What’s New in Critical Illness and Injury Science?
The quest for decisional objectivity and clinical precision in critical care: A neurosurgeon’s perspective

Has the era arisen that we no longer practice the art of medicine and make patient-centered decisions regarding treatment options that are largely based on our choices as physicians? Are we at the point where objective tests, protocols, and other measures will dictate who receives a specific treatment? The Hippocratic Oath directs us to do no harm. However, what does one do when making emergent decisions based on limited insight into a patient’s medical condition and diagnostic information that may not be complete? When dealing with severely injured or critically ill patients, physicians may find themselves in very precarious situations in which extreme, nonpreventable damage may have already been sustained by the patient, well-beyond the physician’s control. At the same time, a conflict may emerge wherein the intervention intended to help may, in fact, be detrimental.

Let us discuss, for instance, a common consultation to the on-call neurosurgeon to evaluate the middle-aged patient who sustained an intracerebral hemorrhage as a result of a motor vehicle collision. The patient’s neurological examination is poor and is quickly deteriorating since their arrival in the trauma bay. Several more minutes, feeling like hours, will pass as the trauma team assesses the patient’s other injuries. There are competing priorities that should be balanced, with trauma evaluation and physiologic stabilization being as critical as preventing the progression of neurological damage. Computed tomography of the head demonstrates a large frontoparietal intraparenchymal hemorrhage that is causing midline shift and brain herniation. Faced with this finding, does one operate emergently to remove the blood clot, knowing that removing the brain tissue around it will surely lead to permanent neurological deficits? Or perhaps one should perform a decompressive hemicraniectomy to release pressure and leave the brain to fend for itself? Or should one not intervene—most likely resulting in brain death—knowing that a chance of a functional outcome is miniscule? How does one approach the overall risk-benefit equation in this grave situation, including a discussion with the patient’s family members who are distressed, certainly not prepared to hear and/or process the information in a clear and logical fashion? Despite the devastating news from the neurosurgeon and/or the trauma team actively caring for their loved one, the patient’s family is bound to cling on to the hope that an intervention will not only be lifesaving but will restore their loved one to the person they know and remember. Through these factors, a decision must still be made.

For contemporary physicians, the era has ended where physicians are in full control of guiding all moral and ethical decisions on behalf of their patients (and patient families). We are expected to act along the lines of widely held beliefs and traditional standards of care. Furthermore, how does one reconcile the potential dissonance between case-based, individual outcomes and the growing number of quality control measures, morbidity and mortality indices, patient satisfaction scores, and health economics, all closely associated with different aspects of healthcare delivery and utilization? From an ethical perspective, can a physician make a decision not to intervene feeling that the point of medical futility has been reached? Likewise, should one intervene knowing that neurologic outcome will be devastating, with the sole intent being to provide time for families to cope with a situation? If the patient survives without a functional outcome, is it fair to expect the family to assume health-care costs for the future? As we can see, there is truly no acceptable *status quo* in this situation.

Neurosurgeons cope with these kinds of scenarios on a daily basis. Both personal and professional costs of this struggle can be high, affecting both patients (e.g., clinical outcomes) and their doctors (e.g., burnout and frustration). Despite the vast education and training each neurosurgeon receives, nothing really prepares one for dealing with a devastating neurological injury, especially in the context of modern-day pressures, in an emergency situation, in the middle of the night, or when looking at a distressed family member who desperately clings on to hope. Is it possible to attempt to “try to save all” and therefore treat everyone the same? Would the use of unlimited resources be then justified as well? Traumatic injuries to the brain or spinal cord have catastrophic consequences that are, in most cases, not reversible. When is it right to do all interventions, no matter the cost, in an attempt to help a patient who may have very little chance of a meaningful functional outcome? Moreover then, how does one define “meaningful survival”? Taking this
a step further, complex interdisciplinary care does not usually end with the neurosurgeon as a sole provider. Thus, the decision-making process becomes a group exercise, with the trauma/general surgeon, neurologist, and potentially many others involved, as seen in original articles published in the current edition of IJCIIS.[1,2]

When looking at the articles in this issue of the Journal, one begins to encounter similar themes and thoughts, coming to a realization that we are now in an era of medicine that is rapidly changing and evolving, where data and clinical evidence have become paramount. The first two articles look at biomarkers in the setting of spinal cord injury and the surgical management of intracerebral hemorrhage, respectively. Authors of both manuscripts are looking for objective measures to help determine when to intervene and the potential outcomes following an intervention.[1,2] The first study, by Singh, et al., shows how a serum biomarker may provide an early prognostication of the severity of spinal cord injury in adult patients.[1] The second study, by Sandeep, et al., represents an assessment of the surgical management of intracerebral hemorrhage, demonstrating that 10% of patients will recover and live independently at the 1 month temporal marker, with 20% of survivors becoming functionally independent at 6 months.[2] Moreover, these two articles fit well with the work describing an emergency transfusion score, demonstrating that the implementation of this score may help prevent inappropriate requests for blood transfusion.[3] Educational competency – another important element in the overall equation of modern clinical science – is elegantly addressed by Moorman et al.,[4] with additional aspects on the spectrum of knowledge dissemination and didactics addressed by Adoga, et al.,[5] and Krishnan, et al.,[6] all of which highlight multi-disciplinary approaches and the complexity of the dynamic interplay involved in the care of the trauma patient.

