

*Chapter 2***THE ECONOMICS OF REGIONAL TRAUMA CENTERS - THE GEORGIA MODEL**

***Greg Bishop,<sup>1</sup> Dennis W. Ashley<sup>2,3,4\*</sup> and Joe Sam Robinson Jr,<sup>2,3,4,5</sup>***

<sup>1</sup>Bishop+Associates, Irvine, CA

<sup>2</sup>Georgia Trauma Commission, Atlanta, GA, USA

<sup>3</sup>Medical Center of Central Georgia, Macon, Georgia, USA

<sup>4</sup>Mercer University School of Medicine, Macon, Georgia, USA

<sup>5</sup>Georgia Neurosurgical Institute, Macon, Georgia, USA

This chapter provides an overview of the economic factors impacting regional trauma centers, with the Georgia Trauma Commission's work in assessing Georgia's trauma centers for 2006-2008 (with funding arriving in 2008) used as a case study.

**BACKGROUND**

The U.S. military learned lessons during the Vietnam War that led to dramatic changes in the care of the seriously injured in America in the 1970's and 80's. Upon returning home, medical personnel pointed out that a soldier wounded in the jungles of Southeast Asia had a better chance of survival than those injured in auto crashes in communities across this nation.[1]

In those two decades, the first trauma centers were developed, trauma center standards were established by the American College of Surgeons, training programs were created, and regional trauma systems developed in a number of States.[2] Trauma centers proliferated in the 80's, driven by a passionate group of physicians, nurses and emergency personnel committed to saving the lives of the injured. At the end of the eighties, development stalled and trauma centers started closing due to economic challenges.[3, 4]

Today, while many still struggle economically, about 600 [5] of the nation's hospitals serve as regional trauma centers. They dedicate extensive staff, physician and facility resources at all times so that seriously injured patients have the best possible chance of survival and productivity. [6]

---

\* Corresponding Author: Dennis W. Ashley, 840 Pine Street, Suite 710, Macon, GA 31201.  
Email: ashley.dennis@mccg.org.

## THE REGIONAL TRAUMA CENTER

When a regional trauma center opens, paramedics transport injury victims past local hospitals to its waiting trauma team, composed of a trauma surgeon, emergency physician, trauma nurses and personnel from radiology, blood bank and other departments. Fifteen surgical and medical specialties from neurosurgery to OB/GYN are on standby, and nursing teams are ready in the operating room and critical care unit. [6]

The difference between the severity and type of injuries treated by an emergency department versus a regional trauma center is indicated in this table.

Paramedics use formal triage criteria [7] to determine whether injury victims will be transported to the closest hospital or to one of the 10% of the nation's hospitals that serves as a regional trauma center.

Across the U.S. regional trauma centers are categorized as Level I or II, depending upon their level of resources. Some are specialized pediatric trauma centers. Level I trauma centers conduct education and research and are typically based in teaching hospitals, and Level II trauma centers are usually based in community hospitals. There are also Level III and IV trauma centers that are typically based in smaller rural hospitals where they treat lower severity injury patients and stabilize and transfer the more seriously injured to a regional trauma center. [6]

Typical Patient Injuries Treated	
Emergency Room	Trauma Center
Broken Leg	Multiple Fractures
Back Sprain	Paralysis
Broken Rib	Punctured Lung
Laceration	Stab Wound
Concussion	Brain Injury

Trauma Medical Staff Specialties	
Trauma Surgery	Emergency Medicine
Anesthesiology	Neurosurgery
Orthopedic Surgery	Ophthalmology
Plastic Surgery	Micro Surgery
Hand Surgery	Cardiac Surgery
Thoracic Surgery	Critical Care
Oral Surgery	Radiology
Pediatric Surgery	Ob/Gyn Surgery

Regional trauma centers are the cornerstone of state trauma systems, which also incorporate emergency medical services (paramedics, air medical transport, etc.), referral hospitals (rehabilitation, burn centers), and other hospitals in a systematic approach to optimizing care for the seriously injured at all stages of treatment. [8, 9]

## GEORGIA'S TRAUMA CENTERS: A CASE STUDY

Georgia experienced a crisis in trauma care in the mid 2000's due to closures of trauma centers in a state with an inadequate supply to begin with.[10] The most critical issues were the declining number of physicians available to participate in trauma care, a substantial proportion of uninsured trauma

victims, the lack of a system to direct patients to the most appropriate hospital, and an antiquated emergency medical services (EMS) system that is fragmented and under resourced. [11,12] These issues are common in states across the nation, and particularly in the South and Southwest where there are high proportions of uninsured and large rural areas. [13]

Georgia's trauma surgeons, nurses and other system stakeholders worked for years to get the state to act, and developed strong alliances with EMS, Georgia's hospital and medical associations, and the Chamber of Commerce. The State Legislature acted to create the Georgia Trauma Care Network Commission and allocated \$58.9 million to stabilize and expand Georgia's trauma system. [14] The Commission met in December 2007 for the first time and set about assessing Georgia trauma center's financial performance. The assessment was conducted on information provided by trauma centers on 2006 patients meeting Georgia trauma registry criteria. [15]

## **FUNDING FOR REGIONAL TRAUMA CENTERS**

In June 2008, the Commission approved the 2008-2009 \$59 million trauma system-funding plan, which included funding of \$17,888,539 for Level I and II trauma center readiness costs and another \$17,888,539 for trauma center uninsured patient care costs (for a total of \$35,777,078). The four Level I and nine Level II trauma centers were responsible for passing on 25% of this funding to their medical staff who participated in trauma care. [16, 17]

Additional assessments of Level I and II trauma center financial performance were conducted for 2007 and 2008, the period in which initial state funding arrived at the trauma centers. This case study summarizes the results of all three years as a basis for exploring the economic factors that impact acute trauma care.

