



**Notable Grand Rounds**  
*of the*  
**Michael & Marian Ilitch**  
**Department of Surgery**

Wayne State University  
School of Medicine

Detroit, Michigan, USA

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**Chief Residents**

**NOTABLE SESSIONS**  
**AT THE**  
**2024 ACS CLINICAL CONGRESS**

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October 30, 2024



## About Notable Grand Rounds

These assembled papers are edited transcripts of didactic lectures given by mainly senior residents, but also some distinguished attending and guests, at the Grand Rounds of the Michael and Marian Ilitch Department of Surgery at the Wayne State University School of Medicine.

Every week, approximately 50 faculty attending surgeons and surgical residents meet to conduct postmortems on cases that did not go well. That “Mortality and Morbidity” conference is followed immediately by Grand Rounds.

This collection is not intended as a scholarly journal, but in a significant way it is a peer reviewed publication by virtue of the fact that every presentation is examined in great detail by those 50 or so surgeons.

It serves to honor the presenters for their effort, to potentially serve as first draft for an article for submission to a medical journal, to let residents and potential residents see the high standard achieved by their peers and expected of them, and by no means least, to contribute to better patient care.

David Edelman, MD  
Program Director  
The Detroit Medical Center

and

Professor of Surgery  
Wayne State University School of Medicine

**Notable Sessions  
at the  
2024 ACS Clinical Congress**

Chief Surgical Residents

The Detroit Medical Center

*Grand Rounds presentations*

Michael & Marion Ilitch Department of Surgery  
Wayne State University School of Medicine

October 30, 2024

*The American College of Surgeons (ACS) Clinical Congress 2024 (ACS 2024) was held in San Francisco in October. The Wayne State Surgical Society sponsors all of the chief residents to go to the meeting, covering the costs of their airfare, hotel stay, and conference registration. In return for this significant investment, we then ask the residents to report back to us on something that they learned, something they found particularly interesting. The residents and the topics they chose to report on are as follows:*

Catherine Byrd	Lung Cancer Revolution
Michelle Coughlin	The Ethics of Trainee Involvement in Surgery
Benjamin James	Updates on Abdominal Trauma
Alex Lynch	Image-Guided and AI-Assisted Abdominal Surgery
Rachelle Moore	ICU Management of Spinal Cord-Injured Patients
Matthew O'Brien	Management of Adult Head and Neck Masses
Madyson Riddell	Ethical Considerations in Geriatric and Palliative Surgical Care
Amanda Dooley Romero	Implementing the BIG Guidelines for TBI
Ryan D. Rosen	Whole Blood Transfusion in Trauma Care

*Below is a summary of the reports they each presented at Surgical Grand Rounds.*

David Edelman, MD  
Residency Director

## Lung Cancer Revolution

Catherine Byrd, MD

Lung cancer remains one of the leading causes of cancer-related death in the United States and globally, with nearly half of all cases presenting at an advanced stage. Dr. Jessica Donington, Professor of Surgery and Chief of the Section of General Thoracic Surgery at the University of Chicago, presented the John H. Gibbon Jr., Lecture on the transformative changes in lung cancer treatment.

***Stigmatization of Lung Cancer and Implications for Public Health*** Dr. Donington underscored the social and cultural factors that have long influenced lung cancer's prognosis and treatment development. In the 1960s, two-thirds of American men smoked, contributing to high lung cancer mortality. Following the 1964 Surgeon General's report linking smoking to lung cancer, smoking rates began to decline among men, and lung cancer mortality followed. However, due to sociocultural trends such as the sexual revolution, women's smoking rates declined later, delaying a reduction in female lung cancer mortality until around 2005.

The public health response, initially focused on personal health, evolved to address secondhand smoke. Despite these efforts, lung cancer remains highly stigmatized due to its association with smoking, which has impacted funding allocations and slowed the pace of research compared to other cancers.

***Advances in Screening*** Low-dose computed tomography (CT) screening has become a vital tool for early detection of lung cancer. Initially approved in 2013 and updated in 2021, current guidelines recommend screening for individuals aged 50-80 with a significant smoking history.

Key studies, such as the National Lung Screening Trial (NLST) in the United States and the Nelson trial in Europe, demonstrated that low-dose CT significantly outperforms chest X-rays in detecting early-stage lung

cancer and reduces mortality by up to 20%. However, uptake remains low; only around 10% of eligible patients undergo screening, and year-to-year adherence is approximately 50%, due to barriers including racial disparities, geographical access issues, and health insurance coverage.

Expanding access and improving adherence rates remain critical to enhancing early-stage detection rates in the U.S.

***Refinements in Surgical Techniques*** The evolution of minimally invasive techniques has significantly altered the landscape of lung cancer surgeries.