Cumulatively, these articles point to a shift in medicine where the “art of medicine” is becoming increasingly more objective. In both trauma and other settings, neurosurgeons have to make quick decisions with limited information for many of the ailments we treat. The time-critical nature of neurological interventions, including the need for prompt and accurate clinical decisions, is exemplified by Abraham et al.,[7] who evaluated factors that contribute to potential delays in the management of acute stroke. Stoke care was largely stagnant until the era of tissue plasminogen activator (tPA) introduction, which shifted the evaluation and management of patients to a fully time-based approach. Neurosurgeons built off this framework of a time-based approach with interventions involving angioplasty and stent placements.[8] Reflecting on the past, the introduction of tPA represented an important and paradigm-changing event, where the use of objective measures led to a significant change in care for stroke patients, in that, only those fitting into certain time scales would receive potentially illness altering therapy.

As a neurosurgeon, I often remind myself that my scope of practice is much more than an elective surgical practice involving disc herniation and other common, “bread and butter” conditions. This is most evident when I am faced with emergent situations involving traumatic brain or spinal cord injuries, or nontraumatic neurosurgical emergencies, where I am expected to make prompt and accurate decisions regarding traumatic intracerebral hemorrhage, hemorrhaging brain tumors, evolving spinal cord injuries or ruptured aneurysms with no appreciable room for error. The key dilemma, once again, revolves around whether one can reliably and consistently make “quick yet critical decisions” that are consistent with the principle of “do no harm”? The common proverbs that travel through neurosurgery training echo in my mind each day of my career. One of the verbalisms that I heard often in my training and will remain with me for a lifetime is, “Often wrong, but never in doubt.” This is most certainly not a reflection of the use of a completely objective framework for decision-making but is more so a reflection of the paradigm where we need to consistently make “right decisions” very quickly, and quite frequently in critically ill patients. Another highly impactful “neurosurgical proverb,” especially relevant in the context of this editorial, is that “Neurosurgery will give you the highest highs and the lowest lows.” This is surely true in life-altering illnesses and when making decisions that are– by virtue of the associated circumstances– not always objective. As a physician who operates in a high-risk field of neurosurgery, as with other interventional and surgical specialties, it becomes very difficult to disconnect from your clinical experience when you leave work each day. This includes the multitude of emotions associated with different clinical encounters, surgical procedures, and outcomes. At times, I struggle to reconcile the “objective” with the “emotional” aspects of my cases, often replaying scenarios involving objective measures that may prevent me from intervening, especially when my feelings tell me otherwise. Being unable to intervene can create the same emotional struggle as a poor outcome after an intervention. As human beings, we do not want to lose the ability to make medical decisions completely in favor of objective measures that will solely determine those who receive treatment. As controversial as these words and proverbs may be, they will always be close to my heart as a physician, and in the era of rapidly evolving medical care, it is important that while we embrace change and scientific evidence, we must never forget about “the art of medicine.”

Steven M. Falowski
Center for Neuroscience, St. Luke’s University Health Network, Bethlehem, Pennsylvania, USA
REFERENCES

1. Singh A, Kumar V, Ali S, Mahdi AA, Srivastava RN. Phosphorylated neurofilament heavy: A potential blood biomarker to evaluate the severity of acute spinal cord injuries in adults. Int J Crit Illn Inj Sci 2017;7:212-7.

2. Sandeep YS, Guru MR, Jena RK, Kumar VA, Agrawal A. Clinical study to assess the outcome in surgically managed patients of spontaneous intracerebral hemorrhage. Int J Crit Illn Inj Sci 2017;7:218-23.

3. Alimohammadi H, Kianian Y, Zerepooosh FB, Derakhshanfar H, Alavi-Moghadam M, Hatamabadi HK, et al. Accuracy of emergency transfusion score in prediction need for blood transfusion among multiple trauma patients: A cross-sectional study from Iran. Int J Crit Illn Inj Sci 2017;7:248-51.

4. Moorman ML, Capizzani TR, Feliciano MA, French JC. A competency-based simulation curriculum for surgical resident trauma resuscitation skills. Int J Crit Illn Inj Sci 2017;7:241-7.

5. Adoga AA, Ozoilo KN, Iduh AA, Mugu JC. Otorhinolaryngological manifestations in head trauma: A prospective study of the epidemiology, clinical presentations, management, and outcomes. Int J Crit Illn Inj Sci 2017;7:231-5.

6. Krishnan U, Byanyima R, Faith A, Kamulegeya A. Maxillofacial injuries among trauma patients undergoing head computerized tomography: A Ugandan experience. Int J Crit Illn Inj Sci 2017;7:236-40.

7. Abraham SV, Krishnan SV, Thaha F, Balakrishnan JM, Thomas T, Palatty BU. Factors delaying management of acute stroke: An Indian scenario. Int J Crit Illn Inj Sci 2017;7:224-30.

8. Fransen PS, Beumer D, Berkhemer OA, van den Berg LA, Lingsma H, van der Lugt A, et al. MR CLEAN, a multicenter randomized clinical trial of endovascular treatment for acute ischemic stroke in the Netherlands: Study protocol for a randomized controlled trial. Trials 2014;15:343.