REPORT OF THE
JOINT COMMISSION ON HEALTH CARE

STUDY OF THE NEED FOR AND EFFICACY OF A STATEWIDE TRAUMA TRIAGE PLAN PURSUANT TO SJR 353 OF 1995

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

SENATE DOCUMENT NO. 23

COMMONWEALTH OF VIRGINIA
RICHMOND
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Preface

SJR 353 directed the Joint Commission on Health Care to study the need for and efficacy of establishing a pre-hospital and inter-hospital triage and transport plan for trauma patients.

Nationally, and in Virginia, trauma is the leading cause of death for persons under age 45. In Virginia, trauma is the fifth leading cause of death for all ages. The average charge per hospital admission for trauma injuries is three times higher than other acute care admissions. Trauma includes blunt trauma (e.g. automobile crashes and falls) and penetrating trauma (e.g. gunshot and knife wounds) injuries.

Many states, including Virginia, have established trauma systems to improve the medical treatment of trauma victims. Trauma centers are specialized hospital units with surgical and medical specialists, laboratory services, and operating and critical care facilities available to treat severe injuries 24 hours a day. Trauma centers form the heart of a trauma system. The American College of Surgeons has developed an extensive list of criteria that hospitals must meet to be designated as a trauma center.

Research has shown that between 20 and 30 percent of trauma deaths are preventable, and that trauma centers lower the mortality and morbidity of trauma patients. Surgical staffing and early surgical care available at trauma centers are the major reasons why trauma centers can reduce mortality and morbidity rates. However, the value of trauma centers is not fully realized unless severely injured patients are "triaged" to these facilities for care. The triage of trauma patients simply means that ". . . the right patient gets to the right facility at the right time."

For a trauma system to be optimally effective, it is critical to utilize a triage system which appropriately differentiates the most critically injured patient who needs the specialized services and resources of a trauma center from those who can be treated appropriately in other acute care facilities. A number of triage guidelines or protocols have been developed by various medical experts to assist in determining which patients are in need of the specialized services available at trauma centers.

In Virginia, the Office of Emergency Medical Services (EMS) within the Department of Health administers the Commonwealth's trauma system. The Office of EMS, the EMS Advisory Board, and the Critical Care Committee administer a Trauma Center Designation Program. Eleven hospitals across the state have been designated as a Level I, Level II, or Level III trauma center. Another component of the Commonwealth's trauma system is the trauma registry. All hospitals with 24 hour emergency departments must submit information on all trauma admissions to the registry.

While Virginia has established a trauma system and a trauma registry, and has designated trauma centers, there are no statewide trauma triage protocols in place to ensure that trauma patients are transported to the most appropriate facility.

To determine whether statewide triage protocols are needed in Virginia, an analysis of 1994 trauma registry data was conducted. In 1994, a total of 25,817 trauma admissions were reported to the registry. On a statewide basis, approximately 51% of the less seriously injured trauma patients were admitted to non-designated hospitals, while the remaining 49% were admitted to trauma centers. Approximately 24% of the more seriously injured trauma patients were not admitted to a trauma center. Of these patients, only 11% eventually were transferred to a trauma center. The vast majority (93%) of the most critically injured trauma patients were admitted to a trauma center.

The analysis of data also indicated that triage practices vary by EMS regions across the state. For instance, the number of more seriously injured patients not transported to a trauma center ranged from 11% in the Tidewater region to 32% in the Federation region and 31% in the Northern and Southwest regions.

In view of the research that indicates trauma centers have better survival rates and outcomes than non-designated hospitals, the more seriously injured patients in Virginia who are not being admitted to trauma centers may be experiencing less than optimal outcomes. Consequently, statewide triage protocols for trauma patients may enhance the effectiveness of Virginia's trauma system.

Four policy options were presented in the draft issue brief for consideration by the Joint Commission.

* Option I would maintain the status quo.

* Option II would introduce a Study Resolution Directing the Office of EMS, in Cooperation with the EMS Advisory Board, the Critical Care Committee, the Regional EMS Councils, and Representatives of the Emergency Medical Services Community to Study Further the Number of Preventable Trauma Deaths in Virginia and Ascertain Whether a Statewide Triage Plan Would Reduce These Preventable Deaths.

* Option III would introduce a Resolution Directing the Office of EMS, in Cooperation with the EMS Advisory Board, the Critical Care Committee, the Regional EMS Councils, the Trauma Centers, the Virginia Hospital Association, the Virginia Chapter of the American College of Emergency Physicians, Representatives of the Emergency Medical Services Community and Pre-Hospital Providers, and Other Appropriate Organizations to Develop a Draft Statewide Pre-Hospital and Inter-Hospital Triage Plan and Present the Draft Plan to the Governor and the Joint Commission on Health Care.

* Option IV would introduce Legislation Requiring the Board of Health to Establish and Implement a Statewide Pre-Hospital and Inter-Hospital Triage Plan.

Our review process on this topic included an initial staff briefing which you will find in the body of this report followed by a public comment period during which time interested parties forwarded written comments to us on the report. In many cases, the public comments, which are provided at the end of this report, provided additional insight into the various topics covered in this study.

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Executive Director

January 23, 1996

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I.
Authority for Study

Senate Joint Resolution (SJR) 353 of the 1995 Session of the General Assembly directs the Joint Commission on Health Care to study the need for and efficacy of establishing a pre-hospital and inter-hospital triage and transport plan to ensure that trauma patients are being treated in the closest appropriate trauma facility.

II.
Background

Trauma Injuries Continue to be the Leading Cause of Death Among Persons Under Age 45

For the past twenty years, trauma has been the leading cause of death for individuals under the age of 45, and the fourth leading cause of death for all ages combined. Trauma is the leading cause of disability for all ages. For every death, there are tens more admitted to a hospital and hundreds more treated in emergency departments. The estimated annual cost of trauma was a staggering $180 billion in 1988, representing a cost per death twice that of cardiovascular disease and cancer combined. (American College of Surgeons, 1993.) The average charge per hospital admission for a trauma patient is three times higher than that for regular acute care admissions.

In Virginia, according to the Department of Health's Vital Statistics Report for 1993, accidents are the leading cause of death among persons under age 45, and the fifth leading cause of death among all ages. In 1993, the number of accidental deaths in Virginia was 2,027. Motor vehicle crashes were the largest single category of accidental deaths, accounting for 864 of the 2,027 deaths.

Trauma Patients are Victims of Both Blunt and Penetrating Injuries

Nationally, blunt trauma, caused by motor vehicle crashes, falls, or other blunt forces, represents about 80% of all trauma injuries. However, penetrating trauma, primarily caused by gunshot and knife wounds, represents a growing share of urban trauma injuries. This is particularly true in inner-city areas where crime- and drug-related violence has been rising. (U.S. General Accounting Office, 1991.)

Trauma Systems Have Been Developed to Improve the Medical Treatment of Injured Patients; Trauma Centers Are the Heart of the System

Across the country, trauma systems have been developed to improve the medical treatment provided to trauma patients. Trauma systems encompass all phases of care, from pre-hospital through acute care and rehabilitation, including prevention. The term "inclusive trauma system" is used to describe this approach to care for trauma patients. Acute care services include community hospitals and regionalized "trauma centers." While all components of the trauma system are important, it is widely accepted that regionalized trauma centers form the heart of effective trauma systems.

