



History of the Surgical Research Laboratory of the University of Puerto Rico

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Introduction: A review of the history of the Surgical Research Laboratory was performed, from its foundation in 1952 by Dr. Frank Raffucci (School of Tropical Medicine), to current time.

Method: The information for the historical review was obtained from the annual reports submitted by the directors of the Surgical Laboratory. Interviews with surgeons who worked in the original facilities and published works provided the early history.

Results: The history of the Surgical Research Laboratory begins at the School of Tropical Medicine under the direction of Dr. Frank Raffucci (1952-1964). A small concrete building in the patio of the school was used as the surgical laboratory. Research on cardiovascular surgery, shock and transplantation were performed and published. The facilities were later moved to a wood building at the Medical Center and it was directed by Dr. Leo Cuello (1964-1967), followed by Dr. Gerhart Ramírez Schon (1969-1972). Finally, under Dr. Eduardo Santiago-Delpín (1972-1977) the laboratory moves to the tenth floor of the current school of medicine. The directors of the facility at the school of medicine have been Dr. Pedro Roselló (1977-1983), Dr. Norma Cruz (1983-2004), Dr. Manuel Más (2004-2015), Dr. Aura Delgado (2015-2017), Dr. Enrique Márquez (2017-2018) and Dr. Anwar Abdul-Hadi (2018-2024). Currently, the facility is used in collaboration with private industry as a surgical simulation center.

Conclusion: The Surgical Research Laboratory continues to be at the forefront. In the early years the emphasis was in research and currently it is used to train surgeons in the new laparoscopic procedures.

Declining Pediatric Surgical Workload

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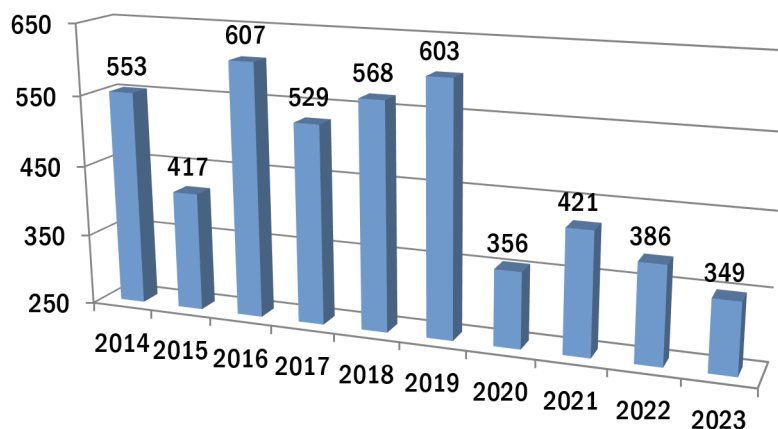
Introduction: The number of births in Puerto Rico has decreased from 67,295 in 2014 to 17,772 in 2023. We evaluated the effect these changes had on the pediatric surgical workload.

Method: Using the University of Puerto Rico (UPR) surgery department database, we evaluated the number of pediatric surgical cases and their characteristics from 2014 to 2023. The cases were separated into subgroups according to age: neonates (birth to age less than 1 month), infants (age 1 month to less than 2 years), children (age 2 to less than 12 years), and adolescents (age 12 to 18). The total number of pediatric cases performed per year was compared to the ones recorded for the adult population during the same period. This database was IRB-approved.

Results: A total of 4,583 pediatric cases had surgery between 1/1/2014 and 12/31/2023. Neonates represented 10%, infants 23%, children 39%, and adolescents 28% of the group. As shown in Table 1, there was a tendency for a steady decline in the total number of cases per year, aggravated by sharp drops in 2015 (retirement of 2 senior faculty members), 2017 (hurricane Maria), and 2020 (COVID-19 pandemic). When compared to 2014, the number of pediatric surgical cases decreased by 37% in 2023, while adult cases decreased by 24% (4,187 vs. 3,190), a statistically significant difference $p < 0.001$.

Conclusion: Puerto Rico's declining birth rate has adversely affected the pediatric surgical workload, resulting in a decrease in the number of surgical cases.

Table 1. Pediatric surgical cases per year



Impact of Gender on Survival and Clinical Outcomes in Craniomaxillofacial Trauma Patients in Puerto Rico: A Retrospective Analysis

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Introduction: Craniomaxillofacial (CMF) trauma presents challenges due to its complexity and the critical regions affected. This study aims to evaluate the influence of gender on acute trauma scores, hospital stay duration, and mortality among patients with CMF trauma in Puerto Rico.

