

# Omaha And The Evolving Business Model Of Trauma Care


Rodger L. Brannan, University of Minnesota Duluth, USA

## ABSTRACT

*Trauma is the leading cause of death for those between the ages of one to forty-five in the United States. Trauma care has increased in complexity and has become a significant contributor to rising medical costs in the United States. The successful management of trauma care has been an enormous challenge to hospital executives. Two medical centers in Omaha, Nebraska recently abandoned a successful joint trauma care business model to operate independent trauma centers. This case can be used in a number of courses, including Accounting, Finance, and Health Care Management.*

**Keywords:** Traum; Omaha; Business; Management; Costs

## INTRODUCTION

 Omaha Nebraska is a major city located in the heartland of America. Wikipedia notes that in the 2010 census, Omaha had a population of 408,958, which was up 4.9% from the 2000 census. If you include the surrounding suburbs, the population is about 932,000. The population of the greater Omaha area (within a 50-mile radius of the city's center) is about 1,300,000. Historically and presently it is an important transportation hub. Omaha is home to the headquarters of five fortune 500 companies. It is the birthplace and residence of Warren Buffet, one of the richest people in the world. It has a diverse and thriving economy. The present unemployment rate is about 3.8 percent. The median age for a resident of Omaha is 33.7 years of age. The median household income is \$45,159 and median cost of a house in the Omaha area is \$130,400. The median income for a white family in Omaha is \$51,784. The black median income is \$22,919 and the Hispanic median income is \$41,293.

Omaha is perhaps unique for its size in that it is home to two high-quality medical schools (Creighton University Medical Center (CUMC) and University of Nebraska Medical Center (UNMC)). It is likewise serviced by two major hospital systems associated with each medical school. One distinguishing characteristic of the medical services offered to the people of Omaha has been the joint Level One trauma center operated by CUMC and the UNMC. For the past twenty years they have had a history of cooperation with shared mission and management. Although each facility offers trauma care space, the two centers alternate days on which they receive patients, and the staff is shared rather than duplicated. This arrangement has been held up as a model for other similar sized cities to follow. The number of trauma cases referred to the two centers has increased steadily over the past five years, reaching an annual average of 2,700 total cases (Table 2 below).

Recently this twenty year-old successful, cooperative program has been scuttled. Both schools/medical centers have begun to operate 24/7, independent, Level One trauma centers. UNMC began on March 12, 2014 by announcing that it was withdrawing from the arrangement. Numerous reasons were cited for the decision according to the Omaha World Herald (Ruggles, 2014), but several major factors stand out. First, having its own full-time trauma department meant increased opportunities for clinical rotations for medical residents and attending physicians resulting in a more robust medical education program. This is particularly important for trauma surgeons. Studies have shown that surgical excellence is achieved through increased hands-on experience. Second, UNMC felt they could make an independent trauma center cost effective and profitable. UNMC also felt that the medical needs of the greater Omaha area would be better served if it went independent. Finally, having a Level One trauma center would enhance the reputation of UNMC as a comprehensive medical services provider. The reaction of CUMC was almost immediate. On March 14, 2014 they, too, announced that CUMC would operate a 24/7 independent Level-one

trauma center, citing the same reasons as UNMC. Omaha will now be served by two independent Level One-trauma centers. The people of the Omaha metropolitan area will certainly see the benefit from the increased availability of trauma services. Most cities the size of Omaha would be fortunate to have a single Level One trauma center. However, the major question still to be answered is whether the people of Omaha will get more value from the decision rather than simply added cost. Will the decision enhance or diminish the quality of trauma service in the metropolitan area?

### **WHAT IS TRAUMA CARE?**

According to the American Association for the Surgery of Trauma (Trauma Facts (2015)), trauma is the leading cause of death among those (1 – 45) years of age. Trauma is defined (American Trauma Society) as an injury caused by physical force; most often as a consequence of a motor vehicle crash, falling, drowning, gunshot wound, fire and burns, stabbing or blunt assault. It could also include events like accidental poisoning and suicide. In statistics cited by Sanji and McDonald (2014), annually there are approximately 37 million emergency room visits nationally. Of that total, approximately 2.6 million (i.e. 7%) of hospital admissions are trauma related. Trauma injuries result in lifetime medical costs of \$80 Billion. Productivity losses, including lost income as a result of trauma, amount to \$184 Billion for non-fatal trauma and \$142 Billion for fatal trauma.