In the 1990s, advancements such as improved video technology, dual-lumen endotracheal tubes, pulse oximetry, and surgical staplers enabled the development of video-assisted thoracic surgery (VATS). Yet, high-quality randomized data comparing VATS to open lobectomy only emerged in 2020, with the VIOLET trial demonstrating better post-operative outcomes for VATS, including reduced pain, quicker recovery, and cost savings. These findings have solidified VATS as a preferred approach for many patients, improving perioperative recovery and allowing more patients to continue with intended oncologic therapies.

In 2010, robotic surgery was introduced to thoracic surgery, but it was not until 2017, when a robotic stapler became available, that robotic lobectomies gained wider acceptance. This development allowed surgeons greater confidence in using robotic technology for lung resections.

***Sub-Lobar Resections*** Historically, lobectomy has been the standard of care for early-stage lung cancer since the Ginsberg study in 1995, which showed poorer outcomes with sub-lobar resections. However, more recent studies have indicated comparable survival rates between sub-lobar resections

and lobectomy for select patients. Advances in imaging, such as PET and CT scans, have facilitated more precise patient selection, allowing sub-lobar resections to become a viable treatment option with similar oncologic outcomes to lobectomy. These developments provide patients with less invasive options and reduce operative morbidity.

### ***Targeted Therapies and Immunotherapy***

Over the past decade, the introduction of targeted therapies and immunotherapies has drastically improved treatment outcomes for advanced lung cancer. Targeted therapies, including PD-L1 and PD-1 inhibitors and biomarker-directed treatments, initially showed success in stage IV disease but are increasingly used in resectable cases, especially stage II disease. Since 2022, 11 major clinical trials have explored various immunotherapeutic and targeted therapy combinations, demonstrating promising outcomes in enhancing survival for patients with early-stage disease.

### ***Funding and Advocacy for Lung Cancer***

**Research** The lecture concluded with a call to improve public health funding for lung cancer research. Due to the disease's strong association with smoking, lung cancer has traditionally received less funding than other cancers, which has limited advancements in treatment. As survivorship improves, however, advocates—including survivors themselves—are bringing attention to lung cancer, helping to secure funding for more comprehensive research efforts aimed at finding a cure.

**Conclusion** The recent advancements in lung cancer screening, surgical techniques, and targeted treatments underscore a revolution in lung cancer management. These breakthroughs not only provide new hope for patients but also highlight the importance of public support and funding for continued research. With improved funding and patient advocacy, lung cancer treatment outcomes are poised to improve significantly, offering an optimistic outlook for one of the most challenging cancers.

## The Ethics of Trainee Involvement in Surgery

Michelle Coughlin, MD

A lecture featuring multiple speakers was presented on the ethical complexities involved in surgical training, with a particular focus on balancing patient autonomy and resident autonomy. Various perspectives on the involvement of residents in surgical procedures at academic institutions were explored. The main themes and ethical dilemmas discussed are summarized below.

***Patient Autonomy and Consent in Academic Medical Centers*** One prominent ethical issue addressed was how to manage cases where patients express a desire that no trainees be involved in their surgery. Academic medical centers necessarily involve medical students, residents, and other trainees in patient care. However, patients may be unaware of the level of trainee involvement or may have personal reservations about it.

The lecture highlighted the importance of transparency, suggesting that institutions could improve communication by updating consent processes to more explicitly inform patients about the educational nature of the institution. Additionally, there was discussion on who bears the primary responsibility for this communication—whether it should fall mainly to the attending surgeons in clinics or also involve residents in pre-operative settings.

***Resident Training and Ethical Challenges of Limited Autonomy*** The lecture noted that for residents, hands-on experience is essential to their training, and limitations on this experience, whether due to patient preferences or institutional restrictions, are a hindrance to learning.

Speakers recounted specific scenarios in which residents established rapport with patients in clinic, only to miss out on the corresponding surgeries due to rotation changes or patient objections. Such discontinuities can disrupt the educational progression for

residents, complicating the ethical balance between patient preferences and the need for adequate training in clinical settings.

### ***Historical Shift in Resident Autonomy***

Resident autonomy has decreased over time, a trend attributed to changing institutional policies, stricter regulatory oversight, and increased public scrutiny of surgical practices. Comparing the current level of attending supervision in surgeries to that of earlier generations, it was noted that residents today have fewer opportunities for independent decision-making.

Although research shows that resident involvement in surgeries does not negatively impact patient outcomes, this information has not fully alleviated public concerns, which may contribute to reduced autonomy. Continued conversation and transparent policies on this issue could foster resident independence without compromising ethical standards or patient safety.

### ***Potential Solutions for Enhancing Resident Training***

To address the ethical challenges related to training and autonomy, the presenters proposed several solutions. These included providing residents with more opportunities through office-based procedural clinics, where minor procedures could be performed under lighter restrictions. Additionally, resident-run surgical services and structured discussions around autonomy could support a more gradual progression toward independence in complex cases.

