56th ANNUAL MIDWEST STUDENT BIOMEDICAL RESEARCH FORUM

Saturday, March 8, 2025

ROOM 3047

1:30 p.m.	O-45	ANALYZING PEDIATRIC PENETRATING TRAUMA TRENDS OVER THE COVID-19 PANDEMIC Presenter: Shalmali Mirajkar
1:45 p.m.	O-44	The Effect of Surgeon and Anesthesiologist-Performed Pectoral Nerve Blocks on Postoperative Pain Management in Gender-Affirming Chest Masculinization Surgery Presenter: Andrew Minchow
2:00 p.m.	O-38	LEVERAGING OBJECTIVE STRUCTURED TEACHING EXERCISES (OSTE) TO ENHANCE FEEDBACK DELIVERY SKILLS AND SCORING ACCURACY IN SURGICAL EDUCATION Presenter: Binh Le
2:15 p.m.	O-34	TEMPORAL DISPARITIES IN ELECTROCONVULSIVE THERAPY UTILIZATION: A NATIONAL INPATIENT SAMPLE ANALYSIS (2016–2021) Presenter: Anisha Kohli
2:30 p.m.	O-22	A NOVEL FINGERSTICK BLOOD IMMUNOASSAY USED IN A NEBRASKA COMMUNITYBASED STUDY HIGHLIGHTS VACCINATION AS A MAJOR DRIVER OF SARS-COV-2 HUMORAL IMMUNITY Presenter: Dylan George
2:45 p.m.	O-17	A novel immunoassay demonstrates low avidity anti-H5 antibodies following H1N1 exposure. Presenter: Del Dsouza
3:00 p.m.	O-12	NOVEL PHASE-AMPLITUDE COUPLING APPROACH FOR IDENTIFYING TASK-ACTIVATED CORTEX IN EPILEPSY PATIENTS Presenter: Srijita Das
3:15 p.m.	O-08	GIVING BACK TO THE COMMUNITY: OUTCOMES FROM A FREE HERNIA REPAIR PROGRAM Presenter: Sophie Bouldoukian
3:30 p.m.	O-04	BARRIERS TO HIGH QUALITY OF LIFE FOR PEOPLE WITH TRACHEOSTOMIES: A NEEDS ASSESSMENT Presenter: Noha Algahimi
3:45 p.m.	O-01	ADVANCING MRI-BASED SEGMENTATION OF LYMPHEDEMA IN RADIOTHERAPY PATIENTS USING DEEP LEARNING Presenter: Trevor Abts

4:00 p.m. **ADJOURN**

ANALYZING PEDIATRIC PENETRATING TRAUMA TRENDS OVER THE COVID-19 PANDEMIC

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Background, Significance, Hypothesis: Pediatric trauma trends have significantly changed in recent history, highlighting an urgent need for further examination and prevention efforts. Our study primarily investigates the impact of the COVID-19 pandemic on pediatric trauma, with a particular focus on whether violence-related incidents increased during this period. We also examine if these incidents decreased after the pandemic. Our study offers a comprehensive analysis of pediatric trauma cases in the peri-pandemic period, exploring how injury patterns and injury severity evolved over this period. By examining data from both pre-pandemic and post-pandemic periods, we identify key temporal trends, shedding light on shifts in the frequency, nature, and outcomes of pediatric penetrating trauma injuries. This study contributes to a deeper understanding of how global events, such as the COVID-19 pandemic, can significantly impact the health and safety of children.

Experimental Design: We completed a retrospective review on pediatric patients (ages 0-19) who sustained a penetrating injury at a University Level I Trauma Center. Three time periods were identified in relation to the COVID-19 pandemic: pre-pandemic (March 2018-Feb 2020), pandemic (March 2020-Feb 2022), and post-pandemic (March 2022-Feb 2024). The data analysis focused on key factors such as demographic data, mechanisms of injury, Injury Severity Scores (ISS), and the resulting patient outcomes.

Results/Data: A total of 290 children with penetrating injuries were examined. Over three periods, the Injury Severity Score (ISS) showed a significant increase, with a high value of 6.5 (range 1.5-10) during the post-pandemic phase ($p=0.042$). While there was an increase in drug and alcohol use among injured children during the pandemic, a post-pandemic decline was observed: drug use decreased from 43.2% to 30.9% ($p<0.001$), and alcohol use decreased from 31.8% to 26.8% ($p=0.003$). Although handgun assaults remained stable, assaults involving knives or sharp objects increased from 9 to 17 during the pandemic ($p=0.05$) and did not decline post-pandemic. Additionally, mortality rates showed a significant increase, rising from 4.5% pre-pandemic to 12.5% post-pandemic ($p=0.01$).