Trauma care has only been recognized as an independent/distinct medical “disease process” in the last forty-years. The current system is modeled on military medicine wherein the objective is the survival of the wounded soldier. In the field, the initial responder’s (i.e. combat medic) mission is straight forward: stabilize the patient (stop bleeding, maintain an open airway and treat for shock). The patient is then transported ASAP to a facility where more intensive and specialized care can be administered. The level of care is commensurate with the severity of the injuries. Under this model, the survival rate of severely wounded soldiers has increased dramatically. This directly correlates with rapid transportation to a specialized medical facility for higher level of quality care. The helicopter has played a profound role in the transportation aspect and has, in fact, changed the face of military medicine.

Anne Ericksen (2002) points out that no such system was available to the civilian population of the United States prior to the late 1960’s. In the last several decades trauma has increasingly been identified as a significant medical issue. It has even been recognized as a significant public health crisis. Today, trauma is an independent medical specialty for which physicians specifically train and for which medical facilities plan and budget services, staff, space and equipment.

Bruce Lambert (1991) in a New York Times article points out that Dr. R. Adams Cowley is considered the father of trauma care to the United States civilian population. He served as an Army physician during World War II and observed that if an injured soldier could be transported to a medical facility equipped and staffed to handle the injury (within one hour-the so called “Golden Hour”) survival rates increased dramatically. He lobbied for trauma care in his home state of Maryland. He particularly wanted to change the philosophy of transporting an injured person to the nearest hospital emergency room. Then and now not all emergency rooms are equal. To successfully treat significantly injured trauma patients, hospitals need to make a significant investment in equipment and more importantly in human expertise (e.g. trauma surgeons). Instead he advocated that the injured patient be transported to the nearest trauma center (an emergency room staffed and equipped to handle serious injuries). He also pushed state authorities to purchase helicopters to transport injured people so that they could reach a trauma center within the “Golden Hour.” Survival rates are highest if an injured person can be taken to a dedicated trauma center for treatment within sixty minutes of the accident or injury. Cowley et. al.(1973) showed that when the state of Maryland adopted his proposed trauma system, the results were startling: survival rates increased dramatically. Dr. Cowley’s system has been adopted by all fifty States. States have set up different levels of trauma centers and have coordinated quality of initial medical response and rapid transportation of injured patients. The United States Department of Health and Human Resources (2006) advocates the model indicated in Table 1.

Table 1. Types of Trauma Centers

Level of Trauma Care	Definition	Elements of Care
Level 1	Comprehensive; Regional Tertiary Care; Central to trauma system; provides total care for every aspect of injury-prevention to rehabilitation	<ul style="list-style-type: none"> <li>– 24-hour coverage by surgeons and prompt availability in the following specialties: orthopedics, anesthesiology, emergency medicine, radiology, internal medicine, plastic surgery oral and maxiofacial, pediatric, critical care</li> </ul>
Level 2	Can initiate definitive care for all injured patients	<ul style="list-style-type: none"> <li>– 24-hour immediate coverage by general surgeons, coverage by orthopedic, anesthesiology, neurosurgery, emergency medicine, radiology, critical care</li> <li>– Cardiac surgery, hemodialysis and microvascular surgery may be referred to a Level 1 center</li> </ul>
Level 3	Provide prompt assessment, resuscitation, surgery, intensive care and stabilization of injured patients and emergency surgery	<ul style="list-style-type: none"> <li>– 24-hour coverage by emergency medicine physicians and prompt availability of general surgeons and anesthesiologists</li> <li>– Has transfer agreement with a Level 1 or 2 center for seriously injured patients</li> <li>– Provides backup care for rural hospitals</li> </ul>
Level 4	Provides advanced trauma life support (ATLS) prior to transfer to a higher level trauma center; provides diagnostic and stabilization capabilities	<ul style="list-style-type: none"> <li>– Basic emergency department, 24 hour lab coverage, available trauma physicians and nurses upon arrival of patient</li> </ul>
Level 5	Initial evaluation, stabilization and diagnostic capabilities; prepares patient for transfer to higher level of care	<ul style="list-style-type: none"> <li>– Basic emergency department able to implement ATLS protocols; availability of ER physicians and nurses with arrival of patient</li> </ul>

Source: Model Trauma System Planning and Evaluation, U.S. Department of Health and Human Services (2006).