Trauma Centers: Trauma centers are specialized hospital units with surgical and medical specialists, laboratory services, and operating and critical care facilities available to treat severe injuries 24 hours a day. The ability to rapidly identify and transport severely injured persons to definitive care provided by trauma centers is a critical aspect of a trauma system.

Hospitals Must Meet Rigid Criteria to be Designated as a Trauma Center

American College of Surgeons' Guidelines for Trauma Centers: Since 1922, the American College of Surgeons (ACS) has been involved actively in improving the care of injured patients. In 1976, the ACS first published "Optimal Hospital Resources for the Care of the Injured Patient." Now entitled "Resources for Optimal Care of the Injured Patient," this publication is viewed as the definitive guideline for caring for trauma patients.

Essential to the development of a trauma care system is the designation of trauma care facilities. The ACS has established a rigorous set of guidelines which it recommends hospitals meet in order to be designated as a trauma care facility. The current requirements are included in the ACS' 1993 publication of "Resources for Optimal Care of the Injured Patient." These requirements are universally accepted as the standard for designating trauma care facilities. The hospital criteria for trauma centers are extensive and detailed. Figure 1 provides an overview of the various categories of requirements hospitals must meet to be designated as a trauma center. A copy of the complete ACS Hospital Criteria for Trauma Facility Designation is provided at Appendix A.

ACS Trauma Designations Include Level I, Level II, Level III and Level IV Facilities

The ACS recommends that trauma facilities be designated as a Level I, Level II, Level III, or Level IV facility based on the services, resources and staffing available at the facility. The ACS recommends that a trauma system include an appropriate number of each level of facility based on the population to be served and the geography of the region.

Figure I

American College of Surgeons' Hospital Criteria For Trauma Center Designation

Categories of Trauma Center Requirements

Hospital Organization	Clinical Capabilities
Facility Resources/Capabilities	Quality Improvement Program
Physician Outreach Program	Prevention/Public Education
Trauma Research Program	Continuing Education
Trauma Service Support Personnel	Organ Procurement Activity
Hospital Transfer Agreements	

Source: Committee on Trauma, American College of Surgeons, "Resources for the Optimal Care of the Injured Patient"

For each of the specific criteria included within the various categories shown in Figure 1, the ACS guidelines identify whether the service, staffing, resource or capability is "essential" or "desirable." If considered "essential," the criterion must be met by the hospital. If identified as "desirable," the hospital is encouraged, but not required, to meet the criterion. Most of the hospital organization, clinical capabilities, facility resources, and quality improvement requirements are "essential."

Level I Trauma Center: The ACS identifies a Level I center as a regional resource trauma center that is a tertiary care facility central to the trauma system. The Level I facility is the highest designation in the ACS program, and must meet the most rigorous standards. According to the ACS, the Level I facility must have the capability of providing leadership and total care for every aspect of injury from prevention through rehabilitation.

Level II Trauma Center: The Level II center is a hospital that also is expected to provide initial definitive trauma care regardless of the severity of injury. However, depending on geographic location, patient volume, personnel and resources, the Level II centers may not be able to provide the same comprehensive care as a Level I center. Therefore, patients with more complex injuries may have to be transferred to a Level I center.

As seen in Figure 2, many of the clinical and facility requirements that a Level I and Level II center must meet are similar. The key differences in clinical capabilities are that cardiac surgery, hand surgery, infectious disease management, microvascular surgery (replantation), and pediatric surgeons are "essential" for Level I centers and are "desirable" for Level II centers. In addition, there are several specialized facility resources (e.g. cardiopulmonary bypass and acute hemodialysis) that are "essential" at Level I centers and are "desirable" at Level II centers.

Level III Trauma Center: The Level III Trauma Center serves communities that do not have immediate access to a Level I or Level II institution. Level III centers can provide prompt assessment, resuscitation, emergency operations and stabilization, and also arrange for possible transfer to a facility that can provide definitive trauma care. Prompt availability of general surgeons is required in a Level III facility.

Level IV Trauma Center: Level IV trauma centers provide advanced trauma life support prior to patient transfer in remote areas where no higher level of care is available. Such a facility may be a clinic rather than a hospital and may or may not have a physician available. Because of geographic isolation, however, the Level IV trauma center often is the "de facto" primary care provider. As with Level III centers, treatment protocols for resuscitation, transfer protocols, data reporting and participation in quality improvement programs are essential.

Continuous Quality Improvement (CQI)

In addition to the clinical and facility requirements that a designated trauma center must meet, all designated centers (Level I, Level II, Level III, and Level IV) must implement a continuous quality improvement program. Through this program, trauma centers assess and re-evaluate all aspects of the care provided to trauma patients on an on-going basis. These CQI programs are quite extensive and involve substantial data collection and analysis activities.

Figure 2

American College of Surgeons' Hospital Criteria For Trauma Center Designation

Selected Key Clinical and Facility Resource Requirements for Level I and Level II Trauma Centers

Clinical Capabilities

In-House 24 Hours/Day

General Surgery
Neurologic Surgery
Emergency Medicine
Anesthesiology

On Call/Promptly Available

Cardiac Surgery*
Cardiology
Hand Surgery
Infectious Disease*
Obstetric/Gynecological Surgery
Ophthalmic Surgery
Oral/Maxillofacial Surgery
Orthopedic Surgery
Microvascular Surgery*
Pediatric Surgery*
Plastic Surgery
Pulmonary Medicine
Radiology
Thoracic Surgery

Facility Requirements

Personnel (24 hours/day)

Surgeons, Anesthesiologists
Emergency Trauma Physicians
Emergency Trauma Nurses
X-Ray/Radiology Technicians
Operating Room Staff
CT Scan Technician

Equipment/Capabilities

Operating Room: 24 Hours/Day
X-Ray: 24 Hours/Day
Special Radiology (24 hrs/day)
Organized Burn Care
Spinal Cord/head Injury Capab.
Trauma ICU
Clinical Laboratory (24 hrs/day)

* Denotes "Essential" services/resources in Level I Centers, "Desirable" in Level II Centers

Note: This list does not include all Clinical or Facility requirements of Level I and Level II Centers

Source: Committee on Trauma, American College of Surgeons, "Resources for the Optimal Care of the Injured Patient"

Other Acute Care Facilities: In addition to the designated trauma centers other acute care hospitals play an integral role in the "inclusive trauma system." As will be discussed later, it is estimated that only about 15% of injured patients require the services of trauma centers. Accordingly, while other acute care hospitals are not designated as a trauma center, these hospitals will continue to treat many, if not most, injured patients. Thus, it is essential to have the support and involvement of these hospitals. In an inclusive trauma system, these hospitals treat those patients that are less severely injured, and transfer the most seriously injured patients to the appropriate trauma center when necessary.