However, the ethical considerations of “overlapping cases,” where an attending supervises multiple overlapping surgeries, remain complex. While simultaneous surgeries are not permitted, some overlap is allowed, with the attending required to be present for the critical stages of each procedure. This practice seeks to balance resident training needs with appropriate oversight.

***Educating the Public and Building Trust***

The lecture underscored the importance of educating patients and the public on the realities of surgical training. There is often a public perception that the lead surgeon performs every part of a procedure, whereas in reality, complex surgeries require skilled assistance from a broader team, including residents and other trainees.

By fostering a better public understanding of academic training environments, hospitals may encourage greater patient acceptance of trainee involvement and enhance trust in teaching institutions.

***Conclusion*** The ethics of surgical training in academic medical centers require a careful balancing of patient preferences, resident education, and institutional standards. Improved transparency with patients, initiatives to safely increase resident autonomy, and public education on surgical training processes could support ethical practices in these settings. Teaching hospitals should continue to address these evolving needs to maintain high standards of care and ensure effective training for future surgeons.

## Updates on Abdominal Trauma

Benjamin James, MD

Recent advancements in the management of abdominal trauma, particularly for severe colon injuries, highlight the evolving strategies and ethical discussions around high-stakes surgical interventions. Key findings and debates presented in the abdominal trauma session at ACS 2024 are summarized below.

The session covered updates on the management of destructive colon injuries, including research insights on resection and primary anastomosis, as well as a panel discussion on multi-visceral transplants in trauma care.

### ***Management of Destructive Colon Injuries***

A central topic was the evolving approach to managing destructive colon injuries, particularly those classified as grade III to V. The trend in recent years has moved away from diverting ostomies towards primary resection and anastomosis, challenging the long-standing belief that diversion offers better outcomes.

One study presented at the session, analyzing five years of data from the Trauma Quality Improvement Program (TQIP), showed no significant mortality benefit from diverting ostomies in these cases. However, patients who underwent diversion experienced higher rates of infectious complications and extended hospital stays.

The study's authors concluded that, except in specific circumstances, diversion may not be as protective as previously thought, and resection with primary anastomosis should be considered more broadly.

However, the session's speakers expressed caution in abandoning diverting ostomies entirely. The limitations of the study were noted, especially the lack of propensity matching for traditional factors influencing the decision to create an ostomy, such as

resuscitation levels, degree of spillage, or delays in reaching the operating room. It was emphasized that these factors, including vasopressor use, left-sided injury location, and associated pancreatic injuries (which are linked to a tenfold increase in anastomotic leak rate), should still influence surgical decisions.

The conclusion was that while primary anastomosis could be viable in many cases, further research is needed to identify circumstances where diversion may still play a protective role.

### ***Ethical and Logistical Considerations in Multi-Visceral Transplants***

Another session of interest involved a "mega M&M" panel, where residents presented complex trauma cases, followed by discussions with experts on the ethical and practical implications of these high-risk surgeries.

One notable case from Pittsburgh involved a multi-visceral transplant following a gunshot wound to the left flank. After extensive resections, the patient received a transplant of the liver, small bowel, and right colon. Despite surviving to discharge, the patient ultimately succumbed to complications, including a necrotizing infection at a thoracotomy incision.

This case sparked significant debate on the ethical appropriateness of multi-visceral transplants in trauma cases, especially given the national organ shortage. Panelists raised questions about the balance between "pushing the envelope" in trauma surgery and responsible organ use. Advocates argued that advancing surgical boundaries in trauma care could provide vital experience and refine techniques for future patients. Opponents, however, expressed concern over the potential misallocation of scarce resources. The session ultimately concluded that such procedures might be justified in carefully se-



lected cases, provided that they offer a meaningful chance of survival and recovery.

**Conclusion** The abdominal trauma session offered valuable insights into the latest approaches for managing destructive colon injuries and ethical considerations in resource-intensive interventions like multi-visceral transplants. Although evidence increasingly supports primary resection and anastomosis over diversion for destructive colon injuries, questions remain about the nuances of patient selection.

Additionally, the ethical debate surrounding multi-visceral transplants in trauma cases highlights the need for balance between pushing surgical boundaries and responsible resource allocation. These discussions underscore the dynamic, evolving nature of trauma surgery, as well as the ethical complexities inherent in high-stakes decision-making.

## Image-Guided and AI-Assisted Abdominal Surgery

Alex Lynch, MD

In recent years, the use of image-guided interventions in abdominal surgery has been gaining traction, especially as artificial intelligence (AI) and augmented reality (AR) technologies continue to advance. An ACS 2024 presentation on this topic discussed the use of AI and AR to enhance precision in abdominal procedures.

Although image-guided intervention is well-established in fields with more fixed organs, the challenges in abdominal surgery, particularly with mobile organs such as the bowel, highlight the complexities and the potential of AI in improving surgical outcomes.

