

A COMPREHENSIVE ASSESSMENT OF THE FLORIDA TRAUMA SYSTEM

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Preface

This report was prepared to satisfy the requirements of a grant awarded to a group of investigators from the University of South Florida and the University of Florida

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by the Department of Health, Office of Emergency Medical Services of the State of Florida, Appendix 1. A comprehensive assessment of the Florida Trauma system was conducted by the investigators and the data recorded in this report has been used to support a series of recommendations. These recommendations will, we hope, assist in guiding the future development of our trauma system and lead to improved outcomes for patients injured in the State of Florida. The grant award from the state mandated a group of goals and objectives which are listed below:

Goals:

1. Conduct a comprehensive assessment of the Florida trauma system
2. Evaluate the number and distribution of trauma centers
3. Determine the responsibility of local government to fund trauma care and any local responsibility for trauma care
4. Development of outcomes based performance measurements to determine if the inclusive trauma system delivers results
5. Establishing methodologies for the objectives listed
6. Performing and documenting a comparative analysis that demonstrates the effectiveness of Florida's trauma system relative to systems in place in other states
7. Include recommendations submitted by regional trauma agencies and stake holders
8. Define the geographical composition of an area that ensures rapid access to trauma care
9. Include historical patterns of patient referral and transfer within a specified area
10. Provide an inventory of trauma care resources
11. Assess population growth characteristics
12. Define medically appropriate ground and air travel times
13. Obtain the recommendations of the Regional Domestic Security Task Force
14. Document the actual number of trauma victims being served by each trauma center

Objectives

The following objectives are to be achieved by the successful conclusion of this study:

1. Develop a definition of a "Trauma Alert Victim"

2. Develop recommendations on aligning trauma service areas within the trauma region boundaries (July 2004) or other methods of regional trauma planning
3. Identify any duplication of effort in current regional trauma planning
4. Review the Regional Domestic Security Task Force structure and determine whether integrating trauma system planning with interagency regional and emergency disaster planning efforts is feasible, and identify any duplication of efforts between the two entities.
5. Make recommendations on the number and level of trauma centers needed in each trauma service area to provide a statewide integrated trauma system
6. Identify the number of trauma patients currently being treated in state-approved trauma centers
7. Make recommendations on the minimum/maximum number of trauma patients that can be treated at a trauma center
8. Establish criteria and define the methodology for determining the number and level of trauma centers needed to serve the population in a defined trauma service area or region
9. Review the current boundaries of the trauma service areas and make recommendations to retain or modify current trauma service areas
10. Provide an inventory of health care resources, i.e. trauma surgeons, neurosurgeons, nurses and other health care practitioners to support trauma centers
11. Develop a map of the existing trauma centers and identify the area served within 30 minutes of the existing trauma centers by ground or air transport and within 50 miles of the existing trauma centers by air transport
12. Identify existing emergency medical services transportation capabilities
13. Identify existing emergency medical services that transport patients to trauma centers and the distance and time they travel
14. Identify Florida's population growth characteristics and establish a methodology for mechanism of trauma trending
15. Make recommendations regarding a continued revenue source which shall include a local participation requirement
16. Make recommendations regarding a formula for the distribution of funds identified for trauma centers, which shall address incentives for new centers where needed and the need to maintain effective trauma care in areas served by existing trauma centers, with consideration for the volume of trauma patients served and the amount of charity care provided
17. Identify potential public funding sources available for trauma care
18. Identify the current incentives for hospitals to become trauma centers
19. Identify the current volume of trauma patients at trauma centers and non-trauma centers
20. Identify the amount of charity and uncompensated care provided by trauma centers
21. Identify reimbursement to trauma centers from local governments, taxes/taxing districts, and the state for the previous five years

The data gathered and analyzed during the course of this study and the recommendations generated from the data analysis will be presented in sections pertaining to 1) Status of Trauma Systems in the United States, 2) Current Status of the Florida Trauma System, 3) Trauma Outcomes in Florida, 4) Regional Planning for Trauma Care in Florida, 5) Funding of Florida Trauma Centers, and 6) Conclusions.

Status of Trauma Systems in the United States: Trauma system development in this country was stimulated by the 1966 National Research Council report *Accidental Death and Disability – The Neglected Disease of Modern Society*. A sequence of national and state legislative decisions led to the development of emergency medical systems which provided resources to supply communities with modern ambulances and trained pre-hospital care personnel. The need for on-line medical control of pre-hospital care stimulated the development of sophisticated emergency departments in hospitals. The emergence of a highly mobile population within the United States, many of whom did not have health insurance but required immediate access to health facilities, produced an exponential growth in visits to hospital emergency departments. These events were important in the growth of Emergency Medicine as a specialty. Trauma centers had traditionally been associated with urban, inner city teaching hospitals that had strong traditional commitment to the care of the indigent. With the development of government sponsored insurance programs; the increased understanding of the importance of rapid transport to definitive care as a means of preventing early death from injury; and the realization that most injuries sustained by Americans occurred away from the inner city led to the identification of trauma care units in tertiary care hospitals across the country. As these systems grew and proliferated, organized visions for the future of trauma systems were required and organizations such as the American Trauma Society partnered with government agencies to articulate this vision.¹ In this report, entitled *Trauma System: Agenda for the Future*, the need to have an inclusive trauma system with effective regionalization and an integrated, multidisciplinary approach was recognized. The authors also emphasized the increased hospital costs associated with trauma care and the need for a role for government at all levels to assist in providing funding. These increased costs necessary to provide the acute and rehabilitation services for injured patients cared for by the integrated trauma system are associated with lower overall costs because of the reduced mortality and increased return to productive activity for these patients.

The fundamental components of an inclusive trauma system are prevention, pre-hospital care, acute care facilities, and post hospital care. The key infrastructure elements are: leadership, professional resources, education, and advocacy, information management, finances, research, technology, and disaster preparedness. In a section to follow we will summarize the status of the Florida Trauma System in achieving this organizational structure. According to a report authored by MacKenzie and colleagues² in 2003, there were, in 2002, 190 Level 1 and 263 Level II trauma centers in the United States. Recent data from the Coalition for Trauma Care indicate that, as of 2004, there were 747 trauma centers in the United States. These were divided into 214 Level One; 406 Level Two; 97 Level Three and 30 unclassified.

A phase of rapid growth of trauma systems occurred during the late 1980's and the early 1990's. Most trauma centers were self-designated. Many subsequently chose to seek verification of trauma capability through the American College of Surgeons. There were a few states, such as Florida, where government supervised system development was undertaken and state-level rules for center designation were used.

Reductions in the rates of reimbursement have occurred related, at least in part, to efforts to control health care costs through managed care approaches and the inability of managed care organizations to react to the unique hospital and professional cost structures associated with trauma care. These reductions have been coupled with increases in fixed costs for trauma centers due to advances in technology and medical knowledge as well as increased costs to provide consistent medical specialist availability and liability protection. These developments have led to contraction of trauma systems in many areas nationwide, including Florida, accompanied by loss of participation by acute care providers. Dailey and associates³ assessed trauma center closures by analyzing information from 44 trauma centers which ceased participation in trauma systems in 14 states. They documented medical staff opposition to trauma center status and inadequate financing as the two most important challenges for

trauma center hospitals. The 2002 HRSA report on development of state trauma systems cited finance and human resource availability as the two greatest threats facing states as they developed their trauma systems.⁴ Financing crises have led to national scrutiny of trauma systems because of threatened closure of trauma center hospitals and reductions in access to trauma care in Los Angeles County California⁵ and Las Vegas, Nevada.⁶

The scientific foundation supporting establishment of regional trauma systems was formed from a series of empiric observations made repeatedly over the past 20 years documenting a decline in injury related mortality when results after a trauma system is established are compared to mortality rates prior to establishment of the system.^{7 8 9} The majority of the studies which employ this type of historical control methodology report an expected reduction in injury related mortality of 15-19 percent resulting from the implementation of the trauma system.

Recent assessments of system efficacy have focussed on appropriateness of triage criteria and studies which compare trauma center outcomes to those observed in non trauma centers. The rapid delivery of a seriously injured victim to a trauma center by advanced pre-hospital care services is recognized as a critical component of the trauma system. Recent reports from mature regional trauma systems report appropriate pre-hospital triage in 33-71 percent of cases. Higher appropriate triage rates are observed in more mature trauma systems and in geographic areas which are in close proximity to trauma centers.^{10 11} Patients delivered to trauma centers are more likely young, male, and victims of multiple injury events such as motor vehicle crashes. Evidence is available that elderly patients are more likely to be inappropriately triaged. Phillips and associates¹² studied the Florida trauma system and confirmed that pre-hospital triage criteria did not reliably identify seriously injured elderly patients. Similar findings have been reported by others.^{13 14 15}

Comparisons of overall outcome for similarly injured patients treated in trauma centers and nontrauma centers have been difficult because of confounding variables preventing adequate case matching. Some of these hazards include variances of case mix, maturity of the trauma system, and characteristics of the database examined. For example, Reilly and colleagues¹⁶ reported equivalent risk adjusted mortalities in patients treated in trauma centers and acute care hospitals in New York City. This study was questioned because of the significant variability in hospital death rates particularly deaths within 24 hours of injury among the hospitals examined. Nearly twice as many patients died within 24 hours in trauma centers as compared to nontrauma center hospitals. Examination of trauma death statistics suggested that emergency department deaths of non-admitted trauma patients were not recorded in the database examined. Kane and co-authors¹⁷ reported data from the Los Angeles County trauma system two years after implementation and found a trend toward improved survival in patients triaged to trauma centers that did not reach statistical significance. Clark and associates¹⁸ reported equal frequencies of mortality in trauma centers and non trauma centers in Maine. The failure of the available research to document a reduction in mortality for patients treated in trauma centers versus nontrauma centers is not surprising. In mature trauma systems with adequate triage methods, delivery of seriously injured patients to trauma centers means that the patients with the largest risk of dying will be clustered in the trauma centers. Thus, an increased or unchanged mortality risk observed in trauma centers would not be unexpected given the distribution of risk groups triaged in mature systems. The phenomenon of increased mortality risk in patients delivered to trauma centers has, in fact, been observed in at least one state system.¹⁹ There are additional reasons for the overall improvement of trauma outcomes in a geographic area following implementation of a trauma system. Improvement in access to sophisticated pre-hospital care services is a major force for improvement in outcomes. Shortened emergency medical service response times and overall evacuation times result in delivery of trauma victims to definitive care sites within the "golden hour." Improved medical control of pre-hospital care permits the performance of airway and resuscitation interventions

which improve the outcomes for certain time-urgency injuries such a traumatic brain injury where limitation of secondary injury due to hypoxia and hypotension is clearly linked to improved clinical outcomes. Finally, there is a halo effect of the trauma system that extends to nontrauma hospitals. Barquist and colleagues²⁰ documented this effect in their study of trauma care in the Finger Lakes region of New York.

Cost effectiveness of trauma systems is thought to occur through return of recovered trauma victims to productive life. Documentation of this requires longitudinal follow-up research in large groups of patients and the data available to date suggest but do not prove this effect. Effectiveness of any regional trauma system, therefore, will be definitively established through research in the future dealing with long term survival and quality of life.

Current status of the Florida trauma system: The Florida trauma system is a mature, statewide, government led system which is more than 20 years old. A continuum of trauma care which provides modern injury control coordinated from prevention to pre-hospital care to acute care to rehabilitation and return to productive life is the central goal of the system.

The Florida Department of Health has been working toward the establishment of an inclusive statewide system to meet the needs of trauma victims with the objective to supply access to a trauma center via an integrated pre-hospital delivery system within 60 minutes of the injury event for 90 per cent of the citizens of the state. The 1982 Florida Legislature passed Florida's first trauma legislation which required any hospital desiring to become a trauma center to be verified by The Department of Health and Rehabilitative Service (HRS) as meeting trauma center guidelines established in state rules and based on American College of Surgeons nationally recognized standards. The Legislature expanded this law in 1987 to require HRS to develop a statewide trauma system which included numerous components other than trauma centers. The 1987 law recognized the financial problems facing Florida's trauma care providers by directing the state's Health Care Cost Containment Board (HCCB) to determine the financial magnitude of the problem and provide the Legislature with recommended solutions. The HCCB study showed that 66 study hospitals lost approximately \$41 million treating trauma patients. The HCCB recommended several general actions—including increasing motor vehicle registration fees—to alleviate the trauma care financial problems. The 1989 Florida Legislature felt the need for more implementation specifics before it could provide the substantial funding required by the recommendation.

The Roy E. Campbell Trauma Act of 1990 established the specific steps for an individual general acute care hospital in Florida to follow when seeking state approval to provide trauma care services. Included in the steps are the requirements that the hospital provide a written application to the Department of Health, Bureau of Emergency Medical Services for review and approval and the hospital accept an on-site survey by department staff and contracted out-of-state surveyors with expertise in trauma patient care.

In 1995, the Joint Commission of Health Care identified the need to study the efficacy of establishing a pre-hospital triage plan to ensure that trauma patients are being served in the closest appropriate trauma facility. The Department of Health completed a study and reviewed all existing rule language for adult and pediatric trauma scorecard methodology.

The Department of Health, Bureau of Emergency Medical Services provided a report on the study, "Timely Access to Trauma Care", to legislature in 1998. Based on the recommendation of this report, legislation was passed during the 1999 session, which directed the department to plan, coordinate, and establish an inclusive trauma system plan, the State Trauma System Plan December 2000 – December 2005, designed to meet the needs of all trauma victims. Additionally for fiscal year 2000, \$4.8 million was appropriated to the 20 state approved trauma centers. Key projects for the State Trauma System Planning Committee included transfer and consultation criteria development, hospital partnership concept development, trauma service area review, trauma region development, injury severity review, and promotional strategies for trauma agency development.

Significant progress has been made in evaluating trauma care and meeting the needs of trauma patients since the trauma plan's inception. Improvements to the inclusive trauma system to date include:

- Trauma Service area Study. Completed, January 2001.
- Conducted a 6 year evaluation on DOH Pamphlet 150-9, State Approved Trauma Center and State Approved Pediatric Trauma Referral Center Approval Standards, in February, 2001, which resulted in the revisal of Florida's Trauma Center Standards.
- In 2001, established a rule governing the inclusive trauma system in several areas, including the establishment of an electronic registry.

- In September 2001, received a \$45,000 supplement provided by the EMSC Federal Partnership Grant from the U.S. Department of Health and Human Services, which included special emphasis on trauma in rural areas and trauma registry training.
- Amended rules in 2002 governing trauma transport protocols, trauma agencies, trauma triage, and the security of medications.
- Partnering with Brain and Spinal Cord Injury Program (BSCIP) in the drafting of the HRSA grant, Reaching Florida's Provider Concerning Traumatic Brain Injury, was submitted in December, 2002. The first \$100,000 of the \$500,000 five-year grant award was disbursed March, 2002.
- The "Cost of Trauma Center Preparedness Report" was completed May, 2002.
- Revised Florida's Trauma Center Standards.
- Implementing improved trauma center site survey tools and decreasing association cost.
- Revised adult trauma triage criteria and developing pediatric trauma triage criteria to address the anatomy and mechanism of injury criteria.
- Agreement by the Governor to sign the proclamation for Trauma Awareness Day was held May 22, 2003 and May 21, 2004.
- In July 2002, the trauma section accepted its first complete electronic data submission from Florida's 20 trauma centers
- The Bureau of Brain and Spinal Cord Injury and Trauma implemented site survey integration June 2003. The integration of site surveys has saved Florida taxpayers \$1.5 million.
- Awarded \$3.8 million HRSA (Hospital Preparedness Bioterrorism Grant for Trauma and Burn Care). In August 2003, Florida's trauma system became the national leader in the burn care field, with the adoption of a new, American Burn Association-approved, curriculum that promises to serve as the model for the rest of the nation.
- The Florida Senate issued two interim reports on Florida's trauma system in November and December 2003. For the first report, "Review of Trauma Care Planning and Funding in Florida", the Committee on Home Defense, Public Security and Ports reviewed the status of Florida's trauma system to determine the effectiveness of trauma planning, the adequacy of the current network and the impact of alternative funding strategies. The second report, "Hospital Response Capacity", was prepared by the Committee on Appropriations, which investigated the adequacy of surge capacity at Florida hospitals.
- Recipient of \$40,000 HRSA over triage grant (2003-2005).
- Trauma Annual Report and Trauma registry was completed 2002 and 2003.
- Establishment of Division of Emergency Medical Operations to include the following: Bureau of EMS, Office of Trauma, Office of Public Health Preparedness, Office of Emergency Operations on 704.
- Senate Bill 1762 mandates, the Office of Trauma to oversee a \$300,000 comprehensive assessment of the existing trauma system, due no later than January 30, 2005. The final report to the legislature will include recommendations regarding the realignment of trauma services areas and the number of trauma centers needed in each trauma service area to provide a statewide, integrated trauma center and identification of a continued revenue source. The study will be performed in conjunction with the University of South Florida.
- Office of Trauma awarded \$11.5 million HRSA (Hospital Preparedness Bioterrorism Grant for Trauma/ Burn Care) September, 2004.
- Honors and Accomplishments have included:
- Trauma/ Compliance section recipient of Davis Productivity Award for trauma center site survey process from 1999-2002.

- Trauma/ Compliance section recipient of Quality Management showcase award 2001.
- Integration of Trauma with Disaster Preparedness

September 11, 2001 brought tremendous change to EMS and Trauma centers across the country. Not only did we change our thinking in terms of numbers of disaster related casualties from hundreds to thousands, we also realized the importance of maintaining and rebuilding EMS and trauma systems within our major metropolitan areas should they suffer personnel and infrastructure losses.

As December 2001 closed, much had changed from a year ago. The Governor established state and regional domestic preparedness task forces. Drugs and supplies placed in regional EMS and Trauma center stockpiles were being created which focus on rapid deployment of antidote and personal protective equipment to an incident, while public and private organizations with a stake in domestic preparedness have been brought together and are communicating with each other in order to combat terrorism.

The attack also brought the public to recognize the EMTs and paramedics, trauma physicians, nurses, firefighters, and law enforcement officers as heroes. Legislative proclamations and numerous community ceremonies since the 9/11 terrorist attack have declared those who serve under the Star of Life, are to be acknowledged as heroes. The 2004 Hurricane season from 8/13 to 9/26/04 saw the devastation of four major disasters in our state. But our Florida trauma and EMS system stood ready to provide services through a program of mitigation, preparedness, response and recovery whenever and wherever the situation requires reducing injuries and the loss of life.

But our trauma system cannot be viewed in isolation. With the hurricanes' disruption of essential services, the trauma system was an essential part of the continuum of care with links to the EMS system, dispatch centers, educators, fire service, police, home health and other health care providers. The Office of Trauma staff serves to maintain a foundation of sound trauma and emergency medical practices while growing and expanding our community partnerships and collaborative efforts.

The development of the Florida trauma system was evaluated along with other states in a 2002 Health Resources and Services Administration study.²¹ In this study, the Florida system was noted to have accomplished more than 50 per cent of the major criteria for trauma system development. Moreover, advanced life support level pre-hospital care was noted to be available for more than 80 per cent of the citizens of the state. Challenges noted for the Florida trauma system included availability of human resources and durable financing. These two continuing obstacles to progress for the system have occupied the attention of the leaders of the system and have stimulated much thought and effort to produce a satisfactory set of solutions.

Documentation of cost issues has been plentiful. In addition to the cost of care study referred to above, Taheri and co-authors²² reported a study of the costs of readiness for Florida trauma centers and documented an average cost of almost three million dollars per trauma center.

Cost and manpower concerns have resulted in tensions within the trauma system during the 2003-2004 interval which have taken the form of threatened closures of two centers, one of which is one of the six level one centers for the state and the only center serving a city with a population of nearly one million. The proximate cause of the threatened closure in each instance was the decision by necessary medical specialists to discontinue support of the center. The necessity to cancel or postpone revenue producing patient services in order to cover trauma center patient care obligations and the pressures of the malpractice insurance crisis were cited by the specialists in each instance as the main drivers of these decisions. These crises were solved, at least temporarily by a coalition of government and hospital leaders who were able to arrange funding for stipends to be paid to specialists for support of trauma patient care.

State government support of the Florida trauma system has taken the form of an annual appropriation to each trauma center as well as favorable payment methodologies for trauma centers via the Medicaid insurance system. In May of 2004, the Governor vetoed the funding bill that would have continued the annual award of grants similar amounts of money to each trauma center. In the veto message, the Governor cited the potential inequities of a funding method which awards a set amount to each trauma center, the absence of a clear plan for the future deployment of trauma system resources, an absence of a clearly articulated plan for consistent local participation in the financial support of the trauma system and the need to document the effectiveness of the trauma system. It is in this context that the subsequent data reporting, analysis, and recommendations are offered.

In the completion of this report we have been assisted by a National Steering Committee composed of recognized experts in the fields of trauma care and trauma system analysis. The membership of this group is found in Appendix 2. A State Steering Committee composed of leaders from various healthcare fields in Florida as well as knowledgeable members drawn from stakeholders in the trauma system (see Appendix 3 for membership) met on two occasions and provided strong and valuable input to the process leading to the conclusions and recommendations found in this report. To these individuals we owe a debt of gratitude.

Leaders of trauma agencies, emergency medical services providers, trauma center executives and executives of non-trauma center hospitals were surveyed to gauge opinions regarding the system. The data from these surveys (found in Appendices 4-6) were used to provide valuable contextual perspective for our conclusions and recommendations.

Trauma Center Outcomes – National and Statewide:

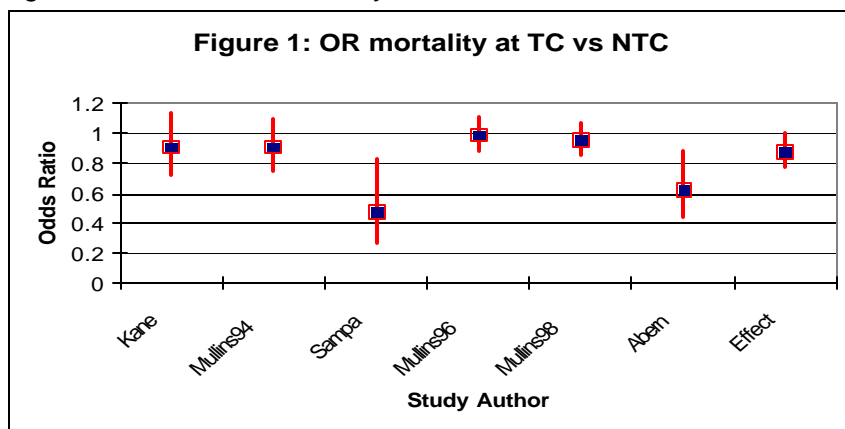
This portion of the study was performed to satisfy goals 4 and 6 as well as objectives 6 and 19. This analysis will determine: whether patient outcomes are better as a result of the existence of a state trauma system, and how outcomes from Florida Trauma Centers (TC) compare to Non-Trauma Centers (NTC).

Evaluation of National Experience

A meta-analysis of the existing English literature was performed to evaluate previous methods used to compare trauma system effectiveness. The primary objective was to review and identify common methodologies that were used in these studies with the intent of applying similar approaches in comparing patient outcome in Florida TC versus NTC. The criteria for entry into the meta-analysis included

- that the study was population based,
- that it compared pre-trauma system development to post-trauma system development,
- that there was sufficient data to calculate odds ratios, and
- that the study had been published in peer-reviewed scientific literature.

Figure 1: Odds Ratio Mortality at Trauma Centers vs Non-Trauma Centers



This process identified 14 reports that qualified for analysis. Figure 1 presents the results of this evaluation, Box figures below the unity line (Odds Ratio line labeled 1) indicate a survival advantage for a trauma system and the total effect recorded in all studies is indicated by the rightmost box figure. The overall data demonstrate a significantly lower odds of mortality following trauma center designation. Overall, institution of a trauma system results in a 15 per cent reduction in mortality from all mechanisms of injury. Of interest is that this outcome advantage required, on average, five years to achieve this degree of difference in outcome.

Most investigators cited in the meta-analysis used commercially available ICDMAP-90® software (Trianalytics, Inc., Baltimore, MD) for risk stratification. This product converts ICD discharge diagnoses to injury severity scores to allow standardized outcome comparison. Among other methods used for risk stratification was the International Classification Injury Severity Score (ICISS), which is described below. This can be more precisely population based and requires no additional software manipulation of available data. One report used in the meta-analysis included a rigorous comparison of the accuracy of risk adjustment of the ICISS method to all other available severity adjustment systems, and validated that ICISS was most accurate. We therefore elected to employ ICISS as a more relevant and valid method of converting discharge diagnoses to risk of mortality. Two other relevant observations emerged from this meta-analysis.

Numerous investigators used specific ICD codes to define patients considered truly at risk from injury. Similar ICD ranges were used for this analysis, and are listed in Table 1.

Table 1: ICD-9 Code Range and Description

ICD-9 Code Range	Description
800-829	Fractures (see exclusion 1)
800-809, 850-854, 952	Skull and spinal cord injury
860-869	Internal injury of thorax, abdomen, and pelvis
900-904	Injury of blood vessels
940-949	Burns

Also of interest were citations of specific ICD codes outside of injury classification ranges that were used as indicators of common pre-existing patient co-morbidity. These were especially relevant to evaluation of elderly trauma victims, because of the implied additional physiologic fragility these diagnoses produce. Many investigators feel that outcome

assessment of the more vulnerable elderly population is the most accurate indicator of true trauma system performance. Because of the high volume of elderly living in Florida, the population of trauma victims aged greater than 64 years was analyzed in detail, and is discussed below.

Florida Trauma System Performance

Patient Selection

Because of the findings of our meta-analysis, the Agency for Health Care Administration inpatient discharge database for 2003 was queried to identify all patients whose discharge diagnosis fell within the ICD-9 code ranges 800 through 959, amounting to 142,311 cases. From these cases, codes involving acute poisoning or non-acute injury related diagnoses, were excluded, therefore yielding an initial dataset including (a) patients who were admitted to Florida hospitals, (b) had recorded at least one injury diagnosis, and (c) coded as an emergency admission.

Some diagnoses included injury cases that are minor or within the scope of non-trauma center services. These were excluded from analysis to allow comparisons with existing peer-reviewed studies of trauma systems in other states that focus on similar populations. This subgroup is defined below under “Exclusions”. The final cohort, referred to as “true trauma victims” were then defined as those with at least one diagnosis from one of the categories shown in Table 1 and the admission was coded as an emergency. The number of patient discharges that fell within this group was 75,147.

Exclusions

Because the intent of this analysis was to compare performance of TC to NTC in managing trauma victims with injuries that may cause fatality, two subgroups within the above population were excluded. First, elderly patients with a specific type of femoral fracture that is the common sequela of falls are not considered acute trauma victims, and were excluded from comparative analysis of outcome between TC and NTC. Second, patients with a single injury associated with no potential for mortality are not the patients for which trauma systems are designed, and were therefore excluded from TC/NTC comparison. Regardless of trauma center designation these “mildly injured” cases do add to the volume of patients to be processed and compete for resources dedicated to salvage of high risk patients. Their presence in the TC population may therefore exert some effect on outcome of system performance.

