

Chapter 20

The Establishment and Evolution of Acute Care Surgery



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Establishing the specialty “Acute Care Surgery” required the unwavering effort of many individuals. Acute Care Surgery, an evolving tri-disciplinary specialty, addresses the concern highlighted by Dr. William Steward Halsted when he stated that “. . . every important hospital should have on its resident staff of surgeons at least one who is well trained and able to deal with any emergency” (Halsted, 1904). The evolution of Acute Care Surgery did not occur *de novo*. On the contrary, several forces created an optimal environment for its birth and development, including a precipitous decline in the surgical workforce that would be involved in the management of such emergencies, along with the well-documented short supply of specialty support in the acute care setting.

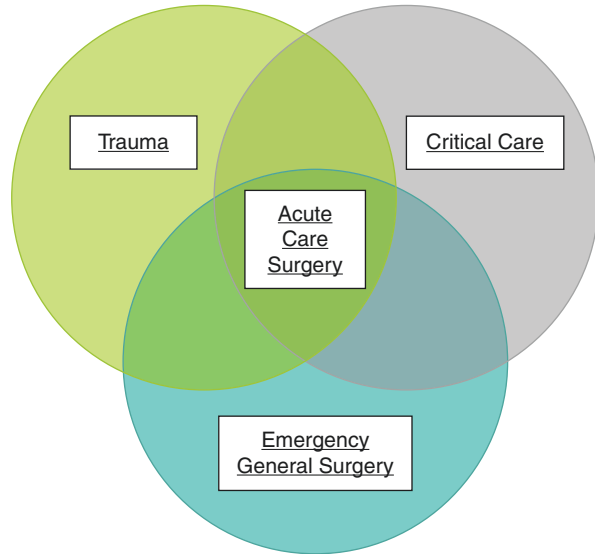
A survey conducted by the American College of Emergency Physicians in 2005 (American College of Emergency Physicians, 2005) showed that nearly three-quarters of emergency department medical directors believed that they had inadequate on-call specialty coverage. In that same survey, orthopedic, plastic, and neurological surgeons, as well as otolaryngologists and hand surgeons, were reported as being in short supply. A fact sheet on “The Future of Emergency Care in the United States Health System,” produced by the Institute of Medicine of the National Academies in 2006, corroborated these findings (Institute of Medicine, 2006). Although some controversy still exists regarding the scope of practice and essential requirements for this specialty, Acute Care Surgery is a new and unique surgical specialty. The label “acute care surgeon” has been erroneously applied to “surgical hospitalists” and “emergency general surgeons.” However, the true definition of Acute Care Surgery embodies three specialty components: trauma surgery, emergency general surgery, and surgical critical care (Fig. 20.1). As a result, the general principles of Acute Care Surgery are derived from these three specialties.

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Fig. 20.1 Acute Care Surgery: a tri-disciplinary specialty



The overarching principle, which transcends each of these three components, is early and expedient medical/surgical intervention. Whether managing a patient with a perforated duodenal ulcer or enterotomies secondary to a gunshot wound to the abdomen, early diagnosis and expedient intervention make up the cornerstone of optimal management. There is no disharmony between the well-established tenets of trauma management and the general principles of Acute Care Surgery. While it is always prudent for surgeons to adhere to the basic priorities (airway, breathing, circulation, etc.) underscored in the primary survey, such an emphasis needs to be tailored on a case-by-case basis in non-trauma surgical emergencies so that timely intervention is not delayed.

For example, for a young patient who presents with a presumptive diagnosis of acute appendicitis and an obvious surgical abdomen, little attention has to be directed to the disability assessment, which is included in the primary survey. The same would be the case for many other non-trauma surgical emergencies. Because of the disparate disease entities that can lead to surgical emergencies and the unique patient populations that may be involved, it is unlikely and, perhaps, unnecessary that an all-encompassing management paradigm, such as Advanced Trauma Life Support (ATLS®) (American College of Surgeons, 2018)—arguably, the most accepted and successful practice guideline in American (and international) medicine—is actually needed. However, general principles of optimal management are, indeed, applicable, even among special populations of patients with potential surgical emergencies. Such general principles are embedded in the thrust of surgical education that continually underscores the important role of surgical judgment and prioritization of patient management.