**Challenges in Abdominal Imaging and AI Application** The primary challenge with AI-based preoperative planning in abdominal surgery lies in the mobility of abdominal organs, especially the bowel, which constantly shifts and layers upon itself. Unlike fixed organs, the variability in positioning complicates planning and intraoperative navigation. However, as AI and imaging technologies evolve, they show promise for use in preoperative planning, intraoperative navigation, and as a tool for surgical teaching, helping surgeons visualize anatomy and make more precise interventions.

**Application of AI and AR in Surgical Planning and Execution** An example given involved a basic case of left-sided lymphadenopathy in a patient with a history of rectal adenocarcinoma. In this case, the surgical team used AI-driven image segmentation and 3D imaging to isolate and study the relevant anatomy preoperatively. After generating a CT scan, they segmented the images to create a 3D model, removing unnecessary structures to focus on the lymph node and its surrounding anatomy. Using Microsoft's HoloLens 2, they generated a hologram of the model, which they could then overlay on the patient's body for intraoperative guidance.

The team was able to adjust the hologram's transparency to match the lymph node's location and the planned incision site precisely. By incorporating ultrasound for additional verification, they confirmed that the lymph node was less than one centimeter from the marked incision site, demonstrating the accuracy of the holographic guidance system.

**Case Example: Targeted Colostomy Creation Using AI and AR** Another use case involved a patient with an obstructing rectal mass who required a diverting transverse colostomy. By utilizing AI-assisted modeling, the surgical team marked the planned stoma site, using both physical examination and AI-guided markers for comparison. With the holographic overlay, they precisely identified the optimal location for the incision, minimizing unnecessary exposure to surrounding tissues. This targeted approach allowed the team to perform the procedure with a single incision, optimizing the patient's outcome by reducing invasiveness.

**Implications for Robotic and Targeted Surgery** Overall, the session provided a forward-looking perspective, noting that as AI technology advances, it will become increasingly valuable, particularly in robotic surgery and in procedures involving fixed structures such as the ureters. AI and AR-guided interventions hold great promise for enhancing the precision of targeted surgery, particularly in complex cases like obstructing rectal cancer, where limited exposure and targeted incisions reduce the risks associated with prolonged intra-abdominal time. With improved imaging and AI tools, surgeons can achieve greater accuracy in targeting specific structures, ultimately improving patient outcomes and reducing morbidity.

**Conclusion** The integration of AI and AR in surgical planning and execution is still in its early stages, but its applications in abdominal surgery are expanding. The potential for

AI to assist in both preoperative planning and intraoperative precision is significant, particularly as technology develops further. With continued advancements, image-

guided interventions promise to enhance surgical outcomes, support minimally invasive approaches, and ultimately improve the quality of care in abdominal surgery.

## ICU Management of Spinal Cord-Injured Patients

Rachelle Moore, MD

Spinal cord injuries (SCI) present a unique and complex challenge in critical care, with approximately 17,000 new cases annually in the United States. While the incidence remains stable, the patient demographics have shifted, with fewer cases resulting from high-risk activities and more from fall-related injuries among older adults. A session at ACS 2024 reviewed current approaches to ICU management of spinal cord-injured patients, highlighting advancements in hemodynamic management, respiratory care, and pharmacological interventions aimed at reducing long-term complications and enhancing recovery.

**Pathophysiology and Phases of Spinal Cord Injury** SCI occurs in multiple phases, beginning with an initial mechanical injury that disrupts blood flow to the spinal cord, followed by a secondary phase that includes inflammation and tissue ischemia. The concept of an ischemic “penumbra” surrounding the hemorrhagic area was emphasized as a target for hemodynamic management to reduce secondary damage. This area represents a critical zone where cellular damage can continue to progress due to inflammatory responses, glutamate release, and calcium influx. Later stages may involve cystic degeneration and perilesional scarring, which can affect long-term recovery.

**Timing of Surgical Intervention: “Time is Spine”** Recent data supports early surgical decompression, ideally within 12 to 24 hours post-injury, when medically feasible. Studies indicate that early intervention can significantly improve neurological outcomes, allowing patients to recover by one to two grades on the ASIA scale. The session highlighted that ultra-early surgery (within 12 hours) has shown particularly promising results, with small studies reporting improvements in up to 89% of ASIA A patients.

However, practical limitations exist for medically frail patients or those requiring preoperative optimization, underscoring the importance of individualized decision-making.

**Hemodynamic Management: Mean Arterial Pressure (MAP) Targets** One of the primary goals in ICU management of SCI is to maintain optimal MAP to promote spinal cord perfusion and prevent further ischemic damage. Studies such as the Catapano study have shown that patients who maintain MAP above 85 mmHg within the first five days post-injury experience better neurological outcomes, while episodes of MAP below 85 mmHg are associated with worse recovery.

Notably, vasopressor use, even at higher doses, has not shown an increased risk of complications, though patients on high doses may have slightly less improvement.

Current guidelines recommend maintaining MAP between 85–95 mmHg for three to seven days, although this varies based on individual patient needs.