The final study group therefore included patients with at least one ICD listed in Table 1, excluding patients whose age is greater than 65 years, and whose only injury consisted of ICD code 820.XX, and patients with a single injury that had a computed probability of survival (Ps) of 100 per cent.

This stratification eliminated 37,842 patients from the study group, diminishing the population of “true trauma victims” from the original 75,147 patient cohort of patients with any injury diagnosis to a study group of 37,442 patients with potentially life-threatening injury. The proportion of these patients receiving care at a designated trauma center was 38 percent.

Risk Adjustment

To stratify patients by risk of mortality, the ICD diagnoses were used to calculate a probability of survival for each patient. The method used was that defined as the International Classification Injury Severity Score (ICISS). This computes a probability of survival for an individual patient by multiplying the single survival risk ratios (SRR) of each of the patient's injury diagnoses. The product of these SRR's is the probability of patient survival (Ps). Survival risk ratios are determined by analysis of a large trauma population to determine the ratio of fatalities for each ICD code divided by the number of patients with that specific ICD code. For example, if a population of 1,000 patients with femoral fractures included 100 patients who died, then the single SRR for that particular diagnosis would be .9 or $[1-(100/1000)]$. A patient with two injuries, one having a SRR of .9 and the other having a SRR of .5, would have a total probability of survival of .9 multiplied by .5, yielding a Ps of .45. This system does not take into direct account presenting physiology, but rather relies on the common physiologic derangements associated with specific injuries to derive the computation of SRRs for those specific injuries. In this way the ICISS indirectly reflects the effect of the physiologic abnormalities of acutely injured patients. This methodology has been validated in multiple studies and has been demonstrated to be a robust indicator of probability of survival, as well as utilization of critical care resources. For purposes of this study, the Florida AHCA databases from 1998 to 2002 were used to calculate individual ICD code SRRs which were then applied to calculate probability of survival for each patient in the 2003 study group. The use of data from the prior five years to derive the ICISS eliminates statistical problems associated with collinearity.

Outcome was then assessed in terms of mortality and patient charges. The latter is recorded in the AHCA dataset, and is subcategorized by various patient care units. We used ICU charges as a surrogate for levels of care associated with high resource consumption and total charges as a surrogate for total system function.

Results

Dispersion of patients among TC and NTC

During calendar year 2003, 2,422,655 discharges took place from Florida hospitals. State designated TC provided care for 22 percent (n=533,720) of all patients, trauma and non-trauma. When considering the true trauma patient population, the proportion of cases managed by state designated TC increases significantly to 38.3 percent (n= 14,240). Table 2 illustrates the distribution of trauma cases among the 21 designated trauma centers. A disproportionate volume of trauma victims (45 percent) received care from the statutory teaching hospitals that are designated as trauma centers. Moreover, it is clear from our analysis that the existing trauma centers in the state serve patients from large geographic areas of the state of Florida. In 2003, the designated trauma centers, on average, served 10 counties each. The average number of counties served by the (then) six level one centers was 22.

Table 2: Geographic distribution of true trauma patients

Trauma Center Case Volume Hospital Number and Name	All	Trauma Category				
		Fractures	Torso	Vascular	Burns	Spinal
100022 Jackson Memorial Hospital	1,818	692	340	10	93	823
100006 Orlando Regional Medical Center	1,356	578	206	14	51	616
100001 Shands Jacksonville Medical Center	1,295	584	220	19	6	658
100128 Tampa General Hospital	1,238	476	187	5	121	577
100032 Bayfront Medical Center	1,084	490	159	9	3	620
100017 Halifax Medical Center	953	367	119	4	9	470
100019 Holmes Regional Medical Center	826	323	85	5	0	409
100075 St Josephs Hospital, Inc.	824	331	128	11	4	351
100039 Broward General Medical Center	775	296	118	6	15	303
100157 Lakeland Regional Medical Center	743	313	89	10	7	289
100113 Shands Hospital at the Univ. Of Florida	640	215	78	4	110	259
100038 Memorial Regional Hospital	604	251	90	2	4	283
100086 North Broward Medical Center	589	264	63	4	2	282
100025 Sacred Heart Hospital	368	165	60	0	4	137
100093 Baptist Hospital	306	142	34	0	1	138
100010 Saint Marys Medical Center	247	94	18	0	0	121
100231 West Florida Hospital	202	88	23	1	1	89
110199 Miami Childrens Hospital	151	68	11	0	3	36
100258 Delray Medical Center	94	39	5	0	2	60
100250 All Childrens Hospital	80	30	16	0	1	46
100012 Lee Memorial Hospital	47	19	10	0	0	24

The data revealed an important differential concerning the location of care received by patients residing in counties without a TC. A consistently higher percentage of this group of patients received care at TC located outside their home county rather than at an NTC. This difference was similar for every strata of risk of survival as determined by ICISS. This wider geographic patient dispersal clearly demonstrates the regional function of TCs. The observation that this difference between trauma centers and non-trauma centers is similar for all four categories of risk suggests that the process of triage is not adequately sensitive to identifying patients most need of transport to a designated trauma center. The data support the conclusion that the presence of a trauma center is associated with reduced motor vehicle injury fatality rate. In a separate analysis motor vehicle injury fatality rates were strongly associated with the distance from a trauma center to the site of the injury event, Appendix 6.

Table 3: Mortality rate by county, sorted in descending order by the overall mortality rate of non-burn trauma cases. Bold font denotes counties that have TC.

R	County	N	M*	R	County	N	M*	R	County	N	M*
1	Hardee	49	14.29	23	St. Johns	673	5.79	46	Jackson	69	4.35
2	Jefferson	17	11.76	24	Orange	1660	5.72	47	Hernando	438	4.34
3	Wakulla	40	10.00	25	Hendry	35	5.71	48	Lee	490	4.29
4	Gadsden	51	9.80	26	Alachua	425	5.65	49	Dade	4549	4.11
5	Calhoun	25	8.00	27	Nassau	124	5.65	50	Bay	318	4.09
6	Leon	243	7.82	28	Charlotte	393	5.60	51	Volusia	1356	4.06
7	Lafayette	13	7.69	29	Hillsborough	2209	5.52	52	Broward	3781	3.60
	Unknown	2049	7.52	30	Duval	1555	5.40	53	Collier	611	3.44
8	Suwannee	84	7.14	31	Marion	474	5.27	54	Martin	314	3.18
9	Highlands	244	6.97	32	Flagler	116	5.17	55	DeSoto	64	3.13
10	Hamilton	29	6.90	33	Okaloosa	272	5.15	56	Levy	96	3.13
11	Osceola	366	6.83	34	Pinellas	2579	5.00	57	Washington	32	3.13
12	Manatee	672	6.70	35	Columbia	140	5.00	58	Putnam	176	2.84
13	Liberty	15	6.67	36	Monroe	180	5.00	59	Palm Beach	2121	2.64
14	Indian River	286	6.64	37	Brevard	1185	4.81	60	Okeechobee	93	2.15
15	Seminole	229	6.55	38	Sarasota	397	4.79	61	Union	50	2.00
16	Gilchrist	46	6.52	39	Pasco	869	4.72	62	Bradford	62	0.00
17	Clay	233	6.44	40	Baker	43	4.65	63	Glades	11	0.00
18	Sumter	110	6.36	41	Dixie	22	4.55	64	Gulf	35	0.00
19	Franklin	16	6.25	42	Lake	618	4.53	65	Holmes	12	0.00
20	Walton	68	5.88	43	Escambia	552	4.53	66	Madison	25	0.00
21	Polk	1111	5.85	44	St. Lucie	584	4.45	67	Taylor	34	0.00
22	Citrus	275	5.82	45	Santa Rosa	294	4.42				

Table 3 lists the number of true trauma patients and the mortality rate by decreasing incidence for every county in the State of Florida, as well as an “unknown” category for patients for whom county data was not available. The 20 counties with highest crude mortality do not have trauma centers located within them.

A logistic regression analysis was performed to evaluate the differential effect of trauma centers while controlling for the influence of demographic characteristics such as age, gender, race, risk of mortality, location, and class of injury. The results indicate a statistically significantly better outcome for patients who presented with injuries in trauma centers. This was further validated by analysis of FARS data which demonstrated a 3.2 fold increase in mortality potential from motor vehicle injuries sustained in a county without a trauma center.

The data show that the age distribution of patients treated in trauma centers versus non-trauma centers is very different. The trauma center population reflects the traditional bell-shaped curve peaking in the years 21-45. This is consistent with established epidemiologic principles of injury and re-emphasizes that injury is, in fact, a disease that disrupts the most productive component of society. The non-trauma center population, on the other hand, is skewed toward the elderly, reflecting the population demographics of the State of Florida and reiterating the high rate of utilization of health care resources by the large elderly population residing in this state. There is a secondary spike in frequency of elderly patients treated in TC. Because of the risk of undertriage of elderly injured patients, there is a need to continue to analyze this population subgroup to make certain that triage by the system is appropriate to optimize system performance and outcome.

Mortality Risk

Table 4 stratifies the number and proportion of patients treated in trauma centers and non-trauma centers by four categories of risk of survival as computed by ICISS. This data demonstrates that the percentage of trauma center patients in the more severely injured categories is higher than that seen in non-trauma centers. The ratios of trauma center to non-trauma center proportions of each of the four categories indicate 4.2, 6.7, and 9.0 times higher percentage of patients in trauma centers with, respectively, most severe, severe, and intermediate injury. In a separate analysis, the selected patients were stratified using the All-Patient DRG® methodology available from the 3M Company. These findings indicated that the proportion of most severely ill patients (“extreme category”) was 2.5 times larger in TC as compared to NTC.

Table 4: Probability of survival or ICISS categories

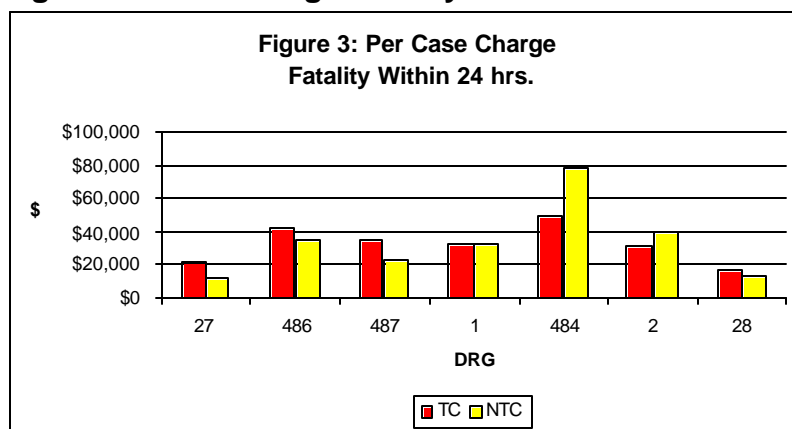
Ps Categories ICISS Category	NTC		TC	
	Count	Percent	Count	Percent
All trauma discharges, excluding burns				
Not expected to survive (most severe) ICISS = 0.125	159	0.7	414	3.0
Not expected to survive (severe) 0.125 < ICISS = 0.25	77	0.3	271	2.0
Intermediate 0.25 < ICISS = 0.50	25	0.1	127	0.9
Expected to survive ICISS > 0.50	22,492	98.9	12,842	94.1

Diagnoses and Procedures

The risk of mortality data in Table 4 demonstrates that patients treated in trauma centers have more acute life-threatening injuries. A more specific definition of the acuity of these patients was determined by analyzing the number of diagnoses and procedures that these patients received during their acute hospitalization. On average, counting both true trauma and non-trauma diagnoses, non-trauma center patients were assigned more diagnoses, however trauma center patients required more procedures. When only true trauma diagnoses were considered, the percentage of patients with more than one injury diagnosis in non-trauma centers was 19.1 percent, whereas almost half of patients (46.7 percent) transported to trauma centers had more than one injury diagnosis to be evaluated and managed. When the analysis of numbers of diagnoses and procedures was further stratified by surviving and non-surviving patients, it was apparent that the number of procedures associated with non-surviving patients was significantly higher in trauma centers, which suggests increased efforts to resuscitate and salvage these patients.

Length of Stay

Figure 2: Case Charge Fatality Within 24 hours



Although only 38 percent of true trauma patients were treated in TC, these patients required 47 percent more hospital bed days. A disproportionate number of trauma center patients also had length of stay less than one day. Because mortality within 24 hours of injury suggests maximum threat to survival, fatalities whose length of stay was less than 24 hours were analyzed in detail to compare the nature of injuries encountered in TC vs NTC. Figure 2 illustrates the per case charge of the most frequent DRGs treated in both TC and NTC. These patients' DRGs demonstrated that TC treated a disproportionately higher volume of life threatening central nervous system injuries and poly-system trauma that required urgent operative intervention. The excessive costs at NTC for care of DRGs 484 and 2 probably reflects the absence of an organized trauma service to provide cost effective, comprehensive, care required by patients with these diagnoses. Table 5 below lists these DRGs and the per case charge for TC and NTC. As stated above, total patient charges are used as the available surrogate for resource consumption and intensity of care.

Table 5: Per Case Charge

DRG	Description	TC	NTC	Difference
27	MED TRAUMATIC STUPOR & COMA, COMA >1 HR SURG OTHER O.R. PROCEDURES FOR MULTIPLE SIGNIFICANT TRAUMA	\$21,488	\$12,034	\$9,453
486	MED OTHER MULTIPLE SIGNIFICANT TRAUMA	\$42,845	\$33,829	\$9,017
487	CRANIOTOMY AGE>17, EXCEPT FOR TRAUMA SURG CRANIOTOMY FOR MULTIPLE SIGNIFICANT TRAUMA	\$34,100	\$22,643	\$11,457
1	SURG CRANIOTOMY FOR TRAUMA AGE >17	\$33,746	\$33,150	\$596
484	MED TRAUMATIC STUPOR & COMA, COMA <1 HR AGE >17 W CC	\$49,980	\$79,378	(\$29,397)
2		\$31,610	\$39,082	(\$7,472)
28		\$16,239	\$12,933	\$3,306

Analysis of the other end of the length of stay spectrum indicated that 8.1 percent of trauma patients required a length of stay greater than 20 days compared to only 2.4 percent of non-trauma center patients. When this data was further stratified to just non-surviving patients,

the percentage of expired patients with a length of stay of one day in the trauma center was, in fact, double that of the non-trauma center, reiterating the point mentioned immediately above.

Discharge Disposition

Analysis of outcomes as determined by discharge disposition indicated the trauma center patients were more likely to have a "normal" discharge to home, whereas non-trauma patients were more likely to be discharged to another acute or chronic care facility. This may be the effect of the age distribution skew. The mortality rate in trauma centers is significantly higher, which reflects the significantly higher acuity of these patients. Trauma center patients are more likely to be admitted as a transfer from another acute care facility, suggesting some degree of intra-trauma system transport and triage. Evaluation of length of stay and charges again illustrate the increased acuity and cost of care associated with the patients treated in trauma centers (Table 6).

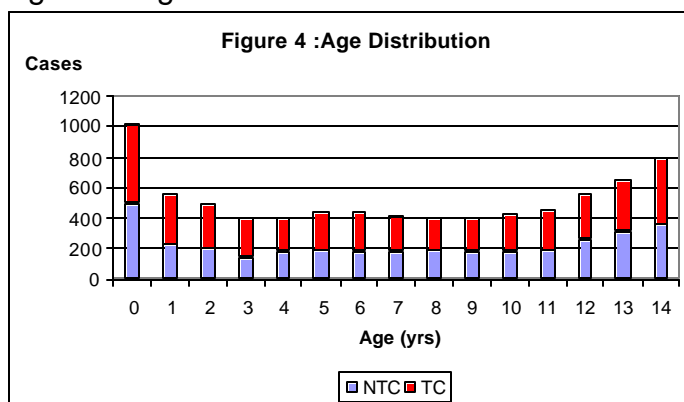
Table 6: LOS and Charges

	NTC	TC	% increase TC
LOS (days)	6.1235	9.002	47%
Charges, overall	\$30,081	\$57,198	90%
Charges, emergency	\$917	\$1,712	87%
Charges, intensive care	\$2,323	\$6,918	198%
Percentage intensive care charges	7.7%	12.1%	57%

Charges were significantly higher in trauma centers, both for total charges, as well as mean intensive care unit and emergency room charges. Analysis of the primary payer, as reported to the Agency for Health Care Administration, suggests that most trauma victims have some commercial insurance coverage, and that the uninsured represent 5.8 per cent and 11.2 per cent of trauma victims respectively in non-trauma centers and trauma centers.

Special Populations

Figure 3: Age Distribution of Children



As noted by previous investigators of trauma system performance and as is especially apparent in the Florida data, patients at either end of the age spectrum present unique challenges and special needs. For this reason children (age less than 15 years) and elderly (age greater than 64 years) were analyzed in greater detail.

Children

During 2003, Florida hospitals admitted 7,896 children for treatment of at least one injury diagnosis. Figure 3 demonstrates the age distribution by year of life and illustrates no significant differences between TC and NTC. A slight majority of these injured children (56 percent) were treated in TC. Mortality was lower than the general population, averaging 1.1 per cent across all ages through 14 years. Analysis of injury severity as measured by probability of survival demonstrates an overwhelming skew toward minor injury with minimal potential for mortality. This is consistent with established epidemiologic reports and is part of the reason that pediatric trauma systems require so much planning emphasis on aggressive initial life support and accurate field triage. Table 7 lists the 20 most common causes of injury as recorded in E-codes.

Table 7 : Most Common Injury Mechanisms in Children

Code	Rank	Injury	Code	Rank	Injury
E8849	1	Fall from object	E9170	11	Kicked in sports
E8840	2	Fall playground equip	E9289	12	Not Otherwise Specified (NOS)
E8889	3	Fall NOS	E9179	13	Struck Accident NOS
E8121	4	MVC passenger	E8852	14	Fall, skateboard
E8859	5	Fall, stumble	E916	15	Struck by object
E8261	6	Bike Passenger	E9248	16	Burn NOS
E8147	7	MVC Pedestrian	E8210	17	ATV crash Driver
E8844	8	Fall bed	E8136	18	MVC Bike
E9240	9	Scald injury	E927	19	Over exertion
E8191	10	MVC passenger	E8842	20	Fall chair

These represent 62 percent of injuries and demonstrate that falls remain the most common cause of injury for Florida's children. Table 8 lists the 20 most frequent diagnoses, which also reflect the low lethality of the most common reasons children required inpatient care for injury. In summary, analysis of Florida's injured children demonstrated that more were treated at TC, that minor injury was predominant, and that the most common mechanisms underscore the importance of prevention and education as critical elements in systems of effective injury control.

Table 8 : Most frequent pediatric diagnoses

Dx	#	Diagnosis	Dx	#	Diagnosis
81241	1	Supercondylar humeral Fx	8248	11	Fx ankle
8211	2	Fx femoral shaft	8501	12	Cerebral concussion, brief unconsciousness
49390	3	Asthma	8505	13	Cerebral concussion, unspecified unconsciousness
9480	4	Minor burn	8001	14	Skull Fx ,no lost consciousness
8500	5	Cerebral concussion, no lost consciousness	81323	15	Fx radius and ulna
81344	6	Fx distal radius and ulna	2859	16	Anemia NOS (blood loss)
9100	7	Skin abrasion	9190	17	Abrasion, multiple
86121	8	Lung contusion	8730	18	Head laceration
920.	9	Face contusion	81342	19	Fx radius
78039	10	Seizures	9160	20	Hip abrasion

The Elderly

Because of Florida's reputation as the ideal retirement state, the elderly represent an unusually large proportion of the population. This demographic characteristic is also reflected in analysis of victims of severe injury. Somewhat unexpected, however, was the bell shaped age distribution curve, peaking at the 80-85 year group. Eighty percent of these patients were hospitalized in non trauma centers. Risk stratification by probability of survival demonstrated that the vast majority sustained minor injury, although the distribution of severe injury (Ps less than .75) was slightly higher at TC (5 percent) versus NTC (1 percent).

The fragility of these patients can be appreciated by review of Table 9, which lists the most common diagnoses recorded in this population. The first injury diagnosis (pubic fracture) is tenth on the list. Of interest is the fact that this supposedly minor injury, when complicated by any of the factors listed above it, will almost certainly result in less than optimal outcome. As it continues to evolve, Florida's trauma care system must address the unique challenges that its elderly citizens present, and must develop better methods to minimize the effects of pre-existing morbidity while maximizing patient potential for return to full functionality.

Table 9: Most Common Elderly Population Diagnoses

ICD	#	Diagnosis	ICD	#	Diagnosis
4019	1	Hypertension NOS	2859	11	Anemia NOS
42731	2	Atrial Fibrillation	2765	12	Hypovolemia
4280	3	Congestive heart failure	2724	13	Hyperlipidemia
5990	4	Urinary Tract Infection	8054	14	Lumbar Fracture
73300	5	Osteoporosis	7802	15	Syncope
41401	6	Coronary art disease	2948	16	Organic Brain Syndrome
496	7	Chronic Obstructive Pulmonary Disease	2761	17	Hyponatremia
25000	8	AODM type II	71590	18	Osteoarthritis
2449	9	Hypothyroid NOS	53081	19	Gastroesophageal Reflux
8082	10	Pubic Fracture	8052	20	Thoracic-spine Fracture

Summary

This analysis clearly demonstrates many the positive returns produced by a fully functional trauma care system. Specific relevant points include:

Trauma centers serve patients are geographically more dispersed.

A county's overall mortality rate is statistically significantly higher if a trauma center is not present in that county.

Most trauma victims have some commercial insurance coverage.

The uninsured consist of 5.8 per cent and 11.2 percent of trauma victims in non-trauma centers and trauma centers respectively.

The age distribution is skewed toward the elderly in the non-trauma centers and concentrated in the 21-44 age group for trauma centers.

Trauma center patients require more procedures.

The percentage of patients with multiple injuries is statistically significantly higher in trauma centers versus non-trauma centers.

The percentage of trauma center patients in the most severely injured category is 3.4 times higher compared to non-trauma centers.

The elderly are very old, very fragile, and present with common co-morbidities that must be considered in risk stratification.

Relatively more injured children received care in TC (56 percent) than in NTC, yet their injuries appeared to be of significantly less severity and may represent a different type of derangement in the pediatric population.

Although clinical effectiveness and good outcomes are obvious from the data, cost effectiveness requires longitudinal prospective research of long term outcomes. It is known that older patients have significant risk of mortality within the first two years after a severe injury even though the patient survives to hospital discharge.²³ In a recent survey of 100 trauma patients queried by telephone as to employment status we found that more than half of those severely injured who were employed prior to injury had returned to full time employment in the same job situation. An additional small proportion were employed in other fields. Those unemployed prior to injury were unlikely to be employed 2 years after injury. Because of these findings, and because of the availability of a wealth of clinical material in Florida, the trauma system should conduct prospective research into long term outcomes. Each trauma center could, as a component of the re-designation process perform an annual acute care performance assessment and participate in system wide prospective research into long term outcomes.

Regional planning and control in the Florida trauma system:
Trauma Centers, Regions, Crash Fatalities and Pre-Hospital Care Resources

Florida Trauma Centers

Florida Statutes 395.402-- Trauma service areas; number and location of trauma centers.-- The Legislature recognizes the need for a statewide, cohesive, uniform, and integrated trauma system. Within the trauma service areas, Level I and Level II trauma centers shall each be capable of annually treating a minimum of 1,000 and 500 patients, respectively, with an injury severity score (ISS) of 9 or greater. Level II trauma centers in counties with a population of more than 500,000 shall have the capacity to care for 1,000 patients per year.

Florida has 21 trauma centers (Appendix 7: Map1). On average, trauma center (TC) hospitals are larger in overall bed size. Trauma centers average 590 hospital beds in contrast to 210 beds at non-trauma center hospitals. More than half of Florida's trauma centers have private not-for-profit ownership. Six have public/government ownership (29 percent) and three are investor-owned (14 percent). Thirteen of Florida's 67 counties have a trauma center, and six counties have more than one TC. Florida has three types of trauma center verification (Level I, Level II and Pediatric Trauma Center). All Level I trauma centers are also Pediatric Trauma Centers. Table 10 profiles Florida's 21 trauma centers.

Table 10: Florida Trauma Centers by County, Hospital Bed Size, Verification Level and Ownership

Trauma Center	County	Beds	TC Level	Ownership
All Children's Hospital	Pinellas	216	Pediatric	Not-for-Profit
Baptist Hospital	Escambia	492	II	Not-for-Profit
Bayfront Medical Center	Pinellas	502	II	Not-for-Profit
Broward General Medical Center	Broward	744	I	Public/Government
Delray Medical Center	Palm Beach	366	II/Pediatric	Investor Owned
Halifax Medical Center	Volusia	734	II	Public/Government
Holmes Regional Medical Center	Brevard	509	II	Not-for-Profit
Jackson Memorial Hospital	Miami-Dade	1,498	I	Public/Government
Lakeland Regional Medical Center	Polk	851	II	Not-for-Profit
Lee Memorial Hospital	Lee	427	II	Public/Government
Memorial Regional Hospital	Broward	684	I	Public/Government
Miami Children's Hospital	Miami-Dade	268	Pediatric	Not-for-Profit
North Broward Medical Center	Broward	409	II	Public/Government
Orlando Regional Medical Center	Orange	517	I	Not-for-Profit
Sacred Heart Hospital	Escambia	431	II/Pediatric	Not-for-Profit
Saint Josephs Hospital	Hillsborough	559	II/Pediatric	Not-for-Profit
Saint Mary's Medical Center	Palm Beach	460	II/Pediatric	Investor Owned

Shands Hospital at U.F. Shands Jacksonville Medical Center	Alachua Duval	594 760	I I	Not-for-Profit Not-for-Profit
Tampa General Hospital	Hillsborough	877	I	Not-for-Profit
West Florida Hospital	Escambia	473	II	Investor Owned

Source: 2004-2005 Directory of Hospitals - FHA and FL Bureau of EMS

Methods

Each county's population, growth statistics and square miles were obtained from the 2004 Florida Statistical Abstract and illustrated in Appendix 7: Graphs 1-2. Crash fatalities were analyzed since motor vehicle crash (MVC) patients constitute approximately 50 percent of trauma cases and research has concluded that TCs increase MVC patient survival. The Florida Department of Highway Safety and Motor Vehicles provides 2003 crash, injury and fatality statistics. These were adjusted for 2003 population statistics to calculate each county's crash, injury and fatality rates per 100,000 population. The Office of Rural Health identifies rural counties, as well as the number of advanced life support (ALS) vehicles, emergency medical technicians (EMTs), and paramedics (EMT-Ps) per county. These were used to calculate each county's ALS vehicles, EMTs and paramedics per 1,000 population and per 100 square miles (Appendix 7: Graphs 3-4). Air medical services were identified through EMS air licenses accessed from the Department of Health, the Association of Air Medical Services Directory, and the Atlas and Database of Air Medical Services (ADAMS).