Conclusions: Our study uncovers a concerning increase in the number of assaults on children, injury severity, and mortality rates. The escalation in mortality, alongside evolving injury patterns and outcomes, underscores the urgent need for targeted interventions to address and reduce these trends.

THE EFFECT OF SURGEON AND ANESTHESIOLOGIST-PERFORMED PECTORAL NERVE BLOCKS ON POSTOPERATIVE PAIN MANAGEMENT IN GENDER-AFFIRMING CHEST MASCULINIZATION SURGERY

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Background, Significance of Problem, and Hypothesis

Major breast and chest surgeries are associated with significant postoperative pain. Although opioids significantly reduce pain after breast and chest procedures, physician-prescribed narcotics have markedly contributed to the opioid epidemic in the United States. Preoperative and intraoperative nerve blocks have been found to significantly decrease pain scores in oncologic, cosmetic, and reconstructive breast surgeries. However, the efficacy of regional anesthesia on postoperative pain in the setting of chest masculinization surgery is not well defined. This retrospective study examined patient-reported pain scores and opioid requirements following gender-affirming chest masculinization in individuals who received a preoperative pectoral nerve block, intraoperative pectoral nerve block, or no block.

Experimental Design

All 292 adult patients who underwent gender-affirming chest masculinization performed by two plastic and reconstructive surgeons between January 1, 2017, and June 30, 2023, were screened for inclusion. Of the 275 patients included in the data analysis, 21 received an anesthesiologist-performed preoperative pectoral II (PECS II) nerve block, 39 received a surgeon-performed intraoperative pectoral I (PECS I) nerve block, and 215 did not receive a nerve block. Intravenous (IV) milligram morphine equivalents (MME) of all opioid medications given in the postanesthesia care unit (PACU) and the number of opioid prescriptions in 90 postoperative days were recorded. Patient-reported numeric rating scale (NRS) pain scores were recorded upon arrival to the PACU and each 15-minute interval thereafter.

Results

The mean PACU IV MME required by the preoperative PECS II (1.9) and intraoperative PECS I (2.0) block groups was significantly lower than the no-block group (4.8, $p<0.01$). The mean maximum NRS pain score at 15 and 30 minutes following arrival to the PACU was significantly lower in the preoperative PECS II (3.0) and intraoperative PECS I (3.5) groups than the no-block group (4.6, $p=0.02$). The mean maximum NRS pain score at 45 and 60 minutes was not statistically different between the anesthetic modality groups ($p=0.45$). Analysis of pain scores at additional time points was not possible due to the number of patients who were discharged from the PACU. The number of opioid prescriptions required following discharge did not significantly differ between the anesthetic modality groups ($p=0.19$).

Conclusion

The implementation of preoperative PECS II and intraoperative PECS I blocks in the setting of gender-affirming chest masculinization resulted in significantly lower NRS pain scores early after PACU arrival (15 and 30 minutes) and opioid analgesic requirements while in the PACU than standard IV analgesia. Preoperative and intraoperative pectoral nerve blocks are an efficacious means to improve the immediate postoperative patient experience after gender-affirming chest masculinization surgery.

LEVERAGING OBJECTIVE STRUCTURED TEACHING EXERCISES (OSTE) TO ENHANCE FEEDBACK DELIVERY SKILLS AND SCORING ACCURACY IN SURGICAL EDUCATION

Binh Le, Emily Ehsan, Lily Ehsan, Avery Kallman, Mollie Urkoski, Keely Buesing, Valerie Shostrom, Priscila Rodrigues Armijo, Jeremy Lipman, Olabisi Sheppard (UNMC; Omaha, NE)

Background: Effective feedback has been shown to enhance learning and improve outcomes in medical training but has not been well-studied in surgical education. Additionally, the field of surgery comes with its own challenges that make improving teaching strategies harder, such as tight schedules, ever-advancing technology and techniques, and an established “way of doing things.” The Objective Structured Teaching Exercise (OSTE) is a teaching method aimed at assessing clinical and communication skills in faculty instructors and learners in real-time. In the OSTE, a faculty instructor observes a learner in a simulated encounter and gives direct feedback afterwards. Although OSTEs are designed to develop teaching skills, their use and impact as a method for improving feedback skills remains unclear.