## **A COMPREHENSIVE TRAUMA SYSTEM**

While this case study focuses on the financial viability of regional trauma centers, an essential issue addressed in Goal #2 below, a comprehensive trauma system is necessary for trauma patients to be treated and transported from the scene, stabilized and transferred by Level III/IV trauma centers and local hospitals to higher level trauma centers, and for those who need it, transfer to rehabilitation and burn care.

In 2008, the GTCNC assessed Georgia's trauma system and found it to be rich in opportunities. This is reflected in the broad range of goals in the GTCNC strategic plan, which expands the concept of a comprehensive trauma system. It includes economically beneficial partnerships with Georgia organizations responsible for emergency communications, telemedicine, all EMS, pediatric emergencies, disaster/ terror preparedness, injury prevention, other types of medical emergencies, and all local/regional emergency care systems. [9]

### *Primary Goals*

1. Obtain Permanent Funding
2. Maintain/Expand Georgia Trauma Centers
3. Strengthen Emergency Medical Services
4. Develop Trauma Communication System
5. Build Trauma System Infrastructure
6. Establish Exceptional Accountability

*Secondary Goals*

1. Pilot/Build Trauma Telemedicine System
2. Enhance Pediatric Trauma Subsystem
3. Strengthen Trauma Physician Support
4. Address Rehab, Burn and Interstate Transfers
5. Assist Initiatives to Reduce Traumatic Injury
6. Integrate with Disaster/Terror Preparedness
7. Expand System to All Emergency Care Needs
8. Develop Trauma System Regionalization
9. Develop Policy/Stakeholder Structure

Progress has also been broad and includes:

- All 2007 trauma centers have maintained their status, four hospitals have become trauma centers, two have upgraded, and others are in process.
- A cutting edge performance-based payment program to improve quality and reduce costs with financial incentives has been established.
- A state-of-the-art system to assure all injured are quickly moved to the appropriate level of care is developing, using Sweden's trauma communication system software.
- EMS is stronger throughout Georgia for all emergencies due to new ambulances, pediatric training, and a robust stakeholder structure within the GTCNC.

The components of the GTCNC Strategic Plan above impact many of the economic factors of trauma care, and they provide a broader basis for exploring these factors in this case study.

## **GEORGIA REGIONAL TRAUMA CENTER 2006-2008 FINANCIAL PERFORMANCE**

This component summarizes the results of 2008 in comparison to 2006 and 2007.

### **Trauma Center Volume and Severity**

The table below indicates the breakdown of admitted patients treated in 2008 in Georgia trauma centers by injury severity score (ISS) and comparative 2006-7 data.

#### **Georgia Admitted Trauma Center Patients**

Injury Severity	2008	%	2007	%	2006	%
ISS 0-8 Minor	4,057	37%	3,425	31%	4,132	36%
ISS 9-14 Moderate	4,133	38%	3,972	36%	3,816	34%
ISS 15-24 Major	1,800	16%	2,158	20%	2,016	18%
ISS >24 Severe	993	9%	1,410	13%	1,354	12%
Totals	10,983	100%	10,965	100%	11,318	100%

In 2008 the average patient volume was 1,564 for Georgia's Level I trauma centers, and 521 for Level II trauma centers. The total number of admitted patients with an ISS above 15 (major/severe injuries) was 2,733, or 25% of the total, in comparison to 3,568 (33%) in 2007 and 3,370 (30%) in 2006.

For 2008, information on non-admitted patients meeting state trauma registry criteria was also provided by Georgia trauma centers and is summarized in the table below.

### Georgia Admitted Trauma Center Patients 2008

Type Non Admit	All Trauma Centers	Treatment Cost	Average Cost
Dead On Arrival	22	\$44,570	\$2,026
ED Deaths	233	\$1,140,866	\$4,896
OR Deaths	51	\$555,755	\$10,897
ED Transfers Out	320	\$2,159,483	\$6,748
Transfers In and ED Discharge	403	\$745,271	\$1,849
Totals	1,027	\$4,916,568	\$4,787

The total of 1,027 patients adds 9.3% to overall volume, and the cost of \$4.9 million adds 2.1% to \$237.9 million in patient treatment costs (see below).

