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ARTICLE

The Acute Care Surgery Initiative

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ABSTRACT

Acute Care Surgery describes a new surgical practice paradigm and a surgical training curriculum. This article will highlight the history and driving forces behind this initiative, describe the training curriculum and its requirements, and discuss the practice and setting of a surgeon trained in this area of expertise. While there are no new technical surgeries represented in the model, it is a unique way to utilize surgical expertise that is focused on emergent and acute problems. The purpose of this article is to make the reader aware of this model of surgical care, and to consider the advantages to incorporating this into their own environment. It is unclear if this practice paradigm, which is remarkably attractive to graduates of US general surgery training programs, will become more international in scope.

Acute Care Surgery is a relatively new focus of surgical training and a practice paradigm that has arisen in the United States of America (USA). It is based on a single surgeon, or a group of surgeons, providing care for the trauma patient, the emergency general surgery patient, and surgical critical care. These three components are all considered very time-sensitive injuries or illnesses, and often involve a critically ill patient requiring intensive care unit nursing care. The international community has begun to consider the acute care surgeon, as defined by this training and practice paradigm, as an model of essential importance in developing nations.¹⁻³

The origin of this practice and training paradigm can be traced to a March, 2003 a joint meeting of the leadership of the American College of Surgeons Committee on Trauma (ACS-COT) and the Association for the Surgery of Trauma (AAST), Eastern Association for the Surgery of Trauma (EAST), and Western Trauma Association (WTA). This unusual meeting of all of the leaders of these surgical societies was to consider the future viability of trauma surgery as a career and training paradigm. These four surgical societies represent all professionals practicing trauma and emergency general surgery in the United States, including both university/academic programs and independent/private practicing surgeons. The goals of this and subsequent meetings were to re-define the training and practice of trauma surgery to make it a viable, attractive, and sustainable career, in the best interest of patient care, and importantly, to

keep trauma care a surgical discipline. A survey of trauma surgeons at that time emphasized that the vast majority felt that the practice of trauma care only was not sustainable, and without changes, trauma surgeons would become extinct, and trauma care would be relegated to emergency physicians, anesthesiologists, medical hospitalists, or critical care internists, with multiple consultations for specific surgical procedures.⁴ The result was the formation of a working group within the AAST that developed a surgical training curriculum that is expected to meet the needs of the future generations of surgical trainees and anticipated practice preferences, but perhaps more importantly was a response to a growing shortage of on-call surgeons and the needs of patient care.⁵

By the early part of the 21st century, the United States (US) was experiencing a critical shortage of surgeons willing to take any emergency call. A 2006 Institute of Medicine report entitled "The Future of Emergency Care" highlighted the deficits in care of the emergent patient.⁶ Demand for emergency medical care had increased by 26% between 1993 and 2003, yet the number of Emergency Departments (ED) decreased by 425 over that same time period, and the number of hospital beds decreased by 198,000. In 2003, there were approximately 114 million ED visits (39 per 100 people), a 26 percent increase since 1993.⁷ ED crowding was, and continues to be, a widespread problem, with ED boarding up to 48 hours common practice. In 2003, ED overcrowding

led to over 500,000 instances of ambulance diversion, nearly one per minute. Added to this overcrowding crisis is the lack of specialty coverage. Over three-quarters of hospitals report a problem with ED specialty services on-call coverage. The lack of available neurosurgeons is a particularly critical problem. Part of this problem can be attributed to a growing demand, particularly at designated trauma centers, coupled with the lack of adequate reimbursement and a perceived increased medical liability in this patient populations. This combination of overcrowding and lack of specialty services raises significant questions as to the ability of emergency medical services in the US to respond to a major national disaster. EMS received only 4% of Homeland Security first responder disaster funding in 2002 and 2003.