While there are three main pillars of support for Acute Care Surgery, some degree of modification is expected because of specific institutional resources. The specialty must have the capacity and flexibility to naturally evolve. Peitzman et al. (2015) reported on a potential expanded role for the specialty. He and co-authors opined that

a critical service provided by their acute care surgeons is one of surgical rescue. In a landmark article by Ghaferi, Birkmeyer, and Dimick (2011) in *Medical Care*, the authors underscored the advantages of establishing strategies that focus on the timely recognition and management of complications once they occur. Although the outcomes were not perfect, they found that there were better outcomes at high-volume centers, where surgical rescue was initiated more expeditiously (Ghaferi et al., 2011).

From one of the best databases in the world, the American College of Surgeons National Surgical Quality Improvement Program (NSQIP), it was determined that there existed over a 10% failure-to-rescue rate in the surgical population (American College of Surgeons National Surgical Quality Improvement Program, 2013). Twenty percent of patients with the greatest risk for developing postoperative complications account for approximately 90% of failure-to-rescue cases. With complications of medical or surgical care being one of the most frequent hospital-based diagnoses (exceeding even cholecystitis, intestinal obstruction, and appendicitis), Acute Care Surgery undoubtedly offers the specialty expertise needed to provide the hospital surgical rescues required to optimally address these complications. Early intervention by a high-performance surgical team provides the best opportunity to reduce failure-to-rescue rates. In many settings, the high-performance specialist in charge of that surgical team will be the acute care surgeon.

The specialty Acute Care Surgery has been distinctly defined, although the label is not always correctly and consistently applied to what is actually being practiced. Has there been a template training model constructed for both fellowship and general surgery training? A Committee on Acute Care Surgery, first established within the American Association for the Surgery of Trauma by past President Ronald Maier, was chaired by past President Jurkovich and populated with the familiar names provided in Table 20.1. Dr. Michael Rotondo and I wrote the first vision statement and draft of the curriculum. After much input and many contributions from many individuals, a basic fellowship curriculum format was endorsed.

Relating to the curriculum, the two key questions that arise today are the following: (1) Does there need to be a revised curriculum and an update on expected case volume for Acute Care Surgery? (2) Should there be a more realistic database requirement? The answer to both questions is affirmative. There is currently no uniform and established Acute Care Surgery curriculum for general surgery specialty training, which is problematic if, in some locations, the general surgeon specialists

Table 20.1 Membership of the Committee on Acute Care Surgery

Gregory J. Jurkovich, MD, Chair	
Kim Anderson, PhD, Consultant	Ronald V. Maier, MD
L. D. Britt, MD, MPH	J. Wayne Meredith, MD
Christopher T. Born, MD	Ernest E. Moore, MD
William G. Cioffi, MD	Lena M. Napolitano, MD
Thomas J. Esposito, MD	Michael F. Rotondo, MD Vice Chair
David B. Hoyt, MD	Grace S. Rozycki, MD
Robert C. Mackersie, MD	David A. Spain, MD
Mark A. Malangoni, MD	Alex B. Valadka, MD

will be expected to address this workforce need. When the model of core general surgery training is revised, Acute Care Surgery specialty must be a key component of the curriculum. Currently, there is not a universally adopted training model for both fellowship and core general surgery residency.

Adopting a sound business plan to ensure financial viability is essential. There is no long-term success without such a plan. The overarching concern is whether the current business model is, indeed, sustainable or a failed model. Some hospital administrations deem the Acute Care Surgery business model to be a failure.

While the debate is ongoing regarding the best model to sustain financial viability for an Acute Care Surgery service, the decision will undoubtedly not be based on the clinical revenues generated. Establishing a best business model would incorporate hospital subsidies, along with efforts to achieve meaningful revision of the relative value units (RVUs). There is a consensus that a sound business plan to ensure financial viability has not been endorsed as a “best practice.”