### Trauma Center Patient Treatment Costs By Payer Class

The table below indicates fully allocated treatment costs, composed of both direct and indirect costs, for admitted trauma patient under each payer class:

#### Trauma Center Treatment Costs by Payer Class

Payer Class	CY 2008 Costs	Payer Mix	CY 2007 Costs	CY 2006 Costs
Private Insurance	97,185,231	41%	\$84,758,174	\$86,991,732
Other	23,214,860	10%	\$11,103,058	\$14,604,157
Medicare	28,140,570	12%	\$22,452,714	\$25,707,732
Medicaid	46,747,856	20%	\$41,491,140	\$37,181,827
Uninsured	42,578,211	18%	\$59,529,585	\$56,199,126
Total	\$237,866,728	100%	\$219,334,671	\$220,684,574

Georgia's 39% trauma center proportion of privately insured patients in relation to the 51% national norm [13] is low and is offset by a higher proportion of uninsured/underinsured patients. Total costs in 2008 were 8.5% higher than in 2007, with about the same number of patients. The application of the "other" category was inconsistent over previous years in that some poorly insured patients were included in 2008 that resulted in a corresponding decrease in uninsured patient costs. There is no evidence that actual uninsured patient costs decreased in 2008.

### Trauma Center Readiness Costs

Trauma centers incur substantial costs over and above patient treatment costs that are not normally allocated to trauma patient care by hospital cost allocation formulas. These extraordinary "readiness costs" would be eliminated if the trauma center were to close.

The GTCNC's Trauma Care Economic Subcommittee developed a new methodology to assess such costs, based upon previous trauma center readiness cost surveys in Georgia and Florida [18], and using the American College of Surgeon's standards for trauma centers. [6] Summarized results of the survey are as follows:

### Trauma Center Readiness Costs

Readiness Cost Category	LI Total	LI Average	LII Total	LII Average	Georgia Totals
Administrative	2,431,530	607,883	3,339,644	371,072	5,771,174
Medical Staff	18,003,208	4,500,802	12,836,008	1,426,223	30,839,216
In House OR	1,744,231	436,058	2,284,553	253,839	4,028,784
Education/Outreach	222,518	55,630	1,437,046	159,672	1,659,564
Totals	\$22,401,487	\$5,600,372	\$19,897,251	1,992,890	\$42,298,738

The 2008 results total \$42.3 million, compared to \$46.3 million in CY 2007, and \$44.0 million in CY 2006.

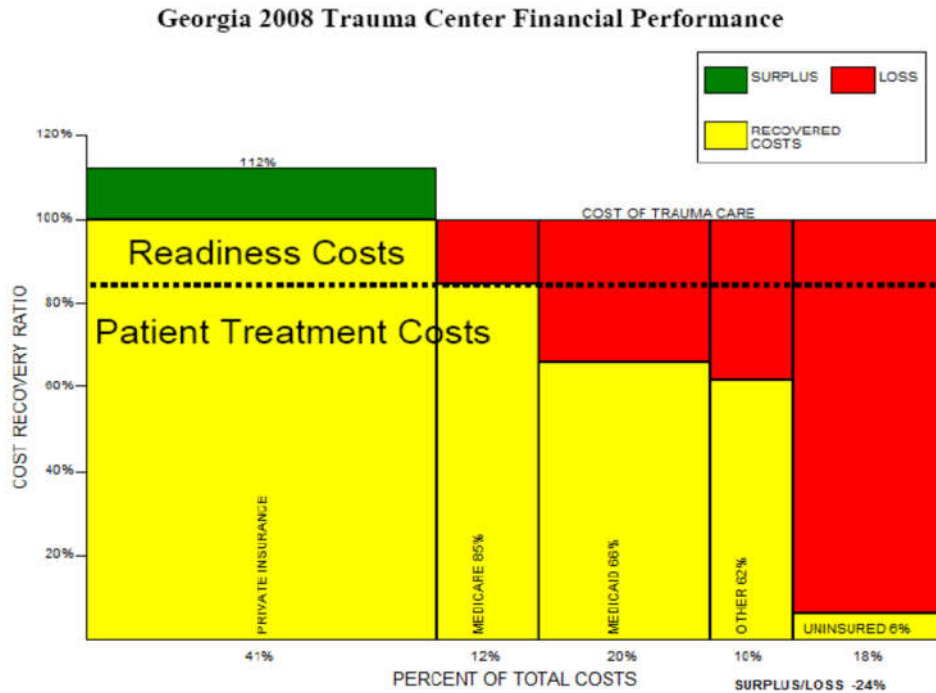
### 2008 Revenue and Total Costs and Payer Class

The table below incorporates total trauma center costs (including readiness costs) allocated by payer, revenue produced by each payer source, the cost recovery rate (CRR) or revenue divided by costs, and the percentage of overall loss contributed by each payer class.

#### 2008 Trauma Center Total Costs Revenue by Payer Class

Payer Class	Total Costs	Revenue	Surplus /Loss	CRR %	Overall Contri.
Private Ins.	\$114,467,230	\$128,194,547	\$13,727,317	112.0%	4.9%
Other	\$27,343,051	\$16,873,772	(\$10,469,279)	61.0%	-3.8%
Medicare	\$33,144,677	\$28,111,038	(\$5,033,639)	84.0%	-1.9%
Medicaid	\$55,060,811	\$36,752,712	(\$18,308,099)	66.0%	-6.7%
Uninsured	\$50,149,697	\$3,079,352	(\$47,070,345)	6.1%	-16.8%
Total	\$280,165,466	\$213,011,421	(\$67,154,045)	76.0%	-24.0%

Readiness costs were allocated proportionally to treatment costs and together total \$280.2 million. Patient revenue was \$213 million, leaving a loss (before state funding is considered) of \$67.7 million.