Appropriate Triage of Trauma Patients is Critical in a Trauma System

The value of designated trauma centers depends in large part on how trauma patients are "triaged" in the field prior to being transported to an acute care facility. With respect to a trauma system, the "triage" of patients simply means that " . . . the right patient is transported to the right hospital at the right time." For a trauma system to be optimally effective, it is critical to utilize a triage system which appropriately differentiates the most critically injured patients who need the specialized services and resources of a trauma center from those who can be treated appropriately in other acute care facilities. Despite the extensive services and resources that are available at a trauma center, if critically injured patients are not transported to these centers for care, the significant benefits of trauma centers are not fully realized.

Pre-Hospital and Inter-Hospital Triage: The initial "triage" of trauma patients occurs in the field normally at the site where the patient is injured. This stage of triage is called "pre-hospital" triage. Typically, the pre-hospital triage is performed by emergency medical personnel such as ambulance and fire/rescue units.

In addition to the initial triage that is performed in the field, triaging of patients also is conducted at the acute care facility which receives the patient. This second triage phase may result in an "inter-hospital" transfer. During this phase, the emergency medical staff at the hospital make a determination if the facility has the resources and services to properly care for the trauma victim. If it is determined that the hospital possesses the necessary resources and services, the patient typically remains at the facility. However, if the hospital does not have the requisite resources and services, the patient should be transferred to an appropriate facility, such as a designated trauma center.

Several Tools and Scoring Systems Have Been Developed for Triaging Patients

In an effort to triage patients appropriately, a number of triage tools and scoring systems have been developed for use by pre-hospital providers in assessing the extent of a trauma victim's injuries. These triage tools include the Trauma Score, the Revised Trauma Score, the Glasgow Coma Scale, and the CRAMS Score. In addition to these triage tools, the Trauma Committee of the American College of Surgeons and the American College of Emergency Physicians each have developed triage algorithms for use in triaging patients. All of these tools or scoring systems have been developed to quickly and accurately determine the extent of a patient's injury so that the patient can be transported to the most appropriate acute care facility. Figure 3 provides a brief description of each triage tool.

Figure 3
Triage Tools and Scoring Systems

Glasgow Coma Score:	A neurologic scoring system that evaluates eye opening, verbal responses, and motor responses.
Trauma Score:	A physiologic index composed of the Glasgow Coma Score plus indices of cardiac and respiratory function.
Revised Trauma Score:	Similar to the Trauma Score, this tool uses the same indices but a different method of calculation.
CRAMS Score:	Assessment of the patient's injury as it relates to Circulation, Respiration, Abdomen, Motor, and Sensory capabilities. Similar to the Trauma Score, also includes observations regarding presence or absence of thoracic and abdominal injuries.
American College of Surgeons Triage Algorithm:	A decision tree that assesses the patient's vital signs, level of consciousness, type of injury, mechanism of injury (e.g. ejection from automobile, high-speed auto crash, falls over 20 feet, etc.), and patient characteristics (e.g. age, cardiac or respiratory disease, pregnancy, etc.).
American College of Emergency Physicians Model Trauma Algorithm	Similar to the ACS Triage Algorithm, assesses vital signs, type of injury, and mechanism of injury.

Source: A. Brent Eastman, et. al, American Journal of Surgery, Vol. 154, July, 1987; Committee on Trauma, American College of Surgeons. "Resources for the Optimal Care of the Injured Patient;" Policy Statement, American College of Emergency Physicians, Annals of Emergency Medicine, June, 1993, 22:6.

The ideal triage tool would be one that could be applied quickly and easily under field conditions, give consistent results among different observers, and have a high rate of accuracy. While the various triage tools are all somewhat effective in accurately determining the extent of a patient's injury, none have been shown to be ideal. Nonetheless, nearly all methods of triaging trauma patients incorporate some aspects of these tools and scoring systems.

Under-Triage and Over-Triage: One of the shortcomings of these imperfect triage tools is the under-triage and over-triage of patients. Under-triage occurs when severely injured patients are not taken to trauma centers. Conversely, over-triage occurs when minimally injured patients are taken to a trauma center. While both reduce the efficiency of a trauma system, under-triage is seen as the more critical error since it can result in preventable mortality or increased morbidity.

Trauma experts generally agree that a certain amount of over-triage is necessary to avoid an unacceptable level of under-triage. In developing a trauma triage plan, the triage tool that is used to assess patients and the medical personnel involved in the determination of appropriate care must be sensitive to and strive for an acceptable level of over-triage and a very minimal level of under-triage.

The "Injury Severity Score" is Used to Measure the Accuracy of Trauma Prediction/Triage Tools

While the triage tools described above are used to predict the severity of injury suffered by a trauma victim, the Injury Severity Score (ISS) is used to define major injury based on the retrospective analysis of the anatomic injuries that patients have sustained. (Baxt, 1990.) In much of the literature on the triage of trauma patients, researchers have used the ISS to analyze whether trauma systems and trauma triage tools are appropriately directing patients to trauma centers or other acute care facilities.

The ISS sorts each aspect of a patient's injury into one of six ISS body regions as follows: head and neck, face, chest, abdominal and pelvic contents, extremities and pelvic girdle, and external region. The ISS is an index of anatomic injury as it relates to the six systems or body regions. An ISS can range from 1 to 75, with higher scores indicating more severe injuries.

Critically Injured Patients Have An ISS of 15 or Greater: While there is some difference of opinion among trauma experts as to what constitutes a critically injured patient, it is generally accepted that a patient with an ISS of 15 or greater is, indeed, critically injured and in need of specialized trauma services.

(O'Rourke, 1992.) It is these patients that trauma centers are specially staffed and equipped to handle.

Trauma Centers Have Been Shown to Reduce Mortality and Morbidity of Severely Injured Patients

Numerous studies have documented that 20 to 30% of trauma deaths are preventable. (Norwood, 1995.) Some researchers have estimated the percentage of preventable deaths to be as high as 40%. Implicit in these statistics is the argument that if patients receive immediate, definitive and proper trauma care, the preventable death rate could be reduced. Conversely, failure to recognize the severity of injury and initiate definitive trauma care have been cited as primary causes of death from injury.

A significant amount of research has been conducted on the impact that trauma centers and trauma systems have on the mortality and morbidity rates of injured patients. This research consistently has found that trauma centers and regionalized trauma systems reduce mortality and morbidity. Studies conducted by West (1979 and 1983), Shackford (1987), Kilberg (1988), Norwood (1995), and Sampalis (1995) all concluded that trauma centers reduce mortality and produce improved outcomes for major trauma victims. Figure 4 provides a brief overview of the results of each study.

The Immediate Availability of Surgical Staffing and Early Surgical Treatment is Seen as the Most Critical Aspect of Trauma Centers

A consistent finding among the researchers is that the immediate availability of surgical staffing and early surgical treatment is the single most important aspect of a trauma center that leads to reduced mortality and morbidity. As previously noted, the American College of Surgeons' criteria for Level I and Level II centers require the hospital to have in-house surgeons 24 hours/day and an operating room on stand-by and immediately available 24 hours/day. In addition to the advantages associated with in-house surgeons, patients also benefit from the specialty surgeons that must be immediately available in designated trauma centers.