Significance: Feedback delivery is a core component of clinical education; however, few faculty members are trained in feedback delivery.

Objective: We aimed to develop a training session for feedback delivery in surgical faculty members using an OSTE and to assess its impact on feedback skills of surgical faculty members.

Experimental Design: In July 2024, six physicians that regularly perform central line placements (CLP) at a single institution participated in this study. Four standardized students (SS) were recorded performing CLPs in a mannequin. Participants were randomized to watch 3 of 4 of these pre-recorded videos, grade the SS using a checklist, and provide them feedback in an OSTE session. After the first session, participants completed a training module on using a grading checklist and providing feedback using the Pendleton Method. The Pendleton Method is based on perceiving strengths and weaknesses by both parties. The learner first states what went well followed by the teacher, then the learner states what went poorly with the teacher also following. The feedback delivery then ends with a summary of what was discussed. OSTE sessions were recorded, and the SSs and a master assessor graded participants’ feedback skills using a rubric. Afterwards, participants were interviewed and completed a Likert-scale survey evaluating OSTE and training module effectiveness. Scores were compared post- versus pre-training; data was analyzed using PC SAS v.9.4. Thematic analysis was done for qualitative data.

Results: The average checklist scores were significantly lower post-training (post: -4.5 (CI -7.5, -4), pre: -3 (CI -3, -3), p-value 0.031), while there were no significant differences in the feedback skills of participants post- vs pre-training. Most participants found the OSTE format and training module helpful in enhancing their feedback skills. However, they suggested more in-depth feedback in return from the SSs and the ability to grade SSs during live simulated CLP sessions rather than through video.

Conclusions: Although participants perceived the training module and OSTE to be helpful, data illustrated a tendency to underscore the SSs post-training with no discernible improvement in feedback skills. The Dunning-Kruger effect may explain this, as participants became more critical of themselves and the SSs after the training module, showing that they knew how to evaluate them at an elevated level despite the scores showing that the SSs underperformed. Additionally, participants may have under-appreciated the Pendleton Method approach, limiting their engagement in feedback, which could have affected feedback quality.

TEMPORAL DISPARITIES IN ELECTROCONVULSIVE THERAPY UTILIZATION: A NATIONAL INPATIENT SAMPLE ANALYSIS (2016–2021)

Anisha Kohli, Haley Schuster, Ryan W. Walters, Imad Alsakaf (Creighton, Omaha, NE)

Background, Significance, Hypothesis: Disparities in access to mental health care persist across sociodemographic groups, limiting timely and appropriate treatment for conditions catatonia, major depressive disorder (MDD), bipolar disorder (BPD), schizoaffective disorder, and schizophrenia. Electroconvulsive therapy (ECT) is a critical intervention for severe psychiatric disorders, yet temporal disparities in its administration remain underexplored. Prior research highlights inequalities in mental health service utilization linked to factors such as race/ethnicity, socioeconomic status, and geographic location. Despite ECT's efficacy, racial and ethnic minorities, patients with Medicaid, and those experiencing social determinants of health challenges such as housing insecurity encounter longer wait times for treatment. Understanding the temporal dynamics of ECT utilization is vital for addressing these inequities and optimizing patient outcomes. We hypothesized that sociodemographic factors, including age, race/ethnicity, primary payer, and health-related social needs are significantly associated with time to ECT administration in inpatient settings. Additionally, we aimed to investigate trends in the number of ECT-utilizing hospitalizations and associated outcomes over time.

Study Design: This retrospective cohort study analyzed National Inpatient Sample (NIS) data from 2016 to 2021. Inclusion criteria were hospitalizations in which patients were aged ≥18 years with a primary diagnosis of MDD, BPD, schizoaffective disorder, non-catatonic schizophrenia, or catatonia. Hospitalizations that included ECT were identified using ICD-10-PCS codes. The primary outcome was time-to-first ECT treatment. Secondary outcomes included hospitalization length of stay, total hospital cost, discharge status, and ECT-related complications. Time-to-ECT was modeled using a mixed-effects negative binomial regression models that included as covariates diagnosis, age, biological sex, race, payer, income quartile, and facilty location-teaching status, bed size, and region. All analyses accounted for the NIS sampling design using a hospital identifier as a random effect and NIS stratum as a fixed effect; all results were weighted to provide national-level estimates.