The green area reflects a surplus generated by a payer class; the red area represents a loss, and the yellow area represents recovered costs. Readiness and patient treatment costs are also indicated. Of the loss on trauma care in Georgia (red), 17% is generated by uninsured patients, and Other, Medicaid and Medicare patients generate another 12% in losses. [19]

### 2008 Georgia Trauma Center Reimbursement Profile

The reimbursement profile below depicts the above table in graphic form. The width of each column reflects the proportion of full costs incurred by patients in each payer class, and the height of each column reflects the proportion of total costs covered by each payer class. [19]

### Total 2006-2008 Financial Performance of Georgia’s Regional Trauma Centers

The table below presents the overall financial performance of Georgia’s trauma centers in 2008 in comparison to 2007 and 2006.

Georgia Trauma Centers	CY 2008	CY 2007	CY 2006
<i>Patient Care Revenue</i>	\$213,011,421	\$201,052,174	\$193,999,255
Direct Patient Treatment Costs	\$159,370,708	\$146,954,230	\$147,858,665
Indirect Patient Treatment Costs	\$78,496,020	\$72,380,441	\$72,825,909
<i>Trauma Patient Treatment Costs</i>	<i>\$237,866,728</i>	<i>\$219,334,671</i>	<i>\$220,684,574</i>
Readiness Costs	\$42,298,738	\$46,284,440	\$44,063,224
<i>Total Trauma Patient Costs</i>	<i>\$280,165,466</i>	<i>\$265,619,111</i>	<i>\$264,747,798</i>
<i>Loss on Trauma Care</i>	<i>(\$67,154,045)</i>	<i>-\$64,566,937</i>	<i>-\$70,748,543</i>
<i>State Funding</i>	<i>\$47,041,166</i>		
<i>Remaining Loss</i>	<i>(\$20,112,979)</i>	<i>-\$64,566,937</i>	<i>-\$70,748,543</i>

In CY 2008, with revenue of \$213 million, total costs of \$280.2 million, and a payer mix with 59% of patients either uninsured or underinsured, Georgia trauma centers experienced a combined financial loss on trauma care of \$67.2 million. In 2008, \$47 million in state funding was provided, which reduced this loss from a 2006-2008 average of \$68.2 million to \$20.1 million.

### **Trauma Medical Staff Costs**

In addition to the \$237.9 million in hospital costs for trauma patient treatment, there are also substantial costs for treatment by trauma specialists such as trauma surgery, orthopedic surgery, neurosurgery and plastic surgery. This also includes hospital based physicians such as emergency medicine, anesthesiology and radiology, and other specialists such as urology, ophthalmology and infectious disease.

Based on previous assessments, trauma center physician costs are estimated at 30-35% of patient treatment costs incurred by trauma hospitals. [21] If 33%, this would add \$78.5 million in trauma patient treatment costs for physician care.

### **Total Acute Trauma Care Costs**

Total trauma center costs, or those incurred in the acute care phase of trauma patient care, are estimated as follows:

Trauma Center Treatment Costs	\$ 237,866,728
Trauma Center Readiness Costs	\$ 42,298,738
Trauma Center Physician Costs	\$ 78,496,020
Total Acute Trauma Center Costs	\$ 358,661,486

This does not include costs for care of the seriously injured who do not reach trauma centers, pre-hospital care, rehabilitation and burn care, and out-of-state treatment.

## **THE ECONOMIC FACTORS OF ACUTE TRAUMA CARE**

For decades, trauma centers have reported problems with high costs, low payment and unstable physician support. They have learned to overcome these challenges and, trauma systems continue to slowly but inexorably expand. Georgia presents an excellent example and case study for understanding the variety of economic factors, many unique, that impact the acute phase of care for the injured.

## **THE VALUE OF TRAUMA CARE**

The intrinsic value of trauma care is reflected in polls demonstrating high favorability to government support of trauma care (a 2008 poll in Georgia indicated 78% support for paying \$10 per year for trauma care [22]), and rankings of health services by cost/benefit that placed trauma care at the top [23] (since it heals injured young people who go on to a long, productive life). This intrinsic value is a key reason why the public and their legislators make it a priority, and trauma systems inexorably expand to meet needs.



## REGIONALIZATION OF COMPLEX HEALTH CARE SERVICES

Before trauma centers, each hospital did its best to treat the seriously injured under emergent circumstances, but the low numbers of such patients did not support the resources necessary to effectively care for them. When a trauma system is established, serious injury victims from throughout a region are transported past local hospitals to the regional trauma center, a designated hospital offering specially trained, immediately available staff and the necessary equipment and facilities. [24]

In essence, trauma centers are able to offer high-quality medical care because of the proficiency of the surgeons and trauma specific resources supported by high patient volumes (i.e., economies of scale) [25]. This concept of regionalization of complex health care services, the efficacy of which was first demonstrated with cardiac surgery, provides the economic foundation for regional trauma systems and centers. [26]

## TRAUMA CENTER READINESS COSTS

Trauma patient treatment costs are relatively well defined by standardized hospital cost-accounting systems. The costs required by trauma center regulations to maintain essential infrastructure and capacity to provide emergent services on a 24/7 basis are not. These are non-patient care costs the hospital would not have to pay if it were not a trauma center. They are referred to as trauma center readiness costs [18], and were definitively defined by the GTCNC in the course of their assessments. [27] They can include:

- Medical staff payments for trauma call
- 24 hour operating room staffing
- Added staff for lab/diagnostic services
- Injury prevention activities
- Training of nurses and physicians
- Program administrative infrastructure
- Performance improvement programs
- Trauma specific equipment

In Georgia, these costs amounted to \$42.3 million, or 15% of total trauma center costs.