Richard Mullins (1999) offers an interesting history of the development of trauma care in the United States. He shows that in the late 1960s there was an increased government interest and funding to set up trauma care systems in the various states. Ambulance service was changed to emphasize great professionalism with rigorous training. In many localities ambulance and first responder roles were taken over by fire departments. Technological innovations were brought into the first responder system to increase and coordinate communication between the “medic” and the trauma center. In addition, first responders carried with them more specialized equipment enabling them to respond to an increasing number of different medical emergencies (e.g. portable EKG machines and defibrillators). Helicopter ambulance service to quickly transport trauma patients to the nearest center now serves most areas of the country. This is a particularly important development for rural communities. Government funding (i.e. Federal and State) has been utilized to coordinate the overall system of trauma response and coordination among local, regional and state agencies. Many states, including Nebraska, took the initiative and set up trauma systems (modeled on the military system and that proposed by the United States Department of Health and Human Resources) in which rural or suburban areas would create lower level trauma centers wherein an injured patient would be stabilized prior to being transported to a higher level trauma center better able to treat the various injuries sustained.

### TRAUMA CARE IN OMAHA

UNMC and CUMC had shared a unique mission of providing cost effective trauma care to the citizens of Omaha for twenty years. The joint trauma program began in 1994. It was seen as rational response in providing trauma care in the greater Omaha area. At the time there was limited trauma volume. In addition, a significant number of trauma cases turned out to be charity care. There was also an overall lack of specialists needed to meet the demands of trauma patients (e.g. neuro-surgery, orthopedic trauma, trauma surgeons). Both hospitals shared specialists in order to operate their respective trauma centers. In addition, both hospitals have acute care surgery that can help support a trauma center. According to Ruggels and Glissman (2014) in the Omaha World Herald and as indicated in Table 2, over the last five years the trauma case-load has been increasing. In the year 2013 there were 2,896 trauma cases reported and in 2014 there were 3,016. Jawa et. al. (2012) indicated in the Omaha area the vast majority (90%) of

trauma patients suffer from blunt trauma (e.g. car accident victims). Less than ten percent of trauma patients are admitted for penetrating wounds (gunshots and stabbings).

**Table 2.** Trauma cases in Omaha

<b>Year</b>	<b>Number of Trauma Cases</b>
2009	2,521
2010	2,537
2011	2,699
2012	2,830
2013	2,896
2014	3,016

Source: Ruggles, 2014.

In 2008 the joint program received Level One (the highest level) designation from the State of Nebraska. This is equal to Level One designation from the American College of Surgeon (ACS) (the nation trauma center accreditation body). The ACS, however, will not recognize joint trauma programs for accreditation joint trauma programs. The lack of ACS accreditation in no way compromises the quality of medical care received by patients of the joint program.

The trauma care system in Nebraska can be viewed as a pyramid structure. At the very top are the two state certified Level One centers at UNMC and CUMC. Level One centers offer an extensive breadth and depth of medical coverage on a 24/7 basis not found in other trauma centers. They can handle the most severe traumatic injuries from admission to discharge. One level below that are the Level two centers. These centers have extensive coverage, but not all of their physicians are trained in trauma care. Levels three and four can handle minor injuries, but they are primarily set up to stabilize a seriously injured patient so they can be transported to a trauma center that has the capability to treat the injured patient. The entire system is based on initial diagnosis, emergency treatment, and rapid transportation to the nearest trauma center that is equipped and staffed to handle the type of injury the patient sustained. In a paper by Jawa et al. the outcomes to the two medical centers were compared on number of important indicators (Tables 3-5).