Trauma volumes, population, traffic crash fatality statistics, and pre-hospital resources were analyzed by Domestic Security Task Force (DSTF) regions. DSTF regions and the Trauma System Implementation plan share goals and have overlapping missions, such as regional planning, surge capacity, funding sources, and education. In addition, they have overlapping stakeholders, including trauma centers, acute care hospitals and pre-hospital providers.

For purposes of this analysis, trauma patients were identified using the inpatient discharge data from the Agency for Health Care Administration for the 2003 year as previously described in the Outcomes section.

Traffic Crash, Injury and Fatality Analysis

Maps were created for 2003 data of crash, injury and fatality rates per 100,000 population by county (Appendix 7: Maps 6-11.) A 50-mile radius was identified around each trauma center. Shands Hospital in Alachua County became a trauma center on October 1, 2004, so it was not a regional trauma center during 2003 and is not identified as a TC except on Appendix 7: Map 12.

Nationally, urban areas have higher crash and injury rates, reflecting traffic congestion. In contrast, rural areas have higher crash fatality rates since crashes occur at higher average speeds and typically necessitate longer EMS response times and transport times. Counties with the highest traffic fatality rates were generally rural counties outside the 50 mile buffer of a trauma center (Appendix 7: Maps 11-12.) These included Panhandle counties outside the Pensacola trauma center 50 mile radius (excluding Leon County), counties surrounding Alachua County, and Okeechobee and Glades counties. Despite the higher crash rates in most TC counties, 11 of the 13 counties with trauma centers had fatality rates from .01 to 20 per 100,000 population. Lee County and Polk County had higher crash fatality rates.

Trauma Service Areas and Trauma Regions

Florida has 19 trauma service areas, four trauma agencies, and seven trauma regions (Appendix 7: Maps 2-3.) Florida statutes state that each trauma service area should have at least one trauma center. Six areas lack a trauma center, which are summarized below.

- Area 2 Bay, Gulf, Holmes, and Washington Counties
- Area 3 Calhoun, Franklin, Gadsden, Jackson, Jefferson, Leon, Liberty, Madison, Taylor, and Wakulla Counties
- Area 6 Citrus, Hernando, and Marion Counties
- Area 13 DeSoto, Manatee, and Sarasota Counties
- Area 14 Martin, Okeechobee, and St. Lucie Counties
- Area 17 Collier County

Florida statutes state that a trauma agency should be promoted in each trauma service area. The state must approve the development of each trauma agency. Trauma agencies are responsible for developing a plan for approval by the state, administering an inclusive regional trauma system, coordinating arrangements to develop a trauma system, and updating the plan. However, trauma agencies do not have authority over EMS providers or trauma centers. Only five of the 19 trauma service areas have a trauma agency.

- Area 10 Hillsborough County Trauma Agency
- Areas 4 (excluding Putnam County) and Area 6 North Central Florida Trauma Agency
- Area 16 West Palm Beach County Trauma Agency
- Area 18 Broward County Trauma Agency

A survey of these trauma agencies was conducted to examine the structure, roles and responsibilities of each, including characteristics, operating methods, patient loads, and perceived barriers to success for trauma center hospitals as well as non-trauma center hospitals. Medical Directors and Administrators from three of the four trauma agencies participated in the survey as well as multiple EMS providers throughout the state. Surveys suggest the need to re-evaluate the trauma agency role in regional planning. Currently, their activities reflect local priorities rather than the DSTF regional initiatives. There are inconsistent perceptions regarding the value of certain trauma agency activities due to their lack of authority over EMS providers, trauma centers and acute care hospitals. A full report of the EMS survey can be found in Appendix 4.

Florida's Domestic Security Strategy was developed as a comprehensive approach to address and limit potential vulnerabilities related to acts of terrorism within or affecting Florida and other matters regarding Florida's domestic security. Domestic security strategic initiatives include a health and medical component. Last year, three working groups (pre-hospital, hospital and community) recommended seven projects that the State Working Group subsequently recommended for funding, e.g. conversion of non-clinical space to clinical space for hospital surge capacity.

Efforts are organized around seven Domestic Security Task Force regions (Appendix 7 Map 4.) The state also created *trauma regions* that are coterminous with these Domestic Security regions.

Florida Statutes 395.4015 -- State regional trauma planning; trauma regions.—
 (1) *The department shall establish a state trauma system plan. As part of the state trauma system plan, the department shall establish trauma regions that cover all geographical areas of the state and have boundaries that are coterminous with the boundaries of the regional domestic security task forces established under s. [943.0312](#). These regions may serve as the basis for the development of department-approved local or regional trauma plans. However, the delivery of trauma services by or in coordination with a trauma agency established before July 1, 2004, may continue in accordance with public and private agreements and operational procedures entered into as provided in s. [395.401](#).*

Domestic security planning has encompassed initiatives related to pre-hospital and trauma care. This includes preparing first responders and increasing surge capacity of EMS providers; enhancing the public health and bioterrorism response capacity, including responding to disasters and establishing effective processes for triage; planning for hospital surge capacity; planning for EMS-public health interface, including trauma systems to respond to emergency disaster systems and in coordination with the state disaster plans and establish guidelines specific to the transport of trauma patients; and supporting education and training to assure appropriate human resources for EMS and trauma systems. Funding for domestic security initiatives are reported by source in *The Domestic Security in Florida 2004 Annual Report*, which is available on the Florida Department of Law Enforcement web site. Examples of initiatives related to trauma and EMS are provided below by funding source.

- ❖ **Center for Disease Control (CDC)** – Public health preparedness, including planning, training, and readiness; strategic national stockpile management; mass casualty response; exercise plans and systems
- ❖ **Health Resources and Services Administration (HRSA)** – Burn, blast, trauma capacity; hospital and EMS chemical and biological protection; medicines and vaccines; patient decontamination capability; mass casualty equipment for trauma care and trauma centers; surge capacity for trauma care and trauma centers, surge capacity for non-trauma centers
- ❖ **Office of Domestic Preparedness (ODP)** – Mobile incident command; mass casualty equipment and supplies; first responder personal protective equipment (PPE).
- ❖ **State General Revenue** – Establish Florida Emergency Medical Foundation Education Center; training firefighters, medical technicians and paramedics

Regional planning is also conducted by each of Florida’s Domestic Security Task Force regions. The seven regions have implemented health care initiatives that are funded through Florida’s Domestic Security Strategy revenue pool, as noted in Appendix 7: Map 5.

Trauma Regions

Table 11: Florida Trauma Statistics by Trauma Region

Trauma Region	2003 Population	2000-2003 Growth	Urban Counties	Rural Counties	Trauma Volume	# of Trauma Centers	Trauma Volume to TC	TC per 1 million Population	Percent Treated in TC*
Pensacola	934,092	6.09%	4	6	1,655	3	552	3.2	53%
Tallahassee	530,127	5.39%	1	12	770	0	N/A	0	0
Jacksonville	1,948,237	8.07%	6	7	3,841	1	1,920	1	50%
Orlando	3,275,362	10.04%	9	0	6,934	3	2,311	0.9	44%
Tampa Bay	3,550,457	7.48%	8	1	8,531	5	1,706	1.4	47%
Fort Myers	1,496,891	6.34%	4	5	2,678	1	2,678	0.7	2%
Miami	5,336,342	4.26%	3	1	10,913	7	1,559	1.3	39%
Florida	17,071,508	6.81%	35	32	37,442	20	1,783	1.23	38%

* percent Treated in Trauma Center = (Trauma Center Volume/Trauma Volume)

Trauma center resources were analyzed by trauma region, as reported in Table 11.

The analysis concluded the following.

- Region 1 - The trauma center per population is nearly three times higher than the state average due to the misdistribution of trauma centers in Escambia county. Pensacola includes Trauma Service Area 2 (Bay, Gulf, Holmes, and Washington Counties), which lacks a trauma center. This is the east section of the region and is located outside the 50 mile radius of the three Pensacola TCs. A TC is recommended in Bay County to serve the citizens outside the 50 mile radius of Pensacola trauma centers.
- Region 2 - Tallahassee lacks a trauma center. This region is also Trauma Service Area 3. It is recommended that a TC be added in Leon County.
- Region 3 - Jacksonville has a trauma center to population average that is less than the state average. In addition, it has high trauma volumes per TC and high population growth rates. It also includes Marion County, which is one of the three counties comprising Trauma Service Area 3, which is a trauma service area that lacks a trauma center.
- Region 4 - Tampa Bay has adequate trauma center access at this time. However, it includes two counties from Trauma Service Area 3 (Citrus and Hernando Counties) that lacked a trauma center in the area.
- Region 5 – Orlando has trauma center to population averages that are less than the state average. It also has high trauma volumes per TC and the highest population growth rate in the state. The region includes Trauma Service Area 14 (Martin, Okeechobee and St. Lucie Counties), which lacks a trauma center.
- Region 6 - Fort Myers cannot be properly analyzed due to a coding error at the Lee Memorial trauma center. Trauma patients were not coded as emergencies and thus trauma is under-reported. Their data has been resubmitted to AHCA and can be analyzed once available. However, based on existing information, the region appears to

have too few trauma centers. The region includes Trauma Service Areas 13 and 17. Both lack trauma centers.

- Region 7 – Miami has a TC per 1 million population rate that approximates the Florida average and a trauma volume to TC that is less than the Florida average.

The “trauma volume to TC” considers the entire trauma volume in the region, managed at both trauma centers and non-trauma centers, relative to the number of trauma centers in the region. The “TC per 1 million population” is the population divided by the number of trauma centers and then adjusted per one million population (Appendix 7: Graph 5).

In addition to defining trauma center distribution according to geography and patient population served, national and Florida data support a concept of trauma center capacity. This concept would suggest that capacity can be judged by availability of personnel and medical infrastructure as well as physical facilities. Appendix 7: Table 1 shows caseloads and staffing for the Florida trauma centers at the last state designation survey.

From the table, caseload and personnel availability can be appreciated and the capacity to care for additional patients within a single physical facility should be assessed prior to recommending that a new facility be added.

The percent of population currently within 85 minutes total evacuation time of a trauma center was calculated. This interval was chosen because of the wide availability of high level pre-hospital care services. Data support that this definition will allow definitive care to begin with the “golden hour.” At present, 95.7 percent have access. If trauma centers are developed at hospitals in Bay and Leon counties, the percent having access would increase to 99.2 percent.

Pre-Hospital Care Resource Analysis

Florida has hundreds of EMS providers. The state approves trauma transport protocols for each EMS provider. Data on advanced life support (ALS) vehicle, emergency medical technicians (EMT), and paramedics (EMT-P) statistics by county per 1,000 population and per 100 square miles are summarized and illustrated in Appendix 7: Table 2-3, Graphs 3-4, Maps 13-14. Most counties with higher crash fatality rates have fewer pre-hospital care resources per 100 square miles. Counties with trauma centers typically had fewer ALS vehicles per 1,000 population than counties that do not have a TC, possibly reflecting reduced transport times. Resources vary by region, in part based on the rural-urban mix. Regions that have less than average pre-hospital resources per square mile have more rural than urban counties.

Final Regional Planning Conclusions and recommendations:

1) There is a need for additional trauma centers in the state to improve access to trauma centers for Florida residents with serious injuries. Additional trauma centers, particularly near rural counties, should assist in reducing high rural traffic fatality rates by providing more proximate access to trauma care. Trauma centers are recommended in the following areas.

- a) Region 1 - Pensacola in Bay County (high priority)
- b) Region 2 – Tallahassee in Leon County (high priority)
- c) Region 3 – Jacksonville in Duval and Flagler Counties
- d) Region 5 - Orlando in Orange and Martin Counties

2) It is feasible for the existing trauma service areas to be modified to follow the seven DSTF regions, which are also termed “trauma regions,” to facilitate regional planning. These regions are the platform of initial response to natural or manmade disasters. Consistent with current efforts, each region could integrate planning for trauma and pre-hospital resources. The Office of Trauma can then assist the trauma regions with regional planning efforts. The infrastructure of the trauma regions should be supported where trauma center and Office of Trauma staff

assist in coordination of activities. This change would require careful thought and deliberation. Concerns expressed by members of the State Steering Committee include the fact that some DSTF regions are composed of areas which have highly developed trauma agencies adjacent to areas where there has been no trauma agency. Some trauma centers in the state (Tampa Bay and the trauma center at Shands Hospital in Gainesville) serve two and three DSTF regions respectively.

3) Currently, the Trauma Agencies are operating at a local level and only five trauma service areas have this structure. It is recommended that further discussion regarding the role of the trauma agency and its reporting structure to a local, regional, or state agency occur.

4) An annual regional assessment is recommended to analyze pre-hospital resources, ICU beds and capacity, and other medical resources based on per population estimates to plan for response and improvements.

Financing trauma care in Florida:

Cost issues have been consistently identified as principal drivers of trauma system distress. The situation in Florida illustrates this fact graphically. Table 12 below shows financial data supplied to the investigators by the Florida Trauma Alliance. The Trauma Alliance has indicated that these figures are the results on an analysis completed by the Alliance using information from the Medicare Cost Reports of 18 of the 21 trauma centers in Florida. The net loss to each hospital is the sum of losses due to uncompensated care and preparedness costs. The figures labeled “preparedness costs” are costs designated by each hospital. At the aggregate level, all trauma centers are incurring operational losses associated with the provision of this care. These losses are similar in amount and appear to be the result of the significant investment in preparedness costs by each institution. These figures indicate the magnitude of the problem from the perspective of trauma center hospitals. These figures can be contrasted with data from South Carolina which indicated a \$102.4 million loss for the seven level one and level two trauma centers on that state.²⁴

Table 12 Hospital Costs (millions of dollars, 2003)

	Level I	Level II	Total
Cases	15,530	14,184	29,714
Net Loss	(\$46,624)	(\$46,018)	(\$92,643)
Preparedness			
Costs	\$45,889	\$48,718	\$94,607
State Funds			
Received	\$6,450	\$7,840	\$14,290

In response to the concerns stated in the Governor’s veto message dated May 28, 2004, the investigators have reviewed and analyzed data from several sources. We have been interested to two questions: first, are there tax initiatives that are used in other states that might be useful as local or statewide initiatives in Florida and what factors are perceived to be advantageous or disadvantageous regarding each type of initiative. Second, we wish to assess tax initiatives for health care which currently exist in Florida to determine whether these are associated with improved health outcomes. Appendix 8: Tables: 1-2 list tax initiatives currently in force by other states to fund trauma care and emergency medical services.

Opinions of leaders of state trauma systems where tax initiatives are present disclose that the taxes levied for trauma are broadly supported by the citizenry especially for those taxes levied for traffic violations and intoxication. It is also noted that there is vigorous competition for the funds generated in each state and that certain taxes do not generate sufficient funds to support the entire statewide system.

Data regarding the association of improved health outcomes with tax initiatives is available in a report specifically relevant to Florida authored by Studnicki and associates²⁵. These investigators assessed the relationships of public hospital availability and special taxing authority to health outcomes for 62 separate health conditions in categories of major diseases; cancers; avoidable hospitalizations; trauma/accidents; infectious diseases; and maternal-child conditions. There was a significant association that favored tax initiatives for 43 of the 62 conditions examined. In the trauma/accident category, taxing was favored for 7 of the 10 specific subcategories including motor vehicle crash mortality, firearm mortality, other intentional injuries. The available evidence supports the conclusions that taxation strategies are used in many states; that partnerships between statewide and local tax initiatives are feasible and that the taxes are associated with improved health outcomes.

Funding Alternatives for Trauma Centers and Providers

Trauma care plays an important role in reducing the burden of injury by saving lives and returning those who are seriously injured back to productivity. The increasing numbers of persons without medical insurance and the revenue reductions from public and private payers pose a worsening dilemma for trauma care providers. Florida currently has laws that support funds for trauma and EMS services. [F.S. § 125.271](#) allows certain counties to levy a special assessment to fund emergency medical services. [F.S. § 395.4035](#) creates the Trauma Services Trust Fund in the State Treasury, to be used for the development and support of a system of state-sponsored trauma centers. [F.S. § 395.403](#) provides for financial support to state-sponsored trauma centers, as appropriated, Appendix 8: Table 3 summarizes the appropriations made. However, there is a lack of stable funding for trauma care.

The Florida Senate Interim Project Report 2004-108 (November 2003) reports the following on trauma center funding.

“For the past three years the funding for trauma care beyond the normal reimbursements from Medicaid, other third party payers and private payers has come from the Medicaid program in the form of special non-recurring Medicaid payments under the Upper Payment Limit Program. In the last three years \$44 million in Medicaid payments have been made for trauma care through the Upper Payment Limit Program. Medicaid also estimates they paid \$97.7 million during 2002 in fee-for-service payments for trauma-related diagnoses. Prior to 1998, there was no specific funding for trauma centers. Earlier efforts in 1990-91 were stymied because of a budgetary shortfall and the resources appropriated were cut from the state budget.”

Other states have used many alternatives to fund trauma or indigent care (Appendix 8: Tables 1-2.) Funding sources include traffic fines, vehicle and driver’s license surcharges, alcohol, sales or property taxes, telecommunication fees, and tobacco settlement funds.

DUI and Moving Violation Traffic Fines. Several states rely on traffic fines to fund uncompensated trauma care. These states increase or add fines for serious infractions, such

as driving under the influence (DUI), reckless driving or speeding. For example, Illinois added \$100 to each DUI violation to fund the State's trauma system. Proponents of traffic fine surcharges justify these fines since nearly half of trauma center cases result from motor vehicle crashes. DUI is associated with more than 40 percent of traffic fatalities and crashes that occur at higher speeds are associated with increasing severity of injury. The Florida Emergency Medical Services Trust Fund currently receives approximately 7.2 percent from a civil traffic fine. Barriers to a traffic fine surcharge include the significant competition for these fine revenues. Also, associations representing the "motoring public" typically lobby against such surcharges. More importantly, revenue from citations would be unpredictable since citations are decreasing in some counties. The Florida Department of Highway Safety and Motor Vehicles' driver's license facts report a decrease in citations written over a two year period. Citations decreased from 3.9 million in fiscal year 2001 to 2.8 million in fiscal year 2003. Roadway improvements (e.g. adding traffic signals) are a more effective means to reduce crashes and fatalities and can reduce the need for enforcement, thus decreasing citations. The *Wall Street Journal* reported that some municipalities use citations as a revenue source, such that citation totals may fluctuate with municipality revenue needs.²⁶

Safety Belt Fines. Safety belt violations are categorized as a non-moving traffic violation. Currently, SB 216 and HB 3 propose to delete the provision that restricts enforcement of the safety belt law to a secondary action. The National Transportation and Highway Safety Administration reported safety belt use in Florida decreased from 75 percent in 2002 to 73 percent in 2003.

Research concludes the use of seat belts decreases fatal injuries by 9 percent and non-fatal injuries by 2 percent. In addition, studies conclude that seat belt use increases by 14 percentage points in primary law states, relative to secondary law states. Safety belts provide a direct means of reducing fatalities and injuries if a crash occurs. Thus, a surcharge on seat belt fines further penalizes persons who put themselves at higher risk for severe and fatal injuries.

Vehicle and Driver's License Surcharges. Surcharges on motor vehicle registrations and driver's licenses have financed trauma programs in Arizona, Idaho, Ohio, Kansas, Washington, and Oklahoma. In June 2003, Maryland established the "Maryland Trauma Physician Service Fund" to provide for increased trauma physician reimbursement for trauma services delivered to uninsured and Medicaid patients and to help trauma centers pay for coverage. The funding is financed through a \$5 surcharge added to vehicle registration renewal fees. Oklahoma added a \$5.50 per driver's license renewal for the State's indigent care fund and the State's emergency medical system and trauma system administration. Since the numbers of vehicles and drivers greatly outnumber traffic citations, the potential to generate more funds for trauma or indigent care is greater in contrast to traffic fines. However, retired voters have typically opposed such increases.

Ad Valorem Taxes. Property taxes have been successfully used to assist with indigent and trauma care. Los Angeles County in California recently passed a measure to increase property taxes by \$3.50 per month on the average house to fund trauma centers, emergency departments and bioterrorism preparedness, which was estimated to raise \$168 million annually. Florida laws limit property taxes to a maximum of 10 mills for operating purposes, but allow local voters to authorize additional millage for specific purposes (Appendix 8: Table 4.) A separate analysis of selected assessed taxes, which occur at the local level, are discussed in the following section.

Sales Taxes. Taxes on retail products have been implemented to fund trauma and indigent care. Florida statutes allow a county to levy a trauma center surtax not to exceed a half penny or 0.5 percent. Also, Florida statutes allow counties with populations of fewer than

800,000 to levy a voter-approved indigent-care surtax. In Florida, Hillsborough County has a half-cent sales tax that funds a nationally recognized healthcare program. In March 2004, Polk County voters approved a half-cent indigent-care sales tax. The barrier to this tax is the likelihood of political and electoral support for this funding source is quite small. The Hillsborough County Health Care Plan is a comprehensive managed care plan for indigent residents with incomes up to 100% of the federal poverty level who do not qualify for other coverage. Enacted in 1991, Hillsborough County, FL, established a half-cent sales tax to fund indigent health care. In Miami-Dade, the Health Care Trust Fund (PHT) operates the county-owned health care facilities and is also responsible for county-wide planning to ensure access to health care for all residents. In addition to the state mandate, the Board of County Commissioners approved a referendum to impose a half-cent sales tax, the proceeds of which are considered “unrestricted tax revenue of the Trust and shall be used only for the operation, maintenance and administration of Jackson Memorial Hospital.” The half-cent sales tax (healthcare surtax) together with Miami-Dade County funding, accounts for the publicly funded indigent care in Miami-Dade County.

Gasoline Taxes. Some states have proposed taxes on the sale of gasoline without success. A one-cent gas tax was defeated by Florida’s Hillsborough County Commission in a vote 4-3. The proposal was intended to raise money in order to continue to provide healthcare for the poor.

Alcohol and Cigarette Taxes. Several states (California, Missouri, and Oregon) have attempted to add a surcharge on items such as alcohol and cigarettes, which are regarded as neither luxuries or necessities. Maryland, for example, increased the state alcoholic beverage tax to fund the Emergency Medical Services Operation Fund. California proposed a 5 cents per drink of alcoholic beverage to reimburse government expenses increased for medical expenses for alcohol related emergencies. Missouri is attempting to legislate a \$0.41 tax on each pack of cigarettes to generate \$100 million for unfunded trauma care. In November 2002, voters in Arizona approved a \$0.60 tax on cigarettes that will generate \$62 million annually for hospital emergency rooms, medical research and health care for the poor. Known as the “sin tax,” this tax has received much resistance from the beverage industry lobby and the general public who drink beer and wine.

Sick Taxes. Health care provider taxes to finance trauma and indigent care are known as the “sick tax,” and have been imposed with much controversy. Florida was the first state to implement a provider tax program, which developed a hospital tax program in 1984. Revenues from the tax program helped pay for expansions of health services for the low income, including starting a medically needy program. Recently, New Jersey enacted a 3.5 percent tax on gross receipts of selected outpatient providers to fund charity care provided by hospitals this year. Minnesota passed a 2 percent gross revenue tax in 1992 on medical services that are paid out-of-pocket by patients or passed through to health plans. The tax was implemented to fund the newly created program for the uninsured – MinnesotaCare – which helps low-income workers buy health insurance. Opposition to permitting a state to tax hospitals and other health care institutions to supplement state funding of Medicaid program costs per se has come from groups as the American Hospital Association who see it as a way to ease the state’s financing burden. Nevertheless, public hospitals typically favored this financing provision.

Telecommunications Taxes. Telecommunication taxes have recently been proposed as a means to fund trauma care. California proposed a phone tax to fund emergency care. The initiative would increase the 911 tax on phone calls made within California. The tax would be

capped at 50 cents per month for residential telephone customers, but not cellular or commercial lines, and seniors and low-income customers would be exempt. The funding would be divided among a number of groups, including 911 dispatch, emergency departments, trauma centers, emergency physicians, urgent care clinics, and pre-hospital providers. This initiative received strong opposition from the telecommunications industry who ran advertisements that it is a case of one industry taxing another. Critics also argue that many hospitals will still close even if reimbursed for emergency care. Proponents include the California Medical Association, the American College of Emergency Physicians, and other physician organizations who argue the money would reduce the number of emergency room closings and avert a shortage of urgent care that would affect both people with or without health insurance.

Firearms and Ammunition. Some states have taken on initiatives to tax guns and/or ammunition which are a cause traumatic injury, but achieved little success. California proposed a 10 cents per bullet tax on ammunition sold to customers to fund trauma centers. Much resistance is received from the National Rifle Association and other "right to bear arms" advocacy groups. Illinois, however, has successfully passed an additional \$100 fine on illegal discharge of firearms because of the public's outrage over violent crime in the Chicago area.

Tax Districts. Several regions, such as Palm Beach County in Florida, have instituted specific tax districts for trauma care. Public hospitals often offer trauma care as part of their mission, which is funded by a broader hospital district tax base or the county and/or state tax base. Moreover, Florida state law authorizes counties to establish funding districts for indigent health care and to levy local ad valorem taxes to fund such care. The tax may be levied up to whatever maximum millage rate is approved by the voters (not to exceed five mills). Once established, the district may establish and maintain clinics, purchase institutional services for indigent patients and fund county health services. Trauma-center funding would be allowable from the revenues of the annual property tax and would not be limited to funding trauma care for indigent patients only. For instance, in 1988, Palm Beach County residents voted to pay higher taxes to create a new government agency that would pay for medical care for uninsured people. Today, the Health Care District of Palm Beach County's Coordinated Care Program provides health coverage to 22,000 county residents who cannot afford private insurance and don't qualify for state or federal assistance. Once enrolled, residents have more than 100 doctors and specialists to choose from, can get an unlimited supply of prescription drugs and hospital care from any institution in the county. Residents in the HMO-like program get their health care for free. County taxpayers pay the bill, which in the 2004 fiscal year ended Sept. 30 was \$46.5 million. The money generated also helps to run the county's trauma system.

Another example of implemented tax districts as a means to finance indigent care has occurred in Texas where counties have created hospital districts with the authority to tax the property owners in order to provide health care to the indigent residents of their county. Counties and their commissioners have the ability to tax up to \$0.75 on every \$100 valuation on all property within their boundaries to fund the care of indigent residents, an ad valorem tax.

Automobile Insurance Tax. Premium taxes on auto insurance fees have been assessed in some states. The public policy rationale is that some or all of assessed tax revenues should be related back to the source from which they are derived. Since approximately 50 percent of trauma center patients are injured in motor vehicle crashes, auto insurance premium revenues are a logical source for contributing to trauma care funding. In addition, drivers who receive citations and cause crashes typically have higher insurance premiums. Florida has a history of assessing a premium tax on all insurance products. Specifically, F.S. § 624.509 (1)(a) assesses

a 1.75 percent tax on the gross premium insurance receipts. Within the construct of the public policy rationale suggested above, a portion of the revenue derived from automobile insurance policies could be set aside or carved out for designated use as a funding source for trauma care, and/or the existing premium tax could be increased. An estimate of the available funds from this source may be calculated based upon the police premium tax total collected on automobile insurance policies, which is assessed within incorporated areas only. At a 0.85 percent tax rate, the police premium collections on automobile insurance taxes were \$61 million in 2003. Nearly half of Floridians live in unincorporated areas, however their insurance premiums rates would be lower due to lower risk. Based on the police premiums tax collections, the 1 percent tax to automobile insurance premium is estimated to approximate \$100,000 million annually.