## ADVERSE SELECTION AND DISPROPORTIONATE SHARE

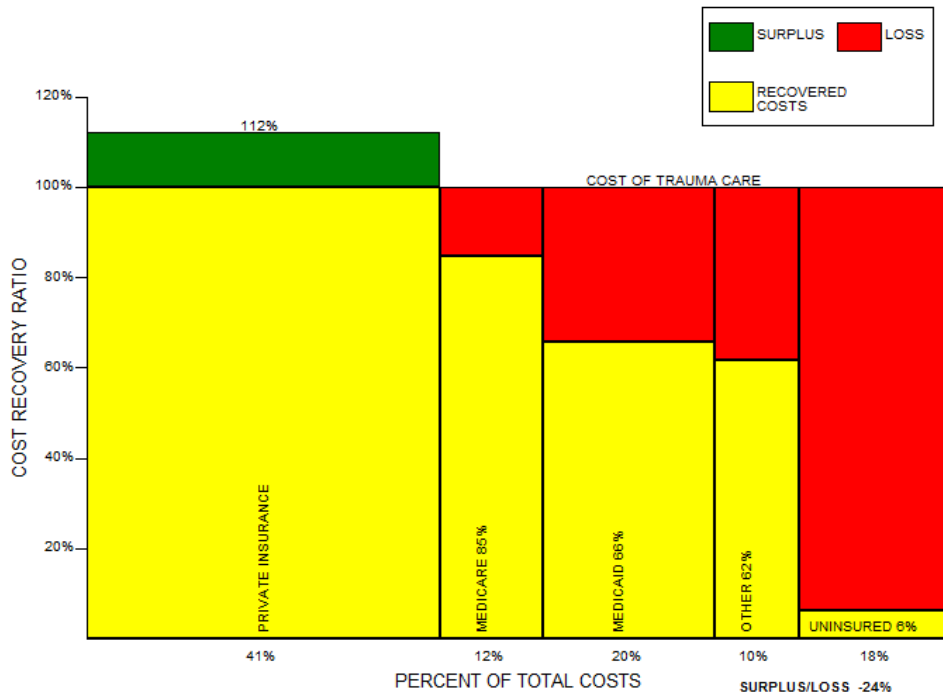
Young adults (particularly young men) and the poor have an increased propensity for injury; these groups make up a high proportion of the patients in trauma centers. They are also less likely to have commercial insurance coverage or be eligible for public assistance programs; as a result, trauma centers attract a *disproportionate share* of patients unable to pay for their care.

Trauma systems also seek the sickest and thus the most expensive patients in a classic example of *adverse selection*. This means higher costs over which to spread the same revenue on uninsured, Medicaid, Medicare and insured patients paid on a case or day rate. The combination of adverse

selection and disproportionate share act as multipliers to produce high levels of uncompensated care. [19, 28]

## COST SHIFTING

Charging insured patients more to cover the uncompensated costs of treating un/under insured patients is cost shifting, which has become a fundamental trauma center financing mechanism. This profile of the financial performance of Georgia's trauma centers shows a surplus of 12% on privately insured patients and losses on all others, a classic example of cost shifting. It is more prevalent in states with high levels of uninsured like Georgia.[13]



## OUT-OF-NETWORK AND REPATRIATION

With the development of managed care, payers use their leverage to direct patients to contracted, low-cost providers. With trauma care, EMS triage policy and paramedics determine patient destination, leaving health plans with little control. Health plans consider trauma patients out-of-network and "out-of-control." This is what enables extensive cost-shifting. [29, 30]

Managed care organizations with a high market share have responded by leveraging the high amount of non-trauma business they do with trauma hospitals to force down their costs for trauma care. Those with a low market share pay a much higher rate for trauma care. Another response is repatriation, in which health plans seek to bring patients back into network by arranging their post-stabilization transfer from trauma centers to lower cost, contracted facilities.

