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**Objectives:** This study assessed the treatment patterns, healthcare resource utilization (HCRU), and cost of care during hospitalizations for thermal burn patients who were treated with autograft, which is included in the current standard of care for severe burns. **Methods:** The Truven Health MarketScan® Database was used to identify thermal burn patients who were treated with a first inpatient autograft between 01/01/2011 and 06/30/2016. The first admission was noted as the index hospitalization. Forty-five-day pre- and 6-month post-index continuous enrollment were required. Patient demographics, clinical characteristics, treatment patterns, HCRU, and total cost were reported. **Results:** Of 1,695 patients included in this analysis, mean age was 36.6 years (SD=18.5), 1,124 (66.3%) were males, 1,566 (92.4%) had third degree or deep third degree burns, and 572 (33.7%) had  $\geq 10\%$  total burn surface area (TBSA). The majority of burn sites were in upper or lower limbs (66.3% and 56.2%, respectively). During the index hospitalizations, mean overall length of stay (LOS) was 14.2 days (SD=18.8) (Mean LOS: 7.8 days for  $<10\%$  TBSA, 13.1 days for 10%–19% TBSA, 21.1 days for 20%–29% TBSA, and 42.8 days for  $\geq 30\%$  TBSA); mean total cost was \$133,613 (SD=\$260,552); 238 (14.0%) patients had nonautologous/homograft/heterograft procedures; 526 (31.0%) patients had synthetic substitute procedures; 6 (0.4%) patients had pedicle grafts or flaps procedures. 1,623 (95.8%) patients received debridement; 131 (7.7%) patients were treated with respiratory intubation and mechanical ventilation. 1,178 (69.5%) and 1,122 (66.2%) patients received physical therapy and occupational therapy, respectively. Approximately 64% of patients were admitted through ER. During 45-day pre-index, 562 (33.2%) patients had burn-related outpatient ER visit; 236 (13.9%) patients had burn-related hospitalization. 110 (6.5%) patients had all-cause 30-day readmission. Among them, 67.3% were burn-related. **Conclusions:** The economic burden of hospitalizations for thermal burn patients who were treated with autograft was substantial. Treatment included various graft materials along with autograft during hospitalizations.

## PIT22 UNDERSTANDING PATIENT JOURNEY IN TERMS OF HEALTHCARE RESOURCE UTILIZATION (HCRU) AND COST OF CARE AMONG PATIENTS WITH THERMAL BURNS AND AUTOGRAFT IN A LARGE MANAGED CARE POPULATION

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**Objectives:** Autograft is included in the current standard of care for severe burns; however, little is known about economic outcomes in this population. This study aimed to assess the real-world HCRU and cost of care among patients who were treated with autograft during an inpatient stay for their thermal burns. **Methods:** The HealthCore Integrated Research Database (HIRD®) was used to identify thermal burn patients receiving a first inpatient autograft between 01/01/2011 and 04/30/2016. The first admission date was regarded as the index date. One-year pre- and two-year post-index continuous enrollment were required. Patient demographics, clinical characteristics, HCRU, and total cost were presented. **Results:** Of 371 identified patients, mean age was 39.6 years (SD=21.86), and 67.1% were males. The majority of burn sites were in upper limb (67.1%) or lower limb (64.2%); 93.3% of patients had third degree or deep third degree burns. Approximately 43.2% had at least 10% total burn surface area (TBSA). The average length of stay during index hospitalization was 17.9 days (SD=23.78), with mean total cost of \$157,274 (SD=\$323,728). While the one-year pre-index mean total cost was \$18,823 (SD=\$38,506), the first year post-index mean total cost was \$184,805 (SD=\$349,355), and 92.7% were burn-related. On average, index hospitalization accounted for 85.1% of the first year cost. The second year mean total cost was \$16,872 (SD=\$47,423), with 17.9% burn-related. During the first year post-index, 23.2% of patients had  $\geq 1$  hospitalization, with 64.0% burn-related. The proportion of patients having inpatient hospitalization during the second year dropped to 13.7%, and only 15.7% were burn-related. **Conclusions:** The economic burden of thermal burn patients who were treated with inpatient autograft was significant in the first year after burn injuries. The major cost-driver during the first two years was the initial hospitalization with autograft. The proportion of burn-related utilization and cost considerably reduced in the second year post-index.