**Table 3.** Comparison of the Two Omaha Hospitals (1994-2008)

<b>Item</b>	<b>UNMC</b>	<b>CUMC</b>
Total Trauma Cases	15,234	13,104
Blunt Trauma Percent	90%	86%
Stabbing Trauma Percent	2.5%	3.8%
Gunshot Trauma Percent	4.5%	7.2%
ISS > 5	23.2%	29.8%
Mortality	5.2%	6.4%
Average Age	43.9	38.8
ISS Mean Score	11.7	13.4
Trauma Activations	5590	6869
Non Trauma Per Day	<b>177</b>	<b>307</b>

Source: Jawa et. al. (2012)

**Table 4.** Trauma Care Costs

<b>Item</b>	<b>UNMC</b>	<b>CUMC</b>
Direct Costs	\$13,897	\$10,577
Indirect Costs	\$6,833	\$8,776
Total Costs	\$20,730	\$19,353

Source: Jawa et. al. (2012)

Table 5. Payer Mix

Type of Insurance	UNMC	CUMC
Private	45%	44%
Medicaid	17%	15%
Medicare	25%	22%
Charity/None	13%	19%

Source: Jawa et. al. (2012)

Over the years both programs experienced comparable mortality rates. One facility, CUMC, has served more patients with a higher Injury Severity Score (ISS) score. The other facility, UNMC, has tended to see a younger group of trauma patients. The outcomes were essentially equal. The above charts point out some other important points to be made about the Omaha experience in joint trauma care. About one-third of the trauma patients were charity care or had Medicaid, which reimburses at a lower rate than does Medicare or other insurance coverage. Of course this will change somewhat with the advent of the Patient Protection and Affordable Care Act (ACA). Overall revenue streams should improve, at least modestly, for the trauma centers under the ACA. An individual hospital can share common costs across a number of departments. CT scanners and MRI imaging devices can be used by a number of departments within each hospital. The costs are therefore spread over a larger number of patients. This is also true with the allocation of expensive medical-physician specialist costs (e.g. neurosurgeons, anesthesiologists, trauma surgeons, orthopedic surgeons). Overall the joint system has worked well for the Omaha community by providing first class trauma care to the Omaha area. It has preserved and increased the availability and quality of trauma care. As an added benefit to the respective hospitals, the trauma centers have been able to operate profitably over the years of the joint trauma agreement.

### THE EVOLVING MODEL OF TRAUMA CARE

Christensen et.al. (2009) point out that in the past, hospitals operated much like high-priced resort hotels, minus the luxurious amenities. The business model was quite simple: maximize volume and patient throughput. Success was measured by percent occupancy or patient bed days (i.e. how many of the hospitals beds were occupied on any given day). Admissions were more prevalent and even encouraged. In addition, hospital stays were longer. The system worked for a while. However, it was fraught with inherent problems: there was a lack of communication among medical specialists, information systems were archaic and at times non-existent, there was a lack of integration among all of the medical professionals since they tended to stay in their marked-out specialty-based silo.

York et. al (2013) posit that the old financial/operating model was founded on the assumption that everything was based on inpatient care. Simple procedures, both surgical and diagnostic, often required a stay in the hospital of two or three days. What doomed the old model was a confluence of two forces. One was a radical change in surgical technology and philosophy. The second force was the ascending power of third party payers (i.e. government and insurance companies). With the advent and subsequent continuous improvement in laparoscopic surgical technology there was significant decrease in the need for extended hospital stays. What is more, surgeons became more and more comfortable with having patients go home the same day as a surgical procedure. In addition, increasingly complex surgeries are being done via laparoscopic surgery. Outpatient surgery is the predominant mode of delivering surgical intervention, in all but a few cases. The second great revolution in medical care has been the increasing power of third party payers. These payers include the federal government (Medicare and Medicaid) and medical insurance companies. They have both encouraged and often demanded shorter hospital stays to reduce costs. They have likewise encouraged the expansion of outpatient surgery and medical care as a low cost alternative to more expensive inpatient care.

