

[CHAPTER EIGHT]

TRAUMA CARE IN TEXAS

Trauma is the leading cause of death for Texans under the age of 45 and is the third leading cause of death and disability for all Texans. Every day, there are an average of 32 trauma deaths in Texas with motor vehicle crashes, suicide and homicide topping the list of causes (Jones et al., 2004). Regionalized emergency and trauma care systems have been shown to increase survival of severely injured patients (Nathens et al., 2004), but these systems are not well-developed throughout the state and are facing external pressures.

Growth in regional trauma systems is not keeping up with the population. They are increasingly becoming overburdened by the public who often use emergency rooms for primary-care related visits. A rising number of seriously mentally ill patients are going to emergency rooms due to declining funding for community-based mental health services. Because trauma centers must treat both the insured and uninsured, and must ensure adequate availability of special equipment and trained personnel to meet the needs of severely injured patients, they are also becoming financially vulnerable.

To address the development and current state of emergency and trauma care systems in Texas, this chapter will provide an overview of the history and underlying problems of this component of the health care system. The chapter is an abbreviated version of the white paper “Emergency and Trauma Care in Texas” submitted to the task force by Begley (see Appendix G).

LEGISLATION AND FUNDING OF TRAUMA SYSTEMS

FEDERAL

Federal funding for emergency system planning and provider training was first granted during the 1970s through two pieces of legislation – the Emergency Medical Services System Act of 1973 and the Emergency Medical Services Amendments in 1976. Although \$300 million was spent over eight years and 304 EMS regions were created, only a few areas were able to establish continual funding for EMS at the state or local government level (Mullins, 1999) (American Trauma Society, 2002). The Omnibus Budget Reconciliation Act of 1981 substantially reduced the allocation of emergency medical services (EMS) grants to the states and incorporated the funding in block grants to states for programs to support preventive measures and health services (Mullins, 1999).

Additional federal legislation that impacts trauma care includes the Emergency Medical Treatment and Active Labor Act (EMTALA) (Kamoi, 2004). Passed in 1986 as part of the Consolidated Omnibus Reconciliation Act of 1985 (Pub Law 99-272), this law, often referred to as the ‘anti-dumping law’, creates a requirement for medical screening and stabilization of patients with emergencies presenting to a hospital emergency center. Moreover, this law imposes regulations and restrictions on transfer of patients between hospitals. While provisions have been made for payment for screening examinations, this law still largely imposes an “unfunded mandate” on hospitals and trauma centers caring for injured patients (Fields, et al., 2004).

In May of 2005, the Centers for Medicare & Medicaid Services (CMS) issued final guidance for a nationwide \$1 billion program mandated under the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) to help hospitals and other providers with the cost of providing emergency care to undocumented aliens. The four-year program provides extra funding to those states, including Texas, with a higher burden of care for undocumented aliens. The funding, often referred to as Section 1011, designates a national contractor to administer reimbursement to hospitals, certain physicians and ambulance providers (CMS, 2003).

TEXAS

Initial state legislation to establish regionalized emergency and trauma care systems in Texas was passed in 1989. The Texas Legislature charged the Texas Department of Health (now the Texas Department of State Health Services, or TDSHS) to implement a statewide EMS and trauma care system including a designation system for trauma facilities and a trauma registry. However, no funding was provided to TDSHS to accomplish these directives (TDSHS, 2003). In 1992, the TDSHS adopted rules for implementing the Texas trauma system which called for the state to be divided into 22 trauma service areas (TSAs). Each TSA was required to develop a regional advisory council (RAC) with appropriate representation from local EMS agencies and trauma hospitals. RACs were required to develop and implement a regional trauma system plan (TDSHS, 2002).