Methods: Electronic medical records of all patients treated for CMF trauma at the trauma center in Puerto Rico from October 2018 to January 2022 were reviewed. Data consisted of sociodemographic characteristics, Glasgow Coma Scale (GCS) scores, Revised Trauma Scores (RTS), length of hospital stay, and outcomes. Injuries were classified by anatomy and stratified by gender. Pearson Chi-Square and t-test were used to determine gender differences. Statistical significance at $p < 0.05$. IRB-approved study.

Results: Our sample comprised 960 males and 201 females ($n = 1161$). Males exhibited a higher mortality rate (12.7%) compared to females (6.5%) ($p = 0.012$). Motor vehicle accidents not related to cars were the most common etiology of trauma in males (24.1%;

$p < 0.001$) and car accidents in females (42.3%; $p = 0.018$). Injury to the middle face had the highest prevalence (males 61.5%; females 54.7%; $p < 0.05$). GCS and RTS were lower for male patients (GCS: $t = -2.840$, $p = 0.005$; RTS: $t = -2.015$, $p = 0.044$), indicating worse neurological status and severe trauma.

Conclusions: These findings suggest the need for gender-specific measures that target trauma prevention and treatment protocols in CMF trauma care. Future research should focus on longitudinal studies to explore the effects of gender on trauma recovery and the underlying factors contributing to disparities.

Impact of Obesity on Outcomes of Gunshot Wounds to the Abdomen or Thorax

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Introduction: The obesity prevalence in Puerto Rico is estimated at 36%, while the incidence of gunshot wounds (GSW) at the Puerto Rico Trauma Hospital (PRTH) amounts to 18%. Therefore, this study aims to evaluate the effect of obesity on trauma outcomes among GSW patients.

Method: We designed an IRB-approved retrospective study of adult patients with thoracic and/or abdominal GSWs admitted to the PRTH during 2019-2024. Patients were classified as obese and non-obese cohorts. The parameters measured using the Trauma Registry were sociodemographic, clinical, hospital course, and outcomes.

Results: Four hundred ninety-eight patients met inclusion criteria, of which 26% were obese. Most patients were male in both groups ($\approx 91\%$, $p = 0.95$), with obese subjects being older than their non-obese counterparts (35 vs. 31 years; $p < 0.001$). The obese cohort was more likely to present with hypertension and diabetes. Furthermore, 35% of patients had an ISS > 15 , regardless of their BMI category ($p = 0.55$). Obese patients were marginally more prone to be admitted to TICU (45% vs. 35%, $p = 0.052$) and require MV (48% vs. 39%, $p = 0.078$). The death rate in the obese cohort (13%) nearly doubled that of the non-obese one (7%) ($p = 0.03$). Obesity was associated with 2.14 (95% CI: 1.04–4.37; $p = 0.038$) times increased odds of death after adjusting for confounders.

Conclusion: Our findings suggest that obesity is a risk factor for trauma mortality among GSW patients. Accordingly, these patients may require aggressive management. Research with prospective design is needed to clarify the controversy regarding visceral fat's protective role in penetrating injuries.

Injury Patterns and Outcomes Associated with the Use of Opioids and Benzodiazepines in Trauma Patients

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Introduction: Opioids and benzodiazepines are widely used and prescribed medications, but their effects on trauma patients, particularly among Hispanics, are poorly understood. This study examines the relationship between these drugs and patient outcomes at the Puerto Rico Trauma Hospital (PRTH).

Methods: We performed an IRB-approved retrospective cohort analysis of patients admitted to the PRTH directly from the scene between January 2000 and May 2023. Patients were categorized based on toxicology results: negative (NEG), benzodiazepine-only (BZO), opioid-only (OPI), and benzodiazepine-opioid (BZO-OPI). Statistical analyses included descriptive statistics, pairwise comparisons, and regression models.

Results: Among the 2,209 patients studied, 14.9% of patients tested positive for BZO, 8.4% for opioids, and 2.4% for both. Opioid positivity was associated with increased odds of intensive care (ICU) admission (AOR: 1.95; 95% CI: 1.16–3.23), while BZO positivity was linked to higher odds of complications (AOR: 1.41; 95% CI: 1.04–1.91). Toxicology results were not associated with in-hospital

mortality, hospitalization time, the need for mechanical ventilation, and costs. BZO and BZO-OPI patients had more severe injuries (ISS $\geq$ 15: 59.3% each vs. NEG: 51.2% and OPI: 44.3%; $p=0.005$). BZO patients had more severe neurologic deficits (27.7%; $p<0.001$) and head/neck injuries (40.4, $p<0.001$). BZO-OPI was related to more heart and lung injuries (55.6%; $p<0.001$).