Figure 4

Summary of Major Trauma Study Conclusions

West (1983):	Concluded that a regionalized trauma system implemented in Orange County, California reduced the preventable death rate from 73% to 9%. The West study is viewed as the seminal research in the area of trauma care.
Shackford (1987):	Replicated the Orange County study in San Diego, and found that a regionalized trauma system reduced preventable deaths from 14 to 3%.
Kilberg (1988):	Concluded that severely injured patients have a significantly higher rate of survival if taken to a Level I trauma center, and that a field triage system can improve outcomes for critically injured patients.
Norwood (1995):	Concluded that implementing the American College of Surgeons Level II Criteria improved the outcomes for the most severely injured patients.
Sampalis (1995):	Observed a significant reduction in trauma-related mortality in Montreal hospitals after their designation as a Level I Trauma Center.

Source: Archives of Surgery, Vol. 118, 1983; Archives of Surgery, Vol. 122, 1987; The Journal of Trauma, Vol. 28, No. 10, 1988; and The Journal of Trauma, Injury, Infection and Critical Care, Vol. 39, No. 2, 1995.

Despite the Evidence that Appropriate Use of Trauma Centers Reduces Mortality and Morbidity, Formalized Protocols For Triaging Patients to Trauma Centers Exist in Few Areas of the Country

As will be discussed later in this issue brief, few states have developed and implemented formal, written protocols or guidelines for triaging patients to trauma centers. While there is no single reason why standard triage protocols have not been established throughout the country, the following have been identified as the most probable reasons.

- A regionalized trauma system for critical care can represent a dramatic change from the usual patient flow and care provision. Consequently, any plan that might adversely affect emergency department utilization may be seen as a threat to many hospitals. Administrators may fear the loss of patients and income. (Jastremski, 1993; Trauma Care System, 1986 Health Congress.)

- Pre-hospital providers may be hesitant to embrace a statewide standard protocol because it limits their discretion and input into the decision of where to transport the patient.

- There may be a reluctance on the part of emergency room physicians treating a critically injured patient in a non-designated trauma center to recognize that he/she is not equipped or staffed to handle the injuries, and, thus, the patient is not transferred to a trauma center. In some cases this reluctance reflects institutional pride. More often it is believed to be a failure to assess adequately the severity of injury. (Trauma Care System, 1986 Health Congress.)

While research has shown that trauma centers can reduce mortality and morbidity of severely injured patients, unless these patients are triaged appropriately to the centers for care, the value of trauma centers is not fully realized. The ultimate consequence is that patients unnecessarily may die or have greater disabilities.

Operating a Trauma Center is Very Expensive; if Critically Injured Patients Are Not Transported to the Centers, the Financial Viability of the Institutions is Threatened

The requirements that a hospital must meet to be designated as a trauma center impose significant financial burdens on the institutions. According to a General Accounting Office (GAO) study completed in 1991, most of the 35 trauma centers reviewed in the study lost money. For the 28 hospitals able to measure their financial losses attributed to the trauma center, the annual losses ranged from $100,000 to $7 million.

Nationwide, About 60 Trauma Centers Have Closed Due to Financial Losses

According to the 1991 GAO study, about 60 trauma centers had closed across the country in the five years prior to the study. The primary reason cited by the GAO for the closures is the financial losses incurred by the centers as a result of treating the uninsured and patients covered by Medicaid and other government-assisted programs.

Urban trauma centers have been the hardest hit, primarily due to the rising incidence of penetrating trauma injuries such as gunshot wounds and knife wounds. The GAO noted that, in 1989, about 80 percent of gunshot and stabbing victims treated in urban trauma centers were uninsured or eligible for medical care cost assistance under government programs.

Without a more balanced payor mix of trauma patients (i.e. a better balance between insured and uninsured patients), trauma centers, particularly urban centers, likely will face increased financial losses. It is generally accepted that trauma centers will continue to receive most victims of penetrating trauma injuries. However, the lack of standardized triage protocols that appropriately direct other critically injured patients (i.e. blunt trauma victims) to trauma centers appears to exacerbate the financial losses of some of these centers.

III.
Virginia's Emergency Medical System and Trauma Center Designation Program

The Code of Virginia Requires the Board of Health to Establish a Statewide Emergency Medical Care System

Section 32.1-112 of the Code of Virginia provides that the Board of Health has the authority and responsibility to develop a comprehensive, coordinated emergency medical care system (EMS System) in the Commonwealth. In accordance with its statutory authority and responsibility, the Board promulgates regulations governing emergency medical services.

Office of Emergency Medical Services and State Emergency Medical Services Advisory Board: The Office of Emergency Medical Services is the subunit within the Department of Health which is responsible for the day-to-day activities and functions related to emergency medical services. The State Emergency Medical Services Advisory Board, which is composed of 37 members, advises the Board of Health on the administration of the EMS System.

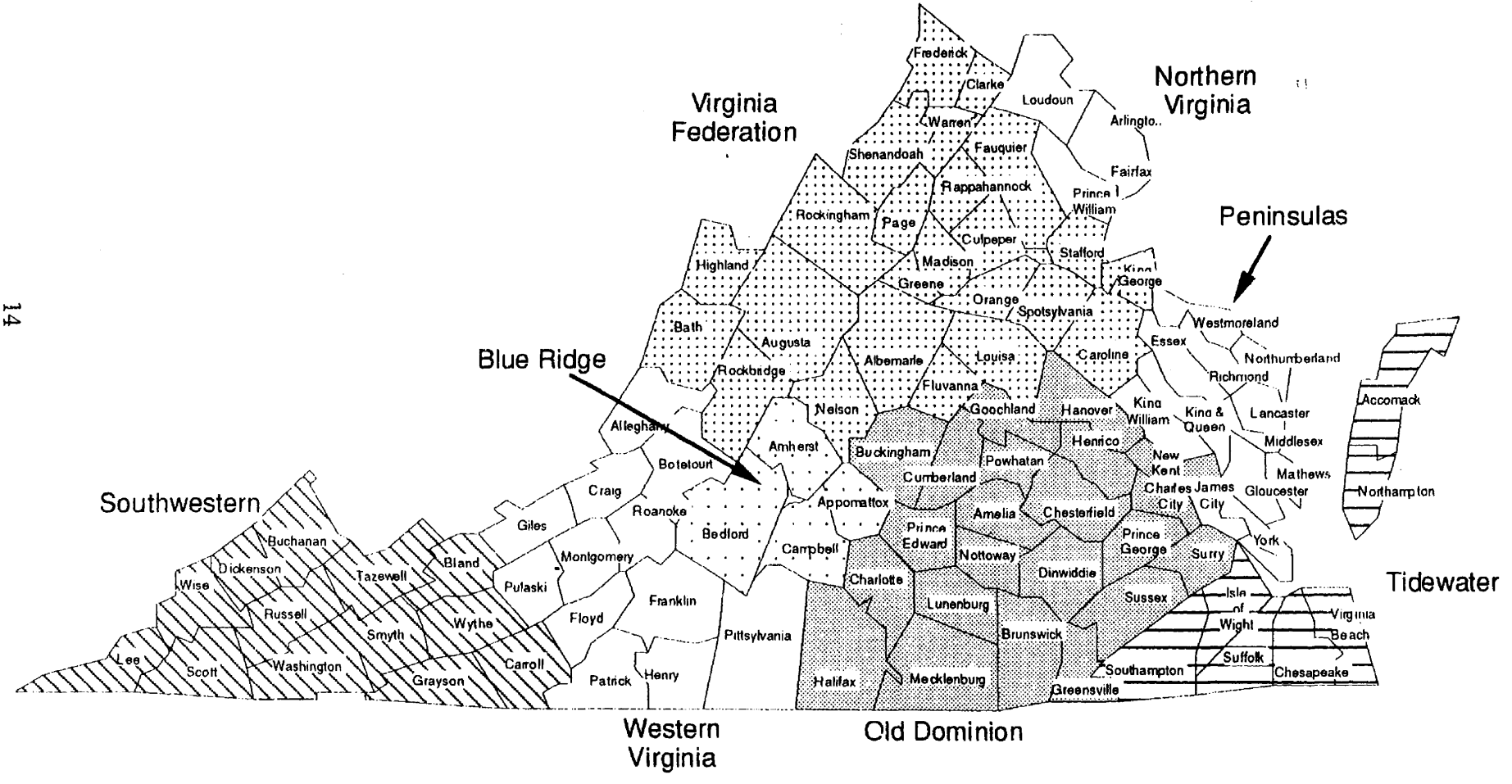
Eight Regional EMS Councils Develop and Implement Local EMS Delivery Systems