Examples of Revenue Forecasts. Examples of funding alternatives from traffic fines are provided using 2003 statistics on driver's licenses and citations written to drivers who paid the fine, paid and attended driver school, or were found guilty. The seat belt citation volume is the total from 2003. Speeding is the most frequently written non-criminal moving infraction. At present, municipalities receive the entire DUI fine. Examples regarding vehicle titles and registrations used 2004 statistics.

Table 13: Examples of new/additional fees or surcharge forecasts

Examples of Funding Sources	New/Additional Fee or Surcharge	Annual Volume	Revenue Forecast
Driving under the influence	\$100	42,000	\$4.2 million
Seat belt violations	\$25	229,000	\$5.7 million
Speeding	\$20	650,000	\$13 million
Divers license original/renewal, transfer	\$5	3 million	\$15 million
New/used/transfer vehicle titles	\$5	4.1 million	\$20.5 million
Car & truck vehicle registration	\$5	13.7 million	\$68.5 million
Auto Insurance Premium Tax	1%	All	\$100 million (estimate)

LOCAL PUBLIC TAX SOURCES OF SUPPORT FOR TRAUMA

In this section we provide a limited summary of information about local, direct tax revenue sources for trauma related care. While the state and federal governments provide various direct and indirect support, Florida law permits local governments (both municipal and county) to levy certain taxes in support of specific uses. These uses include both health care generally and trauma care in particular. Florida has 18 taxing districts as summarized in Appendix7: Table 4.

Some of these taxes are ad-valorem, as against assessed values of properties; others are sales taxes. Some taxes are expressly designated for health or trauma, some are derived from general revenues. Only one county, Palm Beach, has a designated ad-valorem assessment expressly intended for trauma services. Some health care institutions are permitted to issue tax-exempt revenue bonds that may be underwritten by either local tax revenues or separate county government underwriting. The proceeds of these issues are generally for facility construction to provide care – a not inconsequential factor in the delivery of trauma services. Nearly every county has general revenue funds that are budgeted for health

care services --- generally for indigent or uncompensated care provided to or on behalf of residents in specific institutions.

Local health care tax supported programs are generally under the management and control of local taxing authorities, which may be associated with a single hospital facility, or with a group of hospitals in a county. Tax revenues are assessed as part of formal, local ad valorem taxing mechanisms, and proceeds are made available to the taxing authority for direct deployment to its related institutions. Sales tax revenues, such as those derived from the national award winning Hillsborough County Health Care Plan, are controlled by the county government. Other, general tax revenues are under the direct distribution control a local government entity (city or county government).

In order to glean information about the sources and uses of tax revenues, we consulted annual filings of taxing districts with the Florida Department of Revenue. We successfully accessed and obtained copies of the annual revenue reports submitted by each of the state's hospital taxing districts. These reports are required by law each year for direct and indirect taxing district entities in the state.

Historically, little use has been made of these reports or the data contained within them

Further, there is no standard format for the presentation of data to the State. Some of the reports are merely reiterations of basic, audited financial statements. Others contain substantial amounts of documentation and references to investments as well as modest references to uses of funds. Most of the reports contain summary data that are to be found in the annual financial reports prepared by the health care institution or the taxing authority's accounting firms.

While the reports provide limited information about the amount of certain tax-generated revenue procured by each of the districts or entities, there is wide variation in the level of detail proffered about these sources, and virtually no data on uses of these sources of funds. There are substantial discrepancies within reports as to the amounts of tax revenues claimed/reported by certain entities. For example, total ad-valorem reported revenues may not equal the sum of separately reported restricted and unrestricted tax revenues. There is no consistent application of tax based revenues to operating verses non-operating revenue account classifications – so financial statement analysis across institutions may not reflect similar nomenclatures. There are deductions from tax revenues that are not explained in notes. And there is evidence across the districts of various forms of related party transactions, involving separately created not for profit and for profit corporations designed to provide a category of care or service – and these separate entities appear to have varied and separate contractual arrangements with the parent entity. The cash flows between and among entities are generally presented at a macro level only, making it difficult to distinguish uses of funds for trauma and related services.

These reports have, however, provided some insight about the use of alternative, public sources of funds which were not earlier identified as potentially available for use in trauma and other care, including local contracts with health units and county governments for the provision of indigent and uncompensated care and other categorical services.

Cross analyses of AHCA hospital discharge and financial data provide no useful information about sources of tax revenue used to pay for health care services – even within categories of trauma care. Rather, the tax revenues that devolve to individual institutions are generally placed in non-operating funds, and then deployed for a variety of uses, which may or may not include direct health care services and/or facilities.

Accountability for the use of ad valorem tax revenue sources does not appear to be uniformly or aggressively required by taxing districts or the state.

We recommend a thorough analysis of all sources and uses of all public funds that are intended for and/or used in the provision of trauma services. The current reporting system is not adequate to provide accurate and useful data on this matter. As was the case fifteen years ago in the matter of children’s health services in Florida, there are too many unanswered questions about the actual uses of public funds intended for a particular purpose. Therefore, we encourage a comprehensive study that tracks the sources and uses, throughout the state, of public funds intended for use in trauma and related services.

Conclusions: The data analyzed and reported herein support the following main conclusions:

1. The existing Florida trauma system works well albeit within the limitations of its geographic pattern of deployment. Overall, the rate of triage of injured patients to trauma centers is lower than the national average at 38 percent. It is reasonable to set, as a system goal, an appropriate triage rate of 65 percent. Actions which would improve triage would be to alter the trauma alert criteria to make age greater than or equal to 65 years a primary indication for a trauma alert designation (red criteria) and placing new trauma centers in Tallahassee and in Bay County. Addition of the new trauma centers would increase the triage rate to nearly 50 percent. Trauma agencies placed within each DSTF region could be charged to improve triage in each region consistent with the above mentioned triage goal. Where trauma centers are geographically close, most injured patients are delivered to the centers with the possible exception of the elderly. Each of the trauma centers serves a wide geographic area and level one centers each serve more than 20 counties. Compared to national norms and to results in nontrauma centers in Florida, clinical outcomes are excellent for the “true trauma” patients the system was designed to serve. Of concern is the observation that distance from a trauma center increases the motor vehicle injury fatality rate. This finding underscores the need for additional trauma centers especially in the Tallahassee region and in Bay County.
2. Acceptable access (delivery to a trauma center within the “golden hour”) to the trauma system by ground or air evacuation is available for more than 90 percent of the citizens of Florida. Deployment of trauma centers in Tallahassee and in Bay County would increase access to the system to 99 per cent.
3. Trauma center hospitals face significant financial pressure as the data disclose. In the main, the losses can be ascribed to expenses needed to support up-to-date trauma care and provide for medical specialist coverage. As reimbursement for professional medical services has been reduced and malpractice insurance costs have increased, this problem has become more severe and threatens the trauma system in Florida and almost every other state system as well. Survey

data gathered for this report indicate that these two areas are the most frequently cited as threats. Moreover, concerns over medical specialist cost, opposition of medical staff and liability risk are cited by medical and hospital leaders as the main disincentives for Florida hospitals to join the trauma system (See responses in Appendix 5). As can be seen from a review of responses of hospital executives, these deterrents to join the trauma system overshadow decisions about becoming a trauma center even when the option to join the system is considered to be in keeping with the mission of the hospital. Several avenues for productive local-state partnerships are available for tax support of the trauma system and the data indicate that taxation for the support of healthcare initiatives is associated with improved health outcomes.

4. The data support the feasibility of transforming the Florida Trauma Service Areas so that these would coincide with the Domestic Security Task Force Regions. Trauma agencies need to be developed in each region and these agencies should coordinate performance improvement efforts for all segments of the trauma care continuum. The agencies should have community outreach and service goals so that the value of the trauma system is emphasized and local financial support of the system is realized.
5. Florida trauma centers are not recording performance in a consistent similar manner. As well, there is a need for trauma center leadership in the area of injury prevention. The state trauma registry has not reached its full potential as a useful data source because of weaknesses in the data submitted to the registry. A state level initiative to strengthen the registry and develop a method for an annual trauma center performance assessment would signal the value of the trauma system to the citizens of Florida. The data suggest that annual performance review would be a useful addition to the state designation process and that injury prevention activities for each trauma center should be periodically evaluated.

Findings and recommendations relative to goals:

1. Conduct a comprehensive assessment of the Florida trauma system
The assessment has been completed and reported herein.
2. Evaluate the number and distribution of trauma centers
The findings indicate that additional trauma centers placed in Tallahassee and in Bay County would bring the triage rate for the state of Florida to the national average. This deployment should take priority based on the rate of injury generation and the motor vehicle fatality rate in these areas. Additional trauma centers should be placed in the Jacksonville region and the Orlando region. Deployment of additional trauma centers should take place based not only on the number of patients served per trauma center but according to a concept of "trauma center capacity" which would be determined by staffing levels of medical specialists and other healthcare professionals.
3. Determine the responsibility of local government to fund trauma care and any local responsibility for trauma care
We have provided several methods for funding and have identified roles for state and local government. It is reasonable to fund trauma centers with public funds based on the unrecoverable financial burden incurred by trauma centers. This would best occur through a methodology that recognizes the level of effort by the institution and the population served.

4. Development of outcomes based performance measurements to determine if the inclusive trauma system delivers results
The inclusive trauma system works, serves the citizens of Florida well and produces excellent outcomes. The system's effectiveness is constrained by a lack of trauma centers in the areas identified above. There should be, in the future, a commitment to system wide prospective research on long term outcomes for injury.
5. Establishing methodologies for the objectives listed
This is described in the text of the report.
6. Performing and documenting a comparative analysis that demonstrates the effectiveness of Florida's trauma system relative to systems in place in other states
The National Steering Committee will provide opinions on this question following their review of this report.
7. Include recommendations submitted by regional trauma agencies and stake holders
Survey data support a strengthened role for trauma agencies which would be deployed according to DSTF boundaries. There is consensus on this point with some members of the State Steering Committee suggesting that more discussion occur. Survey results are included with this report which indicate these concerns. On the other hand, the scope and categories of activities which comprise the mission of the Domestic Security Task Forces are pertinent to the trauma system. Moreover, successful function of a regional trauma agency leading to integration of the continuum of trauma care in a region would be a compelling signal to the citizens of the region that the trauma system's value is significant and worthy of support.
8. Define the geographical composition of an area that ensures rapid access to trauma care
We have documented that access to the trauma system by ground or air transport is available for 95 per cent of the citizens of Florida. Advanced Life Support level pre-hospital care is available for most citizens. The suggested addition of trauma centers would raise the access level to 99 per cent.
9. Include historical patterns of patient referral and transfer within a specified area
This data is provided.
10. Provide an inventory of trauma care resources
This data is provided.
11. Assess population growth characteristics
This data is provided.
12. Define medically appropriate ground and air travel times
Because of the ready availability of excellent pre-hospital care over most of Florida we have determined that arrival at a trauma center within 85 minutes of an injury event for a trauma alert patient is appropriate. If the trauma system is modified as suggested, this goal is achievable.
13. Obtain the recommendations of the Regional Domestic Security Task Force
This has been accomplished.
14. Document the actual number of trauma victims being served by each trauma center
This data is provided.

Findings and recommendations according to objectives listed:

1. Develop a definition of a “Trauma Alert Victim”
The current definition of a “Trauma Alert Victim” should be modified in recognition of the age distribution of Florida citizens toward an older age group and because of the abundant data that indicates the risk of under triage of older injured patients. Age greater than or equal to 65 should become a primary trauma alert indicator.
2. Develop recommendations on aligning trauma service areas within the trauma region boundaries (July 2004) or other methods of regional trauma planning
This recommendation is made based on data presented.
3. Identify any duplication of effort in current regional trauma planning
Regionalization as described in (2) above will necessitate a re-definition and strengthening of trauma agencies to be certain that a broad level of support and high quality service is provided by the trauma system.
4. Review the Regional Domestic Security Task Force structure and determine whether integrating trauma system planning with interagency regional and emergency disaster planning efforts is feasible, and identify any duplication of efforts between the two entities.
This recommendation for integration is feasible and is made within the body of the report.
5. Make recommendations on the number and level of trauma centers needed in each trauma service area to provide a statewide integrated trauma system
This recommendation is made based on the data reported and is found in the “Goals” section above.
6. Identify the number of trauma patients currently being treated in state-approved trauma centers
This has been done and is reported in “Goals” above.
7. Make recommendations on the minimum/maximum number of trauma patients that can be treated at a trauma center
The concept of trauma center capacity is described in “Goals” above.
8. Establish criteria and define the methodology for determining the number and level of trauma centers needed to serve the population in a defined trauma service area or region
This has been completed and is discussed in the body of the report and in “Goals” above.
9. Review the current boundaries of the trauma service areas and make recommendations to retain or modify current trauma service areas
This has been done and the recommendation made that DSTF regions replace the current trauma service areas.
10. Provide an inventory of health care resources, i.e. trauma surgeons, neurosurgeons, nurses and other health care practitioners to support trauma centers
This is provided in the body of the report.
11. Develop a map of the existing trauma centers and identify the area served within 30 minutes of the existing trauma centers by ground or air transport and within 50 miles of the existing trauma centers by air transport
This has been provided.
12. Identify existing emergency medical services transportation capabilities
This has been assessed and is reported.
13. Identify existing emergency medical services that transport patients to trauma centers and the distance and time they travel
This has been provided.

14. Identify Florida's population growth characteristics and establish a methodology for mechanism of trauma trending
This has been provided.
15. Make recommendations regarding a continued revenue source which shall include a local participation requirement
Several options have been provided. Specific formula(s) have been avoided since there are, based on our analysis, a number of potentially successful avenues and, moreover, it is likely that a "one size fits all" approach will not gain wide acceptance.
16. Make recommendations regarding a formula for the distribution of funds identified for trauma centers, which shall address incentives for new centers where needed and the need to maintain effective trauma care in areas served by existing trauma centers, with consideration for the volume of trauma patients served and the amount of charity care provided
Several options have been provided. Data supporting this concept and options are provided based on information from other state trauma systems and knowledge of initiatives to fund healthcare initiative in many Florida communities. A decision on a specific formula may best be determined by consensus with consideration given to cost, effort, and population served.
17. Identify the current incentives for hospitals to become trauma centers
Survey data is included in the appendices of the report and summarized in the body of the report. Currently, forces which would serve to motivate hospitals to become trauma centers are being overcome by concerns over cost and liability risks.
18. Identify potential public funding sources available for trauma care.
Data is reviewed and a variety of options are provided.
19. Identify the current volume of trauma patients at trauma centers and non-trauma centers
This has been recorded and the data provided in the report. Across the state, the triage rate for injured patients to trauma centers is lower than acceptable. There is however, wide geographic variation and, in proximity to trauma centers, the triage rate is very good. Changing the performance assessment function of trauma agencies and altering the distribution and location of trauma centers will go far in remedying this problem.
20. Identify the amount of charity and uncompensated care provided by trauma centers
This financial data is provided in summary form.
21. Identify reimbursement to trauma centers from local governments, taxes/taxing districts, and the state for the previous five years
The data that is available has been provided. The information is in summary form and is limited by incomplete participation by trauma centers and minimal data available from nontrauma centers.

APPENDIX 1: Request for Proposal

**Department of Health
Division of Emergency Medical Operations
Office of Trauma**

Comprehensive Assessment of the Existing Trauma System

1. Background

For many years, the Department of Health (DOH) has been working toward the establishment of a statewide regionally based trauma system to meet the needs of trauma victims in Florida. National research identifies regional trauma systems as the most effective means for planning and providing trauma care. Effective trauma systems reduce the costs of morbidity and mortality from trauma injury.

2. Scope of Services

Interested state universities must review and provide a comprehensive assessment of the existing trauma system and determine how effective it is in providing trauma care uniformly throughout the state and make recommendations on how to implement an inclusive statewide trauma system. Any evaluation of Florida's trauma system must include structure, process, and outcome measures and incorporate a review of system resources, patient needs, and patient outcome. Cost containment, managed care, and patient outcome must be evaluated as well.

Interested state universities must utilize the most informative methodologies will be most informative for trauma system evaluation.

Interested state universities must collect or use existing trauma data to determine the number and location of trauma centers in Florida.

The total fee for this comprehensive assessment of the existing trauma system shall not exceed \$300,000.00.

3. Goals

Interested state universities shall conduct a comprehensive assessment of the existing trauma system which must include the following elements:

- Evaluation of the number and distribution of trauma centers.
- Determination of the responsibility of local government to fund trauma care and any local responsibility for trauma care.
- Development of outcome based performance measurements to determine if the inclusive trauma system delivers results.
- Conducting a comprehensive assessment of the existing trauma system.
- Establishing methodologies for addressing the tasks in section 4.
- Documentation of a comparative analysis to demonstrative if the Florida trauma system delivers results.
- Reviewing the survival rate of trauma victims at trauma centers versus non-trauma centers.

The comprehensive assessment of the existing trauma system must also include the following:

- Recommendations submitted by regional trauma agencies, stakeholder recommendations.
- The geographical compositions of an area to ensure rapid access to trauma care by patients.

- Historical patterns of patient referral and transfer in an area.
- Inventories of available trauma care resources.
- Population growth characteristics.
- Transportation capabilities.
- Medically appropriate ground and air travel times.
- Recommendations of the regional domestic security task force.
- The actual number of trauma victims currently being served by each trauma center.
- Other appropriate criteria.

4. Objectives

Interested state universities shall perform the following tasks:

- Recommendations on aligning trauma service areas within the trauma region boundaries as established in July 2004, or other methods of regional trauma planning.
- Identify duplication of effort for current regional trauma planning, including the following:
 - Regional Domestic Security Task Force.
 - Local government planning and participation.
 - Current state-approved trauma agency plans.
- Review the Regional Domestic Security Task Force structure and determine whether integrating the trauma system planning with interagency regional emergency and disaster planning efforts is feasible and identify any duplication of efforts between the two entities.
- Recommendations on how trauma regions shall be established, considering the existing trauma service areas and/or the need for the existing trauma service areas.
- Recommendation on the number and level of trauma centers needed for each trauma service area to provide a statewide integrated trauma system.
- Identify the number of trauma patients currently being treated in state-approved trauma centers.
- Recommendations on the minimum/maximum number of trauma patients that can be treated at a trauma center.
- Establish criteria and define the methodology for determining the number and level of trauma centers needed to serve the population in a defined trauma service area or region.
- Review the current boundaries of the trauma service areas and make recommendations to keep existing trauma service areas or make modifications to them.
- Identify the inventory of health care resources, i.e. trauma surgeons, neurosurgeons, nurses and other health care practitioners to support trauma centers
- Develop a map of the existing trauma centers and identify area served within 30 minutes by ground or air transport or within 50 miles by air transport of the existing trauma centers.
- Identify existing emergency medical services transportation capabilities.
- Identify existing emergency medical services that transport to trauma centers and distance and time they travel.
- Identify population growth characteristics of Florida and establish a methodology for population trending.
- Make recommendations regarding a continued revenue source which shall include a local participation requirement.
- Make recommendations regarding a formula for the distribution of funds identified for trauma centers which shall address incentives for new centers where needed and the

need to maintain effective trauma care in areas served by existing trauma centers, with consideration for the volume of trauma patients served, and the amount of charity care provided.

- Identify funding sources available for trauma care, including local, state, federal, etc.
- Identify current incentives for hospitals to become a trauma center.
- Identify current volumes of trauma patients at trauma centers and non-trauma centers.
- Identify amount of charity care/uncompensated care provided by trauma centers.
- Identify reimbursement to trauma centers from local governments, taxes/taxing districts and the state for the previous five years.

5. Organizational Experience

- Interested state universities shall identify their organizational experience related to the provision conducting studies of trauma systems or other health care related systems.
- Interested state universities shall identify their skills and experiences related to the implementation of conducting studies of trauma systems or other health care related systems.
- Interested state universities shall identify their skills and experience related to data collection related to trauma patients.
- Interested state universities shall identify their capabilities of completing the tasks identified in section 4 by January 14, 2005.
- Interested state universities shall identify their key staff that will be involved with performing this comprehensive assessment.
- Interested state universities shall include an organizational chart that depicts their comprehensive assessment staff and indicates how each member relates to the other.

6. Suggested Qualifications for the Project Team

Interested state universities shall staff the comprehensive assessment with key personnel. Interested state universities comprehensive assessment coordinator shall meet or exceed the following minimum professional qualifications:

- A PhD and/or Medical Doctor Degree from an accredited institution and experience in the following:
 - Experience in conducting population trend studies.
 - Experience with the Florida trauma system.
 - Experience in conducting health care related studies.
- The interested state university must also staff the program with the following key personnel:
 - Health care practitioner with trauma clinical experience
 - Epidemiologist
 - Statistician

7. Deliverables

- Satisfactory performance and completion of the tasks described in section 4.
- Provide monthly progress reports to the contract manager on the fifteenth (15th) of each month.

- Provide a written project plan including estimated timelines for the completion of each task listed in section 4 and deliverables as listed in this section.
- Provide methodology for collecting trauma patient data and other data related to the tasks in section 4.
- Propose methodology(s) to improve both the process and outcome of trauma care.
- Make recommendations for future trauma planning.
- Propose methodology(s) to determine if an exclusive trauma system improves outcome of care.
- Complete the comprehensive assessment of the existing trauma system by January 14, 2005.
- Determine the outcome of care for trauma patients being treated in a trauma system. The outcome of care is whether trauma patients are more likely to survive from serious injury in an exclusive trauma system.

8. Submission

Submissions must be received no later than 5:00 p.m. EST on Thursday, July 15, 2004. The DOH resumes no responsibilities for missing or delayed submissions. Interested state universities must send one (1) original and one (1) electronic copy (either CD or disk).

Submissions must be submitted to the following:

Department of Health
 Division of Emergency Medical Operations
 Office of Trauma
 4052 Bald Cypress Way, Bin C-18
 Tallahassee, Florida 32399-1738

Questions may be directed to:

George G. Schaffer, Jr.
 Division of Emergency Medical Operations
 Office of Trauma
 4052 Bald Cypress Way, Bin C-18
 Tallahassee, Florida 32399-1738
 (850) 245-4440

9. Method of Payment

The interested state university will be paid on a monthly basis per submission of a monthly progress report and compliance with the written project plan as indicated in section 7.

10. Standard DOH Contract

The DOH's Standard Contract contains additional general contract terms and conditions by required the DOH for all providers. Each interested state university shall review and become

familiar with the DOH's Standard Contract which contains administrative, financial and non-programmatic terms and conditions usually mandated by federal or state statute and policy of the Department of Financial Services.

Appendix 2: National Steering Committee Members

National Steering Committee

J. Wayne Meredith, MD, F.A.C.S.
Director, Division of Surgical Sciences
Chairman, Department of Surgery, Residency Program Director
Wake Forest University School of Medicine
Winston-Salem, NC

Richard J. Mullins, MD, F.A.C.S
Professor of Surgery/ Chief of Trauma
Critical Care Section,
Oregon Health and Science University
Portland, OR

Pat Kilgo
Department of Public Health Sciences
Wake Forest University School of Medicine
Winston-Salem, NC

Ellen Mackenzie, PhD
Professor and Director
Center for Injury, Research and Policy
Johns Hopkin's Bloomberg School of Public Health
Baltimore, MD

David Butz, PhD
Professor of Business Economics
University of Michigan Business School
Co-Director of the Center for Health Care Economics
Ann Arbor, MI

Appendix 3: State Steering Committee

STATE STEERING COMMITTEE LIST

John Benz
Chief Strategic Officer
Memorial Healthcare System

Dr. Carl Lentz
President
Florida Medical Association

Dr. Patty Byers
Chair, Florida Committee on Trauma
Ryder Trauma Center

Ms. Terry Papp, RN
Trauma Program Manager
Lee Memorial Hospital

Ms. Michelle Ziglar, RN
Trauma Program Manager
Shands/UF Gainesville

Mr. John Hillenmeyer
CEO, Orlando Regional Medical Center

Ms. Amy Maguire
Campaign Director
Florida Trauma Alliance

Dr. David Seaberg
Florida College of Emergency Physicians

Dr. Arthur Diskin
Director of ER
Mt. Sinai Medical Center

Ms. Susan Skelton
Regional Domestic Security Task Force

Mr. George Danz
Trauma Management Agency, Broward County

Mr. Dave Rogoff
Director
Hillsborough County Health & Social Services Department

Dr. Sandy MacLeod
Medical Director
Sarasota County Health Department

Ms. Rhonda Sherrod
Chair of Rural Hospital Council of Florida
Administrator, Shands at Live Oak

Ms. Judy Ploszek
VP of Finance, Tampa General Hospital

Mallory Horne
Office of the Executive Director
Dept of Highway Safety & Motor Vehicles
Florida DOT State Safety Office

Mr. Paul Belcher
Florida Hospital Association

Mr. Steve Sheffer
University of Florida

Mr. David Halstead
Florida Department of Law Enforcement
Chief of the Office of Domestic Preparedness

Rick Slevinski, MD
EMS Medical Director, State of Florida

Mr. Alan Levine
Secretary, Agency for Health Care Administration
(Ann Sarantos – October meeting)
(Lisa Rawlins – January meeting)