Throughout the decade, emergency services and trauma system planning and development continued as the TDSHS rules were implemented. Yet, many of these activities took place with little funding. In 1997, the Texas Legislature redirected

\$4 million from 9-1-1 funds to the newly created EMS/Trauma System fund. Each legislative session thereafter has redirected approximately \$4 million to this account each biennium from 9-1-1 fees. In 1999, \$100 million of the state's tobacco funds was set aside in a permanent endowment with the interest on these funds directed toward trauma and EMS needs. The annual interest from these funds, approximately \$3 million a year, is directed toward local project grants to EMS agencies and funding for the RACs. Also during the 1999 legislative session, the tertiary medical account was established to reimburse trauma hospitals for the cost of uncompensated trauma care incurred for out-of-county patients (TDSHS, 2003). A little over \$16 million was allocated to this account in 2001 and 2002. No funds have been appropriated since 2002.

An important development in trauma and emergency services system planning was the establishment of the Governor's EMS and Trauma Advisory Council (GETAC) in 1999 by the TDSHS Sunset legislation. GETAC was established to provide input and recommendations to the Texas Board of Health and TDSHS staff. Later, GETAC's charge was expanded to assess the EMS needs in rural areas of the state and to create a strategic plan relating to development of EMS and trauma systems in the state and to refine educational and certification requirements of EMS providers (GETAC, 2002).

With a growing vocal constituency calling for funding support for the state's EMS agencies and trauma centers, the 78th Texas Legislature passed two funding vehicles in 2003. Senate Bill 1131 directed funds to EMS and trauma care providers through an additional \$100 fee to be paid by those convicted of certain intoxication offenses. It was expected to raise between \$3 million to \$6 million

annually for uncompensated trauma care. Funding from this legislation in the most recent biennium was just over \$2 million to support trauma hospitals, EMS agencies, the RACs and the TDSHS Office of EMS/Trauma Coordination. In addition, House Bill 3588 promised a great deal more in funding to EMS and trauma care providers through its Driver Responsibility Program. This program, which would penalize habitually bad drivers, was expected to generate \$220 million annually for uncompensated trauma care costs, as well as the cost to provide EMS services throughout Texas.

Simultaneously with the development of the EMS and trauma system was the implementation and growth of the emergency communications system. While Odessa was the first city in Texas to implement the universal emergency telephone number of 9-1-1 in 1970 (Odessa American, 1970), by the end of the decade, only 20 such systems existed in Texas cities. The 1980s saw the creation of emergency communication districts in various counties in Texas. During the 70th Texas Legislature in 1987, a bill known as House Bill 9-1-1 was passed, charging regional planning councils to develop a statewide emergency communications system. By 1990, all regions within the state not covered by an existing emergency communications district had submitted plans for the development of the telecommunications system needed to support 9-1-1. The regions were then allowed to begin collecting fees charged on local citizens and business' telephone lines to fund implementation of the telecommunications plans (Galveston Co. Emerg. Comm. Dist., 2005).

From the perspective of emergency management, the importance of adequate funding for EMS agencies and trauma facilities cannot be overstated. Today, funding for local EMS services remains

primarily an obligation of local governmental entities in Texas, despite federal and state efforts to provide support. Likewise, support for trauma services is generally dependent upon the voluntary decisions of local hospitals. Although the Texas Legislature has worked to ensure 9-1-1 capability in all 254 counties in Texas, it can neither guarantee that there will be an ambulance to pick someone up after a 9-1-1 emergency call, nor can it guarantee that there will be a hospital available to take care of the patient.

TRAUMA CENTERS

Currently, there are 252 designated trauma centers in Texas, 13 Level I, 10 Level II, 40 Level III, and 189 Level IV (TDSHS, 2006). The TDSHS designates facilities using standards set forth by the American College of Surgeons. The resources that must be maintained by these facilities are described below.