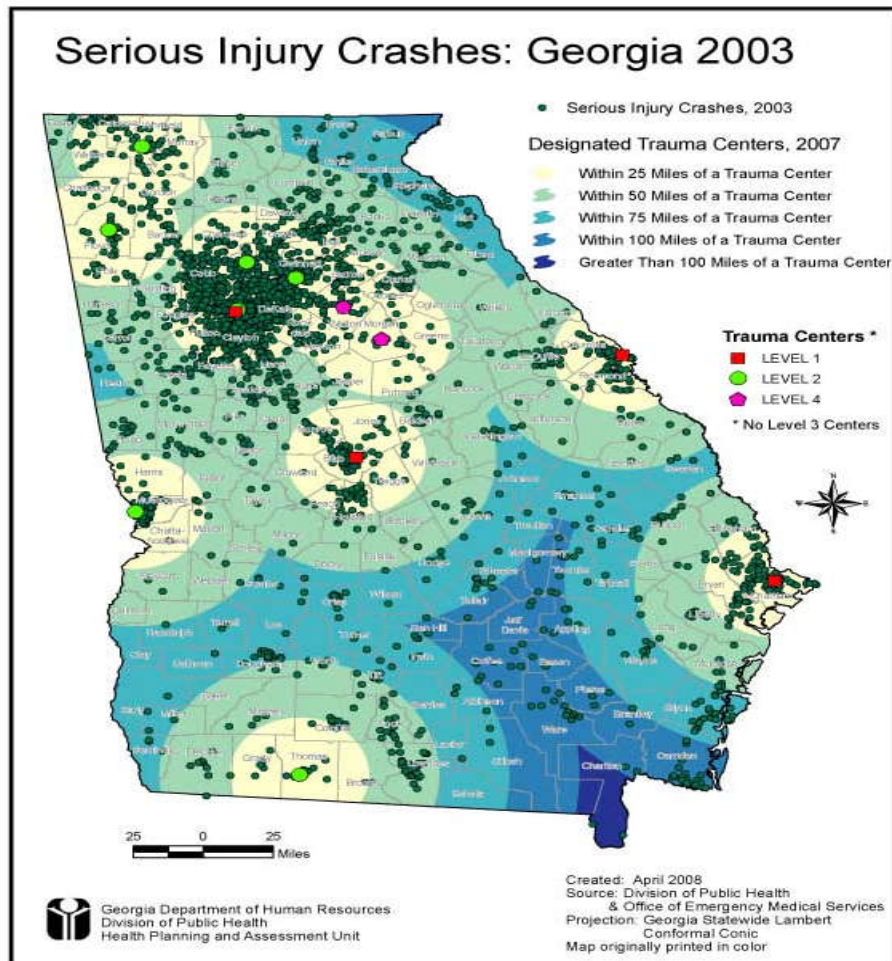
## INCREASING SHORTAGES AND COSTS FOR TRAUMA MEDICAL STAFF

Up to 200 physicians in 16 specialties are needed to support a regional trauma center. For most, trauma care is a small and often problematic part of their practice. It is a responsibility they have taken over from their brethren at other hospitals in the region, and most find it incompatible with their private practice and would like to limit the “opportunity cost” to their lifestyle from trauma call. In essence, their *costs* participating in trauma care have increased, and like any other producer, they raised their prices. [13]

Trauma hospitals are now paying substantial and increasing amounts of call pay or other forms of compensation, but are finding it increasingly problematic to have all trauma specialties staffed at all times. This is in addition to increased difficulty in recruiting surgeons to many areas of the country. [31]

Professional fee billing on trauma care is unique because of the unusual sources of payment (e.g., auto insurance), the disproportionate share of uninsured patients, surgery billing codes that do not reflect the demands of emergent trauma care and very limited means for cost-shifting. Also problematic is obtaining adequate documentation to support charges under emergent circumstances. [13]

The shortage of surgeons developing in many areas of the country [32] bodes ill for trauma care at multiple levels because the remaining ones are busier, making trauma call that much more disruptive. Perhaps the U.S. will end up like Eastern Europe where their very effective trauma centers are staffed only with emergency physician/surgeons, anesthesiologist/critical care specialists and radiologists.



## **SCARCE RURAL TRAUMA CARE RESOURCES**

Rural, lowly populated regions have limited public health structures, small numbers of medical care providers, volunteer emergency medical systems, and long travel distances. Despite these limitations, rural ambulance services and hospitals play a critical role in trauma care. [13]

Georgia presents an excellent example. The map on the right indicates the location of serious injury crashes and adult Level I and II trauma centers, and the areas within 25, 50, 75 and 100 miles of each. The result is that there are large portions of very rural southern Georgia that are beyond 50 miles of a trauma center. [33] The time it will take to stabilize and transport the seriously injured from these areas (medium and dark blue) to a trauma center will exceed the “golden hour”, the point at which their prospects for survival start declining rapidly.

## **COMMUNICATION ENABLES EFFICIENT USE OF SCARCE RESOURCES**

A key economic factor driving plans for the Georgia Trauma System is the efficient use of scarce resources. Strategies include the following [9]:

*Trauma Communication Center* - Functioning like an air traffic control system, it will route inbound ambulances and helicopters with injured patients to the closest hospital staffed and equipped to meet the patient’s needs. It would also help rural doctors transfer critical patients to a trauma center or tertiary care hospital, and can be expanded to other medical emergencies like strokes and heart attacks if the experts in these fields wish to utilize the trauma infrastructure.

*Trauma Telemedicine System* – The Commission has partnered with Georgia Tele-Health to link regional trauma centers with rural providers using telemedicine to enable real time observation of the patient’s emergency care course to enable offsite evaluations by specialists, guide resuscitation measures, and assess radiology and lab test results.

