2 years of implementation, 47% (n=26) of patients performed active mobility including stages 3-6 while utilizing mechanical ventilation via ET tube. Some pre-ambulation interventions not identified in the algorithm, were weight bearing through use of a tilt table, seated strengthening exercises, and marching in place while standing. Major limitations to the mobility progression were line placement restrictions and cardiovascular instability. Ultimately, retrospective analysis of the Vented Burn Patient Mobility Algorithm demonstrated that burn patients undergoing mechanical ventilation via ET tube could safely and efficiently progress toward independence with functional mobility under established guidelines.

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Laura Griffard – No Relevant Financial Relationships to Disclose
David Roggy – No Relevant Financial Relationships to Disclose
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Stages of mobility	
1	PROM/AROM
2a	Chair Mode of Bed
2b	Dependent Chair Transfer
3	Transfer to EOB
4	Standing
5	Active Chair Transfer
6	Ambulation

Smart Phone Feedback Progresses Patients From Admission To Discharge

Sunday, November 5
11:45 am-12:00 noon

Author and Co-authors:	Angel D. Alvarez, OT; Sondra L. Ulbrich, MSPT; Louis R. Pizano, MD Jackson Memorial Burn Center at University of Miami, Miami, FL

Objective:	Upon completion of the lecture, attendees should be better prepared to: ▪ Describe newly trialed treatment techniques. ▪ Demonstrate how to best use these treatment techniques.

Abstract:	In our ABA verified Burn Center we have incorporated individual video footage of patients' burned extremities in motion into all phases of their treatment plan. Whether used in an emergency room, resuscitation unit, acute care floor, rehab setting, clinic or outpatient gym, smart phones seem to help accomplish three treatment goals. Most importantly, taking video footage of a patient walking or performing an activity of daily living allows them to observe themselves from an outside perspective. This form of feedback magnifies patients' unique motion deficits and increases their understanding of the needed movement correction. Secondly, video footage improves patients' compliance with home exercise performance. By providing an image of themselves perfectly performing the necessary exercises, patients have a point of reference against which their daily technique may be compared. Lastly from a motivational standpoint, dated videos act as objective visual documentation of exactly how far a patient has come since their initial burn. Personal proof of progress appears to inspire even the most unmotivated patient. It also allows patients to show others their progress which inevitably helps them build confidence. Ultimately, we are always aiming to improve patient outcomes and smart phone video has radically revolutionized how we do just that.

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