**Spinal Cord Perfusion Pressure (SCPP)** Emerging research also considers spinal cord perfusion pressure (SCPP), calculated as MAP minus cerebrospinal fluid (CSF) pressure, as a potential metric for managing SCI patients. However, data from the SQUARE study found no significant improvement in ASIA scores for patients with an SCPP below 50 mmHg, nor for those with MAP below 70 mmHg. This raises questions about the relevance of SCPP at the injury site, as localized swelling may impact pressure measurements.

Ongoing studies aim to clarify the relationship between SCPP and MAP in SCI management.

**Cardiac Complications in SCI** SCI at or above T6 disrupts autonomic regulation, leading to cardiac complications such as neurogenic shock, which can last up to five weeks. The recommended approach includes judicious fluid use alongside vasopressors to maintain MAP, with no particular vasopressor favored. Cardiac complications like orthostatic hypotension, sinus bradycardia, and even cardiac arrest are common in cervical and upper thoracic injuries. Atropine serves as the first-line treatment for bradycardia, and pacemakers may be considered in cases of life-threatening arrhythmias.

**Respiratory Management** Respiratory complications are prevalent in SCI patients, particularly those with high cervical injuries. Early tracheostomy is recommended for patients with injuries above C5 or those with concomitant head injuries, as it reduces ventilator days, ICU length of stay, and overall respiratory complications.

Diaphragmatic pacemakers, which stimulate the diaphragm to increase tidal volume, are a promising intervention for patients struggling with ventilator weaning. While these devices do not significantly improve ventilator liberation at discharge, they reduce hospital costs and enhance quality of life.

**Pharmacological Interventions** The use of methylprednisolone remains controversial, although studies have demonstrated modest benefits for short-term neurological improvement, particularly in cervical SCI patients. However, long-term outcomes converge with non-steroid-treated patients, and the risk of infection may be slightly increased. But despite mixed results, methylprednisolone is often considered in young patients with cervical injuries.

Another potential treatment, riluzole, originally approved for ALS, shows promise for SCI management by blocking sodium channels and reducing cytotoxic damage from glutamate. Preliminary studies suggest that riluzole may attenuate axonal degradation in SCI patients, though more extensive research is necessary to establish its efficacy and safety in this population.

#### **General ICU Management Strategies**

Standard ICU protocols for SCI patients include early DVT prophylaxis, screening for blunt cerebrovascular injury in cervical spine injuries, early Foley catheter removal, and early mobilization. Additionally, maintaining a dedicated respiratory protocol for both ventilated and non-ventilated SCI patients is critical for minimizing complications and promoting early recovery.

**Conclusion** The ICU management of SCI patients requires a nuanced approach to prevent secondary injuries, optimize hemodynamic and respiratory function, and prepare patients for rehabilitation. Advances in hemodynamic targeting, respiratory support, and emerging pharmacologic interventions underscore the evolving strategies aimed at improving outcomes in this challenging patient population. Continued research on factors such as SCPP and new drug therapies may further enhance care for SCI patients in the future.

## Management of Adult Head and Neck Masses

Matthew O'Brien, MD

A session at ACS 2024 reviewed the evaluation and management of adult neck masses, emphasizing a cautious approach where any adult neck mass is presumed malignant until proven otherwise. A systematic approach to diagnosis involves a detailed history and physical examination (H&P), imaging (ultrasound, contrast-enhanced CT, or MRI), and fine-needle aspiration (FNA) or core needle biopsy when indicated.

The session highlighted common benign neck masses as well as management strategies for cutaneous squamous cell carcinoma (SCC) with a focus on risk stratification and follow-up protocols.

### Benign Neck Masses

1. **Sialadenitis and Sialolithiasis** Acute and chronic forms of salivary gland inflammation often arise from duct obstruction or infection. Risk factors include dehydration, polypharmacy, and immune suppression. Staphylococcus aureus is commonly isolated in these cases. Management involves hydration, pain relief, warm compresses, and antibiotics for acute cases. In cases with duct obstruction due to salivary stones, endoscopic retrieval is often effective.
2. **Ranula** A ranula is a mucocele of the sublingual gland that can occasionally extend into the neck, presenting as a mass. Treatment involves excision of the lesion with care to preserve nearby structures, such as the lingual nerve, while removing the mucocele without disrupting the major salivary ducts.
3. **Paraganglioma** Paragangliomas, though rare, can present as asymptomatic neck masses or with symptoms such as dysphagia or Horner's syndrome. These hypervascular tumors are identifiable on imaging by the "lyre sign," a splaying of the carotid vessels. Given their vascular nature, biopsy is generally avoided. Workup includes urine metanephrines, as up to 20% of cases are associated with hereditary syndromes. Surgical resection is the primary treatment when symptomatic or confirmed on imaging.
4. **Thyroglossal Duct Cyst** This midline neck cyst arises from incomplete closure of the thyroglossal duct. Treatment involves the Sistrunk procedure, where the cyst and its tract are excised along with part of the hyoid bone to prevent recurrence. These cysts are commonly seen around the hyoid level on imaging.
5. **Vagal Schwannoma** Vagal schwannomas are benign nerve sheath tumors found along cranial and peripheral nerves, typically presenting in the third to fifth decade of life. These tumors are often removed through intracapsular excision to preserve nerve function, but in cases where preservation is impossible, complete excision may be necessary.
6. **Pleomorphic Adenoma** The most common benign tumor of the parotid gland, pleomorphic adenoma is treated with superficial parotidectomy. Incomplete excision risks recurrence, often leading to the formation of multiple small tumors that are challenging to treat.