Other problems faced by trauma surgery challenged the viability of this specialty. It is perhaps worth noting for this audience that in the United States, all long-bone fracture care is provided by orthopedic surgeons, most head injury and all operated head injury care is provided by neurosurgeons. The trauma surgeon in the US in designated trauma centers is responsible for ED resuscitations, admission, and overall care of the patient, including operations involving chest, abdomen, and soft tissue. The designation of trauma centers is largely overseen, verified and enforced by the American College of Surgeons Committee on Trauma (ACS-COT), with state-specific legislative authority for this designation, which allows for special funding and enhanced

financial resources.⁸

As non-operative management of solid organ injuries became more accepted and deemed safe, the vast majority of trauma celiotomies disappeared, and trauma surgeons were left to care for patients operatively managed by neurosurgeons and orthopedist.^{4,9} Residents and students largely perceived trauma surgery as a non-operative field. Trauma surgeons themselves shared this concern. A 2002 survey of the operative experience of surgeons practicing in Level I and II ACS-COT verified trauma centers revealed that over one-half of the Trauma Directors at 79 Level I facilities performed fewer than 50 operations per year, and more than 70% of the other surgeons providing trauma care did fewer than 50 operations per year.¹⁰ The lack of operative experience was even more dramatic at Level II centers, where 70% of trauma surgeons did fewer than 20 operations per year. Fakhry et al estimated that a surgical resident would have to provide non-operative care to 500 blunt trauma patients for every splenectomy or liver-injury repair.¹¹ The rates for trauma laparotomy had fallen to 39 per 1,000 trauma admissions for high blunt-trauma volume institutions.

This represented a far cry from the de-facto trauma centers in the 1960's-1970's in the city-county hospitals, where research and a new understanding of resuscitation strategies arose from the Vietnam War era.¹² During the ensuing two decades, trauma surgery became an attractive career based largely on the mentorship of general surgeons in urban city-county hospitals such as Chicago

{Freeark}, Dallas (Shires), and San Francisco (Blaisdell), and was rapidly spread by devotees of these charismatic leaders. They epitomized the master technician who developed an academically productive career based on the physiology of the injured patient. These trauma surgeons (although they did not call themselves that) operated confidently and effectively in all body cavities, and perhaps were the last of the "master surgeons" that once were the hallmark of general surgery. Operating primarily in large volume, public, city-county hospitals, these surgeons were also typically referred the most challenging surgical problems not only in their own institution, but from around the city or region, particularly if there was a financial disincentive to caring for the patient at another hospital. Consequently, the city-county or "safety net" hospital trauma surgeons developed an active elective surgical practice while providing trauma coverage.¹³ This practice pattern has largely disappeared, driving the nostalgic article by surgeons who trained and practiced in this era, entitled "Eraritjaritjaka", an Australian aboriginal word meaning a longing for things lost.¹⁴

Adding to this problem was that most designated trauma hospitals require their trauma surgeon to have added expertise in Surgical Critical Care, and in fact nearly all trauma surgeons in the United States are also board certified in critical care and provide critical care for all trauma patients, regardless of organs injured. The extra training in surgical critical care adds to this problem as operative

experience during the nine of the twelve months of surgical critical care training is forbidden. The majority of patients cared for by trauma surgeons have never had an abdominal or thoracic operation, but most have had an operation by another surgical specialist, notably an orthopedist or neurosurgeon. Residents saw trauma surgeons as resuscitation doctors who surrender the actual operating to others. Remuneration for this effort is significantly less than that received by the operating surgeons, particularly considering the time involved. Added to this are the largely unrewarding jobs of interdisciplinary coordination, communication, and discharge planning. This is a far cry from the "golden age of trauma surgery", nostalgically describe as a time when trauma surgeons were considered "master surgeons" who operated on the neck, chest, abdomen, and any injured vessel, and non-operative management was unusual.¹⁵ Indeed, one of the suggestions from current trauma surgeons practicing in "safety net" hospitals is less dependence on multiple specialty surgical and non-surgical providers (e.g. interventional radiologists), and more of a reliance on a more broadly trained acute care surgeon.¹³

To a large extent, trauma surgeons worked unappealing hours, with a great deal of unpredictability, high stakes and high stress. The strains of sleep disruption, ill patients, high patient mortality rates, personal infectious risks and the witnessing of carnage to another human carry an emotional toll that may be too high for most students and

residents. It also is true that many physicians perceive trauma patients as “undesirable”, as they are often intoxicated or drug-altered with no insurance nor means of paying, yet the medical-legal expectations are unchanged.