Results: We identified 74,275 hospitalizations in the United States meeting inclusion criteria. The median time-to-first ECT session was 5 days (IQR: 2-11; range 0-246). From 2016 to 2021, the number of ECT-utilizing hospitalizations declined ($p < 0.001$; Figure 1), while the mean time to first ECT increased by 24.6% from 7.3 days in 2016 to 9.1 days in 2021 ($p < 0.001$; Figure 2). Non-catatonic schizophrenia showed the longest adjusted time-to-ECT compared to MDD (adjusted rate ratio [aRR]: 2.24, 95% CI: 2.05-2.44, $p < 0.001$). Compared to Whites, Blacks averaged 18% longer time to ECT (aRR: 1.18, 95% CI: 1.11-1.26, $p < .001$) and Hispanics averaged 13% longer delays (aRR: 1.13, 95% CI: 1.04-1.23, $p = 0.003$). Medicaid beneficiaries and patients with housing insecurity also faced prolonged wait times, whereas receiving treatment in a rural hospital was associated with shorter times to ECT compared to urban teaching hospitals (all $p < 0.001$). In-hospital ECT-related complications were extremely rare (0.2%) and most discharges were routine (84.6%).

Conclusions: Temporal disparities in ECT administration highlight systemic inequities in mental health care. Significant delays were observed in Blacks, Hispanics, Medicaid beneficiaries, as well as in the presence of housing insecurity which could potentially exacerbate psychiatric morbidity. These findings underscore the need for policy interventions to address sociodemographic barriers and streamline ECT access. Further research should explore preauthorization processes and cultural factors influencing ECT utilization.

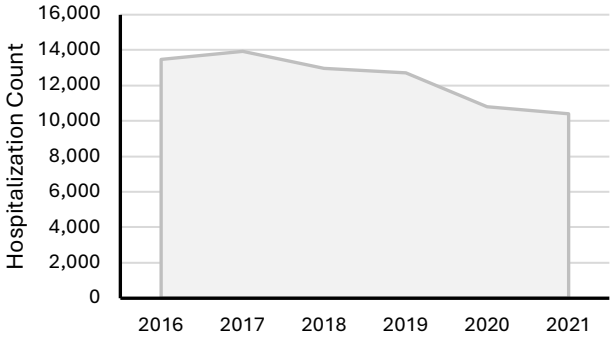

Figure 1. Year-over-year trends in the number of hospitalizations in the United States that included ECT.

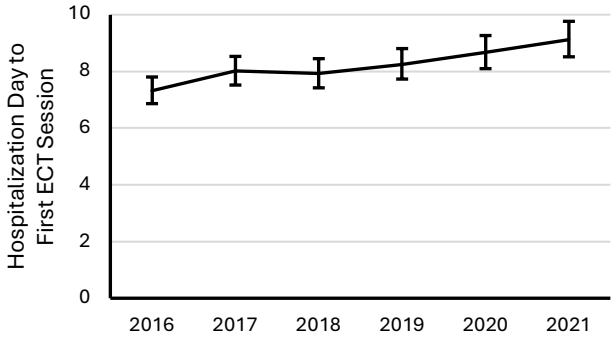

Figure 2. Year-over-year trends in the day to first ECT session. Error bars represent 95% Agresti-Coull confidence intervals.

A NOVEL FINGERSTICK BLOOD IMMUNOASSAY USED IN A NEBRASKA COMMUNITY-BASED STUDY HIGHLIGHTS VACCINATION AS A MAJOR DRIVER OF SARS-COV-2 HUMORAL IMMUNITY

Dylan George, Del Dsouza, Bailey Barcal, Jan Williamson, Julie Carstens, Lauren Longacre, Kathleen Angell, Julia Bai, Andy Schnaubelt, David Brett-Major, M. Jana Broadhurst

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Background and Significance: As COVID-19 vaccination rates decrease and antibody levels wane, there is a gap in our understanding of protective humoral immunity as new variants of the virus continue to emerge. Quantitative detection of anti-SARS-CoV-2 IgG antibodies in capillary blood specimens offers a powerful tool for monitoring correlates of protective immunity using community-based specimen collection. To characterize evolving antibody profiles, we developed and implemented a novel, quantitative, high-throughput, multiplex immunoassay in a Nebraska community cohort study using fingerstick-derived capillary blood.