The role of “branding,” often confused with advertising, is underestimated in medicine. While a surgical or medical specialty is not a commodity, it is certainly helpful to know and appreciate the branding mantra that in other industries has withstood the test of time for decades: “create a new category; create a new brand” (Ries & Ries, 2004). The following list is an impressive example of the power of such a strategy:

- Band-Aid—the first adhesive bandage
- CNN—the first cable news network
- ESPN—the first cable sports network
- Nike—the first athletic shoe
- PowerBar—the first energy bar

Curiously, some of these names were not even the first. However, these brands created the perception that they were the first in a new category. Acute Care Surgery (trauma, critical care, and emergency general surgery) is, indeed, a new entity and needs to be branded as such. History has shown that a new brand that clearly defines a category will almost always overshadow the old brand that is stretched to encompass a new category.

Ries and Ries (2004) state that a new brand almost always beats an old brand if the category is important enough, with the ultimate winner being a new brand created exclusively for the category desired.

These brands, however, created the perception that they were the first in a new category. Acute Care Surgery (trauma, critical care, and emergency general surgery) is, indeed, a new entity and needs to be branded as such. There are some advocates for a “stretched” or line-extended brand name for Acute Care Surgery, which would carry both the category name and the brand name (i.e., “Trauma and Acute Care Surgery”). Ries and Ries (2004), however, state that a new brand almost always beats an old brand if the category is important enough, with the ultimate winner being the new brand created exclusively for the category desired, as opposed to the old brand that has been “stretched” to fit the new category.

When a new brand is introduced as a new category, the comparison factor is removed. The new brand then has a chance to ignite because another brand (the old brand) does not attempt to represent the new category. Confusion invariably ensues

when the old brand is fused with the name of the new brand. The two labels that are frequently required, however, are the new category name and the brand name. The category name is a generic word (often in lowercase letters) that includes all the components of the brand. The brand name is the proper name (spelled with uppercase letters) that specifically specifies the brand. For example, a European luxury car is the category for the brand BMW. It is doubtful that, when asked what kind of car they prefer, anyone would respond by saying a “European luxury car” instead of “BMW.” These are not trivial differences if, indeed, Acute Care Surgery is expected to reach its full potential as a new specialty.

“Line-extension brands,” such as Gatorade energy bars, Tanqueray vodka, and Eveready alkaline batteries, never caught traction. Prior to the birth of Nike, many teenage Americans wore sneakers, preferably Keds. Instead of Uniroyal, the owner of the Keds brand, putting a new brand on the new category producing the athletic shoe, the company introduced the new category with the brand “Super Keds,” and the rest is history—spelled N-I-K-E. For our specialty, “Acute Care Surgery” is the brand, and “trauma, critical care, and emergency general surgery” is the category.

Fortunately, recognition of the value of a specialty in medicine is unlike recognition of a product in the book, music, or movie industries. It is well known that if a book fails to make the best-seller lists in the first few weeks, it will likely never make the best-seller lists. In the motion picture industry, a movie will likely never become a blockbuster if it does not open with a big weekend. It is almost guaranteed that a movie will be successful, however, if it has a big opening weekend, especially if the film is first in box office receipts. The same holds true for the music industry. If a record does not do well in the opening week and the second week, it is an ominous sign. Fortunately, the success of Acute Care Surgery is not as time sensitive. Acute Care Surgery will ultimately gain recognition as a result of its impact and the value that it brings to the optimal care of severely injured and critically ill surgical patients. For this to be achieved, the Acute Care Surgery “brand” has to be accepted and promoted, improvement in patient outcomes has to be both chronicled and published, and all aspects of the science of our discipline need to continue to be advanced.

Undoubtedly, the true measure of the value of this specialty will be the demonstration of improved outcomes. Healthcare disparities are at the top of the list of the key underlying trends affecting optimal healthcare (Table 20.2). They have transcended every medical/surgical specialty, with associated severe adverse outcomes—particularly in the area of acute surgical care.