Stresses external to the discipline of surgery also affected a change in all of medicine. The public, payers and legislators are expecting improvements in both the process and outcome of care. The expectation of a continuous in-house physician is no longer confined to the emergency room, but extends to the ICU, the trauma team, and the in-patient floors. Yet this expectation of continuous presence is challenged by equally strong expectations of a limited workweek. The demographics of medicine are changing as well, with more women entering higher education, medical school, and surgery. This changing demographic is undoubtedly having an impact trauma surgery.¹⁶

With these formidable challenges in mind, the American Association for the Surgery of Trauma (AAST) set out to develop a training paradigm and a career practice model that would prove to be attractive, needed, viable and sustainable. The work of the AAST ad hoc Committee on Acute Care Surgery (or commonly called The Future of Trauma Committee) lead to this proposal: trauma and general surgery should together create a specialist that has broad training in elective and emergency general surgery, trauma surgery, and surgical critical care.¹⁷ A graduate of this training paradigm would be

responsible for managing acute general surgical problems, provide on-call coverage for general surgical and specialty services, providing surgical critical care and manage acute trauma. This specialist could do “shift” work, not unlike the emergency physicians, if local practice patterns support this approach. While initially considered, the added training to encompass selected and limited neurosurgical and orthopedic procedures was met with rather stiff resistance for the leadership of these fellow surgical specialists and has largely been abandoned. The training of this specialist would require core general surgery training, and the advanced training and experience of these surgeons is substantial, so as to not just allow, but to encourage the development of a diverse elective surgical practice, again, as local practice patterns permit. This indeed would provide adequate training and experience for the Acute Care surgeon to practice a wider spectrum of complex surgical operative cases, both emergently and if practice patterns allow, electively. By 2007 the AAST had established the curriculum, competency tools, case registry, certification criteria, and set about with in-person site visits for verification of training programs.¹⁸

The naming of this new trauma specialist fostered a good deal of discussion, with the terms “surgical hospitalist”, “acute care surgeon” or an “emergency-trauma surgeon” being among others considered. The AAST settled on the name “Acute Care Surgeon: Trauma, Critical Care, and Emergency Surgery”, suggesting that the

term acute care surgeon needed some explanation while first developed. This concept addresses all the issues that threatened trauma surgery as a specialty. First, the broadened skills and broadened techniques that are available to the new trauma specialist make it a more operating specialty. Second, the option of working on a preset schedule allows for a more controllable lifestyle, and potentially makes this specialty more attractive to surgeons who wish to take a more active part in childrearing or other life integration activities. Third, the expanded training and expertise in technically challenging operations will foster the role of the Acute Care Surgeon as the most experienced surgeon for most circumstances in most hospitals, a resource for all the medical staff. Fourth, since this surgical specialist will most commonly be “in-house” 24-hours a day, the likelihood of significant complications due to lack of an experienced surgeon at night and on weekends will be reduced; thus, the cost of care is likely to be reduced. Additionally, fewer on-call disruptions to historically “elective” surgical practices should be appealing to other surgeons on staff. Finally, in academic centers, the ready availability of an in-house surgical specialist will increase the exposure of medical students and residents to surgical attendings.

The following steps were taken to establish this new surgical specialty or practice paradigm. The AAST has developed a comprehensive curriculum for a two-year expanded training in trauma surgery,

emergency non-trauma surgery, and Surgical Critical Care. (Table I) This curriculum and training is expected to be in addition to (i.e., follow) certification in core general surgery. Conceptually, this two-year program involves 9 months of critical care, 15 months of trauma and advanced surgical operative skills, and includes at least 12 months of trauma and emergency surgery call. Those surgeons interested in only surgical critical care aspect could limit this training to one year, as is the current practice. Some changes to the curriculum and requirements continue to evolve, such as a refinement of the operative case requirements and a shift from a rotation-based curriculum to a longitudinal/experiential model with case minimum requirements, but the concept remains unchanged.¹⁹⁻²¹