Hypotheses: 1) SARS-CoV-2 antibodies measured in fingerstick blood will correlate with those in plasma; 2) COVID-19 vaccination history is a critical driver of variant-specific SARS-CoV-2 antibody profiles over time.

Experimental Design: Paired plasma and capillary blood specimens were obtained from the Clinical Characterization Protocol for Severe Emerging Infections (UNMC IRB #0146-20-FB) from June 2022 through April 2023 to assess concordance of antibody measurements between specimen types. We collected fingerstick blood samples alongside medical questionnaires from 347 Nebraskans at multiple sites across the state between February 2022 and September 2023 under the Community Threat Assessment study (UNMC IRB #0689-21-EP). Variant-specific IgG levels were compared between groups with varying SARS-CoV-2 exposure history and time since vaccination. Statistical analysis was performed with GraphPad Prism (v10.1.0).

Data and Results: Paired plasma and capillary blood samples (n=44) yielded concordant detection of IgG targeting wild type and Omicron receptor binding domain (RBD). Median fluorescence intensity (MFI) values demonstrated a strong linear correlation between specimen types ($r>0.95$). Among community participants, IgG antibodies binding wild-type and Omicron SARS-CoV-2 RBD proteins were highest in participants who reported receiving a COVID-19 vaccine compared to those who had prior COVID-19 infection only or no known prior exposure (Kruskal-Wallis test $P<0.0001$). Anti-Omicron RBD IgG decayed at a higher rate than wild-type RBD IgG following vaccination and was pronounced in individuals more than 3 months from vaccination (K-W $P<0.0001$).

Conclusion: Excellent quantitative correlation of anti-RBD antibodies in paired plasma and capillary blood specimens supports use of our novel immunoassay for community-based serologic monitoring studies. Vaccination is a major driver of antibody profiles against SARS-CoV-2, eliciting higher anti-RBD IgG titers than infection alone in a community cross-sectional cohort. In the context of waning protection and decreasing COVID-19 vaccination rates, strategies are needed to monitor antibody levels at the population scale.

A NOVEL IMMUNOASSAY DEMONSTRATES LOW AVIDITY ANTI-H5 ANTIBODIES FOLLOWING H1N1 EXPOSURE.

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Background, Significance, and Hypothesis: The Hemagglutinin (H) protein of the Influenza A virus (IAV) is essential for viral entry and is divided into two groups based on antigenic properties[1]. Group 1 includes H1 and H5, while Group 2 is represented by H3[2]. Zoonotic Influenza viruses have repeatedly spilled over into humans, with H1N1 causing a pandemic in 2009 and H5N1 with recurrent zoonotic spillovers since its first detection in 1996[3,4]. Since 2003, 261 human H5N1 cases have been reported with a 54% case fatality rate. Recent CDC surveillance revealed that 7% of dairy workers show signs of recent HPAI H5N1 exposure, underscoring the need for better understanding of H5 immune profiles[5].

The seasonal circulation of H1N1 and H3N2, annual vaccination, and early-life immune imprinting leads to complex immune profiles in the population. However, pre-existing immunity to H5N1 remains poorly understood, particularly among high-risk groups like dairy and poultry workers. The hemagglutination inhibition (HAI) assay is the gold standard for assessing immunity to novel or zoonotic influenza viruses. However, the titer format can test only a narrow range of circulating strains and is restricted to blood-based samples.

To address these limitations, we have developed a novel high-throughput immunoassay that enables the analysis of antibody profiles against multiple influenza hemagglutinin subtypes using both blood and mucosal specimens. Leveraging this novel tool, we aimed to explore the prevalence of pre-existing immunity to H5. **We hypothesize that in individuals without prior H5 exposure, H5-binding antibody levels are elevated following recent H1N1 exposure compared to H3N2 exposure, revealing potential cross-reactivity within group 1 HA antigens.**

Experimental Approach: We integrated H5 protein into our novel multiplex immunoassay to quantify IgG levels in longitudinal plasma samples from our Clinical Characterization Protocol for Severe Emerging Infections **(CCPSEI: UNMC IRB 146-20-FB)** participants with recent H1N1 and H3N2 infections. Additionally, we conducted a pilot study to explore the correlation between the quantity and avidity of H5-specific IgG in plasma sources from the Nebraska Biobank and commercial plasma donors.