Table 20.2 Key underlying trends affecting optimal healthcare

Healthcare disparities in the population
Aging of the population
Increasing rates of utilization
Economic growth of the nation
End-of-life issues
Advances in genetics screening
Changes in health services delivery system
Efforts to weed out unnecessary or marginally beneficial services
Cost containment efforts

The overarching question remains: What is the actual impact of this innovation (new specialty) on clinical outcomes? Any in-depth analysis would point to the need for implementing comparative effectiveness research (Fig. 20.2) to answer this question. The checklist item that lists “establishing outcome metrics” would have to be scored as “in progress.”

With respect to publishing, there have been some isolated reports and single-institution studies demonstrating disease-specific improved outcomes with the implementation of an Acute Care Surgery service. However, there have also been reports that have not shown a significant difference in outcomes (Earley et al., 2006; Ekeh, Monson, Wozniak, Armstrong, & McCarthy, 2008; Maa, Carter, Gosnell, Wachter, & Harris, 2007). Looking specifically at the impact this designated service has on biliary disease at the tertiary medical center at Eastern Virginia Medical Center, Dr. R. Britt and co-authors documented significant improvement in providing timely care for biliary disease, especially in patients with acute cholecystitis and symptomatic cholelithiasis, with no significant difference in operations performed or patient outcomes (Britt, Weireter, & Britt, 2009). Publications have been initially sparse. As Acute Care Surgery services mature and the patient population expands, there will undoubtedly be more robust and multi-institutional studies documenting the efficiency and favorable outcomes of using the Acute Care Surgery model.

Although they commit some problematic “branding” violations, more established conferences and symposia (e.g., the annual Point/Counterpoint, Las Vegas,

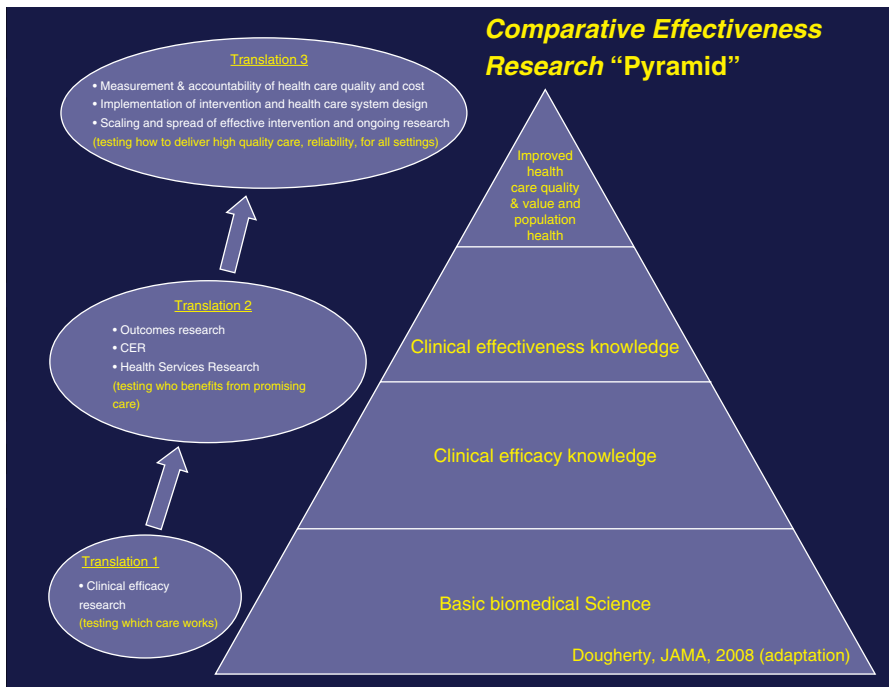


Fig. 20.2 Comparative effectiveness research “pyramid.” (Adapted from Dougherty and Conway (2008))

Kansas City, and Detroit meetings) are beginning to focus on all three elements of Acute Care Surgery (trauma surgery, emergency general surgery, and surgical critical care). Perhaps the greatest challenge for the emerging specialty of Acute Care Surgery is addressing workforce needs. The lack of an adequate workforce to care for surgical patients—who are severely injured and critically ill or have an acute surgical emergency—has been well chronicled (Britt, 2004, 2012).