Level I trauma centers typically serve a large city or a high-density population area and are expected to manage large numbers of injured patients. These centers anticipate admittance of at least 1,200 trauma patients yearly. Of those, 20 percent will have an Injury Severity Score (ISS) of 15 or greater (out of 75) or there will be 35 patients per surgeon with an ISS of 15 or greater. Institutional dedication to trauma is essential. There must be departments or divisions of surgery, neurosurgery, orthopedic surgery, emergency medicine and anesthesia. Essentially every surgical subspecialty as well as obstetrics/gynecology, critical care medicine and radiology must be on call and promptly available 24 hours a day. Board certification is expected for general surgeons, emergency physicians, neurosurgeons and orthopedic surgeons. Level I trauma centers are expected to maintain

specific emergency department personnel as well as equipment pertinent to trauma in all age groups. Twenty-four hour a day immediate operative capability, a staffed recovery room, intensive care units for the critically injured, respiratory therapy services, radiological services (including angiography, sonography, computed tomography (CT) with an in-house technician, and MRI), clinical laboratory services, hemodialysis, burn care, and acute spinal cord management are all essential. Rehabilitation services must also be available. Performance improvement including chart audits, care reviews and a trauma registry are essential. Finally, Level I trauma centers are expected to be leaders in continuing education, trauma prevention programs and research.

Level II trauma centers provide care either in an area of high population density to supplement the activity of a Level I center or in a less densely populated area where a Level I center is not immediately available. In the second case, there should be transfer agreements prearranged with a distant Level I facility. Level II centers are expected to have similar institutional organization, hospital departments/divisions, and clinical capabilities as Level I facilities. However, cardiac surgery, microvascular/replant surgery and acute in-house hemodialysis are not required. A surgeon is expected to be on call 24 hours a day and at resuscitations and operative procedures. The operating room must be adequately staffed and available when needed in a timely fashion. Emergency department personnel and equipment, recovery room and intensive care unit availability mirror that of a Level I institution. Many of the radiological services expected for the Level I center are expected for the Level II center. However, it is acceptable to not have an in-house CT technician

or an MRI unit. There are fewer requirements for continuing education/outreach programs, prevention programs and research.

Level III trauma centers must have the capability to manage the initial care of the majority of injured patients and have 24-hour general surgical coverage. They should have transfer agreements in place for patients that exceed resources. The only specialties considered essential are emergency medicine, anesthesia, orthopedics, plastic surgery and radiology. The 24-hour availability of an operating room and on-call personnel are desirable. In house radiological services are desirable, but not expected; CT availability is expected. A trauma registry and continued medical education availability for physician and nursing staff are expected. Prevention programs and research are desirable, but not required.

Level IV trauma centers should be able to provide the initial evaluation, assessment and resuscitation of injured patients. Patients with known or potentially serious injuries will require transfer to a larger facility with more resources. The facility should have 24-hour coverage by a physician, although surgical coverage may not be available. These facilities are typically located in rural areas. Continuing education and prevention programs are desirable as well.

TRAUMA CARE USE AND OUTCOMES

Trauma volume in Texas hospitals for 1999 and 2003 was estimated from Texas hospital admission data. There has been an overall increase of 16.1 percent during the five-year period (Table I). As a percentage of total discharges, trauma admissions increased from 3 to 4 percent. The characteristics of trauma cases has remained relatively stable. The

majority of cases are adults ages 18 to 64. The race/ethnicity distribution reflects that of the population. About one-third are commercially insured, 40 percent are covered by Medicare and Medicaid, and 15 percent are uninsured.

Table I. Trauma Cases, 1999 – 2003 in Texas

	1999	2003
Total discharges	74,275	86,203
Gender (%)		
Female	42.9	46.2
Male	57.1	53.8
Age (%)		
Children 0 – 17	15.6	15.3
Adults 18 – 64	58.3	55.9
Elderly 65 and older	26.1	28.7
Race (%)		
American Indian/Eskimo/Aleut	0.2	0.1
Black (non-Hispanic)	10.5	9.6
White (non-Hispanic)	58.4	60.0
Hispanic	24.7	26.0
Asian/Pacific Islander	0.8	0.7
Other	3.9	5.1
Payment Source (%)		
Commercial Insurance	36.5	32.9
Medicare	25.3	30.2
Medicaid	8.8	11.5
Other Government	0.3	0.3
Other Private	6.4	5.0
Uninsured/Self-pay	16.7	15.3
Other	5.6	4.6

The Injury Severity Score (ISS) is used to measure the severity of the patient's injury. Most cases fall in the 1-15 range of severity with 8 to 9 percent per year hospitalized for major trauma (ISS>15). The percentage of major trauma cases did not change over the period. Over 70 percent of all patients treated were discharged home or to self-care expecting a full recovery. Approximately one-fourth of the patients were transferred to another facility where their condition upon discharge is unknown. Only 2 to 3 percent died before discharge or were discharged to hospice care.