## Injury & Trauma - Medical Technologies

### PIT23 THE COST BURDEN OF NONUNION FOLLOWING LONG BONE FRACTURE IN A COMMERCIAL INSURED POPULATION IN THE UNITED STATES

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**Objectives:** There are currently no studies evaluating resource utilisation and costs for fracture non-union compared with routine healing for a wide variety of fracture types. The purpose of this study is to present an analysis on the burden of ten different types of fracture non-union vs routine healing. **Methods:** In a large US claims database, all adult patients diagnosed with a long-bone fracture in 2012 were stratified into two cohorts: with and without subsequent claims of a non-union

diagnosis based on ICD-9-CM diagnosis codes. Healthcare resource use and medical costs of fracture were compared in patients with and without non-union. **Results:** Out of 4,963 patients with long bone fractures, 3% (n=163) had a subsequent diagnosis of fracture non-union within 2 years of their fracture. The overall non-union rate varied significantly by fracture type. The highest non-union rates were for the humeral shaft (18%), followed by the tibial shaft (10%) and femoral shaft (9%). The lowest nonunion rates were for the lower end radius/ulna (2%) and elbow (2%). Overall, medical costs of non-union fracture patients were higher than that of the routine healing cohort. This was true for all types of fracture. The mean total care cost for non-union patients was more than double that of patients without a non-union (\$35,317 vs \$102,989, P = 0.0006). **Conclusions:** Patients whose fractures fail to heal routinely often have significantly greater healthcare resource use and, in turn, incur higher medical costs. Future research should be focused on strategies to improve fracture healing rates with the goal to reduce costs for patients, third party payers, employers, and governments by decreasing usage of healthcare services.

### PIT24 RETROSPECTIVE ANALYSIS OF NEGATIVE PRESSURE USAGE IN HOSPITALS

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**Objectives:** It has been estimated that in the growing therapy of Negative pressure, 88.3% of wounds currently receiving traditional negative pressure in long-term care facilities could be moved to single use devices. This potentially could provide both cost savings and patient benefits<sup>1</sup> Little research has been performed to profile negative pressure usage within acute facilities. Our analysis profiles Negative Pressure usage by wound type and hospital profile and aims to provide an estimate for the overall proportion of wounds within hospital care which may be amenable to single use negative pressure. **Methods:** The study was a retrospective analysis, conducted using the Premier database. A sample of patients (n=7914) who had a documented usage of Negative Pressure within their patient records were analysed with patient length of stay or outpatient status used as potential indicators for wounds that may be moved to single use devices. **Results:** Negative pressure usage is majorly used in diabetic foot ulcers, disrupted surgical wounds and pressure ulcers (24.5%, 22.3%, 24% respectively). 5831 (73.7%) patients were considered to have potential to switch to single use devices, with 55.1% of spend considered movable to a lower cost alternative. When profiled by institution size this decreased from 87.9% in hospitals under 99 beds to 44.4% in hospitals with more than 300 beds. **Conclusions:** Many negative pressure treated wounds are cared for via either short hospital stays or outpatient visits. Potentially many wounds currently treated with negative pressure have the potential to move to a lower cost more convenient device. 1. Adeyemi, A., & Waycaster, C. (2018). Cost-minimization Analysis of Negative Pressure Wound Therapy in Long-term Care Facilities. *Wounds* 2018, 30(2), 13-15.

## Injury & Trauma - Methodological & Statistical Research

### PIT25 DEVELOPMENT OF A MACHINE LEARNING ALGORITHM TO PREDICT FUTURE RISK OF PATIENTS FOR HIGH-COST HOSPITAL-ACQUIRED PRESSURE INJURIES

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**Objectives:** Hospital-acquired pressure injuries (HAPIs) result in over 60,000 deaths in the U.S. at a societal cost of \$26 billion. Early detection of those at greatest risk could improve outcomes. The Braden Scale is a HAPI risk-assessment tool, with scores collected in patient charts. Our first objective was to develop a machine learning algorithm to predict future Braden score trajectories from electronic health records (EHR). Second, we applied constrained optimization to the database to improve predictive efficiency. **Methods:** We used a retrospective cohort of hospitalized patient EHRs between 2011 and 2014 to calibrate the algorithm. These data contained HAPI diagnosis not present-on-admission, patient-specific Braden scores for each 12-hour clinical shift up to the 12<sup>th</sup> shift, and age. We used multilevel ordered logistic regression to create a predictive algorithm of HAPI risk, and applied constrained optimization to identify the optimal number of scores needed to efficiently and accurately predict future risk while minimizing overuse. **Results:** Our predictive algorithm using mixed-effects ordered logistic regression that was best-fit with no fewer than five Braden scores in order to anticipate categorical changes in HAPI risk to a high degree of accuracy (log-likelihood=-109,945.29). The best fit regression model was:  $y_{ij} = (14.6969 + u_{i0}) + 0.0149 \cdot x_{ij} + 0.0231 \cdot \text{Age}_i + e_{ij}$ . Based on assessment of the area under the curve (AUC), there was a statistically significant improvement in predictive validity of HAPI risk with 6 Braden scores (p<0.05). **Conclusions:** A series of 5-6 Braden scores can be used to accurately predict a patient's future HAPI risk. This machine learning algorithm can be used to conserve hospital resources by directing preventive practices to patients of highest need. Two points of future exploration are: (A) whether the time required to wait for a 6<sup>th</sup> score comes at a concerning incremental budget impact; and (B) whether inter-rater reliability between Braden scores from separate shifts adds more parameter uncertainty than is worth the wait.