The Code of Virginia requires the Board to designate Regional Emergency Medical Services (EMS) Councils which are authorized to receive and disburse public funds. These regional councils are charged with the development and implementation of an efficient and effective regional emergency medical services delivery system. Each Regional EMS Council is required to adopt and revise, as necessary, a regional emergency medical services plan in cooperation with the Board.

The Board has established eight Regional EMS Councils: the Old Dominion EMS Council, the Northern Virginia EMS Council, the Southwest Virginia EMS Council, the Western Virginia EMS Council, the Tidewater EMS Council, the Peninsulas EMS Council, the Blue Ridge EMS Council and the Virginia Federation EMS Council. Some Regional EMS Councils are divided into sub-regions. Figure 5 illustrates the geographic boundaries of the eight Regional EMS Councils.

Figure 5

Virginia's Regional EMS Councils



Source: Office of Emergency Medical Services

Within Each Regional EMS Council, Numerous Individuals and Organizations Provide Emergency Medical Services

In each of the Regional EMS Councils, numerous individuals and organizations provide emergency medical services. These individuals and organizations are referred to as "EMS Agencies," and include volunteer and paid rescue squads, ambulance services, air ambulance services, municipal entities and others. Each Regional EMS Council has a Medical Director who provides overall medical review and direction to the agencies.

Operational Medical Directors: In addition to the Regional EMS Council Medical Director, each EMS agency is required by regulation to have a minimum of at least one "Operational Medical Director" who provides medical direction to the agency. The Operational Medical Directors play a key role in coordinating and directing the delivery of emergency medical services in their respective regions.

Figure 6 provides some key statistics and information regarding the eight Regional EMS Councils.

Figure 6
Key Statistics and Information on Virginia's Regional EMS Councils

EMS Regional Council	No. EMS Agencies	Operational Medical Directors	EMS Calls Annually	Hospitals
Old Dominion	68	31	93,000	19
Northern Va.	34	9	95.500	12
Southwest	92	22	85,000	19
Western Va.	77	22	83,500	16
Tidewater	51	15	84,000	13
Peninsulas	36	11	60,000	8
Blue Ridge	29	7	33,000	3
Virginia Federation	139	14	97,500	14
TOTALS	**526**	**131**	**631,500**	**104**

Source: Profiles, Virginia Regional EMS Councils, Office of EMS, 1990

Virginia's Emergency Medical Services Patient Care Information System Includes a Trauma Registry

Section 32.1-116.1 of the Code of Virginia establishes the Emergency Medical Services Patient Care Information System, and assigns the Board of Health with the responsibility for administering the system. The system was established to: (i) collect data on the incidence, severity, and cause of trauma; (ii) integrate the information available from other state agencies on trauma; and (iii) improve the delivery of pre-hospital and hospital emergency medical services. The system includes a pre-hospital patient care reporting procedure and a statewide trauma registry.

Trauma Registry: The establishment of a trauma registry was mandated by the General Assembly in 1987. All hospitals with 24 hour emergency departments are required by law to submit certain information on:

(i) any patient admitted to a Virginia hospital trauma and/or surgery service because of acute injury/trauma with an ICD-9CM Code between 800 - 959.9;

(ii) any patient transferred from one hospital to another because of acute injury/trauma; and

(iii) any patient who dies in the emergency department as a result of injury/trauma.

The Trauma Registry data is used for several purposes such as studying the epidemiology of injury, evaluating and improving the trauma care delivery system, and developing injury prevention programs. The Office of Emergency Medical Services administers the Trauma Registry.

There Were a Total of 25,817 Trauma Patient Admissions in Virginia During 1994

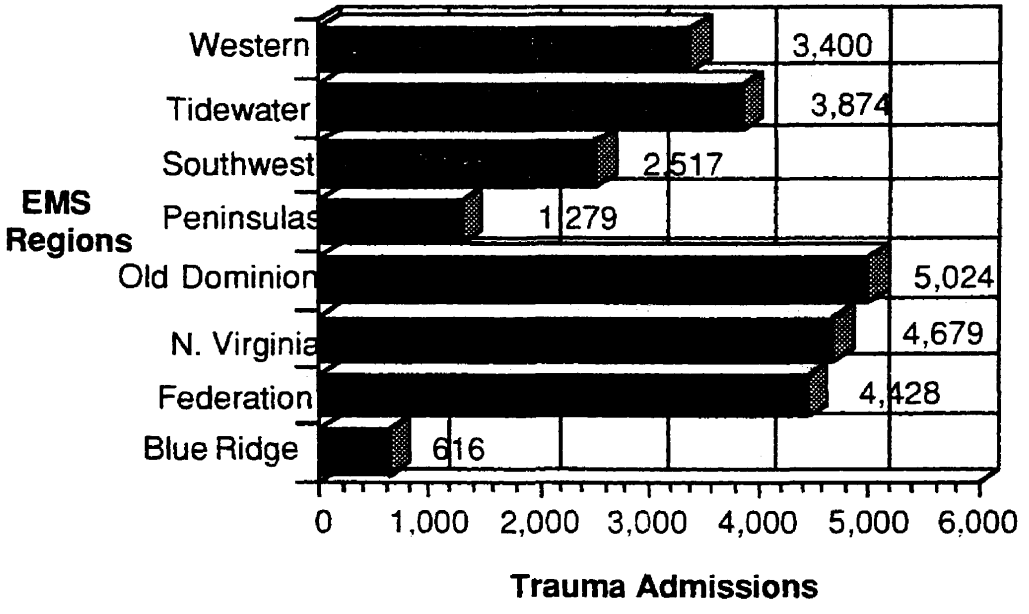
Based on information reported to the statewide trauma registry, a total of 25,817 trauma admissions occurred in Virginia during 1994. Figure 7 illustrates the number of trauma admissions in each of the eight EMS Regions. More detailed information from the Trauma Registry is presented later in this issue brief.