CURRENT ISSUES AND CHALLENGES

UNCOMPENSATED CARE

Trauma centers are financially vulnerable because, in their role of providing critical care services to a community, they treat a disproportionate share of uninsured and underinsured patients. There has not been an on-going effort to measure the amount of trauma care costs that are uncompensated in Texas' EMS and trauma care systems. However, uncompensated trauma hospital costs can be extrapolated from figures supplied by hospitals to the TDSHS to solicit HB 3588 funds. If these self-reported figures are used, it would appear that Texas hospitals spent about \$208 million treating uninsured trauma patients in 2003 (TDSHS, 2005). This figure is based on uncompensated trauma care charges to which DSHS applied hospital specific cost-to-charge ratios to derive uncompensated trauma care costs for each designated facility. The figure is similar to an independent estimate by Bishop+Associates in a 2002 study conducted on behalf of Save Our ERs in Houston. Based upon their analysis, 32 percent of all trauma patients in Texas were uninsured, generating uncompensated costs at these facilities of more than \$181 million. An effort is being made at the TDSHS

to include questions in the annual survey of hospitals related to the provision of care to uninsured emergency and trauma patients. This will likely be included in the 2005 Annual Survey which will be administered in mid-2006.

Hospitals must recoup their costs, or risk going out of business. The standard practice is to shift the cost of uncompensated care to those who can pay. A recent national study estimated that in 2005, premium costs for family health insurance coverage provided by private employers will include \$922 in premiums due to the cost of care for the uninsured (Families USA, 2005). Health insurance premiums for Texas families is estimated to be \$1,551 higher due to the unreimbursed cost of health care for the uninsured. The portion of these costs attributable to uncompensated costs of trauma care is unknown.

EMERGENCY ROOM OVERCROWDING AND TRAUMA CARE

In addition to providing specialized trauma services, many trauma centers are also a critical part of their community's health care safety net. With the enactment of the Emergency Medical Treatment and Active Labor Act (EMTALA) in 1986, they became the only legally mandated "open door" for everyone in a community. Several studies have shown that the uninsured without a regular source of primary care are disproportionate users of hospital emergency rooms (ER) (Jones et al., 1999; O'Brien et al., 1997; Grumbach, 1993). The reliance on hospital emergency rooms for basic care, particularly by low-income uninsured populations, contributes to the ER overcrowding problem. ER overcrowding is the term used to describe a nationwide problem of overloaded emergency departments