Trauma care requires the creation of an integrative communications network and high levels of cooperation among medical specialists. Unfortunately, it is a very costly operation because it requires numerous medical specialists and access to these said specialists on a 24/7 basis. Many other non-physician specialists must be available on a continuous basis as well. In addition to high labor costs, such a set-up also requires a very significant investment in expensive diagnostic equipment. The hospital must also make significant investment to handle downstream costs (e.g. intensive care, physical therapy, in-patient care and at home care). This necessitates high operating leverage and must be seen as a highly risky financial investment. High operating leverage requires a set volume to at least

break-even financially. Hospitals must have accurate and reliable information about the volume of potential trauma patients and their ability to pay.

Trauma care has become the problem child of medical financial management over the last thirty years. Initially, there was a lot of pressure for hospitals to add the highest possible level of certified trauma care as an extension of their emergency rooms. In many cases hospital managers felt there would be a type of halo effect (i.e. added prestige) accruing to their hospital if they operated a high level trauma center. In addition, it was also felt that such a trauma center would be an added inducement to attract and keep physicians. In their haste to add trauma care to the portfolio of services offered by the medical facility, many managers did not fully appreciate the challenges and difficulties that would come with that decision. First and foremost, it is very difficult to predict and ensure an adequate number of trauma patients to help pay for the costs of operating the center. The nature of the types of injury has a big impact on the ability of the hospital to collect on services rendered. Blunt trauma, which is most often associated with car accidents, involves patients with medical insurance, who have the ability to pay for services rendered. Penetrating trauma, which is most often associated with gunshot wounds and stabbings, often involves patients that do not have insurance and cannot pay for services rendered. Hospitals that operate trauma centers in urban, inner-city or rural areas, have often found themselves financially strapped to operate the trauma center. In fact, many of these trauma centers were unable to survive without significant subsidies from government agencies or from the hospital itself. In addition to challenges on the revenue side, many medical managers did not fully appreciate the nature of the incremental costs associated with operating a trauma center. Simpson (2015) estimates, the annual costs associated with operating a Level One trauma center at Sentra Norfolk General Hospital to be approximately \$28.5 million per year. These costs include the salaries of specialist physicians hired to staff the trauma center on a 24/7 basis. In addition to more specialist physicians, there are numerous other professional staff (e.g. trauma nurses, radiology technicians, laboratory specialists, inhalation therapists) that likewise must be hired to fully staff the center. A trauma center also requires a very significant investment in capital equipment (i.e. diagnostic equipment) that must be available on a 24/7 basis as well. These would include MRI and CT scanning machines. Opportunity costs are also relevant, as several operating rooms must be left open and available for trauma patients on a 24/7 basis. Consequently, a significant number of trauma centers have closed because the hospital could not sustain the continuous financial loss sustained in treating trauma patients. Many estimates are that approximately one third of trauma centers have closed in recent years, many located in inner cities and rural areas.

Paradoxically, in the last few years there has been complete 180 degree change in the attitude of medical managers (Omaha is a good example). Many hospital managers now see trauma care as a rich source of profit. The nature of trauma care has obviously not changed. So what has taken place that would cause such a rapid and unexpected turn around in attitude? Hospital financial management, especially with respect to trauma care, has become much more sophisticated. Trauma care is very expensive. However, managers now have a better understanding of the revenue streams that flow from trauma care. Injury types are often a good predictor of revenue or potential problem with collection. Inner city trauma care managers now understand that they will have to rely more heavily on subsidies, gifts and grants to fuel their operations. Trauma care is also tied increasingly with acute care. A trauma surgeon is fully qualified to do an emergency appendectomy. This helps offset the cost of many of the medical professionals. One major change that has occurred in recent years is the creation and acceptance by third party payers of an activation fee when trauma care is needed for an injured patient. Fakry et al. (2009) found that these fees can vary from \$837 to \$24,964 per trauma incurrence. Insurance companies and Medicare will pay for this. However, Medicaid will not. The rationale of the activation fee is charge the trauma patient for the extremely high fixed costs associated with providing trauma care. This particular fee can go a long way to providing reimbursement for the high cost of operation. The ACA may also have a very positive impact on the bottom line of trauma centers. Many who would have been treated as charity cases in the past, will now be covered with a minimum of medical insurance. Most of these will have the equivalent of Medicaid coverage. Medicaid does not allow for the payment of the activation fee, but it will cover costs after a deductible is paid for by the patient. While it is not the equivalent of private insurance coverage in reimbursement, it at least affords the hospital some level of payment for trauma services rendered. Another rich source of potential revenues for trauma centers is fully utilizing and using what is authorized under current medical coding practices. Medical coding is extraordinarily complex. In fact, many health facilities, trauma centers included, are utilizing coding experts to properly code for reimbursement. These coding experts work alongside the medical professionals in the trauma center. They note and code the treatment being given to the trauma patient. Hospitals are using a more aggressive, but legal and ethical, use of higher reimbursement