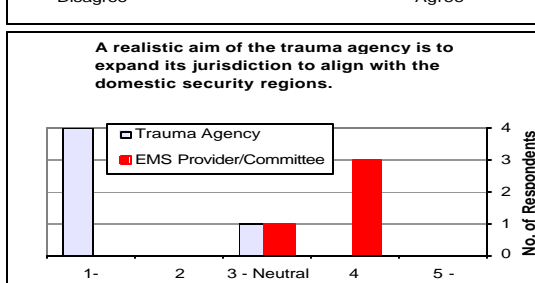
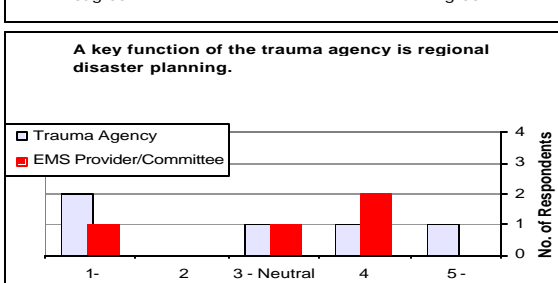
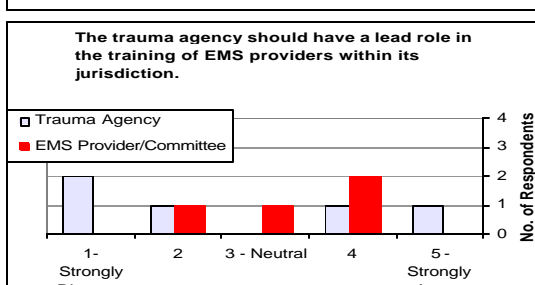
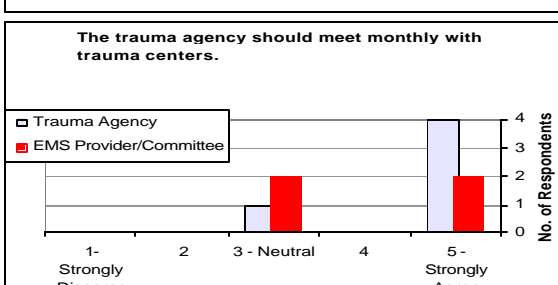
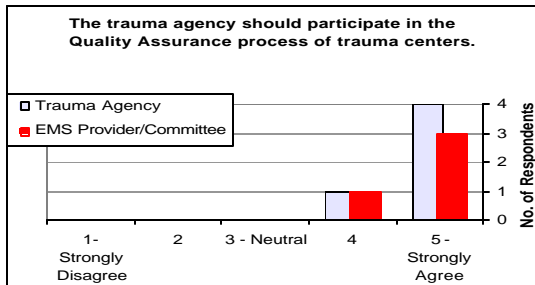
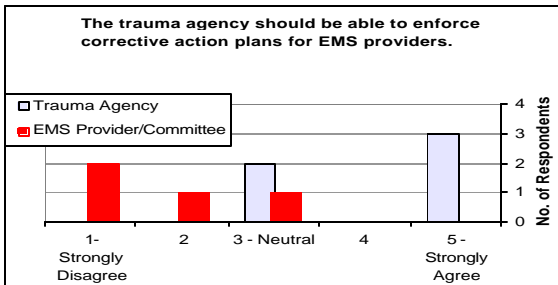
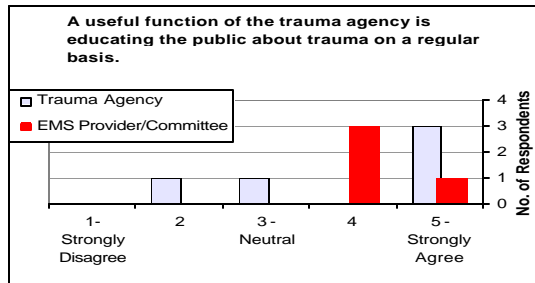
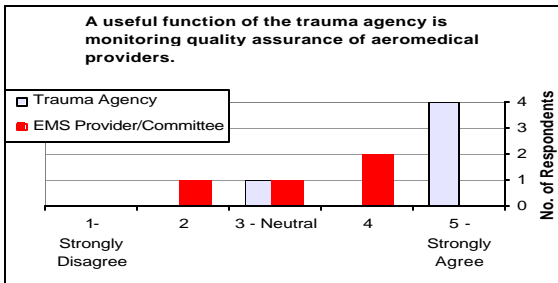
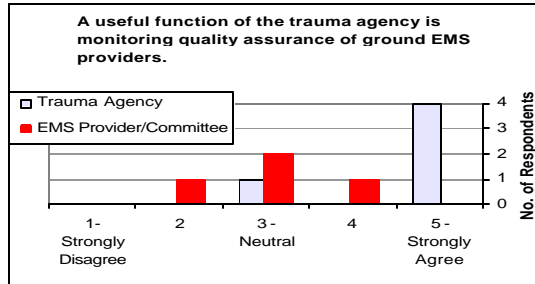
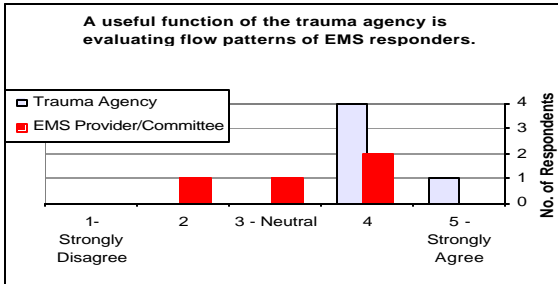
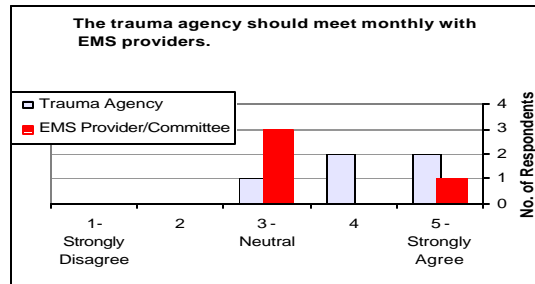
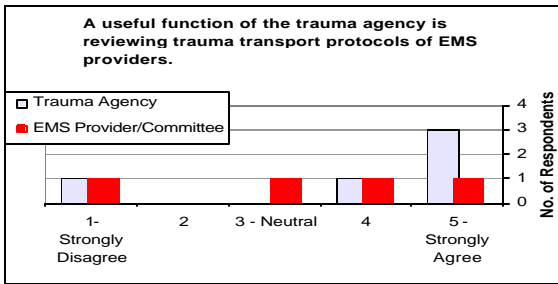
Appendix 4: EMS/ Trauma Agency Survey

Trauma Agency and EMS Provider Survey

Sixteen persons at trauma agencies or EMS providers were contacted for a survey by telephone or e-mail. The questionnaire was divided into two parts, an open-ended section and a Likert Scale section that considers the importance of selected trauma agency functions. The contacts represent all geographical regions of Florida trauma centers. The nine respondents include five trauma agency medical directors/administrators and four EMS providers/committee members (including the State EMS Medical Director).

Currently, four trauma agencies exist. They are Broward County Trauma Management Agency, Hillsborough County Trauma Agency, North Florida Trauma Agency, and the Trauma Agency Division of Palm Beach County Health Care District. These agencies are funded by county general funds or property tax. The agencies are involved in activities relative to community priorities.

The graphs below demonstrate the range of responses from the trauma agencies and EMS providers for the Likert scale questions. There is a consensus between the two groups that trauma agencies should participate in the quality assurance process of trauma centers. However, the EMS respondents do not feel as strongly that trauma agencies should be monitoring the quality assurance of EMS or air medical providers. Despite this, trauma agency respondents would like to be more involved in the activities of EMS providers. Trauma agencies do not wish to create a punitive environment and compromise the existing collaborative relationships, but they would like hospitals and EMS providers to be held accountable to standards adopted by the entire group, if not by formal means, at least by community pressure.



Appendix 5: Trauma Center and Non- Trauma Center CEO/ COO Survey

Florida Trauma System

The State's Review of Current
Trauma Centers and Opportunities
for Growth

Florida Statewide Trauma Center System

Florida Statewide Trauma Center System

Feedback from the CEOs and COOs of Florida's Trauma System

The Positive Aspects of Being a Trauma Center

Results of interviews with the state's trauma centers revealed the following positive aspects of currently operating as a Level I or Level II Trauma center. The responses are varied, but most focus on the community need that is being fulfilled in the respective communities, the operational advantages of being a trauma center, and the passion behind the medical staff to continue to work in a trauma capacity. Responses from the interviews are presented below:

- 1) In this community, we remain a competitive advantage because there are two other Level 2 trauma centers in our area, for a total of three trauma centers. I know that is not a good answer, or the appropriate answer. We offer both tertiary care and trauma care, so we do both. But having the other centers here allows us to remain competitive. The second positive impact and probably the most important is that we are able to care for our patients.
- 2) Improved patient care, and this is situational because we handle critically injured patients in an unorganized manner. The opening of our trauma center organized it, because organization is a requirement for performance improvement. Multidisciplinary teams meet to discuss patient care; this helps us in our organization.
- 3) Obviously, decreasing mortality and morbidity resulting from trauma. We are also a research and teaching hospital, and being a trauma center allows us to see high-end blunt and penetrating injuries. This is good for research, as well as teaching. Being a trauma center also gives a positive image in the community, of simply being a Level 1 trauma center.
- 4) Community need, extremely heavy tourist area of Orlando and it is a needed service. Improves the clinical capabilities of the hospital because even non-trauma patients are benefiting from the capabilities and technologies provided in the trauma center. Positive patient care is extremely important for us. From a global perspective, it enhances the clinical prestige of the hospital. Orlando Regional is one out of six statutory teaching hospitals, and we need patients for our (orthopedic and neurology) residents, the trauma center allows that.
- 5) Having the resources to take care of the kids.
- 6) Resources required for the establishment of a trauma center also improves the operations of the entire hospital system through an organized approach to complex emergency surgery, expanded 24/7 capabilities from pre-hospital through ICU services and rehabilitation.
- 7) In order to be a reputable teaching hospital we have to have specialty programs. It is incumbent upon us to provide specialties that are multi-disciplinary in nature. We also pro-

vide a community and regional benefit, because being a trauma center is a part of our mission.

- 8) Clinical standpoint: having a coordinated patient care versus having to get together everybody, and it is good for the morale of the hospital and community.

The Negative Aspects of Being of a Trauma Center

The negative aspects of being a trauma center were mostly consistent across the various facilities. Patient care reimbursements, and the allocation of the hospitals' resources were big challenges for these facilities. Some of the respondents went as far as to break the down the negative aspects of being a trauma center within the organization, and outside of the organization which provide some insight into the problematic areas of trauma operations.

- 9) The negative aspects are mostly operational, and they operate at two levels: internal and external. Internally, there is a perceived impact on hospital operations. Externally, it creates confusion in EMS and outlying hospital communities. Most trauma care patients are motor vehicle accident patients, and with the expansion of trauma center it creates confusion about patient transfers.
- 10) The risk of having to deal with the resources necessary to run a trauma center. Trauma centers run in cycles, and can reach a point of overload, it is hard to stay on the curve to meet the demands of workload, sometimes you can be overworked, or under worked... how do you manage that?
- 11) The cost of operating, there is no public funding for indigent care. Standby costs are beyond trauma care. The cost structure put us at a competitive disadvantage. Uninsured patients in the trauma center are a higher percentage than uninsured patients in the hospital as a whole, and their costs are much higher than regular patients. Having a trauma center affects the ability of surgeons to perform elective work, resources get consumed, and their schedules (specialists) are disrupted. Transfers from non-trauma centers.... because they (non-trauma centers) lack the specialties that our trauma center has, often these are uninsured patients, and are sometimes transferred because physicians at their hospitals for whatever reason opt not to treat them, and they are sent to us. Physician coverage shortage: depending on private physicians is costly, and there is a shortage of availability. Liability: fear of liability, there is no statutory immunity for our hospital, like some of the other ones that are either academic, affiliated with a university, or state-chartered. We are private, and we don't have the same immunity, and our valorem taxes are higher.
- 12) The significant standby costs and reimbursements that are not available to the staff and to us.
- 13) Cost and competitive disadvantages are the most negative aspects. Under current reimbursement agreements with the government and private insurance, and our trauma patient-payer mix, we are not able to recover operating costs for running the trauma center. Trauma center designation can make it difficult to recruit or retain certain types of subspecialists, i.e. neurosurgeons. We have certainly experienced some key physician specialists choosing to go to other hospitals to avoid trauma calls. Also, there is a perception amongst some of the medical staff that taking calls in a trauma center exposes them to increased malpractice liability and caring for very complex, often unreimbursed patients. Finally, scheduled patients are often "bumped" to make way for trauma patients thereby frustrating these scheduled patients, their families and their physicians.

- 14) We will be down to two neurosurgeons soon, one is not required to take calls because he is 65, and our by-laws allow him not to take calls. We get calls for neurosurgery patients from other areas and we are strapped because of requests for transfers. Neurosurgery is tenuous.... having to hire local physicians to cover orthopedic procedures. It stretches specialists too far.
- 15) Basically funding. We cannot reject patients, we accept everyone, and many are transferred from out side of the area. Litigious patients make it a risky business to be in. The cost of malpractice, and the lack of patient payments make it difficult.

Challenges for Non-Trauma Centers to become a Trauma Center

Current CEOs and COO of trauma center offer their feedback on the challenges facing non-trauma centers to become trauma centers, and why their level of willingness is not a direct indicator of their ability to successfully open and operate as a full trauma center. The responses are presented below and are referenced to the construction, staffing, and operation of becoming a trauma center.

- 1) There are two major reasons. The first is the uncompensated care issue. Secondly there is a need for hospitals to compensate physicians, and this is extremely expensive. Trauma centers have to compensate specialists according to the bylaws of the hospital, such specialists as neurosurgeons, ophthalmologists, orthopedic surgeons, and emergency medicine physicians. Non-trauma hospitals don't have the same governing provisions, and they don't incur the same costs. In addition, for instance ophthalmologists do not need hospitals, they can have their own private practices. This is an untenable situation.
- 2) Internal operations, there are not enough specialists to handle patients. Cost is another big issue. The perception that it disrupts the system. It really isn't a capacity issue. We are a Level I, and we have the capacity capability, we can increase capacity, by reducing length of stay through quality treatment. Very few patients go from the ED to the OR and require long term care. Another issue is there are not enough educated trauma specialists (i.e. neurosurgeons, operating surgeons, orthopedics). There is a shortage of general trauma surgeons, and a lack of surgeons interested in caring for trauma patients.
- 3) The costs mentioned related to the negative aspects of running a trauma center. Lots of costs associated with starting up. Not a real clear indication if it will assist them financially. You have to look at trauma to see if it can work economically. Professional liability is another area – we are faculty so we have positive things that freestanding hospitals don't have. Securing sub-specialty coverage such as hands, penetrating wounds, and detached limbs is difficult.
- 4) Financial picture: having a trauma center is a breakeven service. Given the liability, it is too risky. There is a lack of infrastructure: no residency program. Additional costs and space (the number of routine emergencies vs. trauma), especially in private hospitals. Negative perception of being a public hospital, which results in more indigent and uninsured patients.
- 5) The liability costs associated with operating a trauma center. The inability to put together a team of specialists and have them available 24-7. The lack of full reimbursements including full services 60-80% of Medicare available, and it is a challenge to support pediatric specialist through reasonable compensation.

- 6) Similar to the negative cost of operating a trauma center. There is an inability to recover operating expenses, competitive disadvantage, and a perception of increased liability. Thus, medical staff may not agree to provide coverage per above comments.
- 7) Costs and the nightmare you are faced with having to have specialist coverage twenty four/seven.
- 8) Reimbursements issues, malpractice issues, you have to be able to provide specialties. Hospitals cannot afford these costs. Our personnel have to be highly trained and available twenty-four hours, seven days a week. This is costly.

Challenges to Medical Specialists to Work in Trauma Care

The challenges faced by medical specialists who currently care for patients in Level I and Level II trauma centers are reported below. These are the opinions of the CEOs and COOs who have listened to the feedback of their medical specialist during meetings, and other forums of discussion at their local facility.

- 9) The biggest reason is the exposure to malpractice risk, most procedures are extremely complicated and the patients are extremely ill, people tend to expect a perfect outcome. A second reason is that trauma practice can be taxing when running a private practice. In ER patients are triaged and can be seen later, but when they are involved in trauma, they have to be seen immediately after triage. Our doctors however are generally positive about working in the trauma center. They feel that the work is challenging and they learn a great deal. We have a review board that goes over trauma incidents, and the doctors participate in this process.
- 10) Malpractice, because as you know patients without a pre-existing relationship with a care provider tend to sue more. Disruption of elective schedule, personal lives, and it is interesting from an intellectual viewpoint: lack of professional and personal reward: repetitious treatment of patients, not a broad spectrum of injuries.
- 11) My sense is the economics of it. It is the time-consuming procedures, some love it and live for it. If I were an orthopedic surgeon, I would rather do hips, knees and get in and get out versus a 10-hour procedure putting someone back together. I know that is harsh, but you understand what I am saying. Follow-up care generates 3-6 downstream visits and it is not covered care.
- 12) Liability: most of them have limited their coverage, they don't want the exposure. Then there is the lifestyle issue, we are inundated with trauma patients (3000 Level 1 Trauma patients a year). Most specialists can collect 15-20% of their charges in their own practices, financial baths. There is not enough funding to pay them what they normally charge. Some of them get dumped on by other hospitals. There is no professional reward. They don't like to do trauma procedures (i.e. neurosurgeons).....it's boring.
- 13) Exposure to liability, not reimbursed fully. 80% of Medicaid, 85% hospitals.
- 14) Non-payment of services provided, perception of increased liability, and possibility of increased workload due to complexity of patient needs.
- 15) The number of trauma patients that are uninsured, and the liability of caring for trauma patients.

- 16) Malpractice costs, not wanting to be on call, feeling of its not just worth it. They really don't know the patients.

Patient Reimbursements Covering the Cost of Care

The notion of patient reimbursements covering the cost of care was asked of the respondents, and their responses were very straightforward, but limited. Their responses are indicative of a general tone of aggravation, because patient care doesn't begin to reduce the financial obligations these organizations have. Some offered to comment of direct and indirect costs at their facilities, and how the breakdown between the two is affected by lack of patient reimbursement.

- 17) No, it does not.
- 18) Don't know. Our model indicates you can cover direct, but not indirect costs. A hospital can't stay in business long-term. Especially when specialists are demanding more economic value, hospitals can't add that (increase) to their direct costs. A portion of patients are Medicaid recipients at the state level, and the pressure will diminish state reimbursements, and this is not economic to improve community care.
- 19) No. It probably doesn't even come close, but it has to be provided. We see it not only as a requirement, but we are involved in academics. Is it a good business decision? No, but what does it bring... it bring recognition, quality patient care, etc...
- 20) No. Patients of our trauma center most come from auto accidents. The average patient has P.I.P. auto insurance worth \$10,000, and they typically accrue \$50-\$60K in expenses. No. We spend about \$5-\$6B in private physician coverage a year.
- 21) In aggregate, payments collected for services rendered to trauma patients are inadequate to cover the cost of the services. There is a significant percentage of non-insured or underinsured patients that receive trauma services for which there is little or no reimbursement available. Neither government nor private payors include compensation for the significant readiness costs and physician compensation that is required to maintain trauma center designation. Most health insurance contracts do not provide sufficient compensation for complex, multi-injury trauma patients.
- 22) Figures for the physician Aspect of it: does not come anywhere near the actual costs. How the physicians come out: reserve comment.
- 23) No. Of course not.
- 24) No neither direct costs, or indirect costs.

Trauma Center Financial Obligations Creating Financial Burdens

The financial burdens incurred by hospitals are addressed here as the respondents provide insights on the various costs associated with the acquisition and allocation of resources in the state's trauma centers. In addition the emphasis on specialist coverage is another area in which most respondents recognize as focal point of financial burden in the trauma center.

- 25) It does, because we pay for specialist's coverage and then you have to account for uncompensated care, they go in opposite directions.
- 26) Yes: Direct costs (staffing and equipment) and Indirect costs (capital investments and supporting sub-specialists). For example we have an MRI in our trauma center, it is not trauma related, but trauma patients utilize it.
- 27) They do from the standpoint of whatever mechanisms that cover specialists, and ensure that 90
- 28) resources are available. We pay in-house trauma physicians to take calls, which means lots of costs.
- 29) The payment of private physicians to take private calls, staffing, bad debt load, liability premium exposure (more suits from trauma patients), stress, loose private paying business.
- 30) It gets down to the issue of increased liability exposure, it causes us to have to prioritize trauma services like preventative services for children who have limited means (or services). Capital expenditures have to be defrayed. Prioritization of management issues: if we were fully funded we could invest in full services with other needs such as minimizing drowning through improved parenting skills.
- 31) Our annual shortfall of non-recoverable costs is in the \$10-11 million per year range in order to maintain trauma center status. This includes stipends and per diems for required sub-specialists, capital and operating expenses to maintain resources necessary for trauma center status, and care provided to bad debt and charity patients. It does not include lost opportunity costs, such as keeping an OR room and staff on stand-by for trauma emergencies, or bumping paying, elective patients for emergent trauma patients for certain radiographic or other types of procedures, or for productive physicians who have.
- 32) Running of the operations: physician coverage must be underwritten in the amount of \$700K - \$1M beyond collections to cover salaries of nurses, practitioners, specialists, will be upward of \$2M next year. I do not want to comment on patient's coverage.
- 33) It does because it costs more to provide the service than the revenue we get back. When you have to have tremendous availability of staff, it is expensive.

Local Government Assistance to Current Trauma Centers

The assistance from local government to the trauma center is captured in this section. Most, if not all hospitals that responded, do not receive local government support.

1. They don't. Zero assistance.

2. There is nothing in our location.
3. I don't think we get anything. We don't have any taxation districts like Miami, Tampa, and Palm Beach. We get \$1M from the state.
4. no permanent healthcare sourcing. In 2003, three counties gave a total of \$3M when were about to be shut down. But no, we don't have support like Miami-Dade county, and I think even Hillsborough county.
5. There is no local government support. Our local government supports Jackson Memorial, but not us.
6. We do not receive any local taxes for support of the trauma center.
7. I am not aware of any government support. The county runs EMS program and there is close cooperation.
8. Does not assist us. State government passed a law that causes Hillsborough County Health plan to pay \$3.5M to help subsidize health care for patients who can't pay.

Ways in which the State Government Can Assist

The respondents provided insightful ideas on how the state government should assist with the trauma center currently operating in the state. Most resounded loudly the idea that trauma care is a public health issue, which puts the burden of responsibility into the hands of the public, and the state, and federal government. The respondents feedback is presented below.

- 34) Now the state provides subsidies for trauma centers and they need to increase it. In order for people to qualify to be a trauma (which are not a lot of people), they need to breakeven, and it is not possible to do so. Right now automobile coverages are limited to \$25,000, and the patient's bill could be anywhere in the costs of hundreds of thousands of dollars, and it doesn't nearly cover the cost of patient care. The state could work to increase the limit of auto insurance coverage, but of course this will drive up the cost of insurance without using tax dollars.
- 35) Most of our patients are vehicular accidents, which means most of them are from out of town, or are away from their hometown. Our trauma center benefits the whole state, and funding the trauma centers should fall in the lap of the state and federal government. It's a public service. In organizing a program rehabilitative recognition at the state level. Direct appropriation not attached to disproportionate share buckets: makes it visible and difficult to change or reduce and it develops dedicated funding.
- 36) They should help answer the liability issue, especially with specialist coverage, especially if they are doing the best they can, they need exemption from liability. The state can help fund deficits through federal and state matching funds. But the state must be careful not to have more trauma centers than the resources can support. If you have the volume to operate as a trauma center, then that is fine.
- 37) Acknowledgment of state trauma system. Acknowledge the standby capital costs that is an additional burden. Public health is the responsibility of the government. Structural approach to relieving enhanced liability for non-immune hospitals. Consistent source of funding to offset costs. How do you serve the community? How much of the resources do

you allow? There are more regular patients than there are trauma patients, but trauma patients consume more resources. The state needs to support its social obligations.

- 38) Reimburse us for costs as well as doctors. Indemnify us as a Level I trauma center.
- 39) As the trauma program is a state-run program, it would be most beneficial if the state would fund non-recoverable expenses incurred by state designation as a trauma center as well as helping to defray costs incurred by unfunded patients.
- 40) Certification of state trauma system. Huge need for state to fund directly: financially put a lot of money into the trauma centers with reasonable tort reform. The accessibility of peer review records to everyone causes lack of interest, moral and ethical obligations.
- 41) The state should assist the hospitals depending on the number and types of patient's they treat. The state needs a formula to assess points to determine the subsidy amount.

General Feedback from the Trauma Center Respondents

The following represents general comments and feedback from the respondents as concluding remarks to their interview.

- The thing I think is most appropriate that a community based on population should have a given number of trauma centers. The way that is has currently been set up, is that the system allowed anyone to become a trauma center, and this is now how it should be. In Tampa, Tampa General has a trauma center for Tampa proper and the surrounding area, while Pensacola has three, and for medical reasons everyone stays in the system. The state should structure the system so that there will be an objective and fair way to assign and incentivize trauma centers.
- No state funding of the trauma system and it will collapse over time. Currently the trauma system is maintained by the commitment of a few physicians, nurses, and other hospital staff.
- Trauma care is a crucial service, mission service, and we take our work very seriously. It is a fundamental health requirement and it should not be balanced on the backs of those choose to do it with financial circumstances.
- We appreciate the opportunity to respond and for the state's willingness to do this important survey. In calculating costs associated with trauma shortfalls it is essential that they be a true comparison and truly determine the standby costs associated with trauma operations.
- I am very supportive of having state approved trauma centers, state offices have been supportive but they can do better.
- There should be a mechanism put in place based on a formula that acknowledges how critical patients and how many of those patients are being treated. Critical trauma centers should be subsidized more. The formula should be such that the trauma centers that are more critical, should be well funded.

General Attitude Questions Regarding the Respondent's Trauma Center

This portion of the interview represents the general attitude opinions from the respondents regarding the following statement. Comments provided by the respondents are included below the statement. An average score rounded to the nearest whole digit is represented by the numerical evaluation.

	Strongly Disagree				Strongly Agree		
9. Trauma care is an integral part of the mission of our hospital. -Our board supports it, but we cannot jeopardize our resources.	1	2	3	4	5	6	7
10. A trauma center is consistent with the mission of our hospital.	1	2	3	4	5	6	7
11. Our trauma center fulfills an important community need. -We cannot serve our community without reasonable resources. -Recognizing that many private physicians do not enjoy taking trauma call for reasons stated above.	1	2	3	4	5	6	7
12. The medical staff values that our hospital is a trauma center. -No. They don't. -Administration and orthopedic surgeons believe in our trauma centers, but orthopedic surgeons, and the ones getting calls at 2:00 am are the ones who aren't that happy with it. - Most do. Some don't. -They are tired of it, with a few exceptions. It consumes too many resources, strips resources and capital from other areas. -In general, the fact that we must reimburse physicians for uncompensated care, that certain physicians choose to relocate their practice to other hospitals to avoid trauma call, that there is disruption to patient care and to staffing needs due to remaining compliant for trauma designation, and that trauma results in operational losses due to limited reimbursement ... trauma is a competitive disadvantage. The reason for the "neutral" response is that there are clear advantages such as having a wide variety of sub-specialties caring for both trauma and non-trauma patients as well as the significant clinical and operational benefits that go with having a well organized trauma care system. -Some would say 7, some would say 0, most are supportive, some hate the added responsibility.	1	2	3	4	5	6	7
13. Availability of trauma care gives our hospital a competitive advantage. -No, in this market (local) it just keeps a level playing field. - Yes, but we are still learning to do it well. - Certainly does. -Image-wise, yes. The competitive disadvantage is the cost of operation, doctor's disruption of their elective schedule. - Only because we are now paying stipends and reimbursing private specialists for unreimbursed trauma care ... even then our staffing is always a couple of physicians away from being a problem. -In a way, we get dumped on, good publicity	1	2	3	4	5	6	7
14. Our hospital has adequate medical specialist coverage to fulfill the obligations of being a trauma center. -We do, but we are always teetering on not having enough. We share specialists coverage, but not emergency with the other two local trauma centers. - Yes, but Jacksonville lacks hand trauma specialists. - We have issues like anyone else, it depends on the time and if you lose a faculty member, when you already only had 2 to begin with, how you long can you operate that way? -Willingness to do it is low. - However, we are nearing capacity issues requiring more capital investments and more staffing and equipment requirements. -We don't have all of the specialties covered, and it's at a huge emotional and financial cost to hospitals.	1	2	3	4	5	6	7
15. Our hospital can accommodate additional trauma admissions. -Yes, but it depends on how many. If we have to accommodate one bed per night, sure. But if	1	2	3	4	5	6	7

we had to accommodate three new beds per night, then we couldn't do it.