Table. Conceptualized and Ideal Acute Care Surgery Fellowship Training
Two Year, 24-month curriculum:

<i>Required Clinical Rotation</i>	<i>Length</i>
<i>Surgical Critical Care:</i>	
▪ <i>Trauma/Critical Care (resuscitative and post-op management of complex surgical illness related to general surgery and trauma)</i>	<i>6 months</i>
▪ <i>Electives in Critical Care (management of complex critical illness such as pediatric surgical critical care, neuro critical care, burns, etc.)</i>	<i>3 months</i>
<i>Emergency and Elective Surgery</i>	<i>15 months</i>
<i>Total</i>	<i>24 months</i>

Suggested rotations during Emergency and Elective Surgical experience.

<i>Suggested Emergency & Elective Clinical Rotations</i>	<i>Length</i>
▪ <i>Acute Care Surgery</i>	<i>4-6 months</i>
▪ <i>Thoracic</i>	<i>1-3 months</i>
▪ <i>Transplant/Hepatobiliary/Pancreatic</i>	<i>1-3 months</i>
▪ <i>Vascular/Interventional Radiology</i>	<i>1-3 months</i>
▪ <i>Orthopedic Surgery</i>	<i>1 month</i>
▪ <i>Neurological Surgery</i>	<i>1 month</i>
▪ <i>Electives (Burn Surgery and Pediatric Surgery recommended; others would include: Endoscopy, Imaging, Plastic Surgery, etc.)</i>	<i>1-3 months</i>
▪ <i>Or: maximize time in above rotations</i>	
<i>Total</i>	<i>15 months</i>

Since the inception of this concept now nearly 20 years ago, this training paradigm has flourished both in terms of attracting general surgery graduates looking

to specialize in a field, hospitals employing the acute care surgeon model for trauma, emergency general surgery, and surgical critical care coverage, and the number of

academic medical centers that have adopted this training paradigm. Exemplifying this interest is the number of surgical trainees selecting Acute Care Surgery as their career choice. In the United States, there are about 350 general surgery training programs with about 1480 annual general surgeon graduates. In 2022, 270 (18%) elected to pursue fellowship training in Surgical Critical Care, an essential component of Acute Care Surgery and the best available surrogate for those selecting this career option.²² In comparison, 7% opted for colorectal surgery fellowships, 5% surgical oncology, 3% pediatric surgery, 6% thoracic surgery, and 9% vascular surgery.²³ Additionally, the number of academic training programs for Surgical Critical care has grown from 134 programs in 2019 to 164 programs in 2023. This is remarkable considering surgical critical care was not recognized as a specialty by the American Board of Surgery until 1986.²⁴

The American Board of Surgery has recognized this new specialty by adding an Advisory Council in Trauma, Burns, and Critical Care in 2005, and subsequently recognizing it a component board in 2011. This came at a time when the ABS added three other new Advisory Councils including Surgical Oncology (including breast and endocrine), Transplantation, and Gastrointestinal Surgery (includes endoscopy, hepato-biliary, and bariatric surgery). These advisory councils are comprised of surgeons representing the specialty societies, and their purpose is to give advice and guidance to the American Board of Surgery on their areas of expertise,

recognizing the importance of these areas to practicing surgeons. American training in general surgery remains a five-year long clinical training (often with 1-2 years of research/investigation incorporated), with sub-specialty training to follow, based largely on the perception or fact that work hour restrictions and more direct supervision has made surgical trainees inadequately prepared for independent practice in less than five years, and 80% of graduates seem to support this notion with their selection of further subspecialty training. Nonetheless, the ABS continues to debate, along with other surgical societies, the merit of developing a core general surgical training module of 2-3 years, followed by 2-3 years of "specialty" training. The Acute Care Surgeon model would fit well within that conceptual framework as outlined by members of the American Surgical Association panel on the future of surgical training.²⁵