Data, Result, Discussion: Successful coupling of H5 proteins was verified using anti-HIS antibodies, with additional confirmation achieved through monoclonal antibodies. Anti-H5 IgG median fluorescence intensity (MFI) increased by 8,000 in a confirmed H1N1-positive sample (53-1) compared to the sample collected before H1N1 infection (35-7), indicating a rise in anti-H5 IgG levels following recent H1N1 infection. In contrast, no MFI increase was observed in plasma samples collected before and after H3N2 infection (48-1, 48-2). Simple linear regression analysis revealed a weak positive correlation between anti-H1 IgG and anti-H5 IgG levels (R = 0.42), while a weak negative correlation was observed between anti-H5 IgG and anti-H3 IgG levels (R=-0.44). Anti-H5 IgG antibodies had a lower avidity compared to anti-H1 and H3 antibodies.

Conclusion: Cross-reactive H5 antibodies are detectable in individuals without prior H5 exposure. The increase in anti-H5 IgG may be due to recent H1N1 exposure but the generated anti-H5 IgG are lower in avidity compared to anti-H1 and anti-H3 IgG.

NOVEL PHASE-AMPLITUDE COUPLING APPROACH FOR IDENTIFYING TASK-ACTIVATED CORTEX IN EPILEPSY PATIENTS

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Background, Significance, Objective: Accurate identification of the eloquent cortex is critical to minimize post-surgical deficits in patients undergoing resection for conditions such as epilepsy and tumors. Current methods for identifying eloquent cortices are subjective, vary across centers, and require significant expertise. This underscores the need for more objective and consistent pre-surgical mapping procedures. Phase-amplitude coupling (PAC), the interaction between the phase of low-frequency oscillations and the amplitude of high-frequency activity, has been implicated in task-induced brain activity and may serve as a useful biomarker for functional mapping. Our objective was to develop and validate a novel PAC-based algorithm for non-invasive identification of the somatosensory eloquent cortex using magnetoencephalography (MEG) data. We also aimed to compare task-induced PAC patterns with resting-state activity in epilepsy patients to establish the clinical utility and robustness of this approach.

Methods: We analyzed a retrospective database of epilepsy patients at UNMC and selected thirty subjects who received electrical stimulation of either the left (upper left, UL) or right (upper right, UR) median nerve to localize the somatosensory cortex and had spontaneous MEG recordings between September 2011 and February 2018. Exclusion criteria were patients who were not diagnosed with focal or generalized epilepsy, the presence of other neurological disorders, patients with poor-quality MRI scans, patients with metal implants, and who did not show an observable response in the somatosensory evoked fields on the contralateral hemisphere. MEG data were recorded with a bandwidth of 0.1 to 330 Hz and digitized at a sampling rate of 1 kHz. Raw MEG data were preprocessed to eliminate electrical noise, cardiac and ocular artifacts as well as stimulus contamination to increase signal-to-noise ratio. Power-spectral density plots were generated for each MEG recording to estimate frequencies with prominent activity peaks. Epochs of 300 ms were created and averaged across trials. We created a symmetric boundary element model as the forward head model, followed by source reconstruction using a beamforming approach. PAC was quantified using the direct mean vector length modulation index, with 5 to 12 Hz as the low-frequency range and 80 to 300 Hz as the high-frequency range. PAC was calculated on the time-courses of neural activity for 148 brain regions defined by the Destrieux atlas. Tensor decomposition using the Candecomp/Parafac algorithm with a rank of 2 was applied for dimensionality reduction. Density-based spatial clustering of applications with noise (DBSCAN) with silhouette evaluation was employed to identify task-activated brain regions as outliers. A linear mixed-effects (LME) model was created to quantify the association between activated brain regions and PAC. A binary support-vector machine (SVM) classifier was developed to predict PAC values and identify the expected brain regions activated during somatosensory UL and UR tasks.

Results: Clustering identified 5 active brain regions with high PAC among 6 expected regions for SEF-UL and SEF-UR (p=1.8 x 10^{-8}, hypergeometric test) with a random distribution for spontaneous data. We observed significant p-values ($p < 10^{-60}$) for both conditions, outside the expected regions during a task and within the expected brain regions during a task, in the LME models. The patient specific SVM classifier gave a specificity of 99.46% and a positive-predictive value of 66.9%.