-Pushes out more elective work.

-Trauma surgeons yes, but neurosurgeons no

16. Trauma center status increases the liability risk faced by our hospital. 1 2 3 4 5 **6** 7
- We as physicians have sovereign immunity, but the hospital doesn't. Most patients are just thankful.
-Increased the liability risk for physicians, decreased the liability risk for hospitals
17. Our hospital has nursing and other professional staff available to support a trauma center. 1 2 3 4 5 6 **7**
-Other than physicians, there is always a nursing shortage.
18. The financial obligations of operating a trauma center are achievable in the absence of state and/or local government support. 1 **2** 3 4 5 6 7
-They are not achievable.
- The system will erode long-term if the state doesn't support us.
- No if we lose trauma center funding which is already minimal, it will be difficult to continue, and we will probably put our money and resources elsewhere.
-Drains resources from other areas of the hospital as long as it's a priority.
19. Our pre-hospital care system is sufficiently developed. 1 2 3 4 **5** 6 7
-I don't believe it is. It's pretty close, but not quite. It's not like it should be.
- We are still fairly new, and in the process of building our system
-Working with local physicians, our pre-hospital care is fine.
- I would give it a 5 because parents are capable enough to understand how to minimize. But I would it a 7 from the EMS and medical standpoint.
- For the present but as mentioned in #15 above we will need increased resources at our existing trauma center in order to keep up with regional growth within the next 3-5 years.
-More work needs to be done.
20. Our community has a sufficient number of trauma centers. 1 2 3 4 5 **6** 7
-Our catchment is several counties, because we are little more complicated, I think it is difficult to answer that question, the way it is worded. We share responsibility with Tallahassee, Jacksonville, and Orlando.
-Melbourne is next trauma center, although it is a level 2. Central Florida covers a five county area, and more trauma centers are needed.
-We don't have enough.
21. Our community has sufficient rehabilitation and outpatient facilities available. 1 2 3 4 5 **6** 7
-Yes. We a 150-bed rehabilitation center that is a part of ORHS.
22. Severely injured patients should be transferred to a trauma center. 1 2 3 4 5 **6** 7
-It depends on the situation. In all honesty we can handle severe patients without trauma injuries. Complicated trauma injuries (with multiple systems damaged) should be transferred, but as far as the routine patients, trauma care can be overkill. Once they triage down on the definition of trauma, which goes back to the development of our pre-care system and assessment in the field, we could better assess the severity of patient injuries.
-Yes, because it is all about patient care.
-Level 1 patients should be, but people use it as an excuse. Physicians choose not to provide care for these patients, and the ones they transfer are uninsured.
-Cost of these items, as well as ongoing operations are not covered by trauma patient reimbursement
23. The cost of construction, equipment and staffing to become a trauma center is affordable. 1 2 **3** 4 5 6 7
-Not cost effective, but we can do it.

- The requirement to mount a trauma program is extensive.
- Not the worse, but not the best.
- No reason to get in, given the current circumstances, no physicians, no capital.
- We are committed.

24. The state government should provide incentives for hospitals to become trauma centers. 1 2 3 4 5 6 7

- It is the right thing to do. We need financial support to keep trauma centers in the system. How ever it can be like a 2-edged sword, because it can become negative to have too many trauma centers.
- I would disagree with it, don't like how the question is worded. They should look at the current trauma centers and enhance and continue the current system, and address gaps in the state. A study should be done to find the real holes and take measures to fill those gaps. Otherwise, everyone would be jumping on the boat. If everyone is a trauma center, then there is no trauma system.
- It is good for the state to provide financial service, but if it is not done the right way, we will have too many. There needs to be a regulated and structured system.
- If there is no commitment then why, need to a have a commitment before providing incentives.
- Not only incentives, but also to remain a trauma center.

Florida Non-Trauma Center

The State's Review of Current
Non-Trauma Centers

Florida Statewide NonTrauma Center System

Florida Statewide NonTrauma Center System

Feedback from the CEOs and COOs of Florida's NonTrauma Hospital System

Discussions of Becoming a Trauma Center

Results of the interviews with the non-trauma CEOs reveal their efforts and discussion with management regarding their conversion into a trauma center. The responses are consistent across the board, in that most organizations have discussed or entertained the notion of becoming a trauma, but for various reasons have not, their reasons are listed below.

- 16) Hospital leadership has considered the idea of becoming a trauma center but due to the additional needed resources felt it was not appropriate to pursue at this time.
- 17) For the last ten years, we have put our name in the hat to become the lowest level trauma center, just to keep the door open. We don't get enough trauma center alerts (we only see about 350-400 severe alerts) to become a trauma center. We would not have enough volume to do a top-grade job. We would love to be a trauma center; it would be a step-up for our organization. Financially tax support is needed, and the local government has stated that they will support it.
- 18) Yes, the management team discusses trauma center quite often. However, Orlando is served by Orlando Regional Medical Center, and we do not perceive the need of two trauma centers within 5 minutes of each other.

Current Patient Care

This section addresses how severely injured patients are care for by the respective organization. In particular, the respondents were told to address how they manage severely injured patients within their facilities, and how they coordinate with local trauma centers and EMS to treat the patient. The responses are presented below:

- 19) Severely injured patients having multiple fractures are transferred after being stabilized. Moderately injured patients are typically managed at our hospital.
- 20) We currently have helicopter service, which triages patients in the field, and transports them according the EMS protocol that has been established by Dr. David and others. We don't get many trauma patients; they are usually transferred to St. Mary's in West Palm Beach.
- 21) Florida Hospital is a large tertiary hospital and receives a significant amount of transfers and high level emergency patients. We treat nearly every patient that is brought to Florida Hospital as a non-level 1 designated trauma center. We do not transfer neurosurgery or auto accident patients with multiple trauma unless there is clearly a physician or pro-

cedure not available at Florida Hospital. Transfers for trauma level care from Florida Hospital are rare.

Factors Affecting Becoming a Trauma Center

Current CEOs and COO of non-trauma center offer their feedback on the most important factors that would need to be addressed prior to becoming a trauma center. Their response are listed below, and can be seen as challenges facing non-trauma centers to become trauma centers, and why their level of willingness is not a direct indicator of their ability to successfully open and operate as a full trauma center.

- 42) Additionally needed resources – personal opinion as well as allied health; OR's, etc
- 43) As I mentioned before, tax support from the local government is needed. Our local government has indicated a willingness to do so when it makes sense. We don't want to jump in it for the sake of being one. Although it would resolve some of the ER confusion among specialists.
- 44) The most important factor to be considered would be the necessity of having another trauma center in Central Florida when it is already served by ORMC. We view trauma services as a community obligation which we share with the other major hospital in our market. We believe it is our responsibility to support and cooperate with the trauma provider to be sure that they are sustainable. The supply of physicians to take emergency calls is the most critical issue in our market and we share the challenges that ORMC's trauma service has in keeping neurosurgeons, neonatal intensivists, orthopedic surgeons, and others available 24 hours a day, seven days a week, for severely injured patients. There are major societal reckonings required in the near future to keep the physicians able to provide emergency services to the community.

Incentives from State/Local Government

The area in which the leadership of the non-trauma centers leadership felt necessary to be covered by the state is addressed in this response. The respondents identified ways in which the state and local government can aid the state trauma system. Their responses are presented below.

- 45) Assistance with liability coverage as well as possible reimbursements for added costs associated with trauma center designation.
- 46) Whatever partnership that is created between the local and state government must fund trauma and that bill should not be placed on the patient. Trauma is not a money maker. Adequate funding coupled with a well thought-out location for trauma centers so that you have a well thought-out plan. We currently piggyback on West Palm Beach (St. Mary's), they see anywhere between 1200 and 1500 alerts a year, and they are 40 miles away.
- 47) Incentives should include stronger protection or sovereign immunity for physicians and the hospital providing emergency or trauma care. State or regulatory relief should be provided to prevent the onerous requirements of the EMTALA laws for receiving facilities. Specifically, by establishing a trauma service or a high level tertiary service, hospitals become a potential dumping ground for every facility in the catchment area who would prefer not to care for a patient. Inadequate protection is currently provided to receiving hospitals, and a great disincentive is in place for hospitals to provide high levels of care.

General Attitude Questions Regarding the Respondent's NonTrauma Center

This portion of the interview represents the general attitude opinions from the respondents regarding the following statement. Comments provided by the respondents are included below the statement. An average score rounded to the nearest whole digit is represented by the numerical evaluation.

	Strongly Disagree				Strongly Agree		
5. Managing severely injured patients is currently an integral part of our hospital's mission. -We are in a position to do it, but we are obviously not a trauma center.	1	2	3	4	5	6	7
6. A trauma center is consistent with the mission of our hospital. -It is consistent with our mission to provide services needed, and trauma is not strongly needed at our facility.	1	2	3	4	5	6	7
7. A trauma center would fulfill an important community need.	1	2	3	4	5	6	7
8. The medical staff would value our hospital becoming a trauma center. -Our medical staff will devalue becoming a trauma center depending on who is getting paid for the trauma call.	1	2	3	4	5	6	7
9. Availability of trauma care would give our hospital a competitive advantage.	1	2	3	4	5	6	7
10. Our hospital has adequate medical specialist coverage to fulfill the obligations of being a trauma center. -We are having trouble getting specialist coverage in non-trauma ER coverage. We have no ophthalmology services anymore, they all left in unison.	1	2	3	4	5	6	7
11. Trauma center status increases the liability risk faced by a hospital.	1	2	3	4	5	6	7
12. Our hospital can accommodate additional admissions for severely injured patients.	1	2	3	4	5	6	7
13. Our hospital has nursing and other professional staff available to support a trauma center.	1	2	3	4	5	6	7
14. The financial obligations of operating a trauma center are achievable in the absence of state and/or local government support. -Very low.	1	2	3	4	5	6	7
15. The state government should assist institutions that currently participate in the trauma system.	1	2	3	4	5	6	7
16. Our pre-hospital care system is sufficiently developed. - If you mean EMS, then yes it is developed.	1	2	3	4	5	6	7
17. Our community has a sufficient number of trauma centers. -Using West Palm Beach is working really well, it is 40 miles away, but it is tempered with volume.	1	2	3	4	5	6	7
18. Patient reimbursement for severely injured patients generally covers the cost of care. -That's not the problem with trauma care. The fixed costs are the problem, not revenue and reimbursements. It is the expenses required to keep a full staff.	1	2	3	4	5	6	7

20. The cost of construction, equipment and staffing to become a trauma center is affordable. 1 2 3 4 5 6 7
 -With tax support.
21. Availability of trauma care would give our hospital a competitive advantage. 1 2 3 4 5 6 7
22. Our hospital has adequate medical specialist coverage to fulfill the obligations of being a trauma center. 1 2 3 4 5 6 7
 -We are having trouble getting specialist coverage in non-trauma ER coverage. We have no ophthalmology services anymore, they all left in unison.

Appendix 6: Independent Analysis of Crash Fatalities

Comparison of Fatality per Injury Rates in Florida Counties with and without Trauma Centers

OBJECTIVE: To assess if counties with a Level I or Level II trauma center have lower fatality per injury rates from motor vehicle crashes than counties with no trauma centers.

METHODS: State of Florida data from motor vehicle crashes for 2003 from the University of Florida Bureau of Economic and Business Research Statistical Abstract 2004 was analyzed. Crash data was based on per 100,000 population. Counties with level I or II trauma centers were compared to counties with no trauma center. The primary outcome was fatality per injury rate. The secondary outcome was overall mortality per county. Data from 67 counties and 21 trauma centers was analyzed. The list of trauma centers was obtained from the Department of Health Website and does not include the newly designated trauma center in Gainesville. Counties with both a Level I and II trauma center were only counted once. Pediatric centers were not included in the analysis. Data are expressed as proportions with 95% confidence intervals and analyzed using Fisher's Exact test, independent sample t-tests, Mann Whitney U test and ANOVA with a level of significance of $p=0.05$. SPSS software version 10.0.5 was used.

RESULTS: The incidence of fatality from crashes in the State of Florida in 2003 was 30.1 per 100,000 population. The incidence of fatality from crashes in counties with level I and/or II trauma centers versus counties with no trauma center was 16.7 versus 33.4 per 100,000 population respectively; a difference of 16.7 per 100,000 (95%CI=11.6-21.8)($p<0.001$). The overall fatality per injury rate in the State of Florida in 2003 was 2.8% (95%CI= 2.4-3.3). Fatality per injury rate in counties with level I and/or II trauma centers versus counties with no trauma center was 1.3% versus 3.2% respectively; a difference of 1.9% (95%CI=1.4-2.4) ($p<0.001$). Similarly, fatality per crash rate in counties with level I and/or II trauma centers versus counties with no trauma center was 1.2% vs 3.2% respectively; a difference of 2.0% (95%CI=1.4-2.5) ($p<0.001$).

CONCLUSIONS: This study suggests that counties with a Level I or Level II trauma center have lower fatality per injury rates from crashes than counties with no trauma centers. This supports data from other studies in the medical literature that proximity to a trauma center is associated with lower mortality from crashes.

APPENDIX 7: Regional Analysis Tables, Graphs, Maps

Appendix 7: Table 1: Florida Trauma Center Capacity

HOSPITAL	SURVEY	2003				NURSING					
		Trauma D/C	T. Surgeon	N. Surgeon	ED	ED	OR	ICU	MED/SURG	BURN	REHAB
All Children's Hospital	Sep-02	80	7	6	33	89	90	79	136	0	0
Baptist Hospital	Jan-03	306	7	3	14	59	27	37	89	0	**
Bayfront Medical Center	Sep-02	1084	5	4	15	55	32	125	76	0	0
Broward General Medical Center	Oct-04	775	11	3	41	53	57	58	179	0	0
Delray Medical Center	Sep-03	94	6	2	14	32	26	38	44	0	0
Halifax Medical Center	Feb-02	953	6	3	30	90	93	90	42	0	**
Holmes Regional M. Center	May-03	826	11	3	17	24	53	33	75	0	0
Jackson Memorial	May-02	1818	13	9	*	70	224	132	157	20	61
Lakeland Regional M. Center	Jul-04	743	9	3	26	20	52	98	46	0	0
Lee Memorial Hospital	Aug-04	***	5	3	13	34	26	22	21	0	13
Memorial Regional Hospital	Oct-04	604	9	5	25	74	102	191	176	0	**
Miami Children's Hospital	May-02	151	5	2	12	40	40	42	60	0	0
N. Broward Medical Center	Aug-03	589	5	6	12	59	32	41	36	0	22
Orlando Regional M. Center	Feb-03	1356	15	9	13	85	152	72	43	16	0
Sacred Heart Hospital	Jan-03	368	6	3	22	100	61	38	52	0	0
St. Joseph's Hospital	Apr-01	824	8	7	9	36	76	5	112	0	0
St. Mary's Hospital	Mar-03	247	8	7	23	58	55	97	117	0	23
Tampa General Healthcare	Aug-02	1238	7	5	24	70	115	155	76	22	**
Shands Jacksonville M. Center	Feb-02	1295	7	3	26	18	26	73	29	0	**
Shands at the University of Florida	Application	640	14	8	31	55	96	254	76	33	31
W. Florida Regional M. Center	Mar-02	202	5	3	11	23	48	39	23	0	13
TOTALS:			169	97	411	1144	1483	1719	1665	91	163

* Free standing hospital staffed by trauma surgeons.

** Included in medical surgical unit statistics.

*** Data not reported

Appendix 7: Table 2: Pre-hospital Resources by Trauma Region

Table 2 Pre-Hospital Resources

Region	Per 1,000 Population			Per 100 Square Miles		
	EMT	Paramedic	ALS Vehicle	EMT	Paramedic	ALS Vehicle
Pensacola	1.34	0.63	0.16	15.2	7.2	1.5
Tallahassee	1.56	0.55	0.20	7.3	3.2	0.8
Jacksonville	1.44	0.86	0.15	28.5	16.2	2.2
Orlando	1.89	0.93	0.11	85.3	42.1	5.2
Miami	1.52	1.07	0.16	92.3	88.3	9.3
Fort Myers	1.16	0.7	0.14	23.1	12.8	1.8
Tampa Bay	1.11	0.58	0.08	79.5	47.3	5.4
Florida	1.3	0.84	0.1	41.2	26.6	3.2

Areas that have less than average resources are noted in bold print.

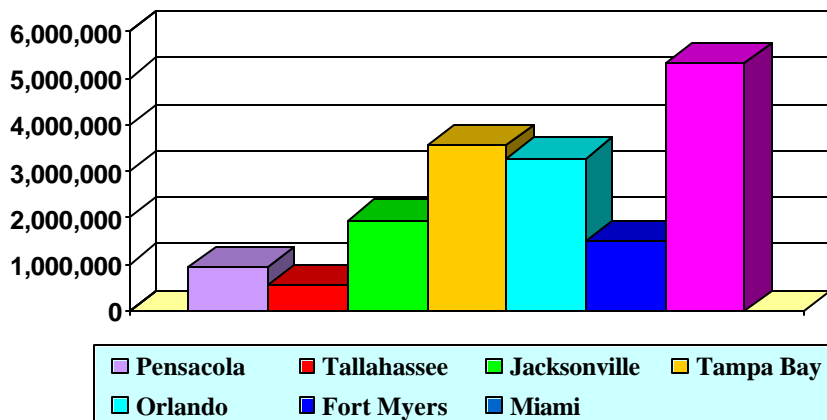
Appendix 7: Table 3: Paramedic to EMT Ratio by Trauma Region

Table 3: Paramedic to EMT Ratio by Trauma Region

Trauma Region	Paramedic to 1 EMT Ratio
Pensacola	.47
Tallahassee	.44
Jacksonville	.57
Orlando	.51
Tampa Bay	.53
Fort Myers	.55
Miami	.98

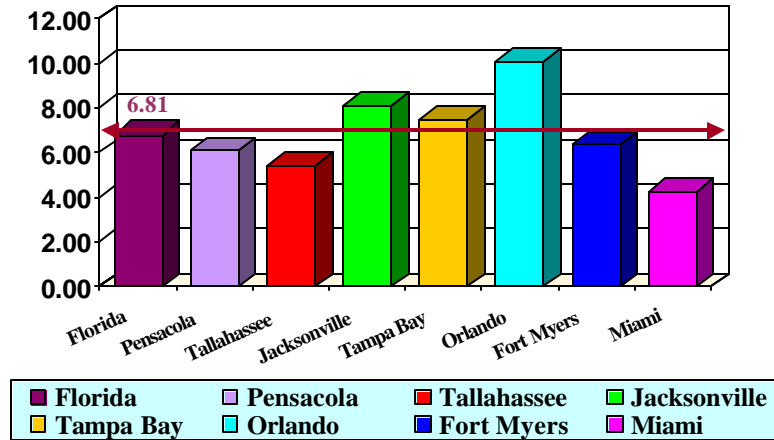
Appendix 7: Graph 1: Population by Domestic Security Task Force Region

Population



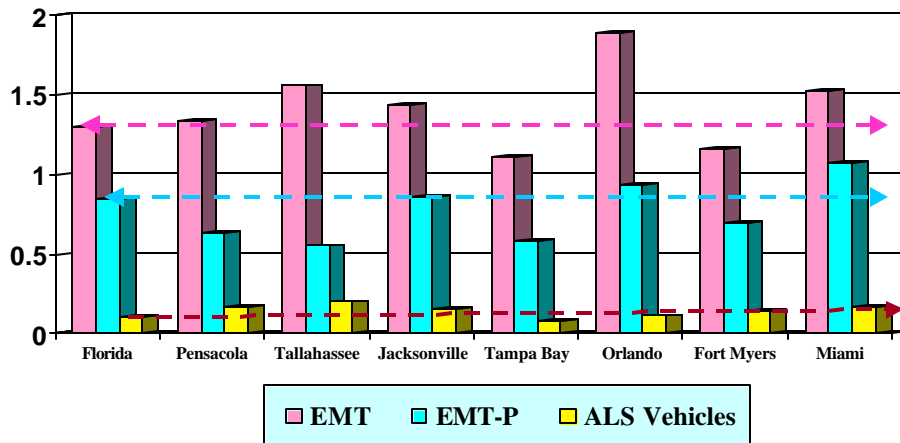
Appendix 7: Graph 2: Population Growth by Domestic Security Task Force Region

Percentage of Population Growth (2000 to 2003)



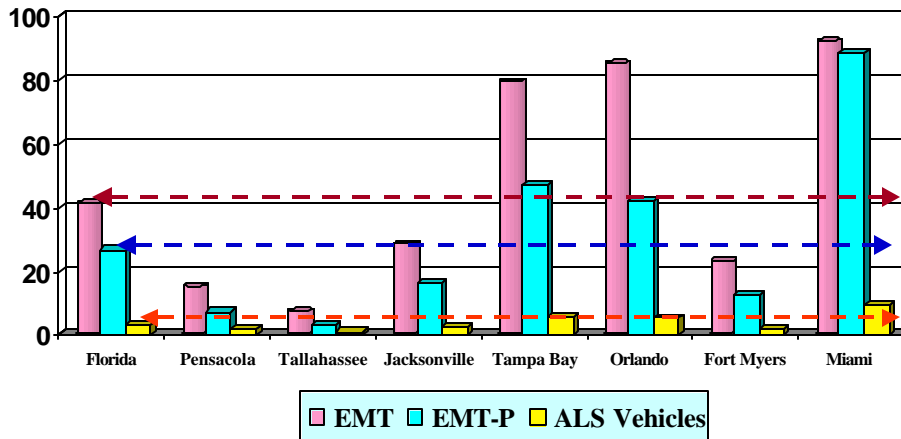
Appendix 7: Graph 3: Pre-hospital Resources per 1000 people by DSTFR

Pre-hospital Resources per 1000 people by DSTF Regions



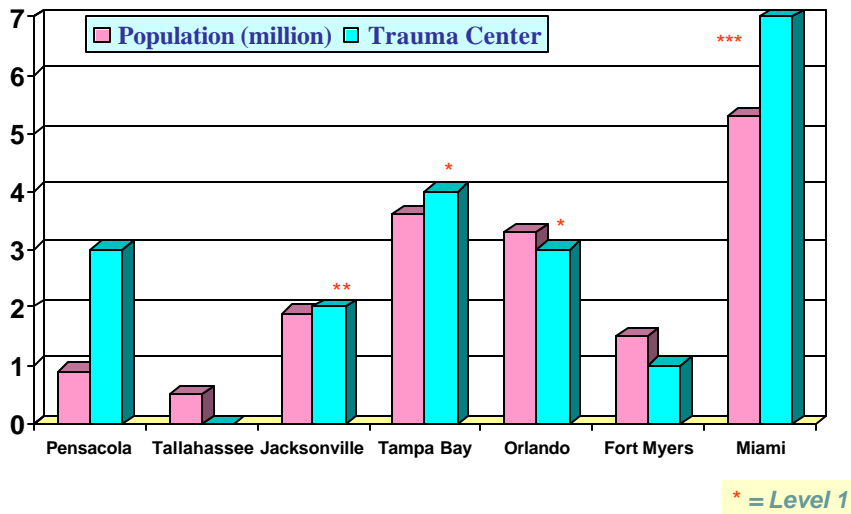
Appendix 7: Graph 4: Pre-hospital Resources per 100 square miles by DSTR Region

Pre-hospital Resources per 100 Square miles by DSTF Regions

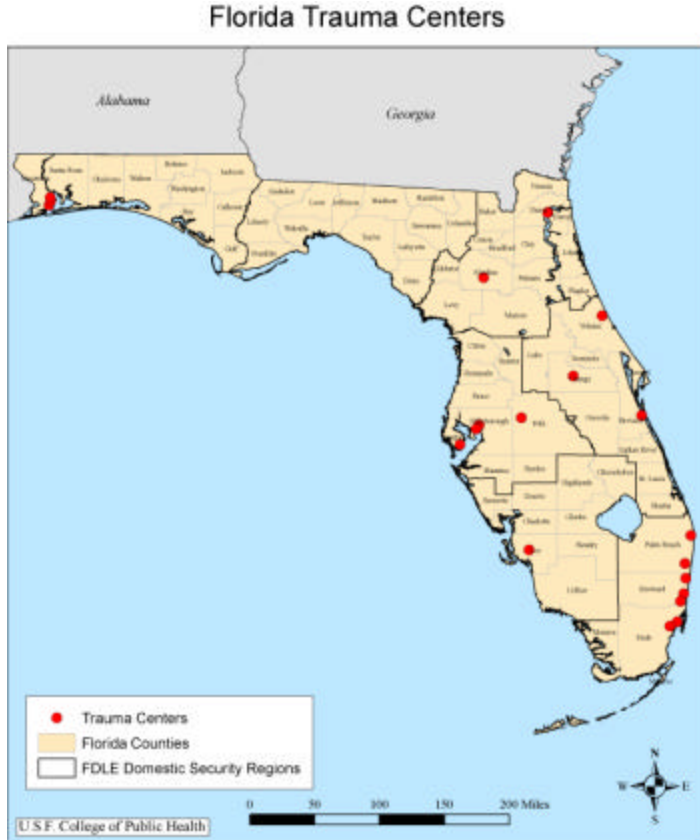


Appendix 7: Graph 5: Population in Millions and Number of Trauma Centers

Population in Millions and Number of Trauma Centers

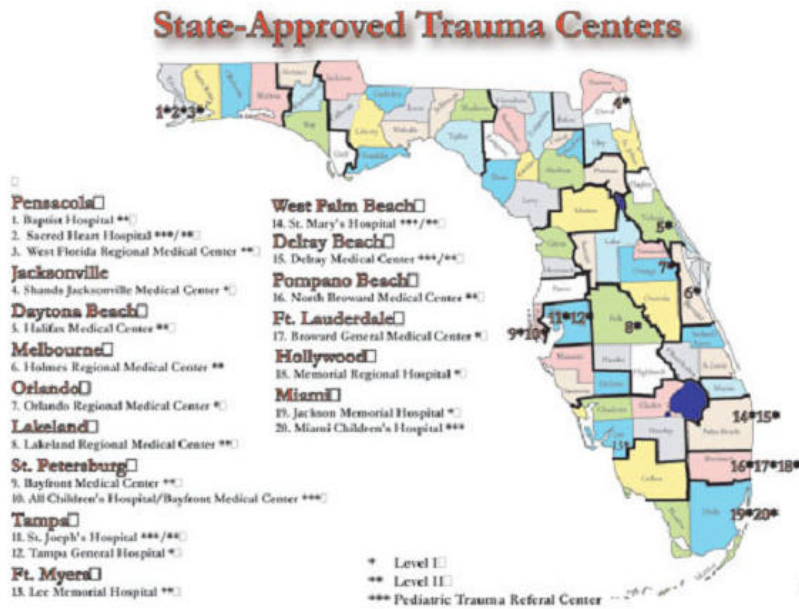


Appendix 7: Map 1: Florida Trauma Centers



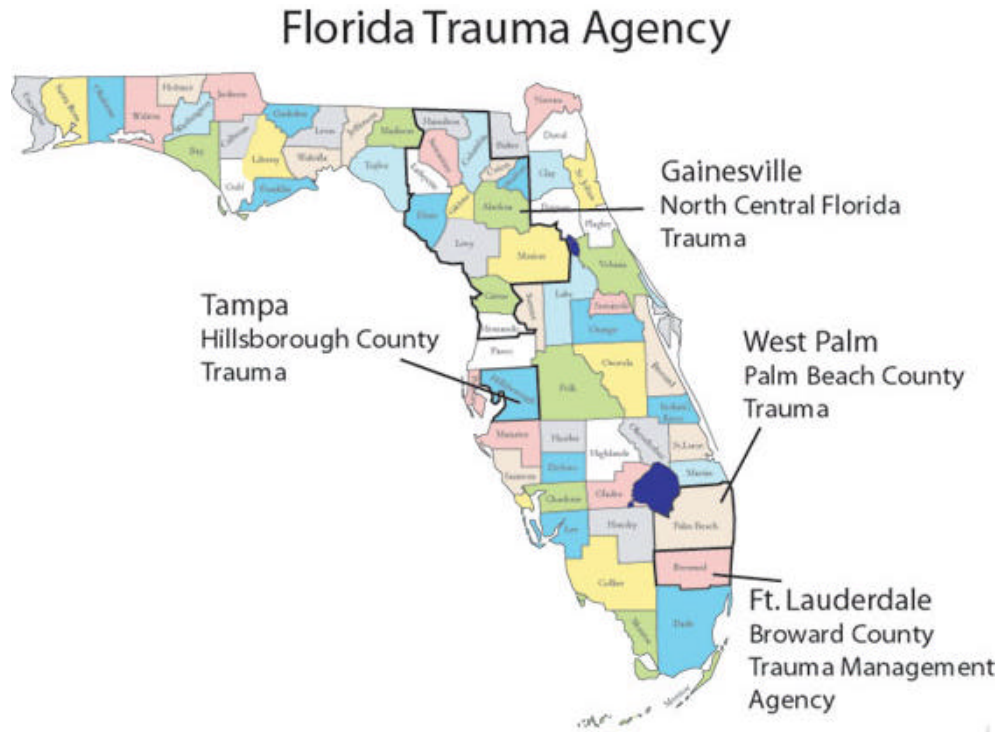
Appendix 7: Map 2: Trauma Service Areas

(Source: <http://www.doh.state.fl.us/workforce/ems1/Trauma/traumacenters.htm>)