An analysis of the current status of Acute Care Surgery fellowships and an awareness of the projected number of future fellowship sites (35–40 fellowships) convincingly highlights the looming workforce dilemma. The original and overarching aim was to develop a specialty to address workforce needs wherever access was suboptimal for surgical patients who are injured or critically ill. By definition, workforce shortage dictates suboptimal access. It is one of the driving forces causing the existing healthcare disparities in acute surgical care. The major underpinning of healthcare disparities is the lack of equity, which can be affected by variances in quality and access. While quality has to continually be reassessed, the warning signs of a workforce shortage in acute surgical care are more ominous.

With the broad terrain of settings where acute surgical care is required, it is clear that the Acute Care Surgery model will not be the complete answer to the nationwide workforce needs. If we consider the medical landscape of this nation, with its well-documented decline in the general surgery workforce, we find a paradox in the fact that the general surgeon specialist remains the cornerstone of emergency surgical care across the country. This is problematic because out of over 3000 counties in the USA, nearly 1200 are without a general surgeon. An additional 358 counties have at least one surgeon but are below the workforce threshold need. As a result, almost half (1525) of all US counties are below the lowest recommended standard for access to a general surgeon specialist.

There is no question that establishing both the Acute Care Surgery model and the Acute Care Surgery fellowship is the paramount advancement needed to begin addressing the healthcare disparities in acute surgical care. An expected corollary to this overarching aim to definitively address these healthcare disparities is the requirement for Acute Care Surgery to be an essential component of the core curriculum for general surgery training. The rationale for this is the fact that the general surgeon will be the one who will likely fill that workforce void in the community setting. The general surgeon specialist (a broad-based and high-performance specialist) will need to have a requisite skill set in order to provide optimal care for the surgical emergencies and critically ill patients who reside in those community settings not populated by acute care surgeons. Other concerns regarding workforce that are still open to debate—although they are not considered by many to be a practical remedy and are considered by some to be a potential enemy to the brand—are the questions: Should grandfathering (or grandmothering) be considered for those surgeons who have been established in Acute Care Surgery? And if so, what should be the process and criteria? The final aspect of workforce demands that should be self-evident but does not always receive the expected uniform emphasis is the need to expand the critical care workforce. Among the growing number of specialties reporting shortages, the healthcare provider with critical care expertise is considered our greatest specialty shortage in healthcare. This problem is even more

dire if we consider the suboptimal presence of surgeons involved in intensive care units. As elucidated by Ivy et al. (2000), there is a definite advantage of having a surgeon provide specific insights and perspectives to the care of surgical patients. Critical care must continue to be an integral component of Acute Care Surgery.

Table 20.3 outlines the essentials that are needed for the Acute Care Surgery specialty to continue to evolve. These essentials include requisite outcome research, the establishment of a national database/registry for research, credible branding, adoption of a process for formal recognition of the specialty (perhaps ACGME-approved programs or ABMS board certification), and ongoing specialty expansion and growth (incorporating workforce needs and compensation models). Table 20.4 outlines the perceived impediments to this process.

The additional steps that need to be taken in order for the Acute Care Surgery specialty to meet its full potential are outlined in Table 20.5.