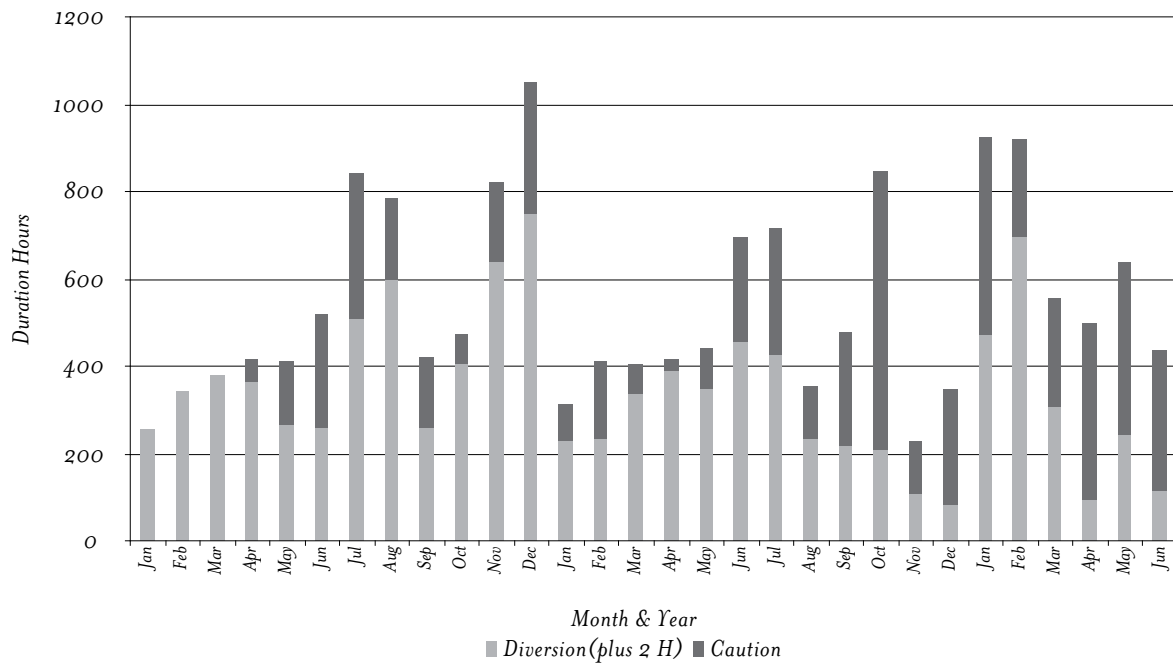
that can lead to ER closures, diverted ambulances, and greater risks for all patients and providers.

ER data have been collected from four major trauma centers — Brackenridge in Austin, a Level II trauma center; Parkland in Dallas, a Level I center; and Ben Taub and Memorial Hermann in Houston, both Level I centers — to examine the frequency of primary care-related visits being made by the uninsured in Texas.¹ The data indicate that the primary care-related visits (non-emergent, primary care treatable, or preventable) (Billings, 2000) represented 52 percent of visits at Brackenridge, 42 percent at Parkland, 57 percent at Ben Taub, and 45 percent at Memorial Hermann. The magnitude of primary care-related visits at these hospitals is not unusual. What is extraordinary is that the patients making these visits are mostly uninsured or on Medicaid, reflecting the payment characteristics of the populations served by these hospitals. The percentage of patients making primary care-related visits at Brackenridge that were uninsured was 46 percent, 48 percent at Parkland, 44 percent at Ben Taub, and 23 percent at Memorial Hermann. The percentage with Medicaid coverage were 24 percent at Brackenridge, 18 percent at Parkland, 19 percent at Ben Taub, and 42 percent at Memorial Hermann.

As a means to alleviate pressure in their own facilities, hospitals across the country employ a practice whereby they notify local EMS agencies when they have reached capacity and request that incoming ambulances be directed, or diverted, to other hospitals. Generally, this leads to a domino-effect in the emergency health care system where capacity issues in one hospital quickly lead to over-

¹ These data were supplied by Sandy Coe Simmons, Indigent Care Collaborative of Travis, Hays, and Williamson Counties; Dan Culica, UTSPH Dallas; Charles Begley UTSPH Houston.

**Figure 1. Diversion & Caution of Level I
(Ben Taub & Memorial Hermann), Yr '03 - June '05**



utilization of emergency rooms in neighboring hospitals and resulting delays in medical treatment provided to critically ill or injured patients as they are driven to hospitals that are farther away. Data relating ER overcrowding to hospital diversion of ambulances is available for Houston hospitals. Figure 1 shows the pattern of hospital diversion and caution in total hours per month for the two Level I centers in Houston (Ben Taub and Memorial Hermann) from January 2003 through June 2005 (Rives). Diversion hours indicate when the hospitals were unable to provide appropriate care to all trauma patients. Caution hours, which Houston hospitals began reporting in April 2003, indicate when the hospitals were only open for some trauma patients. During 2003, these two hospitals experienced high levels of diversion totaling 4,366 hours (50.2 percent of the available total open time). This number was reduced to

2,857 hours in 2004 with additional reductions in 2005. For 23 of the 30 months, the hospitals were on diversion or caution more than 27 percent of the time. For 10 of the months, they were on diversion or caution more than 55 percent of the time.