Designating Hospitals as Trauma Centers is One of the Objectives of Virginia's Statewide Emergency Medical Care System

Section 32.1-112 of the Code of Virginia identifies 11 objectives of the Statewide Emergency Medical Care System. One of these objectives is to establish and maintain a process for designating appropriate hospitals as trauma centers and specialty care centers based on an applicable national evaluation system.

Figure 7

Trauma Admissions by EMS Region
1994



Source: Virginia Statewide Trauma Registry, 1994

The Virginia Statewide Trauma Center Designation Program is Based on National Standards Put Forth by The American College of Surgeons and the American College of Emergency Physicians

The Office of Emergency Medical Services, in conjunction with the State EMS Advisory Board, administers the Virginia Statewide Trauma Designation Program. The Virginia Trauma Center standards are based on national

standards put forth by the American College of Surgeons and the American College of Emergency Physicians. The Virginia standards are reviewed and updated based on changes in the national standards as well as the evolving needs of the trauma system in Virginia.

The Critical Care Committee: The Critical Care Committee of the State EMS Advisory Board was established in 1988 to address all aspects of acute patient care delivery, specifically as pre-hospital patient care interfaces with in-hospital patient care. Since the establishment of the trauma designation program, the Committee has assumed administrative responsibility for the Virginia Trauma Center designation and verification process. The Committee also participates in the ongoing development of the Trauma Registry.

The Virginia Statewide Trauma Center Designation Program Recognizes Three Levels of Trauma Center Designation

While the American College of Surgeons' trauma center designations include four levels (Level I, Level II, Level III, and Level IV), the Virginia Statewide Trauma Center Designation Program recognizes three levels, Level I, Level II, and Level III Trauma Centers. Virginia Trauma Center Designations are based on the same criteria established by the American College of Surgeons that are attached at Appendix A.

Virginia Has Designated 11 Hospitals as Trauma Centers

In accordance with the designation process, Virginia has designated 11 hospitals as Trauma Centers. Five hospitals have been designated as Level I Trauma Centers; four hospitals have been designated as Level II Trauma Centers; and two hospitals have been designated as Level III Trauma Centers. Figure 8 identifies Virginia's 11 Designated Trauma Centers. Figure 9 illustrates the geographical location of each trauma center.

Figure 8

Virginia's Designated Trauma Centers

Level I Trauma Centers

Medical College of Virginia	Richmond
University of Virginia Medical Center	Charlottesville
Fairfax Hospital	Fairfax County
Sentara Norfolk General Hospital	Norfolk
Roanoke Memorial Hospital	

Level II Trauma Centers

Alexandria Hospital	Alexandria
Bristol Regional Medical Center	Bristol, Tn.*
Riverside Regional Medical Center	Newport News
Virginia Beach General Hospital	

Level III Trauma Centers

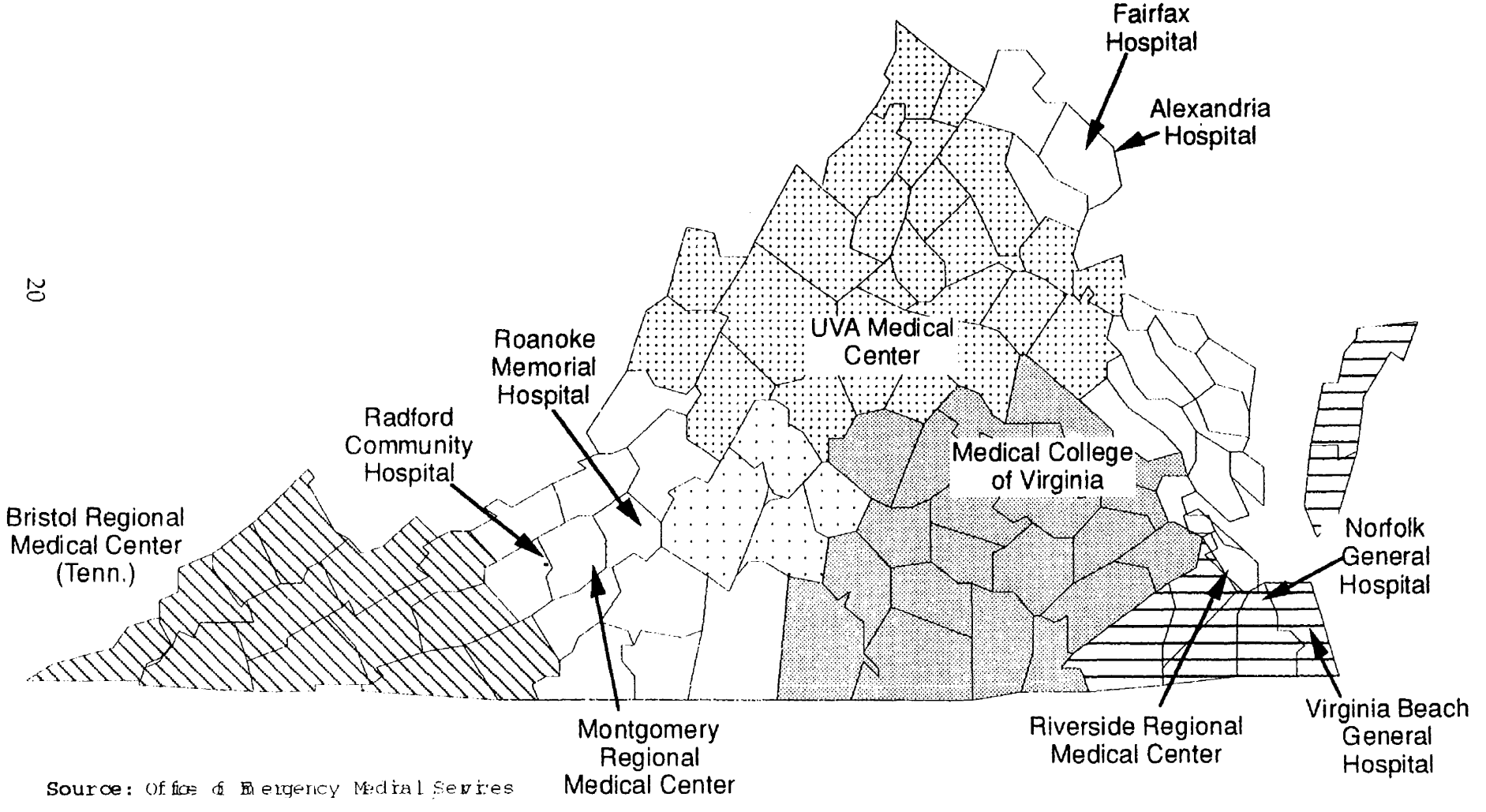
Montgomery Regional Medical Center	Blacksburg
Radford Community Hospital	Radford

* Hospitals in states adjacent to Virginia may be "recognized" as having equivalent trauma care capabilities.