*Statewide GPS EMS Vehicle Locater System*

This will enable all dispatch and transports by ambulances in Georgia to be managed based upon the vehicle’s location. This is critical in high severity trauma cases where time is of the essence, as well as other time critical medical emergencies.

All communication components are being integrated to add new capability to Georgia disaster/terror response organizations.

## **PERFORMANCE: AN ECONOMIC ISSUE**

Getting the most out of health care dollars is now imperative. Performance based payment (PBP) is an evolving concept in health care that is gaining traction as a means of improving quality and reducing costs by financially incentivizing providers to do so. Its application in trauma care is very limited, although it has strong potential in terms of quality and costs, particularly in states that fund trauma centers.

Georgia has taken on PBP as an opportunity to squeeze the best value out of Georgia’s resources by developing a cutting edge program with financial incentives that is fostering the needed participation in trauma system development, cost effectiveness, injured patients’ access to trauma care, meeting trauma center standards, and most importantly, patient outcomes. [34]

## **A NEW PUBLIC SERVICE FOR GEORGIA**

When trauma systems start breaking down, the overburdened emergency care sector of the overall health care system starts breaking down as well. When a trauma center is full and cannot handle the next seriously injured patient, such patients go to other hospitals and physicians, who are then impacted like dominos and react to avoid such cases. Surgeons opt out of call panels for all patients, and paramedics are left to search for another hospital willing to accept the injured patient.

The converse can be true too. When a state builds a trauma system, it can strengthen its overall emergency care system. The surgeons available for trauma care are also available for other surgical emergency cases. Within a trauma hospital, a strong trauma service takes a major load off the overburdened ER. Ambulance GPS systems benefit all emergency patients. The regional infrastructure built to coordinate trauma patient triage, transport and transfer can also help consolidate fragmented county EMS programs into efficient regional EMS agencies. This is what is happening in Georgia.

### **A Public Good**

Trauma systems, like fire and police departments, are defined as a public good in economic terms; i.e., the absence of purchase decisions, immediate access to all, and extensive stand-by resources. In response to closures of trauma centers, many states with relatively high proportions of uninsured patients, developed various means to fund trauma centers, including surcharges on vehicle registrations. Georgia has recognized the importance of trauma centers with funding, and due to the high proportion (51%) of motor vehicle crash victims among its trauma patients [35], the funding source of choice is the vehicle registration fee, with a surcharge on speeding violations playing an important role in funding (and injury prevention due to excessive speeding).

### **Partnering to Make the most of Public Resources**

One of the central characteristics of the Georgia Trauma Commission's strategic plan is partnerships with other organizations to maximize the use of Georgia's resources. This includes partnering with public and private organizations whose role involves:

- Terror And Disaster Preparedness
- EMS/Hospital Communications
- Telemedicine
- State EMS And Health Department
- Injury Prevention
- Emergency Medical Services
- Local Hospitals
- Trauma Centers
- Surgeons/Medical Specialists
- Pediatric Resources
- Interstate Trauma Providers
- Specialized Tertiary Care
- Highway Patrol
- Other

There is also an opportunity for having a strong trauma system serve as a new pillar of support for the larger emergency health care sector throughout the state. Evolving problems with facility capacity and physician supply and participation in emergency care go well beyond trauma care and will require this new regional support structure for trauma care to be broadened to address other “time sensitive” health care issues such as stroke, heart attack and other conditions requiring emergency surgery.

### **Partnering with Stakeholders**

There are many stakeholders for Georgia’s trauma system, and each has something to gain as well as contribute to the system. Pediatric trauma providers are an excellent example of leveraging the trauma system. Georgia enjoys an exceptionally strong array of pediatric trauma centers that are well located to care for seriously injured children under age 15. They account for 12% of trauma center patients and require a parallel system to adults due to their specialized needs.

The pediatric stakeholders have worked to make this component an exceptional part of the trauma system– including 911, pediatric trained and equipped EMS, local hospitals with pediatric training and equipment, telemedicine consults, the trauma communication system, air transport, and the pediatric trauma centers. This system can also serve children who are not injured but need emergent tertiary care (e.g., emergency surgery).

### **Partnering with the Ultimate Stakeholders – Georgians**

Fire and police services are strong, established public goods with strong constituencies, broad public support, and exceptional means of communicating their message. When they do something good, their communities are well aware of it.

As a public good, trauma and EMS sectors are highly fragmented, and just bringing the stakeholders together is a major accomplishment. Moving further to build coalitions with related interests, conduct advocacy to build public support, and build connections with local legislators – all critical steps for building a new public service - is uncommon, but this is what trauma system stakeholders in Georgia did to get the necessary resources described in this case study.

A referendum was placed on the ballot in November amid the anti-tax fervor of the 2010 elections to add a \$10 tag fee onto motor vehicle registration to generate funding for trauma. One of the lessons learned was that the Commission’s highest priority - rural regions – voted against it because they believed the resources would favor urban hospitals. Obviously, more education and communication will be needed in these areas.