Conclusion: The study highlights the importance of toxicology screening among patients at a trauma center. Our findings suggest that these drugs are associated with ICU admissions, complications, and severe neurologic deficits, offering valuable insights to improve clinical decision-making and trauma care.

Navigating a Challenging Airway: An Ultrasound-Guided Approach to Urgent Tracheostomy

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Introduction: Ultrasonography is a valuable tool for managing difficult airways in emergency settings, yet its use during awake urgent tracheostomies in patients with complex neck anatomy remains underexplored. This study introduces an innovative algorithm for utilizing ultrasound to guide tracheostomy procedures, aiming to enhance safety and minimize complications.

Methods: A thorough literature review was conducted through PubMed and Cochrane Library, focusing on the role of ultrasonography in airway management, especially during tracheostomy. We synthesized findings on its application in airway evaluation and identified gaps in its use for patients with displaced neck anatomy. The Institutional Review Board (IRB) approved the study, which determined that the research was exempt from review.

Results: Ultrasonography effectively identified key anatomical structures, such as the trachea, cricoid cartilage, and vascular bundles, even in patients with distorted neck anatomy from tumors, radiation, or previous surgery. We developed a stepwise algorithm that integrates ultrasound into clinical decision-making. This approach improved the accuracy of airway structure identification, enhanced procedural safety, and reduced vascular injury risk. While ultrasound may delay intervention in true emergencies, it was invaluable in stable patients, significantly improving the safety and precision of urgent tracheostomies.

Conclusion: This study highlights the critical role of ultrasonography in awake urgent tracheostomies, particularly for complex airway cases. By integrating ultrasound into a structured algorithm, we enhanced patient safety, reduced complications, and demonstrated its necessity for head and neck surgeons managing challenging airways. Our findings support broader adoption of this technology in clinical practice.

A Novel Use of the PROPEL Implant for Transnasal Endoscopic CSF Leak Repair

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Introduction: Transnasal endoscopic surgery has become a highly effective approach for managing anterior skull-base defects. However, in the case of CSF-leak repair, this technique may risk obstructing frontal sinus outflow, potentially leading to iatrogenic frontal sinusitis. Traditionally, stents and gelfoam packing have been poorly associated with preventing these complications. Here, we introduce an innovative application of the PROPEL implant, typically used for localized drug delivery in sinus surgery, as a graft scaffold to stabilize the nasoseptal flap while maintaining the patency of the frontal sinusotomy.

Methods: Inclusion criteria for surgery were based on increased risk of frontal sinus outflow obstruction from defect sizes >2 mm and elevated intracranial pressure (ICP)—IRB-approved study.

Results: The mean age of patients (n=11) was 43.2±9.6 years, with BMIs between 29 to 51 kg/m². Average ethmoid defect size and ICP were 3.9±1.1mm and 26.1±5.1mmHg, respectively. All patients were unremarkable for frontal sinus outflow obstruction or sinusitis during the follow-up period, as confirmed by nasal endoscopies performed 1, 3, and 6 months post-op.

Conclusion: This novel application of the PROPEL implant in ethmoid cavity CSF leak repairs enhanced graft stabilization while preventing frontal sinus obstruction and chronic sinusitis development. Additionally, the drug-eluting nature of the implant may reduce the risk of chronic inflammation and scarring associated with permanent stents. Future studies may expand on the safety and efficacy of this technique.

A Comprehensive Review of Pediatric Hand Burn Management: Clinical, Surgical, and Psychosocial Considerations

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Introduction: Pediatric hand burns are complex injuries with significant clinical, functional, and psychosocial implications. Due to children's unique anatomical and physiological considerations, these injuries require a specialized, multidisciplinary approach. This review explores epidemiology, initial assessment, classification, and treatment modalities, emphasizing comprehensive management to optimize long-term outcomes.

Method: A systematic literature review was conducted using electronic databases. Studies were included if they focused on pediatric hand burns and addressed acute management, long-term outcomes, psychosocial impact, surgical techniques, or rehabilitation. Only peer-reviewed articles, including randomized controlled trials, cohort studies, and case series, published from 2014 onward were selected. IRB-exempt.