codes. They are not gaming or defrauding the system, rather they are fully understanding and using what is allowed. For example, trauma centers can in addition to coding for the activation fee also code to be reimbursed for activation of the emergency room. The use of a coding expert also frees up physicians to render more time to patient care, which can be billed.

Hospital management has become more sophisticated in financial management. Part of that is more fully understanding how costs behave when new departments, like a trauma center, are added to the portfolio of a hospital's offered services. The trauma center can be seen as a profit center to which costs and revenues can be directly traced. Many costs can be defined as direct costs traced directly to the creation and operation of the trauma center. Most of these costs tend to be fixed in nature (they do not change with changes in patient load). There are also the variable costs associated with the treatment of individual patients (e.g. supplies, medicines) (i.e. they fluctuate with patient load). Opportunity costs are also relevant and must be considered in evaluating overall profit.

### **PRESENT STATE OF TRAUMA CARE IN OMAHA**

Both institutions, CUMC and the UNMC, have crossed the Rubicon. On August 1, 2014 each begin offering Level One trauma service independent of the other. Omaha EMS will take unresponsive people to UNMC on odd numbered days and to Creighton on even numbered days. Injured patients who are conscious can request to be taken to the facility of their choice. Under that arrangement neither institution will be able to cherry-pick the patients that have a higher probability to pay (i.e. suburban blunt trauma). Both institutions have received official Level One designation from the State of Nebraska. Although the State has designated both as Level One trauma centers, there was some controversy. UNMC sought and received in short order Level One certification from the State of Nebraska. CUMC likewise sought Level One designation, but was initially denied on seemingly small paperwork issues. CUMC resubmitted its application and was granted Level One status by the State. Level One designation from the American College of Surgeons (ACS) for both institutions is a bit more problematic. Generally, the ACS requires that a trauma center must see at least 2,000 trauma patients per year before it will bestow its Level One designation. If the trauma cases are split between the two facilities, they will not reach that plateau in the foreseeable future.

Financial viability of the trauma centers will be a challenge in both the short and long term. There will be no change in the volume of trauma patients transported to the centers (i.e. static level of paying customers). Both facilities will have to make substantial investments in both personnel costs (e.g. physicians and other professional staff) and in some cases additional diagnostic equipment. In both facilities the operating leverage will increase. On the other hand, non-financial issues have a significant role in making the decision to offer separate facilities. Each institution operates a medical school and an independent trauma center will enhance the educational opportunities for both medical students and medical residents.

There is no reason to believe that the quality of medical or trauma care will decrease as a result of operating two independent facilities. The relevant issue for the people of Omaha and the surrounding area is: are the additional costs justified? Time will tell.

### **CASE QUESTIONS**

1. What is trauma and critical care?
2. Why is trauma care an important and recognized specialty in United States medical care?
3. What is the cost (social and economic) of trauma in the United States?
4. Why would a hospital create a trauma care center?
5. Explain what is involved with the different levels of trauma care and why the State of Nebraska would set up a multi-level system of trauma care.
6. Why is trauma care very costly?
7. In your own words, explain why the University of Nebraska Medical Center created an independent trauma care center.
8. Evaluate each of the reasons cited by UNMC for creating an independent trauma care center.