Conclusion: Our PAC algorithm demonstrated a robust capability to identify the somatosensory cortex with significantly altered evoked response in comparison to spontaneous data. The algorithm will be extended to identify the language, auditory, motor, and memory cortices and can be used as a biomarker of activated cortex. The findings of this work broaden our understanding of neural oscillations, as well as provide non-invasive detection techniques for pre-surgical mapping in epilepsy patients.

GIVING BACK TO THE COMMUNITY: OUTCOMES FROM A FREE HERNIA REPAIR PROGRAM

Sophie Bouldoukian, Sophie Cemaj, Samuel Cemaj, Bennett Berning, Emily Cantrell, Keely Buesing, Zachary Bauman (UNMC Omaha, NE)

Background, Significance, Hypothesis: Hernia repair surgeries are low-risk, high-reward procedures for patients affected by a hernia's everyday pain and discomfort. No study has been conducted looking at the benefits of pro bono hernia repairs for patients who are financially unable to undergo the procedure. Since 2015 our institution has implemented a yearly “Hernia Day” to provide free-of-charge hernia repairs to patients who meet indications. This is in partnership with one of our free local healthcare clinics, in which the patient population is diverse, with individuals from various global backgrounds, and a significant portion consists of Spanish-speaking patients of Latino heritage. The study’s objective was to assess the quality of life of these patients who underwent hernia repair between 2016 and 2024. We hypothesized that most patients had a positive experience, with few complications post-operatively, and an overall greater quality of life post-repair.

Experimental Design: This was a single-center survey study of patients who underwent hernia repair from our institution’s Hernia Day from 2016 to 2024. Basic demographics were obtained. Outcomes of interest included response to a 5-question follow-up survey administered post-operatively and incidence of post-operative complications. Survey questions included: 1. recurrence of their hernia/new bulge since the repair; 2. were they still experiencing pain at the hernia site; 3. return to work since surgery; 4. had they experienced any surgery-related complications; 5. were they satisfied with Hernia Day/participate again. Depending on the response to the questions, additional questions may be asked (i.e. Pain scores, why have you not returned to work, etc.). Three phone call attempts were made for each patient as needed. Descriptive statistics were used for analysis.

Data and Results: Over the 9 years, a total of 91 patients met the criteria for Hernia Day and underwent surgery. Of these, 59 (64.8%) of them participated in the follow-up survey. Of the 91 patients in total, 76 were Hispanic/Latinx ethnicity (83.5%) and of the 59 patients who participated in the survey 51 were Hispanic or Latinx ethnicity (87.9%). Of the total population, 50 patients (54.9%) had a unilateral inguinal hernia repair, and 33 patients (36.2%) had an umbilical hernia repair. Of the responders, 31 (52.5%) had a unilateral inguinal hernia and 21 (35.6%) had an umbilical hernia. Mesh repair was used in 72.5% of all surgeries performed and 74.6% of respondents had mesh. Of the 59 respondents, 5.1% reported a bulge post-operatively but none had a further workup done to identify it as a recurrent hernia. In addition, 54.2% reported no pain, and for those who felt pain the average pain score was 3.4 (±1.19). 86.4% of patients were able to return to work, 100% had zero complications, and 98.3% reported being satisfied with Hernia Day and would participate in it again.

Conclusion: Pro bono hernia surgery, as seen through Hernia Day program, greatly improves patient satisfaction and quality of life. This low-risk procedure has a significant positive impact on those who need it but cannot afford it. If more institutions adopt this type of initiative, many more individuals could benefit and experience a better quality of life.

BARRIERS TO HIGH QUALITY OF LIFE FOR PEOPLE WITH TRACHEOSTOMIES: A NEEDS ASSESSMENT

Noha Algahimi[1], Jana Wardian[2], Jayme R. Dowdall[3] (UNMC Omaha, NE)

Background, Significance of Problem, Hypothesis: The transitionary period to a long-term healthcare facility or home environment following a tracheostomy is a complicated and understudied process that often causes undue stress for patients, caregivers, and healthcare workers. Understanding the established steps in the transitionary process and how they affect the experience of individual people with tracheostomies (PwTs) is integral to improving protocol and creating a more effective and empathetic transition. This needs assessment will identify the highest priority needs exhibited by PwTs from the time they receive their tracheostomy to the time they receive established care in the home or at a post-hospital facility. The assessment will highlight areas that must be researched further and allow for improvement of the existing transitionary process by involved healthcare personnel.