The AAST remains the academic surgical society that oversees the approval of training site, modifies the curriculum, provides a test of knowledge competency, and awards a certificate. This model of specialty societies developing and approving training paradigms is common in the United States, and includes transplant surgery, breast surgery, endocrine surgery, and minimally invasive surgery, among others. The more established pathway is through the American Council on Graduate Medical Education (ACGME) which oversees general surgery training and essentially all "general" or first steps of medical training after medical school. As a rule, trainees in an

ACGME-approved training program are called “residents”; trainees in programs not approved by the ACGME, but sponsored by academic societies, are called “fellows”. There is, however, general misuse of these two terms. As of 2023, there are a total of 28 fully accredited Acute Care Surgery training programs, and a dozen more academic centers considering applying to be a fellowship training site.²⁶

This proposal has been met with some resistance, and considerable misunderstanding. An article in the Bulletin of the ACS highlights some of this angst and misconceptions, but should be expected given the rather rapid rate at which this change is being advanced.²⁷ One of the most prevalent concerns is that this new specialty will mimic the European or Dutch model of trauma care.²⁸ The leadership of the orthopedic trauma community argues against trauma surgeons partaking in “operative” orthopedic trauma care in this country, although splinting and treatment of joint dislocations are widely practiced by emergency medicine trainees and would be supported. They recognize the dissatisfaction with the current model of trauma care by general surgeons, but seem to advocate for an abandonment of overall leadership of trauma care by surgeons²⁹, perhaps a reflection of their general practice of having internists or medical hospitalists provide much of the pre- and post-operative care, a practice that has not yet been challenged by sharing global billing practices. Neurosurgeons have been equally adamant about not formally supporting the training in neurosurgical

procedures, even the placement of ICP monitoring devices, which cannot be supported by lack of a skill set but more by a protection of domain and a legitimate concern about the decision-making process involved in the overall management of the head injured patient.³⁰ Nonetheless, the AAST and the trauma surgical community agrees that when specialty surgeons, like neurosurgeons or orthopedic traumatologist are available and at the bedside, the patient is best served. The Acute Care Surgeon could and should be an ally and aide to other surgical specialists by assisting them with care, and procedures, when training and hospital practice patterns support this type of collegial arrangement. The debate remains: how to provide care if the currently defined “specialists” are not responding or not available?

Other challenges, such as the role of the Acute Care Surgeon in vascular emergencies, including interventional radiological procedures, remains to be addressed, although a small cadre of surgeons trained in both acute care surgery and vascular surgery is making an impact at some centers.^{31,32} It is hoped that some acute care surgeon training sites will be able to provide intervention radiology skill training (e.g. percutaneous drainage of abscess, biloma, etc.), some will provide neurosurgical operative skills (e.g. ICP monitoring, cranial flap elevation), and some orthopedic skills (e.g. open fracture washout, debridement, splinting, external fixation), while all will provide emergency general surgery, trauma,

and surgical critical care experience in a well-defined curriculum guided by the six core competencies set forth by the ACGME.³³ As Acute Care Surgery training programs and practice paradigms continue to expand, many programs are beginning to publish their personal version of this practice paradigm, with evidence to support patient care benefits.³⁴⁻³⁷

Conclusion

The accomplishments and incorporation of Acute Care Surgery into the practice patterns surgery are all signs of a new specialty. There is a clear body of scientific medical knowledge underlying the specialty of Acute Care Surgery. This knowledge is distinct from, or more detailed than, the core body of general surgery. There is a regular presence in academic units and health care organizations of educational programs, research activities, and clinical services of Acute Care Surgery, and there exists a large cadre of surgeons concentrating their practice in this arena. There are national medical societies whose principal interest is in the field of Acute Care Surgery, foremost being the American Association for the Surgery of Trauma and complemented by the Eastern Association for the Surgery of Trauma, the Western Trauma Association, and the American College of Surgeons Committee on Trauma. The topics within the domain of this field are regularly incorporated into the program of many annual regional and national meetings. But perhaps more importantly, the Acute Care Surgeon specialist fills a void and a niche, in being immediately available to provide care in the

time-sensitive and critical illnesses of trauma and emergency general surgery. Although the field of trauma surgery would, and is, benefitting from these changes, those who benefit the most are our patients.

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