### Management of Malignant Neck Masses: Cutaneous Squamous Cell Carcinoma (cSCC)

A significant portion of the talk focused on managing cSCC, particularly the steps fol-

lowing a wide local excision and assessing the patient's risk of nodal disease and recurrence. In cases with clinically node-negative (cN0) disease, patients are stratified into low, high, and very high risk based on pathological factors, which guide surveillance and further treatment planning.

- **Risk Stratification** High-risk and very high-risk factors include poor differentiation, desmoplastic histology, and tumor size >4 cm. These factors warrant closer follow-up, as well as possible adjuvant therapies.
- **Surveillance and Treatment** For patients with high-risk or very high-risk features, gene expression profiling can further categorize patients by the likelihood of nodal metastasis. A class 1 result indicates a low (6.6%) risk of nodal disease, while class 2A and 2B indicate moderate (20%) and high (52.2%) risks, respectively. Radiation therapy is typically recommended when the risk of occult nodal metastasis exceeds 20%, while elective nodal dissection is advised when the risk is greater than 30%.

### Conclusion

Adult neck masses require a thorough and systematic approach, treating each case with suspicion of malignancy until benign conditions are confirmed. Dr. O'Brien emphasized that precise risk stratification in SCC management is essential for tailoring follow-up and determining the need for adjuvant treatments.

## Ethical Considerations in Geriatric and Palliative Surgical Care

Madysen Riddell, MD

A series of presentations at ACS 2024 focused on ethics in geriatric and palliative care, covering topics from cost-conscious surgical practice to palliative care in trauma settings. The talks examined how limited resources impact patient care, the ethical implications of cost-saving measures, the prevalence of “second victim syndrome” among surgeons, and innovative approaches to incorporating palliative care into trauma care.

***Ethical Challenges in Cost-Conscious Surgical Practice*** One presentation discussed the ethical implications of balancing cost with quality of care in surgery. Historically, the ACS has warned against modifying care based on cost alone, suggesting this could compromise ethics. However, the reality of resource limitations in some hospitals has prompted a reassessment of this view. The principle of distributive justice suggests that physicians must consider future patients and not exhaust limited resources on current cases unnecessarily.

For example, during the COVID-19 pandemic, hospitals reduced inpatient stays and discharged patients sooner to minimize exposure risk, demonstrating that some procedures traditionally requiring an overnight stay could safely shift to outpatient care. This same principle applies to resource substitutions, such as using cheaper laparoscopic ports. However, the presentation emphasized that while such measures are sometimes necessary, they should not compromise quality, especially in settings where the rationale is profit-driven rather than resource preservation for the community.

Surgeons and administrators were encouraged to engage in collaborative policy discussions on resource use rather than applying cost-saving measures arbitrarily on individual patients, as this could introduce bias. This was highlighted by questions regarding

training and transparency: when and how are residents educated on resource management, and who makes these decisions?

***Second Victim Syndrome in Surgery*** Another compelling presentation addressed “second victim syndrome” (SVS), a form of PTSD experienced by healthcare providers following adverse patient outcomes. In surgery, where an estimated 9.2% of cases result in complications, SVS is common, though poorly recognized and managed. Early-career surgeons and senior residents, who are making critical decisions and feel directly responsible for outcomes, are at the highest risk.

SVS severity is influenced by the degree of harm to the patient, the nature of the error, and the provider’s perceived responsibility. Current institutional approaches, such as mandatory programs and morbidity and mortality (M&M) conferences, may be inadequate or even harmful in addressing SVS. Though no definitive treatment strategies were presented, there was consensus that recognizing and addressing SVS appropriately could benefit both surgeons and patients long-term.

***Palliative Care in Trauma Patients*** The final and most impactful presentation examined the integration of palliative care in trauma settings, with the University of Utah sharing its proactive approach. Despite ACS Trauma Quality Improvement Program (TQIP) guidelines recommending palliative care consultation for trauma patients, few institutions consistently apply these recommendations. A simple guideline, it was found, is insufficient to effect meaningful change.

To address this, the University of Utah developed a comprehensive “palliative care bundle” integrated into their electronic medical records (EMR) two years post-guideline release. The bundle includes a palliative care



calculator for trauma ICU admissions that considers risk of mortality, risk of disability, pre-injury functional status, and a prognosis question: “Would you be surprised if this patient died within a year?” Based on the score, the system prompts actions such as establishing healthcare proxy, code status, and advanced directives, ensuring early and essential palliative discussions are part of routine trauma care.