There will be more opportunities for funding, and once this critical public service effectively communicates with its ultimate stakeholders, its sustainability will be assured. Rome was not built overnight and police and fire public services took many decades to evolve into the strong positions they enjoy today. Trauma and emergency care public services will also take time to fully develop, and Georgia is well on its way. Unfortunately, once the resources were in hand, the Georgia Trauma Commission became fully engrossed in building an exceptional trauma system for Georgians, but did not communicate with their ultimate stakeholders what they were doing.

## **REFERENCES**

- [1] West JG, Trunkey D, et al: Trauma Systems: Current status – future challenges. *JAMA* 259:3597, 1988.
- [2] American College of Surgeons, Committee on Trauma: Resources for Optimal Care of the Injured Patient, 1999.
- [3] United States General Accounting office: Trauma Care, Lifesaving System Threatened by Unreimbursed Cost and Other Factors: A Report to the Chairman of the Subcommittee on Health for Families and the Uninsured, Committee on Finance, U.S. Senate. Washington D.C., No. HRD 91-57, May 1991.
- [4] The American Association for the Surgery of Trauma: Trauma Center Economic Study – Report on comprehensive survey of nation’s trauma centers. December 1994.
- [5] Coalition for Trauma Care: Number of U.S. Trauma Centers by Level, 2004.
- [6] American College of Surgeons, Committee on Trauma: Resources for Optimal Care of the Injured Patient 2006.
- [7] Sasser, SM, Hunt RC, Sulivent, EE, et al: Guidelines for Field Triage of Injured Patients – Recommendations of the National Expert Panel on Field Triage. Figure 1. Field triage decision scheme – United States, 2006.
- [8] U. S. Department of Health and Human Services, Health Resources and Services Administration. Model Trauma System Planning and Evaluation. February 2006.
- [9] Georgia Trauma Care Network Commission: Our Emerging Vision – A new Public Service for Georgia. February 2009.
- [10] Personal communication with Pat O’Neal, Director, Office of EMS/Trauma, Georgia Department of Community Health, 2008.
- [11] Bishop + Associates: Ideas from and for Georgia’s Trauma System. January 2009.
- [12] American College of Surgeons Trauma System Consultation Program, Georgia Site Visit, January 5, 2009.
- [13] National Foundation for Trauma Care: U.S. Trauma Center Economic Status, 2003.
- [14] Georgia State Legislature, Senate Bill 60: Establish Georgia Trauma Commission, May 11, 2007.
- [15] Georgia Trauma Care Network Commission, 2006 Georgia Trauma Center Economic Analysis, March 2008.
- [16] Georgia Trauma Care Network Commission, Minutes, June 8 2008.
- [17] Ashley DW. The quest for sustainable trauma funding: The Georgia Story. Bulletin of the American College of Surgeons, October 2010.
- [18] Taheri PA, Butz DA et al. The cost of trauma center readiness. *Am J Surg*. 2004 Jan; 187(1):7-13.
- [19] Eastman AB, Rice CL, Bishop GS, et al: An analysis of the critical problem of trauma center reimbursement. *J. Trauma* 31:920, 1991.
- [20] Trauma Center Association of America, Member communications, 2010.
- [21] Bishop+Associates, Information from trauma centers operating comprehensive trauma medical staff billing programs, 1999.
- [22] Healthcare Georgia Foundation. Trauma care in Georgia: Georgians are willing to pay for a statewide system. *HealthVoices*. 2008;23(2).
- [23] Oregon Medicaid Program, Oregon Health Plan 1992.
- [24] Trunkey DD, Lewis FR: Current Therapy of Trauma 4<sup>th</sup> Edition. The Economics of Trauma Care. Eastman AB, Bishop GS: 27, 1999.
- [25] Birkmeyer, JD, Siewers AE, Finlayson, EV et al: Hospital Volume and Surgical Mortality in the United States; *NEJM*, 2002; 293:112-1137.
- [26] Nathens, AB, Jurkovich, GJ, Maier, RV, Grossman, DC et al: Relationship Between Trauma Center Volume and Outcomes; *JAMA*, 2001; 285: 1164-1171.

- [27] Georgia Trauma Care Network Commission, Trauma Center Readiness Costs, Webinar, December 16, 2009.
- [28] Eastman AB, Bishop GS et al: The Economic Status of Trauma Centers on the Eve of Health Care Reform. *J. Trauma*, volume 36, number, 1994.
- [29] Bishop+Associates, Managed Trauma Care Project, 1998.
- [30] Campbell AR and Villinghoff E: Trauma centers in a managed care environment, *1 Trauma* 39:246-251, 1995.
- [31] Rachel Fields, Sullican Cotter and Associates: 5 Factors Affecting Physician On-Call Pay, March 22, 2011.
- [32] American College of Surgeons. Sheldon, George. The Looming Challenge for Small Medical Practices: The Future Physician Shortage and How Health Care Reforms Can Address the Problem. July 8, 2009.
- [33] Division of Public Health and Office of Emergency Medical Services. Serious Injury Crashes: Georgia 2003. April 2008.
- [34] Georgia Trauma Care Network Commission, Performance Based Payment For Georgia Trauma, March 1, 2010.
- [35] Georgia Department of Human Resources, Division of Public Health, Office of Emergency Medical Services/Trauma Operations Research and Analysis Section. Trauma in Georgia: Analysis of 2003 Trauma System Data. December 17, 2004. p. 30.