Experimental Design: A preliminary needs assessment was conducted using an existing structured framework for electronic medical record (EMR) analysis, applied to the EMRs of five PwTs. Data extracted from these records, using this framework, were manually analyzed using the SWOT methodology (strengths, weaknesses, opportunities, and threats) to identify existing needs and establish standards for future data collection. This pilot study informs methodology to analyze a larger pool of records and experiences for exploration of the patient transition from the hospital to a long-term healthcare facility or home environment.

Data and Results: A framework using 26 categories was created to provide the basis for a needs assessment of the transitionary process following a tracheostomy. The categories include both discrete data, such as time of procedure and time spent in the hospital, and more complex narratives, including tracheostomy complications. This information was used in a needs assessment identifying the 4 most relevant needs in current transitionary care: availability of post-hospital facilities, inadequate care training following the procedure, financial barriers, and patient communication obstacles.

Conclusion: This needs assessment provides a look at the patient transitionary period and establishes a standard for gathering new information. It provides preliminary data for identifying patterns and creating a foundation for exploring areas of potential improvement within the transitionary process and their effect on patient care and experience.

ADVANCING MRI-BASED SEGMENTATION OF LYMPHEDEMA IN RADIOTHERAPY PATIENTS USING DEEP LEARNING

Trevor Abts, Robert Aghoghovbia, Ahmed Tayloun, Irin Luke, Glennon Carevic, Sydney Thomas, Rishabh Gaur, Kyle Spier, Saleh Ramezani, Kareem Wahid, Sam Mulder, Clifton Fuller, (Creighton University School of Medicine, Omaha, NE)

Background, Significance, Hypothesis:
Lymphedema is a prevalent complication affecting up to 75% of head and neck cancer patients within three months of radiotherapy, contributing to decreased quality of life. Manual segmentation of lymphatic tissues on MRI is time-consuming and subject to interobserver variability. Deep learning (DL) offers a promising approach to automating segmentation, reducing variability, and improving diagnostic workflows. We hypothesized that transformer-based and residual network deep learning architectures would demonstrate robust segmentation performance for lymphedema detection on MRI, with potential implications for earlier intervention and improved patient outcomes.

Experimental Design:
MRI datasets were obtained from head and neck cancer patients at two to three post-radiotherapy timepoints to capture lymphedema progression. Regions of interest (ROIs) were annotated by multiple observers and aggregated into a consensus ground truth using the STAPLE (Simultaneous Truth and Performance Level Estimation) algorithm. Two deep learning models, ResNet and UNETR, were trained on this dataset and evaluated based on their Dice Similarity Coefficient (DSC) scores—a measure of segmentation accuracy. Performance was assessed against validation and test datasets across specific ROIs and timepoints. Unique imaging sequences, including FatSat, were included to test model generalizability.

Results/Data:
ResNet reached a stable DSC of 0.71 ± 0.03 faster than UNETR during training. On test datasets, both models achieved comparable DSCs (~0.69–0.73) for early timepoints. However, UNETR failed to segment later timepoints involving FatSat sequences, whereas ResNet succeeded with reduced performance (DSC ~0.61). Both models performed consistently across individual ROIs, though anatomical variability influenced segmentation fidelity. These findings suggest the importance of diverse training datasets for generalizability.

Conclusions:
This study demonstrates the feasibility of using deep learning architectures for MRI-based segmentation of lymphedema in radiotherapy patients. While both ResNet and UNETR show promise, ResNet's superior adaptability to novel imaging sequences highlights the need for robust model training on diverse data. Automating segmentation could streamline clinical workflows, facilitate earlier detection of lymphedema, and improve the management of radiotherapy-induced complications. Future work will expand the dataset, integrate clinical outcomes, and explore applications in related connective tissue disorders.

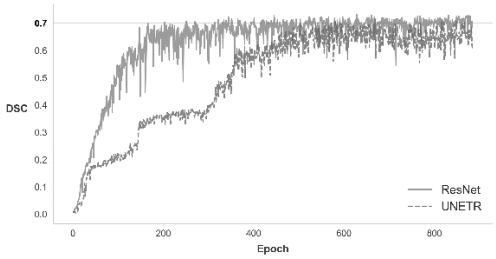

Figure 1. Average DSC scores during training for ResNet and UNETR

Timepoints	Average DSC	
	ResNet	UNETR
1	0.72	0.75
2	0.71	0.71
3	**0.43**	**0.01**

Table 1. Average DSC scores for each architecture at the 3 timepoints