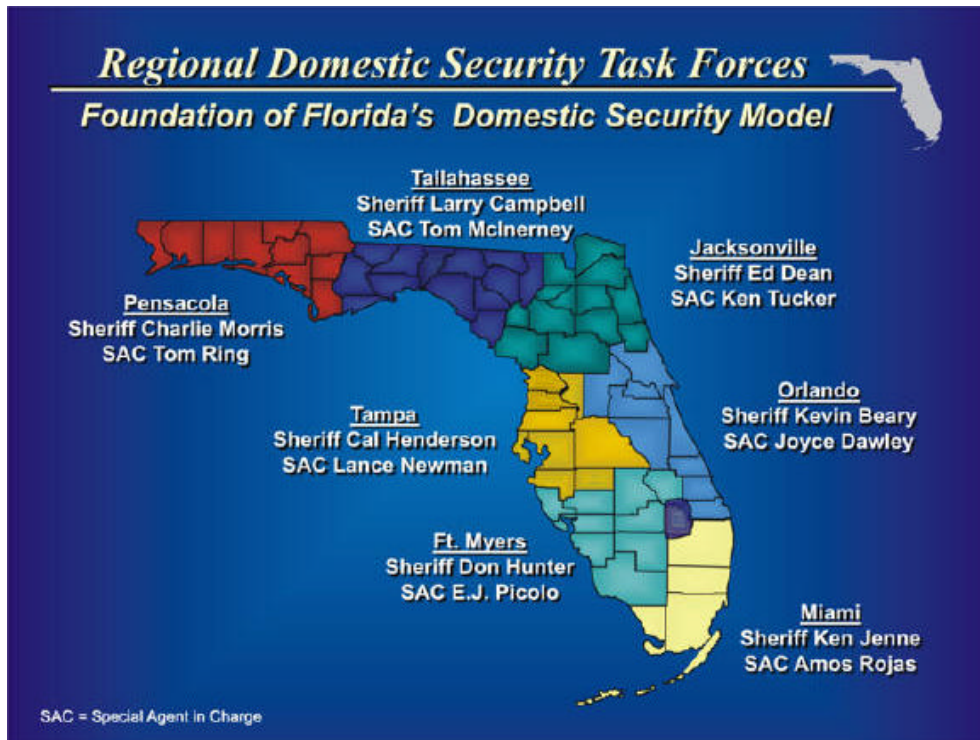
Appendix 7: Map 3: Florida Trauma Agencies

(Source: <http://www.doh.state.fl.us/workforce/ems1/Trauma/agencymap.htm>)

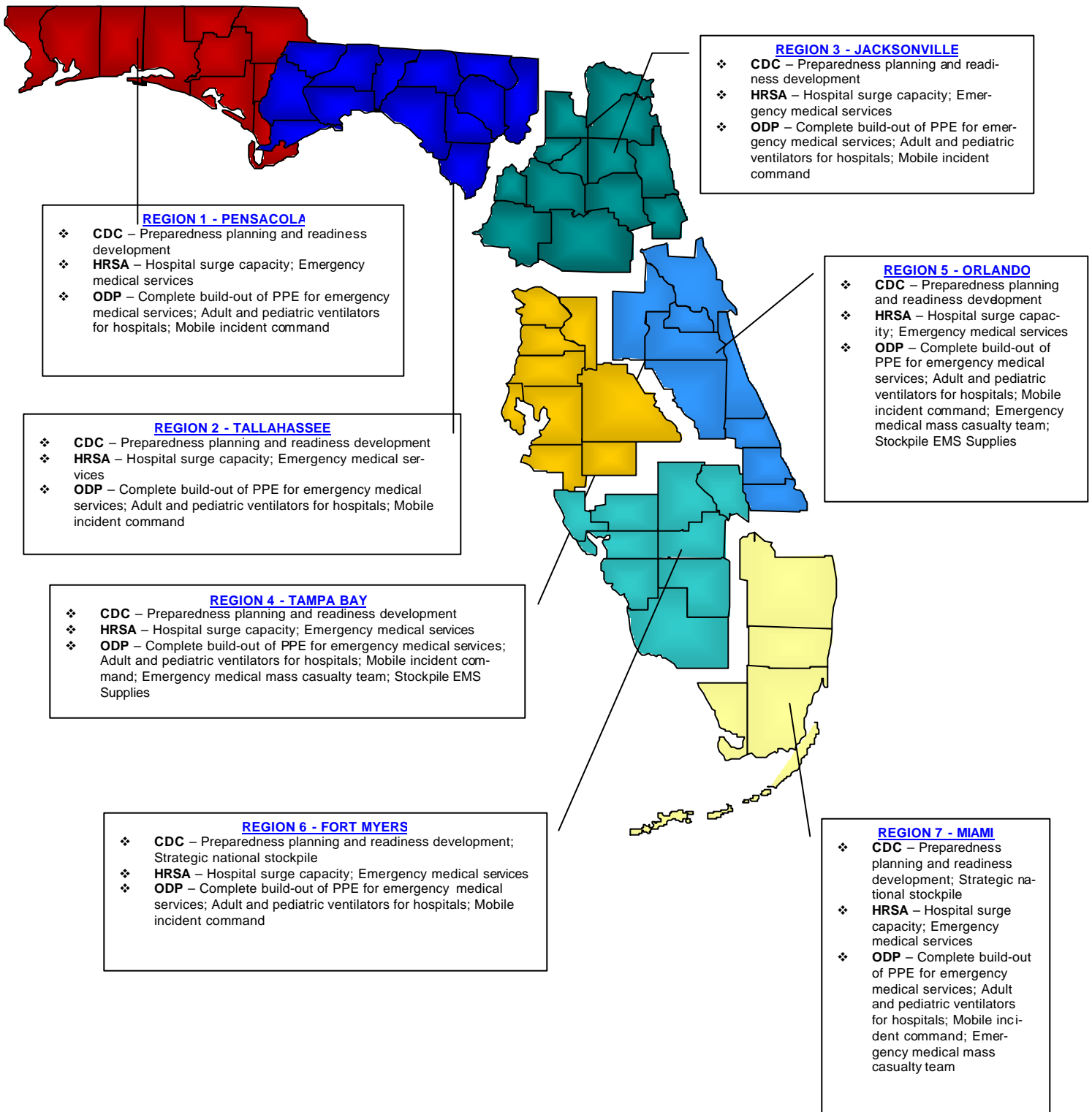


Appendix 7: Map 4: Domestic Security Task Force Regions

(Source: <http://www.fdle.state.fl.us/osi/DomesticSecurity/Regionalcontacts.htm>)

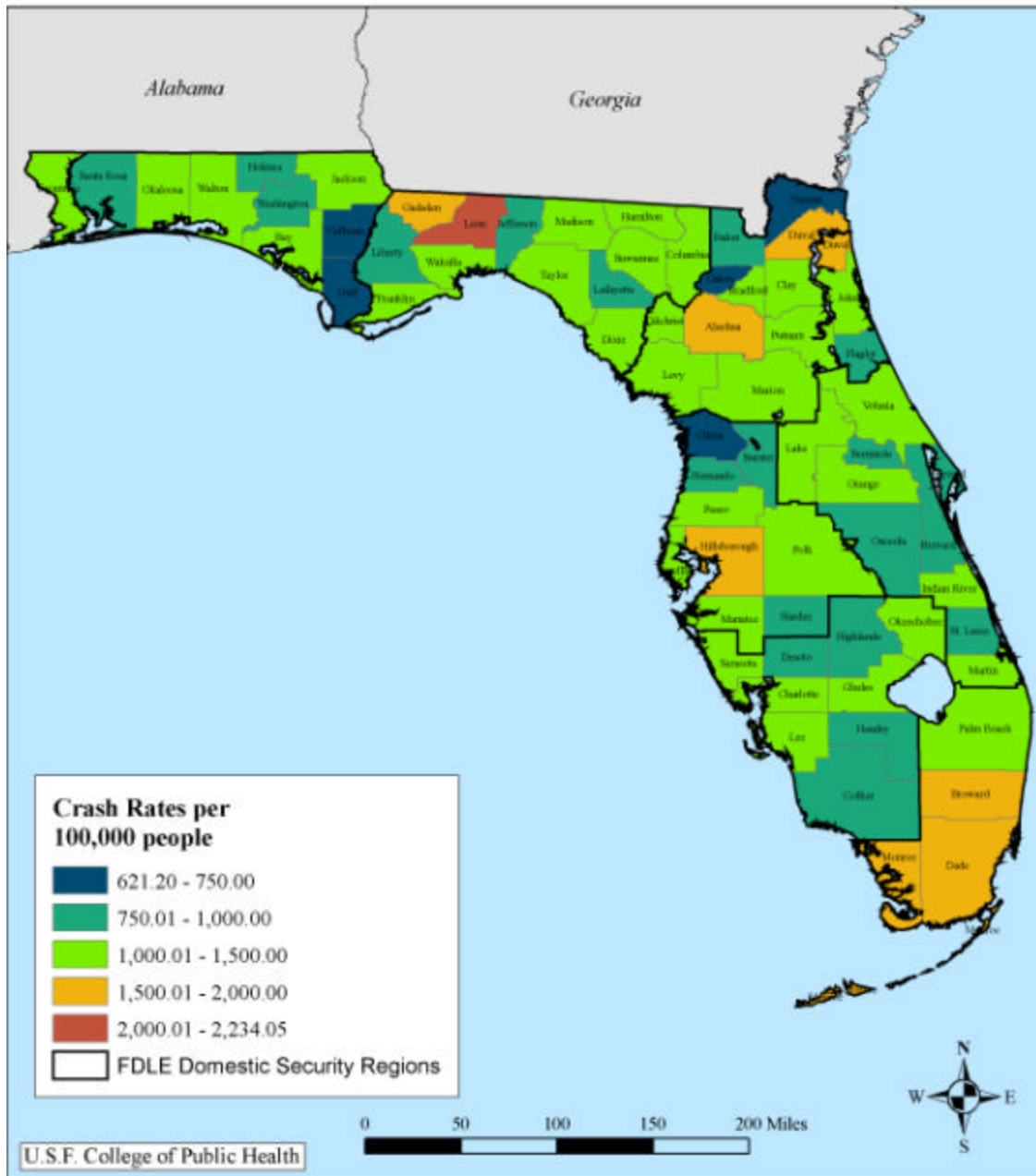


Appendix 7: Map 5: Domestic Security Task Force Funding Initiatives by Region

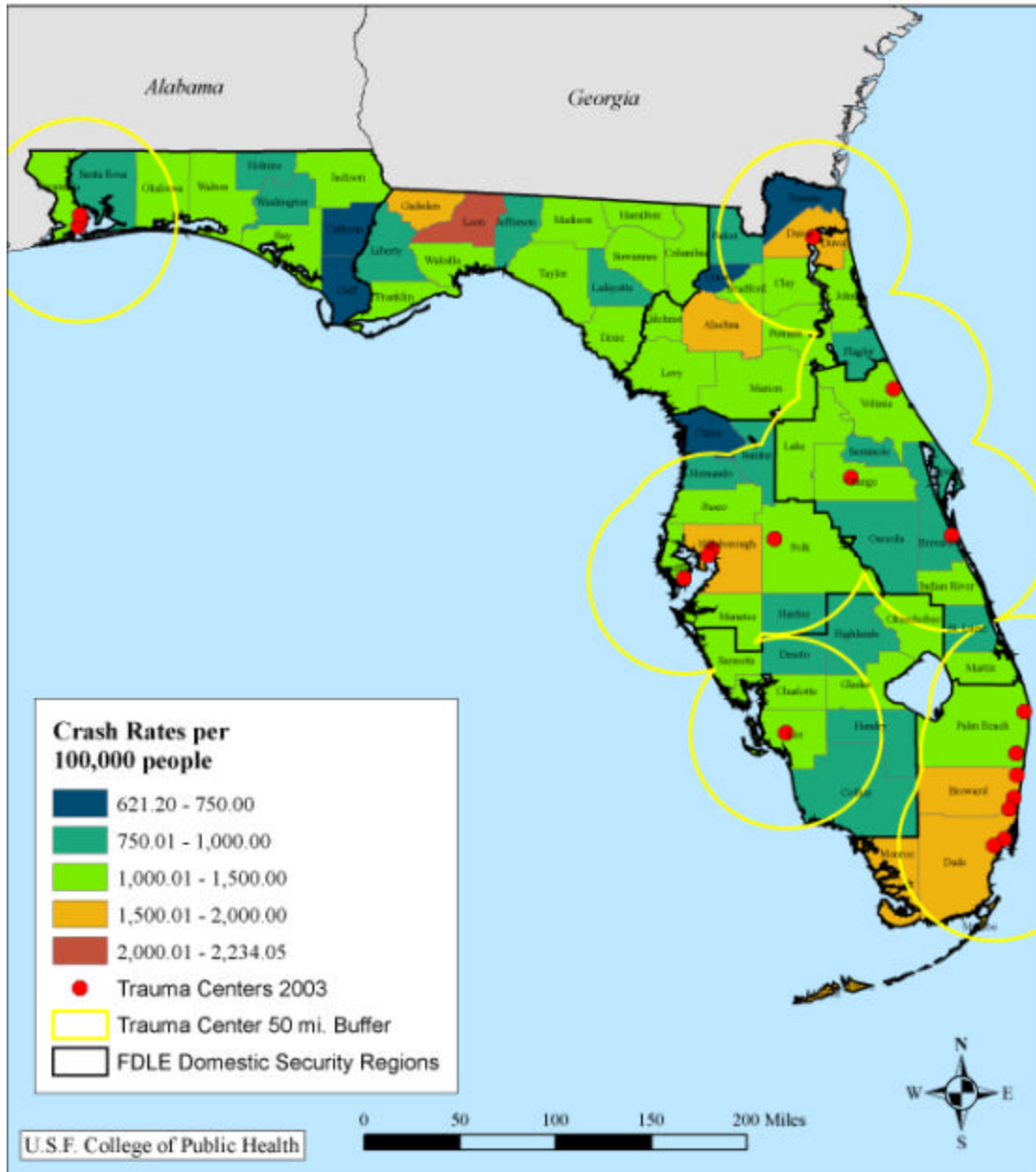


Appendix 7: Map 6: 2003 Traffic Crash Rates per 100,000 people

Crash Rates per 100,000 People by County, 2003

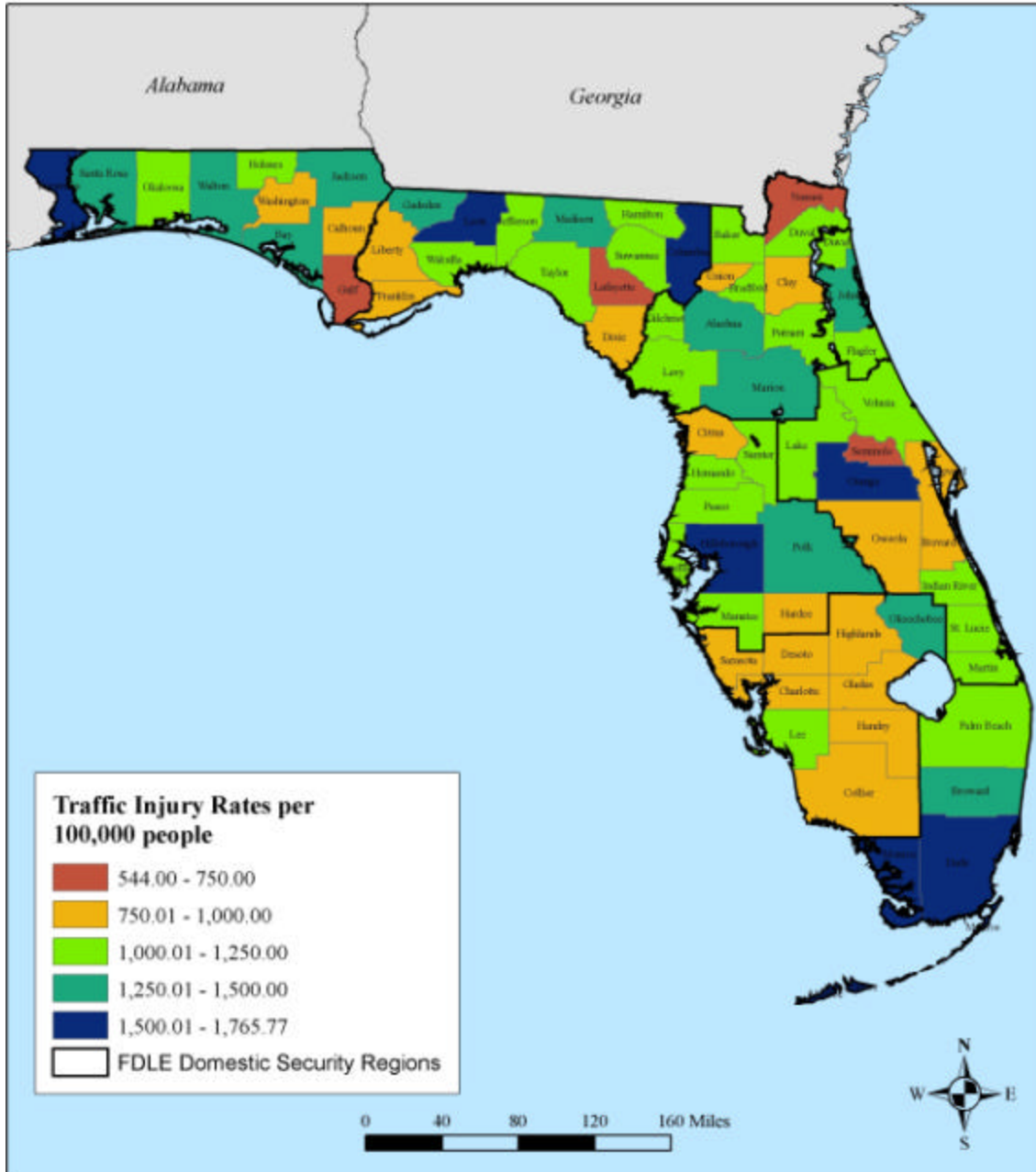


Crash Rates per 100,000 People by County, 2003

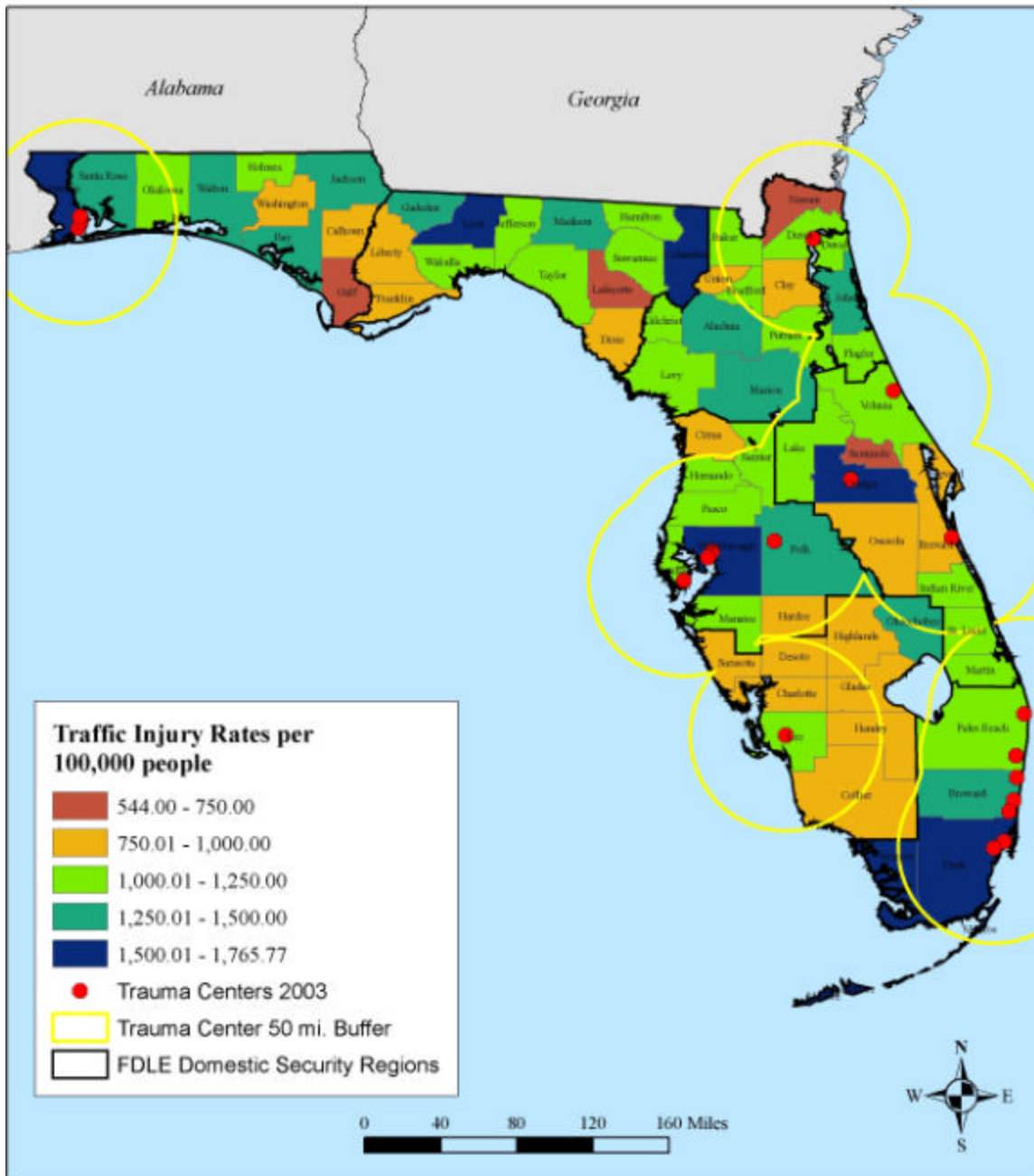


Appendix 7: Map 8: 2003 Traffic Injury Rates per 100,000 people

Traffic Injury Rates per 100,000 People by County, 2003

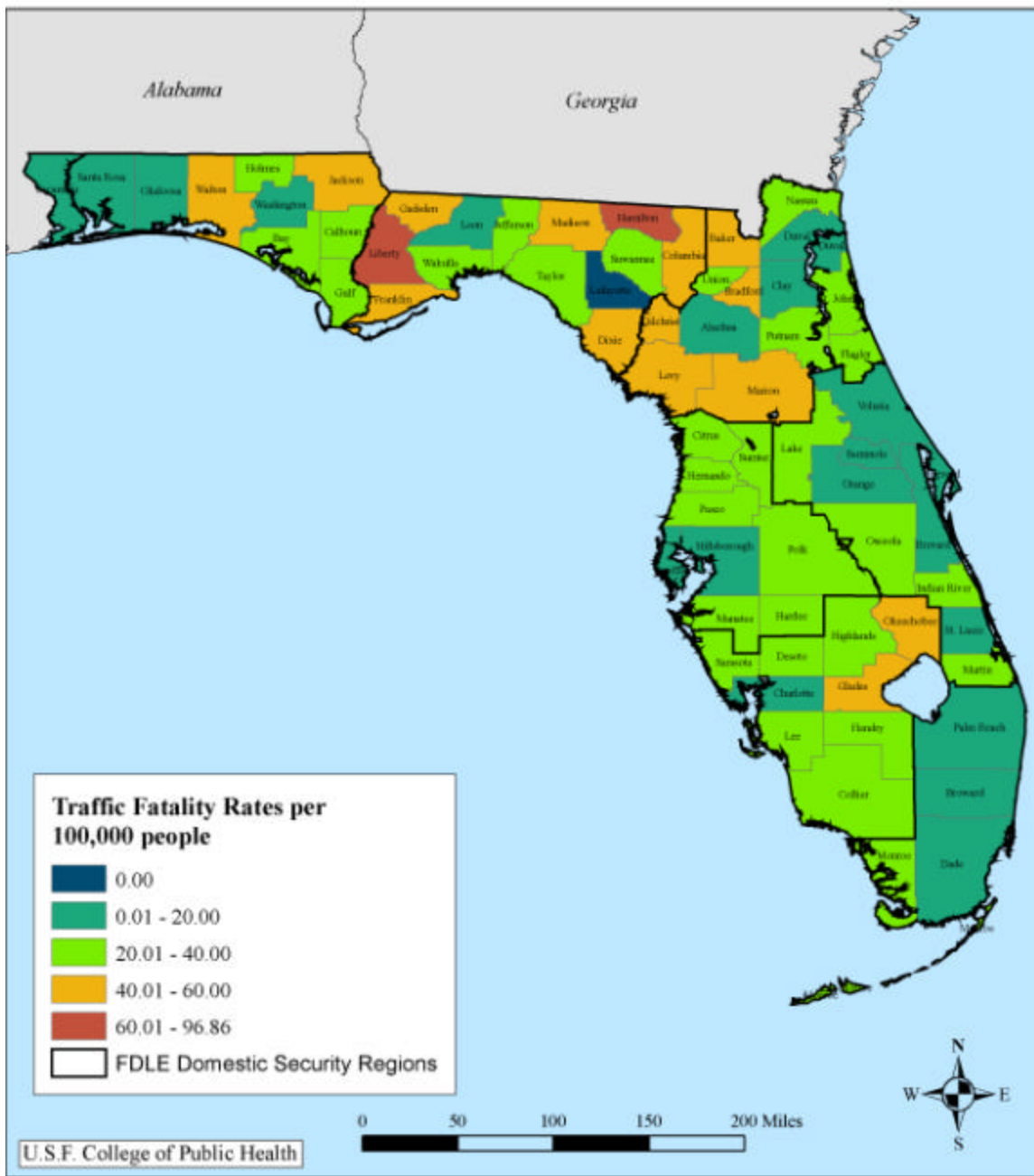


Appendix 7: Map 9: Injury Rates per 100,000 with 50 mile Buffer
Traffic Injury Rates per 100,000 People by County, 2003