9. Analyze and comment on Creighton University Medical Center's decision to likewise create an independent trauma care center?
10. How do the different types of trauma injuries impact a medical center's ability to make trauma care center profitable?
11. Explain how the Affordable Care Act will impact a hospital's ability to offer trauma care?
12. Should medical coders be an integral part of the trauma team? Why or why not?
13. Give three reasons why it is appropriate to charge an activation fee. Give three reason why it would not be appropriate to charge and activation fee.
14. What would be an appropriate upper limit on an activation fee? Explain you reasoning.
15. What is your opinion of the move by Creighton University Medical Center and the University of Nebraska Medical Center to set up independent trauma centers in the city of Omaha, Nebraska? Please elaborate.

### AUTHOR BIOGRAPHY

**Rodger L. Brannan**, Ph. D. (University of Nebraska-Lincoln) is an associate professor of accounting in the Labovitz School of Business and Economics at the University of Minnesota-Duluth. He holds a CPA certificate from the State of Indiana. His current research interests include government and not for profit, accounting and business history, and cost and strategy. He has published in Public Budgeting and Finance, American Academy of Accounting and Finance, Southwestern Business Administrative Journal and Journal of Accounting Case Research. Email: rbrannan@d.umn.edu

### REFERENCES

- Christensen, C., Hwang, J. & Grossman, J. (2009). Disrupting the Hospital Business Model. *Forbes*. Retrieved on June 13, 2016 from: [www.forbes.com/2009/03/30/Hospitals-Hea;thcare-Disruption-Leasership-Clayton-Christensen-Strategy-Innovation.html](http://www.forbes.com/2009/03/30/Hospitals-Hea;thcare-Disruption-Leasership-Clayton-Christensen-Strategy-Innovation.html).
- Cowley, R. A. et. al. (1973). An Economical and Proved Helicopter Program for Transporting the Emergency Critically Ill and Injured Patient in Maryland. *Journal of Trauma*, 13, 1029-1038. Retrieved on June 13, 2016 from: [http://journals.lww.com/jtrauma/Citation/1973/12000/AN\\_ECONOMICAL\\_AND\\_PROVED\\_HELICOPTER\\_PROGR\\_AM\\_FOR.1.aspx](http://journals.lww.com/jtrauma/Citation/1973/12000/AN_ECONOMICAL_AND_PROVED_HELICOPTER_PROGR_AM_FOR.1.aspx)
- Erickson, A. (2002). *Trauma Care: Then, Now, and Tomorrow. Modern Medicine: Healthy Patient Healthy Practice*. Retrieved on June 13, 2016 from: [www.modernmedicine.com/modern-medicine/content/Ttrauma-care-then-now-and-tomorrow?page=full](http://www.modernmedicine.com/modern-medicine/content/Ttrauma-care-then-now-and-tomorrow?page=full).
- Fakry, S. M. et. al. (2009). Survey of National Usage of Trauma Response Charge Codes: An Opportunity for Enhanced Trauma Center Revenue. *Journal of Trauma*, 67(6), 1352-1358. Retrieved on June 13, 2016 from: [http://journals.lww.com/jtrauma/Abstract/2009/12000/Survey\\_of\\_National\\_Usage\\_of\\_Trauma\\_Response\\_Charge.37.aspx](http://journals.lww.com/jtrauma/Abstract/2009/12000/Survey_of_National_Usage_of_Trauma_Response_Charge.37.aspx)
- Jawa, R. et. al. (2012). Two Hospitals With 1 Trauma System: A Joint Approach to the Care of the Injured Patient. *The American Journal of Surgery*, 203, 454-460. Retrieved on June 13, 2016 from: <http://www.sciencedirect.com/science/article/pii/S0002961011003874>
- Lambert, B. (1991). Dr. R. Adams Cowley, 74, Dies; Reshaped Emergency Medicine. *New York Times*, November 1, 1991. Retrieved on June 13, 2016 from: <http://www.nytimes.com/1991/11/01/us/dr-r-adams-cowley-74-dies-reshaped-emergency-medicine.html>.
- Model Trauma System Planning and Evaluation* (2006). U.S. Department of Health and Human Services. Retrieved on June 13, 2016 from: [www.ncdhhs.gov/dhrs/ems/trauma/pdf/hrsatraumamodel.pdf](http://www.ncdhhs.gov/dhrs/ems/trauma/pdf/hrsatraumamodel.pdf)
- Mullins, R. (1999). A Historical Perspective of Trauma System Development in the United States. *Journal of Trauma*, 47(3), 1-11. Retrieved on June 13, 2016 from: [https://www.nasemso.org/Members/Download\\_Documents/CouncilDocuments/Council4/documents/AHistoricalPerspectiveofTraumaDevelopment.pdf](https://www.nasemso.org/Members/Download_Documents/CouncilDocuments/Council4/documents/AHistoricalPerspectiveofTraumaDevelopment.pdf)
- Omaha; Wikipedia; Retrieved on June 13, 2016 from: [http://en.wikipedia.org/wiki/omaha\\_nebraska](http://en.wikipedia.org/wiki/omaha_nebraska).
- Ruggles, R. (2014). Two Omaha Hospitals in High-Stakes race for Highest Trauma Center Rating. *Omaha World Herald*, March 30, 2014. Retrieved on June 13, 2016 from: [http://www.livewellnebraska.com/archives/two-omaha-hospitals-in-high-stakes-race-for-highest-trauma/article\\_ea0d3d58-514d-53b5-8c48-a51d1fdc1a37.html](http://www.livewellnebraska.com/archives/two-omaha-hospitals-in-high-stakes-race-for-highest-trauma/article_ea0d3d58-514d-53b5-8c48-a51d1fdc1a37.html).
- Ruggles, R. & Glissman, B. (2014). Omaha's Two Trauma Centers Begin Dueling Services Today. *Omaha World Herald*, August 1, 2014. Retrieved on June 13, 2016 from: [http://www.omaha.com/edition/iowa/articles/omaha-s-trauma-centers-begin-dueling-services-today/article\\_71c1a1d2-c62a-59f5-a0ee-be7b1e9c4405.html](http://www.omaha.com/edition/iowa/articles/omaha-s-trauma-centers-begin-dueling-services-today/article_71c1a1d2-c62a-59f5-a0ee-be7b1e9c4405.html).