There is general consensus that three areas currently require resolution: (1) scope of practice, (2) pursuit of board certification, and (3) formal affiliation with an

Table 20.3 The requisite essentials for the continued evolution of Acute Care Surgery

What are the essentials?
1. The requisite <i>outcome research</i> to demonstrate the substantive benefits of the specialty
2. The establishment of a <i>national database/registry</i> for research
3. Credible <i>branding</i> (this will occur if nos. 1 and 2 are adequately addressed)
4. The creation or adoption of a process for formal recognition, perhaps ABMS board certification, has pros and cons (ACGME—overly stringent duty hour requirements and billing restrictions)
5. Ongoing <i>expansion and growth</i> (including addressing workforce needs and compensation models)

ABMS American Board of Medical Specialties, ACGME Accreditation Council for Graduate Medical Education

Table 20.4 Acute Care Surgery: perceived impediments

1. <i>No board certification status</i> for Acute Care Surgery
2. <i>No added value</i> from doing an Acute Care Surgery fellowship. (With respect to employment opportunities, is there a meaningful difference between completing a 1-year critical care/trauma training vs. a 2-year critical care/trauma training vs. an acute care fellowship training?)
3. <i>No perceived “public or market” added value</i> in differentiating between an acute care surgeon and a “surgical hospitalist”
4. <i>Reluctance of a few premier trauma/critical care programs to adopt the Acute Care Surgery fellowship model</i> because of the specific curriculum requirements
5. <i>No nationwide compensation standardization</i> for acute care surgeons
6. <i>No widely accepted “bridge training”</i> for some trauma surgeons who need to expand their skill set to include laparoscopic intervention in the emergency setting
7. <i>No apparent coordinated effort</i> between the three major organizations (AAST, EAST, WTA) to address the above and other related issues

AAST American Association for the Surgery of Trauma, EAST Eastern Association for the Surgery of Trauma, WTA Western Trauma Association

Table 20.5 Next steps needed for Acute Care Surgery to meet its full potential

What are the additional steps to be taken?
1. <i>Demonstrate that acute care surgeons improve patient care with proven favorable outcomes</i>
2. <i>Document that the care provided by acute care surgeons leads to improved quality of life</i>
3. <i>Develop scoring scales for acute surgical diseases</i>
4. <i>Educate and train both students and residents in the principles and management of acute care surgery</i>
5. <i>Establish a public image and validate the Acute Care Surgery specialty by elucidating the importance of the acute care surgeon in caring for injured and acutely ill surgical patients, which will increase the public awareness</i>
6. <i>Adopt a formal board certification process for Acute Care Surgery.</i> This would add board certification in trauma to the already established board certification in general surgery and surgical critical care
7. <i>Advocate for the adoption of Acute Care Surgery as a distinct specialty by the international community</i>
8. <i>Pursue governmental and other extramural funding for specific research initiatives</i>

accrediting body. Scope of practice needs to reflect what is actually being done in the “best practices.” Considering the current representation of distribution of emergency general surgery operative cases, “complex emergency general surgery” needs to be more distinctly defined. There is also a growing consensus that “official” board certification (American Board of Medical Specialties) for the Acute Care Surgery specialty should be pursued. If such an option is not a possibility in the immediate future because of timing and associated political issues, we have to ask whether the post-fellowship examination should be the certifying (or qualifying) examination.

An intriguing alternative approach advocated by past President Wayne Meredith is the establishment of board certification in trauma, which would complete the tri-fecta (certifications in general surgery and critical care are already established). The discipline of trauma is the core component of Acute Care Surgery and an area that the typical general surgeon would likely concede without any substantial opposition. Such an approach would be prudent and likely attractive not only to the surgery community but also to the hospital employer.

While there is a consensus that we should consider the training paradigm for Acute Care Surgery to be under the auspices of the Accreditation Council of Graduate Medical Education (ACGME), this is neither a practical nor a cost-effective option. The duty-hour limitations would be counterproductive and would prohibit Acute Care Surgery fellows from ultimately serving in the role as a junior attending, thus eliminating the valuable educational opportunity of acting as junior faculty. In addition, other ACGME restrictions would prevent fellows from billing for their services, which could severely threaten fellowship funding for many of the current programs.