Results: Early wound care, such as antimicrobial dressings and soft casting techniques, is essential to minimizing infection and optimizing healing. Furthermore, proper fluid management, nutrition, and rehabilitation will further optimize healing. Surgical intervention, including early excision and grafting, improves functional outcomes but must be carefully timed. Incorporating pharmacologic and non-pharmacologic modalities, such as virtual reality and pain management strategies, enhances patient compliance and recovery. Rehabilitation and scar management, including pressure therapy and laser treatments, are critical in preventing contractures and optimizing function.

Conclusion: Due to significant functional and psychological pediatric, hand burns require a multidisciplinary, patient-centered approach. Early assessment, wound care, and timely surgical intervention are crucial to prevent complications like contractures and scarring. These injuries can lead to significant psychosocial distress, requiring the integration of clinical and psychosocial support to help children cope with emotional and physical scarring. Lastly, prevention through caregiver education and environmental safety is essential.

Prostate Cancer in Biopsy-Naïve Hispanic Veterans: Impact of Multiparametric MRI (mpMRI)

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Introduction: Prostate cancer (PCa) remains a significant health concern among veterans, particularly those of Hispanic descent, who face unique genetic, cultural, and socioeconomic challenges. This study investigates the role of multiparametric magnetic resonance imaging (mpMRI) in improving early detection of clinically significant PCa among biopsy-naïve Hispanic veterans at the Veterans Affairs Caribbean Healthcare System (VACHS).

Method: This retrospective review analyzed medical records from January 2020 to December 2022, comparing outcomes between 72 patients who underwent pre-biopsy mpMRI and 362 who received standard biopsies. The study was IRB-approved.

Results: Clinically significant PCa, defined as a Gleason score ≥3+4, was identified in 87.1% of the mpMRI group and 83.4% of the non-mpMRI group. mpMRI demonstrated high sensitivity (97%) but low specificity (0%) in detecting significant PCa, with a positive

predictive value (PPV) of 84%. Despite its high sensitivity, mpMRI did not enhance overall detection accuracy compared to PSA testing, which achieved 91% sensitivity and 14% specificity. The anatomical concordance rate between mpMRI findings and biopsy results was 81.9%, though significant lesions were missed in 2.7% of cases. Factors such as marital status, comorbidities, and access to mpMRI influenced patient selection. Limitations included a small sample size, reliance on a single radiologist, and the learning curve associated with implementing mpMRI technology.

Conclusion: While mpMRI shows promise as an adjunctive diagnostic tool, this study highlights the need for further refinement and validation of mpMRI protocols to improve diagnostic accuracy and address healthcare disparities in Hispanic veterans. Future multicenter trials with diverse populations are recommended.

Synthetic Electrospun Fiber Matrix for the Soft Tissue Reconstruction in Traumatic Wounds

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Introduction: Traumatic wounds are often complex and contaminated, increasing the risk of infection and extending healing timelines. These wounds commonly require advanced wound healing matrices to achieve complete closure. In this retrospective case series, the use of a fully synthetic electrospun fiber matrix (SEFM) (Restrata®, Acera Surgical, Inc.) for post-traumatic wound healing was retrospectively examined.

Method: Following institutional review board approval (IRB), medical records of patients who received at least one application of SEFM to a traumatic wound between 2023 and 2024 were retrospectively reviewed. Demographics, wound characteristics and treatments, healing outcomes, and incidence of complications, including infection, were gathered. Data was collected from the initial encounter until wound closure or loss to follow-up (LTF).

Results: Eleven patients were identified for study inclusion. All were male, with a mean age of 37.3. The average wound surface area was 129.6 cm². SEFM was applied an average of 33 days post-injury. Complete wound closure was achieved in 73% of patients. SEFM was utilized to prepare for subsequent skin grafting in 64% of patients. Patients who underwent skin grafting have grafted an average of 11 days post-SEFM application. In 36% of patients, SEFM achieved complete wound healing by secondary intention without skin grafting. There were no incidences of wound infection post-SEFM application.

Conclusion: In this study, utilization of SEFM in traumatic wounds provided an effective bridge to either skin-grafting or complete wound healing with no instances of infection. Additional clinical trials should be conducted further to evaluate its efficacy in traumatic wounds across multiple institutions.