The hospitals also reported the reasons for going on diversion (medical saturation, trauma saturation, ER saturation) and caution (CT scan down, equip down, no burn beds, no medical/surgical beds, no neurology beds, no psychiatry beds, no pediatric beds, no telemedicine beds). ER saturation was reported as the reason for 46 percent of all diversion hours for these two hospitals in 2003 - 2005.

Studies have shown the impact of diversion on the volume of patients treated at overloaded hospitals (Schull, et al., 2003) (Lagoe et al., 2003), ambulance transit time of diverted patients (Scheulen et

al., 2001) (Silka et al., 2001), and a possible association with higher mortality (Begley et al., 2004). Begley et al. compared death rates of trauma patients hospitalized in Houston on significant diversion days, defined as days when both Level I hospitals were on diversion for more than eight hours, and non-significant diversion days when one or both hospitals were on diversion for less than eight hours or not on diversion at all. The study found that the percentage of deaths among all trauma patients, both those transferred and those not transferred, admitted on significant diversion days was consistently higher than on non-significant diversion days.

Additional research is needed to confirm these relationships, but the combined findings from the mortality study, the diversion data and the ER use data suggest that:

- 1) Delays in treatment of trauma patients caused by hospital diversion may increase mortality,
- 2) Diversion is frequently caused by saturation of the ER and,
- 3) Primary care-related ER use of trauma centers contributes to ER saturation.

STATE AND LOCAL EMS/TRAUMA LEADERSHIP

Despite chronic funding issues, concerted efforts have continued to build and strengthen the regional emergency and trauma system in Texas. At the state level, GETAC remains a respected forum for policy-making and planning. With committees that focus on medical direction, pediatric care, trauma system development, EMS, injury prevention, education and air medical issues, GETAC's quarterly meetings draw hundreds of trauma center representatives and leadership of EMS agencies from across the state to continue its charge of providing input and leadership on emergency and trauma care issues.

Several trauma regions in Texas have pursued initiatives designed to make improvements in their systems' response and function, while others have accomplished very little. In July 2005, the Austin-Travis County area announced that hospitals had reached an agreement to not divert ambulances to other hospitals when faced with routine or on-going capacity challenges (Roser, 2005). Austin area hospitals recognized the use of diversion was not in the best interest of the patient and have agreed to no longer refuse ambulance delivery unless their facility is dealing with a particular and short-term disaster, such as flooding or loss of heating or air conditioning.

In recognition of the challenges rural and suburban hospitals have in seeking to transfer their patients who need a higher level of care than they can provide, the North Central Texas Trauma RAC in the Dallas-Fort Worth area has established a formal hospital transfer process. Hospitals needing to arrange a patient transfer contact a toll-free number for the Trauma Transfer Hotline. Dispatch workers contact contracted hospitals, on a rotating basis, which can provide a higher level of care. They inquire whether they have the capability or capacity to accept this patient transfer. Hospitals have a contracted 15-minute window to accept the transfer before the dispatch center contacts the next hospital on the list. This system has been an effective process for hospitals in the outlying areas to arrange patient transfers in a seamless and timely way. (Dunne, 2005).

The Southwest Texas RAC in the San Antonio area has implemented a unified identification badge for EMS personnel, nurses and physicians throughout the region to not only improve security but decrease frustration related to facility access. The ID badge is also a security keycard to

gain entrance to hospital emergency departments, freeing emergency medical technicians and paramedics from having to remember separate security codes for each hospital and allowing physicians quick parking access to the different hospitals they staff. Another initiative in the San Antonio area is the development of the Regional Medical Operations Center. Initially a response to 9/11 events, the vision for this center was expanded to focus on disaster preparedness and crisis response, whether natural or man-made. It serves as a combined dispatch and transfer center during times of identified crisis that integrates public health, acute care and EMS. Once activated by either the public health officer, the emergency management coordinator or a hospital CEO, the center identifies hospital bed availability in the region, assesses the stockpile of critical medications, arranges patient reception if necessary and coordinates identified medical personnel needs. The center activated for the first time in the fall of 2005 in preparation for receiving Hurricane Katrina evacuees to the San Antonio area and stayed in operation to do the same for Hurricane Rita evacuees from southeast Texas (Epley, 2005).