Source: Virginia Trauma Center Designation Program. Resource Manual for Hospitals

Figure 9

Virginia's Designated Trauma Centers



Source: Office of Emergency Medical Services

IV.
Current Triage of Trauma Patients In Virginia

A 1986 Legislative Study Identified the Appropriate Triage of Trauma Patients as A Critical Problem in Virginia

A Joint Subcommittee of the General Assembly studied Virginia's trauma system in 1986 to determine the needs of Virginia's trauma system, including the appropriate triage of patients. The Joint Subcommittee concluded that the problem of how to assure patients are transported to the most appropriate hospital in the least amount of time is among the most important problems facing the EMS system in Virginia. Legislation introduced in 1987 to establish the trauma registry was one of the recommendations of this subcommittee.

There Are No Statewide Trauma Triage Protocols in Virginia

While Virginia has established a Trauma Center Designation Program and other aspects of an organized trauma system (e.g. the statewide trauma registry), there currently are no statewide trauma triage guidelines in place in Virginia. Statewide protocols do not exist for either pre-hospital triage or inter-hospital transfer of patients.

The Virginia Committee on Trauma, a subcommittee of the Critical Care Committee, developed a proposed set of statewide trauma triage guidelines in 1993 - 1994. The proposed guidelines were based on the trauma system care protocols of the American College of Surgeons and the American College of Emergency Physicians. However, the guidelines were not implemented apparently due to a reluctance on the part of various medical and pre-hospital providers across the state to adopt a statewide policy.

The Triage of Trauma Patients Varies By EMS Region

In the absence of statewide trauma triage guidelines, the triage of trauma patients varies among the eight EMS Regions. The Regional Medical Directors as well as the Operational Medical Directors of the various EMS agencies (e.g. pre-hospital providers) generally establish either formal or informal guidelines for triaging patients in their respective areas.

In some regions, written protocols and policies have been established. For example, in the Tidewater region, a decision flow chart for general trauma has been adopted by the Regional EMS Council which includes several of the same assessments used in the triage tools discussed earlier (e.g. Glasgow Coma Scale,

Trauma Score, etc.) In addition to the decision flow chart, the Tidewater EMS Council also has adopted a policy statement which provides that victims of penetrating trauma injuries should be taken directly to the Level I or Level II Trauma Center.

In other regions, however, there are no written protocols or formal guidelines. In these areas, triage is performed based on local practices developed over time. As noted earlier, some regions are divided into sub-regions. In these areas of the state, the sub-regions typically develop their own guidelines and practices regarding the triage of trauma patients.

Given the large number of EMS Agencies (526) and Operational Medical Directors (131) in Virginia, and the variation in the specificity of triage guidelines across EMS regions, it is clear that there is some disparity in the triaging of patients across the state.

There is Anecdotal Information That Some Patients are Transported to Hospitals Based on the Relationship Between Pre-Hospital and Hospital Providers

During the course of this study, anecdotal information shared by various individuals indicated that some trauma patients, as well as non-trauma patients, are transported to hospitals based on factors other than triage guidelines. Examples of this type of activity included transporting patients on the basis of: (i) the traffic patterns en route to the hospital; (ii) relationships between the ambulance or rescue squads and the hospital staff on duty at the time of the incident; and (iii) refreshments and other services that hospitals make available to the crews.

No specific evidence of these situations was found, or sought out. However, it was mentioned in interviews with sufficient frequency that it warrants mentioning in this report. Clearly, to the degree that this activity occurs, patient care may be affected adversely.

Trauma Registry Data Illustrates Current Practices for Triaging Trauma Victims in Virginia

The Statewide Trauma Registry, administered by the Office of EMS, provides insight into the current triage practices throughout Virginia. The data submitted by the trauma centers and other hospitals with a 24 hour emergency department provide a means of analyzing where critically injured patients are being transported for medical care.

Data Analysis: To determine the current patterns for triaging trauma patients in Virginia, Trauma Registry data submitted by participating hospitals and trauma centers for 1994 were analyzed. For purposes of grouping patients into categories of injury severity, the following categories were used:

(i) patients with an Injury Severity Score (ISS) of less than 15 are considered to be less seriously injured;
(ii) patients with an ISS of 15-24 are considered seriously injured;
(iii) patients with an ISS of 24 and higher are considered the most critically injured patients.

These groupings are consistent with those used by trauma researchers and other trauma experts.

Data Limitations: There are limitations to the Trauma Registry data. According to the Office of EMS, the data available for analysis in this study do not include information from two of the 11 designated trauma centers and five non-designated hospitals. In addition, for the data that was available for analysis, a significant number of admissions (791 admissions for non-designated hospitals, and 263 admissions for trauma centers) do not include usable ISS information.

Another limitation of the data is that because all hospital and trauma centers must report a transferred patient as an admission, there is some degree of "double-counting" of patients. This occurs when one hospital reports the initial admission of a patient and another hospital reports a second admission if the patient is transferred. The actual number of "double counted" admissions is not known.

The analysis presented in the following pages speaks only to the current practices of triaging trauma patients in Virginia. The data analysis does not attempt to evaluate or comment on the level of service, the appropriateness of services, or the quality of care provided at trauma centers or non-designated hospitals. Such an analysis requires resources and expertise beyond the scope of this study.

The Total Number of Trauma Patients in Virginia Admitted to Trauma Centers and Non-Designated Hospitals Are Approximately Equal

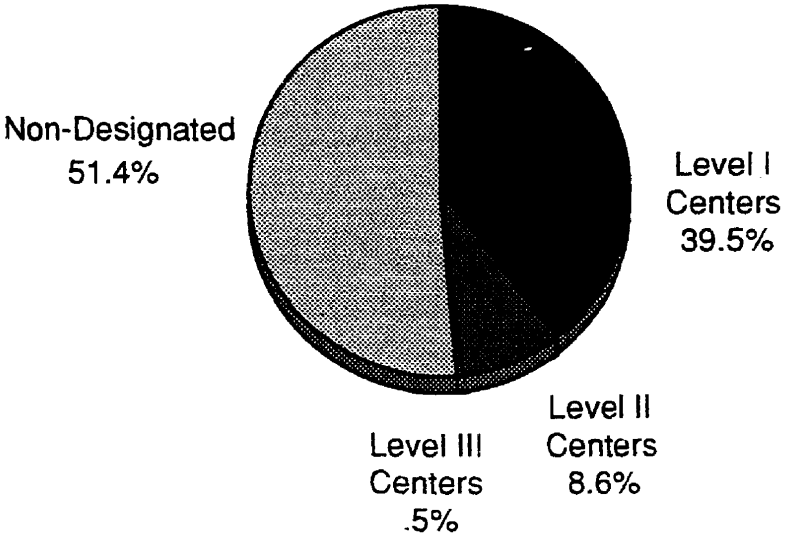
Data regarding a total of 25,817 trauma admissions in 1994 were submitted to the Office of EMS. As seen in Figure 10, the number of trauma admissions at trauma centers (including Level I, Level II, and Level III centers) and non-designated hospitals were approximately equal. Non-designated hospitals

accounted for 51.4% of the admissions; while Level I Centers accounted for 39.5%. Level II Centers reported 8.6% of admissions, while Level III Centers accounted for only .5%.