The bundle mandates family meetings within 72 hours of admission to establish goals of care, with responsibilities clearly outlined among team members: social workers manage the documentation of healthcare proxies and advanced directives, residents complete the palliative care assessment, and ICU attendings dedicate specific times for family discussions. This structured approach resulted in 95% of trauma patients receiving palliative consultations before death, a significant improvement from one-third before the intervention.

incorporating a palliative approach in trauma is not “giving up” but offering a necessary resource for patients and families to navigate their options and prepare for end-of-life considerations. She suggested potential actions to increase palliative care awareness, such as a palliative care journal club or grand rounds lecture, to normalize and destigmatize palliative involvement in trauma and surgical care.

**Conclusion** These sessions highlighted the importance of ethical, resource-conscious decision-making, the impact of SVS on healthcare providers, and the essential role of palliative care in trauma. Moving forward, a collaborative and structured approach to these ethical issues is necessary to ensure that patients, both current and future, receive equitable and compassionate care.

## Implementing the BIG Guidelines for TBI

Amanda Dooley Romero, MD

A panel presentation at ACS 2024 reviewed the BIG (Brain Injury Guidelines) criteria, developed to triage traumatic brain injury (TBI) patients, assess their risk for progression, and determine when neurosurgical consultation or transfer to a higher level of care is necessary. This presentation featured contributions from prominent figures in trauma care, including Dr. Bill Joseph, the primary developer of the BIG criteria, and explored the impact of these guidelines in improving resource utilization across trauma centers.

**Purpose and Significance of the BIG Criteria** TBI is a prevalent and costly condition, with an individual sustaining a TBI every 15 seconds in the United States. TBIs lead to over 611 hospitalizations and 192 deaths daily, costing the healthcare system approximately \$41 billion per year. Notably, 25% of Americans live in counties without a practicing neurosurgeon, making efficient triage and management critical, especially in rural and underserved areas.

The BIG criteria were established to provide guidelines on:

- When to consult neurosurgery.
- When to repeat head CTs.
- When to transfer patients to higher levels of care.

Data from the University of Arizona demonstrated the effectiveness of the BIG criteria, showing a 35% reduction in repeat head CTs, a 19% reduction in neurosurgery consultations, and a 33% decrease in hospital costs without compromising patient outcomes.

**Implementation of the BIG Criteria in Trauma Systems** Applying the BIG criteria at trauma centers has led to significant reductions in unnecessary interventions, particularly among BIG 1 patients (those with minor head injuries and stable neurological exams).

These patients can often be observed in the emergency department for six hours before discharge, avoiding repeat CTs, neurosurgery consultations, and ICU admissions. For example, the University of Arizona achieved a 60% reduction in repeat head CTs, 81% reduction in neurosurgery consults, 27% reduction in hospital admissions, and a 20% reduction in costs for BIG 1 patients.

### Challenges and Solutions for Implementing BIG Criteria

1. **Liability Concerns** Emergency physicians often express discomfort with managing head injuries without consulting neurosurgery. Institutional protocols are needed to address these liability concerns and ensure compliance with BIG criteria, especially for minor head bleeds.
2. **Emergency Department Length of Stay (LOS)** Hospitals frequently prioritize reducing LOS in the ED, but the BIG criteria may require extended observation for certain patients. At the University of Utah, data showed that TBI patients could typically be diagnosed within three hours, thus requiring only a few additional hours of observation under the BIG criteria. Importantly, institutions can adjust their metrics to exclude BIG 1 patients from LOS calculations, aligning with the criteria without impacting performance metrics.
3. **Follow-Up Care** Ensuring continuity of care for TBI patients discharged under the BIG criteria requires a structured follow-up system. Institutions can establish networks of primary care providers and trauma clinics, eliminating the need for patients to seek follow-up care with neurosurgery unless complications arise.

### **Benefits and Impact of the BIG Criteria**

Applying the BIG criteria can prevent unnecessary transfers, particularly in rural areas where patients might otherwise be transported long distances to reach level one trauma centers. Data from UC Davis indicated that 42% of transferred TBI patients were discharged within 48 hours, underscoring the potential for resource savings if these patients could be managed locally.

A study using the TQIP database reviewed over 117,000 TBI cases at level one and two trauma centers, finding that 45% were transferred from outside facilities, and 52% of those were discharged within two days. Implementing the BIG criteria broadly across trauma systems could reduce unnecessary transfers, saving time, money, and resources.

### **Future Directions and Innovations**

**1. AI Integration** AI algorithms could enhance the BIG criteria by assisting in clinical decision-making and providing remote support for TBI management, particularly in facilities without neurosurgeons or trauma surgeons.