Controversy still remains on several issues (Table 20.6), including how regionalization of care should be organized, whether an emergency surgery course should be formulated to help promote improved patient care by non-Acute Care Surgery

Table 20.6 Acute Care Surgery: controversy

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1. *Should there be a role for stabilizing the critically ill surgical patient prior to referral to a tertiary center for more definitive care?*

 2. *Should there be regionalization of care, with the creation of an organized system similar to that for trauma to provide appropriate care for high-acuity and complex patient populations?*

 3. *Should an Emergency Surgery course (similar to ATOM or IATSIC's "Definitive Surgery Trauma Course") be formulated to help train fellows and promote improved patient care by non-Acute Care Surgery fellowship-trained surgeons in rural areas?*

 4. *Should support be requested from either the AAST or the American College of Surgeons for the training of Acute Care Surgery fellows in REBOA, ASSET, ATOM, and advanced ultrasound techniques?*

AAST American Association for the Surgery of Trauma, ASSET Advance Surgical Skills for Exposure in Trauma, ATOM Advanced Trauma Operative Management, IATSCI International Association for Trauma Surgery and Intensive Care, REBOA Resuscitative Endovascular Balloon Occlusion of the Aorta

fellowship-trained surgeons in rural settings, and whether the oversight organizations (e.g., American Association for the Surgery of Trauma [AAST] and Acute Care Surgery) should provide support for focused training in Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA), Advance Surgical Skills for Exposure in Trauma (ASSET), Advanced Trauma Operative Management (ATOM), etc.

As Acute Care Surgery continues to mature as a specialty, the necessary adjuncts will include the establishment of a web-based system; the possible development of a third-year option that would be devoted to conducting supervised research or working on an advanced degree (i.e., MPH, MA, MBA) or both; the designation of centers for appropriate levels of care; and other possible initiatives. If a postscript is to be written on Acute Care Surgery, it would include a call for the standardization of the fellowships (particularly with respect to the training curriculum), along with standardization of the specialty with respect to the complexity of surgical procedures and the establishment of centers of excellence that deliver optimal healthcare, with verification requirements from the American College of Surgeons.

Certain specific strategic initiatives that the American College of Surgeons should consider include generating a "call to action" similar to the *Injury in America* report by the Institute of Medicine (which documented the gaps existing in emergency care; Institute of Medicine and National Research Council Committee on Trauma Research, 1985) and broadening support for Acute Care Surgery among US surgical leaders, other specialties, and organizations/stakeholders. Acute Care Surgery must be viewed as a critical and essential service across all specialties, and assistance must be provided in the development of an enhanced relative value unit (RVU) system (Center for Medicare & Medicaid Services, CMS) for Acute Care Surgery.

As Acute Care Surgery continues to evolve as a new specialty, "best practices" will emerge that are based on its impact and improved patient outcomes; these outcomes will be the ultimate proof that Acute Care Surgery is the healthcare specialty that provides the best treatment for this cohort of patients.

Just as trauma was depicted by the National Research Council of the National Academy of Science in 1966 as “the neglected disease of modern society,” Acute Care Surgery is the neglected disease syndrome of modern society. Acute Care Surgery needs to ensure expeditious and optimal management of injured and non-trauma critically ill surgical patients. Every discipline has a myriad of ever-changing challenges and threats. At no time, however, should there be challenges or threats that affect the specialty’s missions and, especially, optimal care of the patient. Dr. Martin Luther King Jr. stated that “the arc of the moral universe is long, but it bends towards justice” (King, 1958). What Dr. King did not say explicitly is that the arc does not bend by itself. Such bending requires commitment, effort, and sacrifice. Adapting this statement to healthcare, I strongly believe that the arc of healthcare is long, but it bends toward optimal care and inclusion. It, too, does not bend on its own. Making this arc bend also requires commitment, effort, and sacrifice. Establishing Acute Care Surgery as a defined specialty is part of this bending process, which is necessary to achieve optimal care and inclusion for those surgical patients who are injured and critically ill.

Clinical Pearls

- There can never be quality of clinical care without access to care.
- A patient presenting with a trauma-induced abdominal generalized peritonitis does *not* need a mandatory CT scan of the abdomen.
- Laparoscopy is contraindicated in the patient who is in profound shock and needs a celiotomy.

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