- Sanji, N. & McDonald, K. (2014). Trauma and Emergency Care Under the Affordable Care Act. *Bulletin of the American College of Surgeons*. Retrieved on June 13, 2016 from: <http://bulletin.facs.org/2014/04/trauma-and-emergency-care-under-the-affordable-care-act/>.
- Simpson, E. (2015). Sentara Norfolk General Hospital's Trauma Center: Saving Lives at a High Cost. *The Virginian Pilot*, October 11, 2015. Retrieved on June 13, 2016 from: [http://pilotonline.com/news/local/health/sentara-norfolk-general-hospital-s-trauma-center-saving-lives-at/article\\_fbcd2426-91b9-517c-95aa-76bba294409d.html](http://pilotonline.com/news/local/health/sentara-norfolk-general-hospital-s-trauma-center-saving-lives-at/article_fbcd2426-91b9-517c-95aa-76bba294409d.html).
- Trauma Facts, Cost of Injury - General Information* (2015). The American Association for the Surgery of Trauma; Retrieved on June 13, 2016 from: [www.aast.org/generalinterest/links.aspx](http://www.aast.org/generalinterest/links.aspx).
- York, Robert, et al. (2013). Decline in Utilization Rates Signals a Change in the Inpatient Business Model. *Health Affairs Blog*. Retrieved on June 13, 2016 from: [www.healthaffairs.org/blog/2013/03/08/decline-in-utilization-rates-signals-a-change-in-the-inpatient-business-model/](http://www.healthaffairs.org/blog/2013/03/08/decline-in-utilization-rates-signals-a-change-in-the-inpatient-business-model/).

**NOTES**

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.