With a growing diversion rate, Houston area physicians, hospitals and the business community began to work together to find solutions for the growing trauma and emergency services crisis in the Texas Gulf Coast region. They created Save Our ERs in late 2001 with goals to educate the public and implement regional solutions to help ensure that the Gulf Coast's trauma system could meet the area's growing needs. Local task forces were begun to explore these issues and four major studies were commissioned to measure the impact of the lack of resources on this community (Save Our ERs, 2003).

In response to the growing crisis, the Houston-Galveston Area Council created the Emergency/Trauma Care Policy Council in 2003. The Policy Council was designed to examine policy options and possible strategic initiatives to improve the functioning of the region's emergency and trauma care system. Its data committee has begun to measure hospital diversion in the eight-county region through EMS system data provided by the Southeast Texas Trauma RAC. The committee has worked with the TDSHS for access to the region's trauma registry data to measure EMS response time and hospital trauma admissions. The Policy Council's long-range planning committee selected a nationally respected EMS and trauma care consulting firm to provide the region with a road map for system improvements (Houston-Galveston Area Council, 2006).

RESPONSE TO DISASTERS

In 2005, Hurricanes Katrina and Rita highlighted the need for enhanced integration of emergency services at the regional and state level. While some regions met the challenges of these crises ably, there is an underlying need to see greater responsiveness and integration with local disaster planners, emergency medical services, tertiary and trauma care hospitals, RACs, and Texas Department of Transportation and other state agencies. The needs of evacuating citizens, as demonstrated by Hurricane Rita, require collaborative work across state agencies, municipalities, counties and emergency health care providers. Likewise, the health care needs of the Hurricane Katrina evacuees mobilized unprecedented collaboration on the regional level. However, many issues still remain unresolved.

To address these problems, a review of lessons learned from Hurricanes Katrina and Rita should

be performed and a model of active cooperation and collaboration should be developed. The role of multiple agencies of the state needs to be examined in light of the need for improved coordination and response. The state's different regions for disaster areas, public health and TSAs may be creating an unnecessary barrier for communication and response. After the storms, disaster coordinators were obligated to work with multiple public health regions and trauma regional advisory councils were required to work with several disaster coordinators. Standardization of regional subdivisions should be explored to improve efficiencies in planning, communication and responsiveness.

SUMMARY

Texas has done significant work to develop its emergency and trauma systems. This includes ensuring 9-1-1 capability in all 254 counties. Unfortunately, while the 9-1-1 service is available, there are still considerable challenges for trauma care—including having adequately funded EMS services to pick up patients as well as a hospital to deliver them to (due to the current burden on emergency departments). With the Driver Responsibility Program, Texas has one of the richest authorized funding sources for trauma centers in the entire country. With full implementation, this source will meet a substantial portion of the need.

A significant challenge in trauma care is the overcrowding of ERs in the state. While trauma centers have been organized, they still are often unable to handle the patient load due to the increasing numbers of admissions. As a result of EMTALA, which requires medical screening and stabilization of patients, many people are using emergency departments as sources of primary care. In addition, the uninsured and underinsured are a dispropor-

tionate segment of ER use in trauma hospitals, many of which are unable to pay for the services obtained. Consequently, the ability of trauma centers to carry out their mission is related to efforts to provide safety-net primary care clinics in underserved areas of the state. This may include assessing, identifying or funding care-givers including nurse practitioners, physicians, residents and nurses.

It is clear that much remains to be done for Texas to become a leader in regionalized emergency and trauma care systems. Some of the challenges are symptomatic of much larger issues—the growing uninsurance problem, bioterrorism, natural disasters—but efforts must continue to be made to shore up the system through funding mechanisms, oversight, and infrastructure development.

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