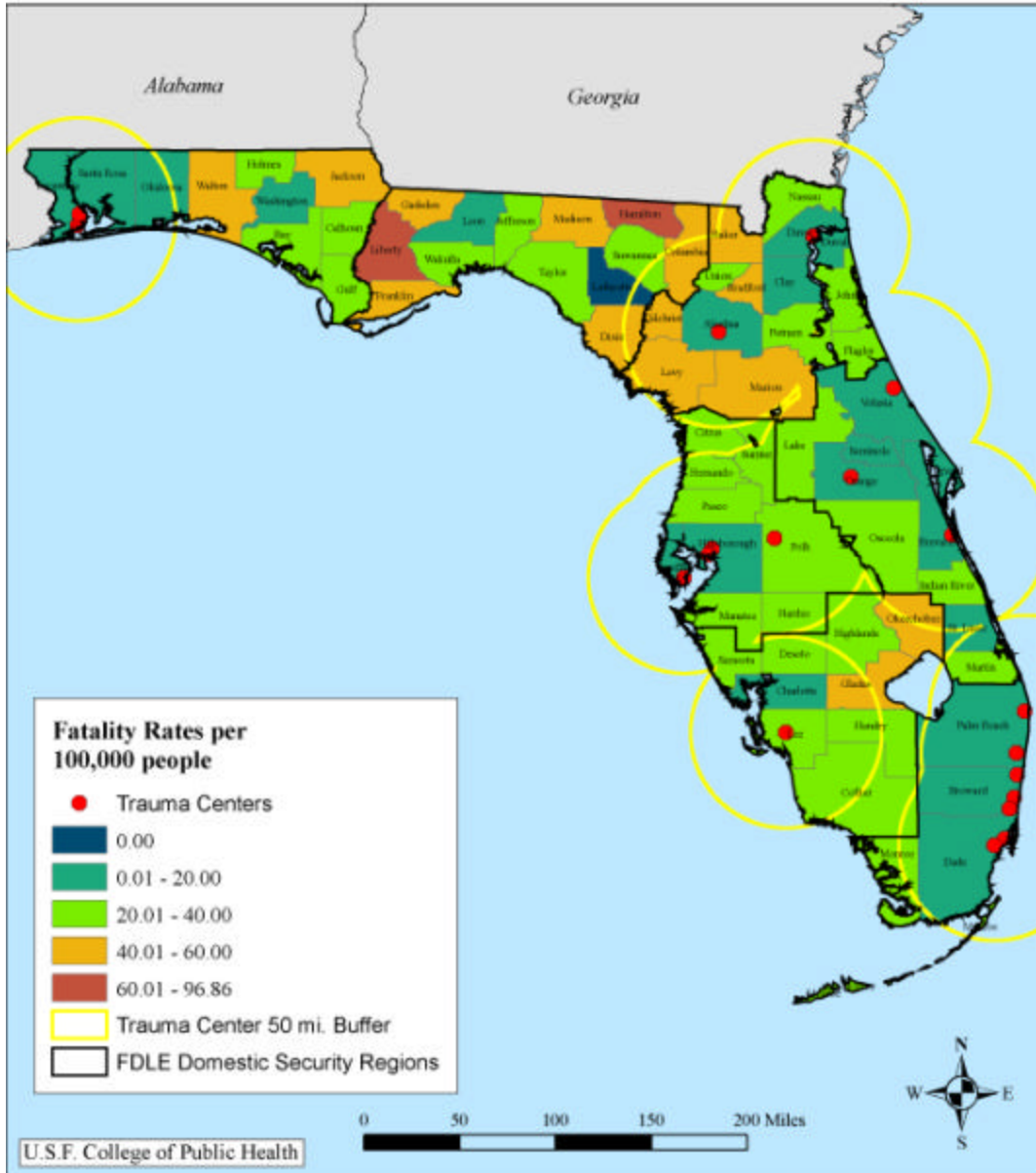
Appendix 7: Map 10: 2003 Traffic Fatality Rates per 100,000

Traffic Fatality Rates per 100,000 People by County, 2003



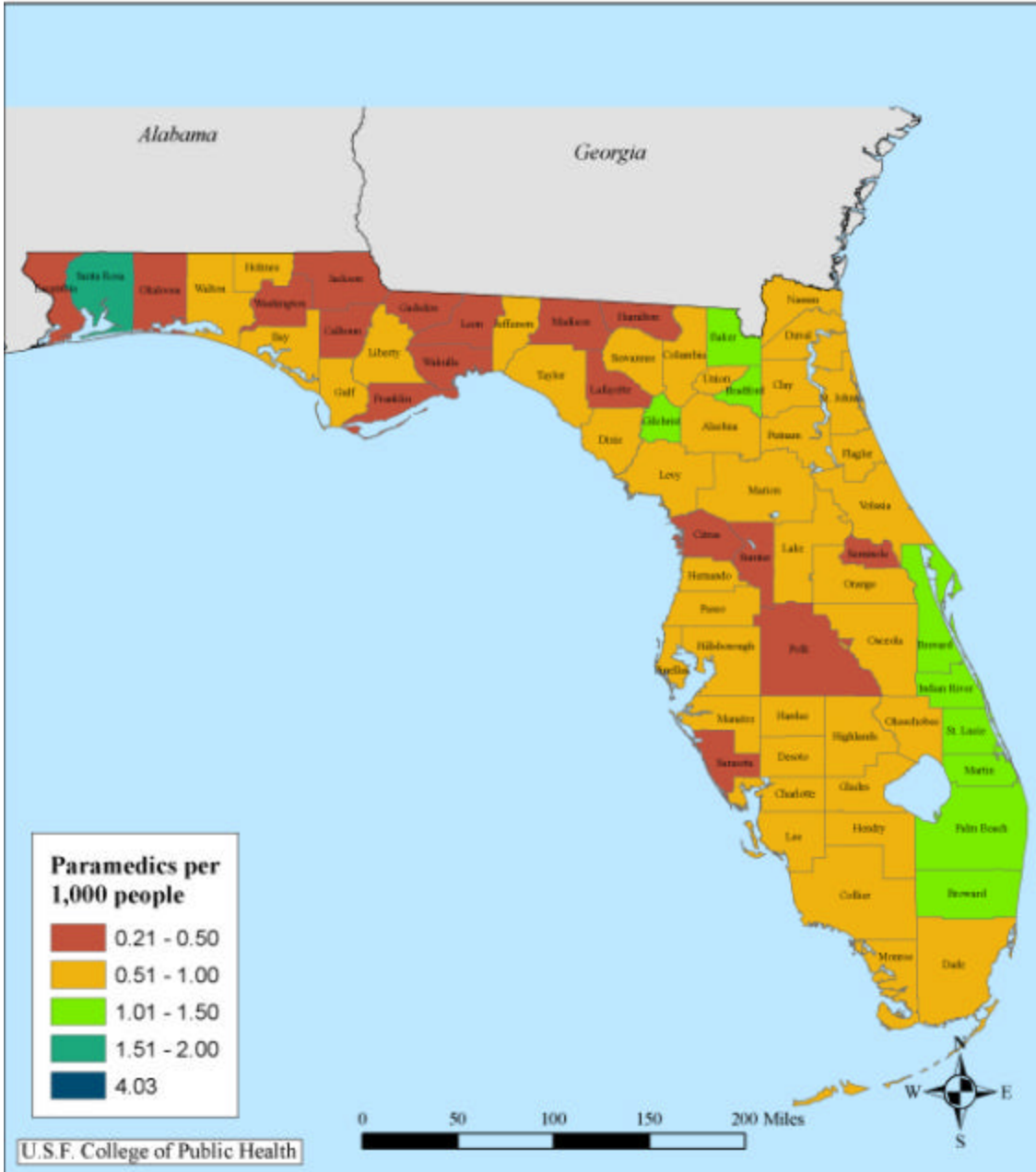
**Appendix 7: Map 12: 2003 Traffic Fatalities per 100,000 People with 50-mile TC Buffer
Adding Alachua Trauma Center in 2004.**

Fatality Rates per 100,000 People by County, 2003



Appendix 7: Map 14: Paramedics per 1000 Population

Paramedics per 1,000 People by County, 2003



Appendix 8: Tax Tables

Appendix 8: Table 1: Funding Sources for Trauma and State Traffic Fatality Rate

State	Funding Tax	2003 Traffic Fatality Rate per 100,000 Population
AZ	Assessment on civil, criminal, and local ordinance violations; 911 excise tax and telecommunications fee; state funding from tobacco settlement funds	20.07
AR	Voluntary tax	23.00
CA	General funds; \$2 penalty assessment for each \$10 in a moving vehicle violation	11.88
FL		18.62
IL	\$100 per DUI violation; \$5 per infraction; \$100 Illegal discharge of firearm; General funds	11.48
IN	\$1.25 per motor vehicle registration fee; \$2 per driver's license	13.46
KY	\$35 fee for issuance of Marriage/Birth certificate	22.54
MD	\$11 per motor vehicle registration surcharge	11.78
MN	90% of seat belt violation fines	12.99
MS	\$5 per moving violation; \$6 M in tobacco settlement	30.23
MO	30 cents tax levy per \$100 assessed property valuation	21.6
NE	Taxes; subscriptions fees	16.85
NM	\$1 per vehicle	23.42
NY	General funds	7.77
OH	fines for failure to use automobile occupant restraining devices	11.17
OK	\$1 per driver's license; ad valorem taxes; earmarked sales tax; earmarked city utility assessments	19.02
OR	General funds	14.38
PA	\$10 per moving violation; DUI violation	12.75
RI	\$1 per moving violation	9.66
TX	911 equalization surcharge on each customer receiving intra-state long-distance service	16.62
UT	Surcharge on criminal fines, penalties, and forfeitures imposed by the courts	13.14
WA	\$5 per traffic infraction; \$4 per vehicle	9.79
USA Average		14.66

Appendix 8: Table 2: State funding for Eemergency Medical Services and Trauma Care

STATE	STATUTE CITATION	ADDITIONAL FUNDING INFORMATION
Arizona		<p>Funding from assessment on civil, criminal and local ordinance violations*</p> <p>Proposed legislation (2001) would use telephone taxes (increase 911 excise tax and a telecommunications fee), state funding (from tobacco settlement funds)</p>
Arkansas	<p>Act 699 of 2003 (HB 2068) relates to the department of health; provides funds for emergency medical services public education and to assist in the recruitment and retention of EMTs and paramedics.</p>	<p>One county has a voluntary tax that supports the volunteer rescue squad; subscription services*</p>
California	<p>Cal. Health & Safety Code § 1797.198 et seq. establishes in the State Treasury the Trauma Care Fund.</p> <p>Cal. Health & Safety Code § 1797.115 authorizes the transfer to the Emergency Medical Services Authority of any moneys in the Federal Trust Fund if the money is made available by the United States for purposes consistent with the implementation of this legislation (2001 SB 1629).</p> <p>Cal. Health & Safety Code § 1797.98a establishes the Maddy Emergency Medical Services Fund, which collects \$40 million from traffic fines. Up to ten percent of the fund can be used to administer it; 58% of the remaining funds go to trauma doctors, 25% to hospital trauma centers, and 17% are distributed on a discretionary basis.</p> <p>Cal. Health & Safety Code § 1797.98a et seq. was amended: Relates to county emergency medical services funds that reimburse physicians, surgeons, and hospitals, for losses incurred. Authorizes each county agency administering the fund to maintain a reserve in specified portions of the fund. Revises the formula for distributions from the fund. Authorizes reimbursement of funds remaining at the end of the fiscal year in excess of the reserve in the portion of the fund reimbursable to physicians and surgeons (2003 SB 476).</p>	<p>EMS Authority administers 2 local assistance funding programs: the State General Fund, and Federal Preventive Health and Health Services Block Grant.</p> <p>\$1.2 million in Federal Preventive Health and Human Services funds block granted to the California Emergency Medical Services Authority. Funds disbursed to the counties for education, research, trauma, EMS systems, EMS for children, disaster data collection and injury prevention projects.</p>

	<p>Cal. Government Code § 15438.5 outlines emergency medical service providers eligible for financing under the Health Facilities Financing Authority Act.</p> <p>Cal. Welfare & Institutions Code § 14198 creates the Regional Burn and Trauma Center Fund within the State Treasury.</p>	
Florida	<p>Fla. Stat. § 125.271 allows certain counties to levy a special assessment to fund emergency medical services (2002 SB 2178).</p> <p>Fla. Stat. § 395.4035 creates the Trauma Services Trust Fund in the State Treasury, to be used for the development and support of a system of state-sponsored trauma centers.</p> <p>Fla. Stat. § 395.403 provides financial support to state-sponsored trauma centers based on the volume and acuity of uncompensated trauma care provided.</p>	<p>\$1.5 million to DOH for trauma care staffing, trauma registry and site survey. In 1998 and 1999, state legislature provided \$3 million for Level I trauma centers. In 2000, funding increased to \$4.8 million and divided among all 20 state-approved trauma centers. Percentage of sales taxes fund trauma subsidies; also adds a surcharge to all traffic fines.</p>
Illinois	<p>Ill. Rev. Stat. ch. 30, § 105/5.350 specifies that the Trauma Center Fund is a designated fund within the State Treasury.</p> <p>Ill. Rev. Stat. ch. 210, § 50/3.225 states that the Department of Public Health shall distribute 97.5% of 50% of the money deposited into the Trauma Center Fund to Illinois hospitals that are designated as trauma centers.</p> <p>Ill. Rev. Stat. ch. 305, § 5/14-8 outlines the calculation of reimbursements for hospitals that are designated as Level I Trauma Centers, and some Level II Trauma Centers.</p> <p>Ill. Rev. Stat. ch. 625, § 5/16-104b relates to the amounts to be designated for the Trauma Center fund from traffic violations.</p> <p>Ill. Rev. Stat. ch. 705, § 105/27.6 designates the use of fees and fines collected in criminal cases. Of the 16.825% disbursed to the State Treasurer, 6.948/17 shall be deposited into the Trauma Center Fund.</p>	
Indiana		<p>State legislature enacted a \$1.25 Motor vehicle registration fee (\$1 to state EMS program and .25 for EMS in county of origin) and a \$2 EMS fee on drivers' licenses.*</p>
Kentucky	<p>Ky. Rev. Stat. § 311A.155 designates the emergency medical services grant program to provide funding to each county for the direct operation of emergency medical ser-</p>	<p>Ambulance taxing districts authorized by KRS Ch. 108. Pre-paid subscriptions.*</p>

	vices (2002 HB 469). Ky. Rev. Stat. § 194A.400c, 410c was amended: Provides for the issuance of a commemorative copy of a birth certificate or marriage, with the fees collected to be deposited in the Emergency Medical Services for Children Program (2003 SB 60).	
Mississippi	Miss. Code Ann. § 41-59-75 establishes the Mississippi Trauma Care Systems Fund. Five Dollars (\$5.00) collected from each traffic assessment of Ten Dollars (\$10.00) as provided in Mississippi Code Ann. § 41-59-61, and any other funds made available for funding the trauma care system, shall be deposited into the fund.	
Maryland	Md. State Finance and Procurement Code Ann. § 7-121 provides that in the annual submission of the proposed budget, the Department of Budget and Management shall provide a description of the proposed expenditures under the Maryland Emergency Medical System Operations Fund for the Maryland Institute for Emergency Medical Services Systems and the R Adams Cowley Shock Trauma Center. Md. Transportation Code Ann. § 13-955 creates the Maryland Emergency Medical System Operations Fund, funded by an \$11 per year per vehicle motor vehicle registration surcharge.	*The Maryland Emergency Medical Systems Operations Fund was created in 1992. The surcharge was originally \$8, but was raised to \$11 in 2001.
Minnesota		90% of seat belt violation fines dedicated to 8 regional EMS Systems.*
Missouri		Ambulance districts up to 30 cents tax levy per \$100 assessed property valuation.*
Nebraska	Neb. Rev. Stat. § 71-8238 creates the State Trauma System Cash Fund to be used for the design, maintenance, or enhancement of the statewide trauma system.	Taxes, donations, subscription fees.
Nevada		Local innovations (e.g., raffles, auctions).
New Mexico	N.M. Stat. Ann. § 24-10A-3 (1978) creates the Emergency Medical Services Fund in the state treasury, and designates funds for particular uses.	State EMS Fund Act administered by EMS Bureau. Money distributed to local ambulance and rescue services. NM Legislature passed amendments to EMS Fund Act to create a permanent fund based upon a \$1 assessment on every annual

		motor vehicle registration. Legislature later amended EMS Fund Act to appropriate \$2.97 million from the GF.
Ohio	<p>Ohio Rev. Code Ann. § 4511.81 creates the Child Highway Safety Fund within the state treasury. The money in the fund is to be used by the department of health to defray the cost of designating hospitals as pediatric trauma centers.</p> <p>Ohio Rev. Code Ann. § 4513.26.3 creates the Trauma and Emergency Medical Services Fund and the Trauma and Emergency Medical Services Grants Fund, and designates the use of fines collected for failure to properly use automobile occupant restraining devices.</p> <p>Ohio Rev. Code Ann. § 4765.07 provides guidelines for the grants program for the Trauma and Emergency Medical Services Grants Fund.</p>	
Oklahoma	<p>Okla. Stat. Tit. 63 § 330.97 (1999) creates in the State Treasury the "Trauma Care Assistance Revolving Fund."</p> <p>Okla. Stat. Tit. 47 § 6-101 was amended: Relates to the Trauma Care Assistance Fund; adds an additional fee to commercial drivers' licensure and renewals to be placed in such fund (2001 HB 2901).</p>	Ad valorem taxes, earmarked sales tax, earmarked city utility assessments, trust funds, subscriptions and donations.
Pennsylvania	<p>Pa. Cons. Stat. Ann. tit. 35, § 6923 et seq. Is titled the Emergency Medical Services Act. § 6925 outlines the duties of the Health Department, which include coordinating a program for planning, developing, maintaining, expanding, improving and upgrading the emergency medical service systems throughout the Commonwealth. § 6934 describes how emergency medical services are supported in the Commonwealth. Funding includes fines levied on traffic offenses and fees imposed on persons admitted to rehabilitation program for offenses including driving under the influence of alcohol or a controlled substance. The money collected from these fines and fees goes into the emergency medical services operating fund.</p>	
Rhode Island		Division of EMS receives \$1 from every moving violation fine.
Texas	Tex. Health & Safety Code § 773.011 al-	

lows emergency medical services providers to create and operate a subscription program to fund and provide emergency medical services.

[Tex. Health & Safety Code § 773.119](#) directs the department of health to establish a program to award grants to initiate, expand, maintain, and improve emergency medical services and to support medical systems and facilities that provide trauma care.

[Tex. Health & Safety Code § 773.120](#) allows a trauma facility or an emergency medical services and trauma care system to accept gifts or other contributions.

[Tex. Health & Safety Code § 773.122](#) allocates the money collected for the imposition of a 9-1-1- equalization surcharge on each customer receiving intrastate long-distance service (§ 771.072(f)) to fund county and regional emergency medical services and trauma care systems.

[Tex. Transportation Code Ann. § 545.413](#) was amended: Relates to fines collected for child safety belt offenses; provides that a percentage shall be used by the tertiary fund for use by trauma centers (2003 HB 418).

[Tex. Health & Safety Code § 773.066](#) added, §773.122 et seq. Amended, Criminal Procedure Code added: Relates to funding of certain emergency medical services, trauma facilities, and trauma care systems; imposes a surcharge on intoxication convictions (2003 SB 1131).

Utah

[Utah Code Ann. § 63-63a](#) directs that a surcharge shall be paid on all criminal fines, penalties and forfeitures imposed by the courts, and that 14 percent of the amount collected is allocated to the emergency medical services grant program.

[Utah Code Ann. § 26-8a-207](#) outlines the use of funds in the emergency medical services system and establishes the emergency medical services grant program.

[Utah Code Ann. § 26-8a-207](#) was amended: Emergency Medical Services Systems Act; amends the emergency medical services grant program by deleting the cap on the funds that may be used for administrative costs (2002 SB 5007E).

[Utah Code Ann. § 26-8a-250](#) establishes a

Certification, equipment rental/sale, \$105,000; EMS Grants Program

statewide trauma system.	
Washington	Local general funds; one-year special levies; 1-6 year excess levies.

Source: National Conference of State Legislatures. "State Funding for emergency Medical Services and Trauma Care." February 2004. National Conference of State Legislatures. 17 December 2004. <<http://www.ncsl.org/programs/health/traumafund.htm>>.

Appendix 8: Table 3: History of Appropriations for Trauma in Florida

Fiscal Year	Department of Health	Agency for Health Care Administration	Comments- Total
1990-1991			\$24 million appropriated but later eliminated by legislative action.
1998-99	\$2,500,000		Level I Centers only
1999-00	\$3,000,000		Level I Centers only
2000-01	\$4,800,000		All Centers
2001-02	\$1,622,601	\$15,000,000	All Centers
2002-03		\$18,000,000	All Centers
2003-04		\$11,610,000	All Centers
TOTAL	\$11,922,601	\$44,610,000	\$56532,601

Source: General Appropriations Acts and legislative work papers
 From the Florida Senate, Interim Project Report, 2004-108, Committee on Appropriations

Appendix 8: Table 4: Ad-Valorem Districts

Florida Hospital Ad-Valorem Taxing Districts

1. Baker County Hospital Authority
2. Campbellton-Graceville Hospital Corporation
3. Cape Canaveral Hospital District
4. Citrus County Hospital Board
5. Halifax Community Health System
6. Hendry Regional Medical Center
7. Indian River County Hospital District
8. Lake Shore Hospital Authority
9. Lower Florida Keys Hospital District
10. North Brevard County Hospital District
11. North Broward Hospital District
12. North Lake County Hospital District
13. Sarasota County Public Hospital Board
14. South Broward Hospital District
15. Southeast Volusia Hospital District
16. South Lake County Hospital District
17. West Orange Healthcare District
18. West Volusia Hospital Authority

REFERENCES:

- ¹ American Trauma Society and the Department of Transportation, National Highway Safety Administration: Trauma system agenda for the future. October 2002
- ² Mackenzie EJ, Hoyt DB, Sacra JC, et al: National inventory of hospital trauma centers. JAMA 2003; 89:1566-1567
- ³ Dailey JT, Teter H, and Cowley RA: Trauma center closures: a national assessment. J Trauma 1992; 33:539-546
- ⁴ US Dept of Health and Human Services, Health Resources and Services Administration: A 2002 national assessment of state trauma system development, emergency medical services resources and disaster readiness for mass casualty events.
- ⁵ Cornwell EE, Berne TV, Belzberg H, et al: Health care crisis from the trauma center perspective: The LA story. JAMA 1996; 276:940-944
- ⁶ Babula J: Liability concerns: trauma center closes. Las Vegas Journal Review 4 July 2004
- ⁷ West JG, Cales RH, Gazzinaga AB: Impact of regionalization: the Orange county experience. Arch Surg 1983; 118:740-744
- ⁸ Nathens AB, Jurkovich GJ, Rivara FP, Maier RV: Effectiveness of state trauma systems in reducing injury related mortality: a national evaluation. J Trauma 2000; 48:25-31
- ⁹ Mackenzie EJ: Review of evidence of trauma system effectiveness resulting from panel studies. J Trauma 1999; 47(3 suppl): S34-S41
- ¹⁰ Baez AA, Lane PL, Sorondo B: System compliance with out-of-hospital triage criteria. J Trauma 2003; 54:344-351
- ¹¹ Vassar MJ, Holcroft JJ, Knudson MM, Kizer KW: Fractures in access to and assessment of trauma systems. J Am Coll Surg 2003; 197:717-725
- ¹² Phillips S, Rond PC, Kelly SM, et al: The failure of triage criteria to identify geriatric patients with trauma: results from the Florida trauma triage study. J Trauma 1996; 40:278-283
- ¹³ Zimmer-Gembeck MJ, Southard PA, Hedges JR et al: Triage in an established trauma system. J Trauma 1995; 39:922-928
- ¹⁴ Meldon SW, Reilly M, Drew BL, et al: Trauma in the very elderly: a community based study of outcomes at trauma and nontrauma centers. J Trauma 2002; 52:79-84
- ¹⁵ Scheetz LJ: Trauma center versus non-trauma center admissions in adult trauma victims by age and gender. Prehosp Emerg Care 2004; 8:268-272
- ¹⁶ Reilly JJ, Chin B, Berkowitz J et al: Use of a statewide administrative database in assessing a regional trauma system: the New York City experience. J Am Coll Surg 2004; 198:509-518
- ¹⁷ Kane G, Wheeler NC, Cook S, et al: Impact of the Los Angeles county trauma system on the survival of seriously injured patients. J Trauma 1992; 32:576-583
- ¹⁸ Clark DE, Anderson KL, Hahn DR: Evaluating an inclusive trauma system using linked population-based data. J Trauma 2004; 57:501-509
- ¹⁹ Mullins, RJ: personal communication
- ²⁰ Barquist E, Pizzutiello M, Tian L, et al: Effect of trauma system maturation on mortality rates in patients with blunt injuries in the Finger Lakes region of New York state. J Trauma 2000; 49:63-69
- ²¹ Ibid, reference number 4
- ²² Taheri PA, Butz D, Clawson A, Lottenberg L, Tepas J, Flint LM: The unrecoverable cost of readiness: a major cause of trauma center financial distress. Am J Surg 87:7-13, 2004
- ²³ Gallagher SF, Williams B, Gomez C, DesJardins C, Swan S, Durham RM, Flint LM: The role of cardiac morbidity in short- and long-term mortality in injured older patients who survive initial resuscitation. Am J Surg 185:131-134, 2003
- ²⁴ Bishop and Associates report *Trauma Centers at Risk*, 2003
- ²⁵ Studnicki JA, Gipson L, Luther S, et al: The relationship between public hospitals, special taxing authority and population health outcomes. 2000, unpublished report
- ²⁶ Story L. Slow Down: That Golfer May Be a Traffic Cop; Police Try Unorthodox Tactics To Catch and Ticket Speeders. The Wall Street Journal. July 1, 2004.