**2. Pediatric Applications** The BIG criteria are currently being adapted for use in pediatric patients, aiming to create standardized guidelines across age groups for more efficient triage and care.

**3. Telehealth Expansion** Telehealth has the potential to support TBI care by allowing remote consultation for patients in rural areas, reducing the need for physical transfers to level one trauma centers when local monitoring is sufficient.

**4. Standardization of BIG 1 Patient Management** Some institutions are exploring whether BIG 1 patients could be managed similarly to closed head injuries without hemorrhage, further streamlining care and reducing unnecessary interventions.

### **Conclusion**

The BIG criteria offer a framework for managing TBI patients effectively while reducing unnecessary resource utilization. As the criteria are implemented more widely and adapted with AI and telehealth, they hold the potential to transform trauma care, particularly in rural and underserved regions. With continued refinement, the BIG criteria can promote patient-centered, efficient care, reducing costs and enhancing access to appropriate resources in trauma systems across the country.

# Whole Blood Transfusion in Trauma Care

Ryan D. Rosen, DO

A lecture at ACS 2024 focused on the use of whole blood transfusions in trauma care, with emphasis on pediatric patients but also applicable to adults. Whole blood transfusions have seen renewed interest due to their potential for balanced resuscitation, reduced donor exposures, and improved patient outcomes. The lecture examined arguments supporting whole blood use, including studies on resuscitation balance, survival outcomes, cost considerations, and ethical challenges, particularly in resource-limited settings.

## **1. Balanced Resuscitation with Whole**

**Blood** One of the main advantages of whole blood transfusion is its ability to achieve balanced resuscitation quickly. The traditional approach using component therapy—packed red blood cells (PRBCs), plasma, and platelets—often results in imbalances as clinicians work to match patient needs dynamically. Data from the TQIP (Trauma Quality Improvement Program) database revealed that many patients receiving component therapy fluctuated between unbalanced ratios throughout resuscitation, potentially compromising efficacy.

A key study showed that trauma patients receiving whole blood reached a balanced transfusion state immediately, with significantly lower overall blood volume requirements compared to component therapy. For instance, pediatric patients received 50 mL/kg of whole blood versus 85 mL/kg with component therapy, resulting in fewer blood donor exposures and lower risk of alloimmunization. Whole blood transfusion was also associated with shorter ICU stays, suggesting an efficiency benefit over traditional methods.

## **2. Improved Patient Outcomes with Whole**

**Blood** Whole blood transfusion offers hematologic advantages, providing higher hematocrit levels (compared to PRBCs alone), more functional platelets (stored cold), and

undiluted coagulation factors. Studies have shown these benefits lead to higher coagulation efficacy and may improve survival rates, particularly in patients with severe trauma.

The presenter referenced a prospective study that demonstrated increased survival for trauma patients receiving whole blood, especially in those with an Injury Severity Score (ISS) between 5 and 40, with a 60% reduction in overall transfusion volume. Additionally, an analysis from TQIP data indicated a 42% reduction in four-hour mortality and a 54% reduction in 24-hour mortality when any whole blood was used. These findings suggest that even limited access to whole blood can significantly improve early outcomes in trauma care.

**3. Cost and Resource Considerations** Although initially perceived as cost-prohibitive, recent studies indicate that whole blood transfusion may reduce overall costs in trauma care. An institution-specific analysis showed that after implementing a whole blood transfusion protocol, the facility saw a 17% reduction in annual blood product costs, saving nearly \$927,000. Whole blood also minimizes logistical challenges associated with component therapy, which requires higher storage and handling costs.

However, whole blood availability remains limited due to the short shelf life (35 days) and the rarity of O-negative blood, a universal donor type. Strategies to mitigate waste include repurposing near-expiration whole blood for surgeries with predictable blood loss, such as cardiac or craniofacial procedures.

## **4. Ethical Concerns: Alloimmunization and Waste**

The use of Rh-positive whole blood in Rh-negative females of childbearing age poses a risk for alloimmunization, which can lead to hemolytic disease in future pregnancies. Surveys of previously alloimmunized mothers indicated that while 56% would ac-

cept a minimal increase in survival (0-4%) to justify the risk of alloimmunization, the decision remains ethically complex, particularly in emergency situations where patient survival is prioritized.

Additionally, there is a risk of waste with whole blood due to its shorter shelf life compared to components. Only 1-8% of the population has O-negative blood, making it a valuable resource. Some institutions repurpose whole blood nearing expiration for elective surgeries to prevent waste, balancing resource efficiency with patient care.

### **Conclusion**

Whole blood transfusion presents compelling benefits for trauma care, including faster balanced resuscitation, improved survival outcomes, and potential cost savings. While ethical and logistical challenges remain—such as the risk of alloimmunization and waste—strategic protocols and repurposing practices can help maximize whole blood's impact. Future research and resource allocation strategies will further clarify whole blood's role in trauma care, particularly in balancing efficacy with accessibility.