For less seriously injured patients (i.e. ISS <15), the distribution of trauma admissions is very similar to that for all trauma admissions. For these patients, 52.1% were admitted to non-designated hospitals; 38.6% were admitted to Level I Trauma Centers; 8.6% were admitted to Level II Centers, and .6% were admitted to Level III Centers.

Figure 10

Total Trauma Patient Admissions: Trauma Centers and Non-Designated Hospitals



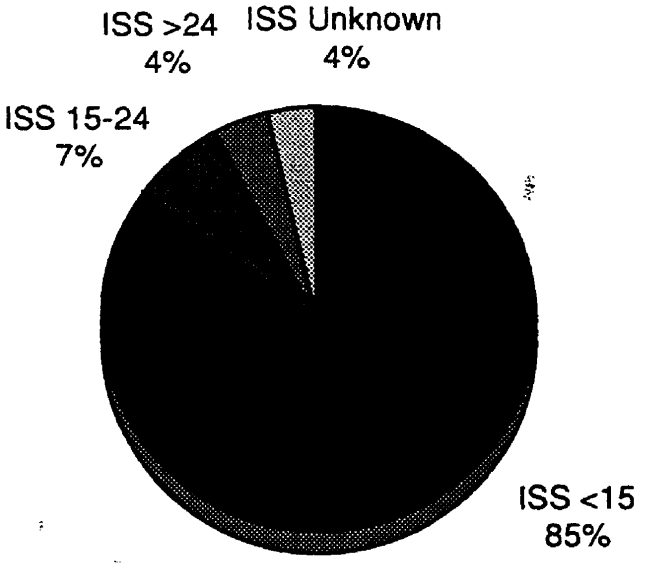
Source: Statewide Trauma Registry Data, 1994, Office of EMS

Similar to National Trauma Statistics, 85% of Virginia's Trauma Victims Have An ISS <15

Researchers and the American College of Surgeons estimate that only about 15% of all trauma victims require the services of a trauma center. As seen in Figure 11, of the 25,817 trauma admissions reported in 1994, 85% had an ISS <15. These are the patients generally considered to be less seriously injured. Seven percent of Virginia trauma admissions had an ISS between 15-24; and 4% had an ISS greater than 24. There were insufficient ISS data available for the remaining 4% of admissions.

Figure 11

Trauma Patient Admissions By Severity of Injury



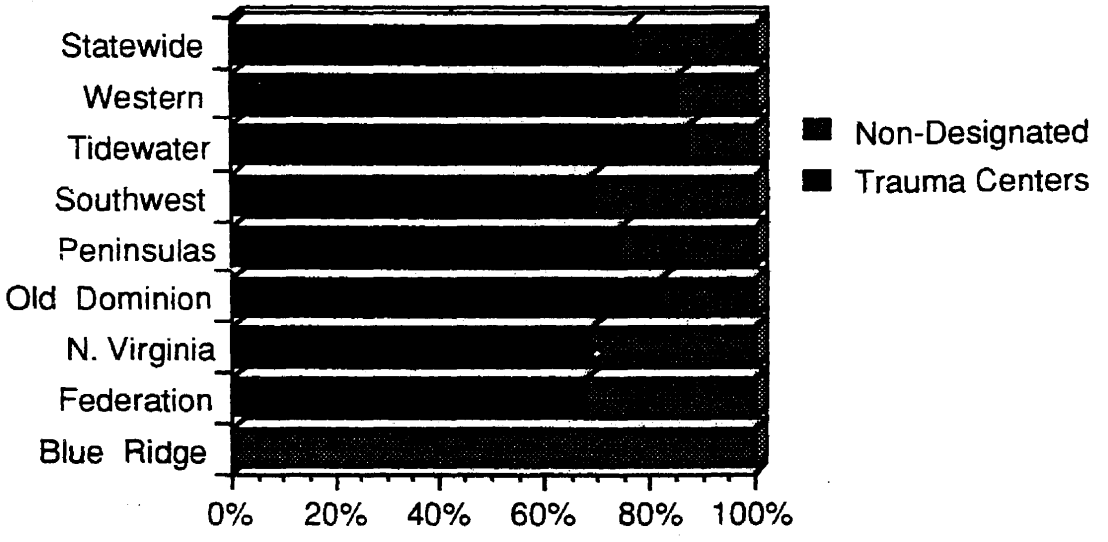
Source: Statewide Trauma Registry Data, 1994, Office of EMS

A Significant Number of More Seriously Injured Trauma Patients (ISS of 15-24) Were Admitted to Non-Designated Hospitals

On a statewide basis, 24% of the more seriously injured (ISS 15-24) patients were admitted to non-designated hospitals. Of the 1603 total patients with an ISS between 15 and 24, 383 were admitted to non-designated centers. The data indicate there is substantial variation among the EMS Regions regarding where these patients are being admitted. As seen in Figure 12, the percentage of patients with an ISS of 15-24 admitted to non-designated hospitals ranged from 13% in the Tidewater region to 32% in the Federation region and 31% in the Northern Virginia and Southwest regions. In the Blue Ridge EMS Region, 100% of these patients were admitted to a non-designated center; however, there are no trauma centers in this region. The closest trauma centers are Roanoke Memorial Hospital and UVA Medical Center.

Figure 12

Admissions of Seriously Injured Trauma Patients (ISS 15-24) : Trauma Centers and Non-Designated Hospitals



Note: There are no Trauma Centers in the Blue Ridge EMS Region.

Source: Statewide Trauma Registry Data. 1994. Office of EMS

Of Those Seriously Injured Patients Admitted to Non-Designated Hospitals, Relatively Few are Transferred to Trauma Centers; There is Variation Among the EMS Regions

SJR 353 directs the Joint Commission to evaluate the need for a statewide pre-hospital and inter-hospital triage plan. Often, a patient who is seriously injured must be taken to the nearest hospital for immediate care; and then transferred to a trauma center, if necessary. Based on the trauma registry data, it appears that relatively few seriously injured patients (ISS 15-24) were transferred to trauma centers after initial admission to a non-designated hospital. Statewide, 11% of these patients were transferred to a trauma center. Again, there is some variation among the regions. The percentage of patients with as ISS of 15-25 who were transferred to a trauma center ranged from 3% in the Blue Ridge region to 19% in the Old Dominion Region. Figure 13 provides information on the number and percentage of patients transferred to trauma centers.

Figure 13

Transfer of Seriously Injured Trauma Patients (ISS 15-24) From Non-Designated Hospitals to Trauma Centers

EMS Region	Trauma Admissions	Transfers to Trauma Centers	Percent Transferred
Blue Ridge	30	1	3%
Federation	85	10	12%
N. Virginia	73	4	5%
Old Dominion	80	15	19%
Peninsulas	14	2	14%
Southwest	38	4	10%
Tidewater	33	3	9%
Western	30	5	17%
Statewide	**383**	**44**	**11%**

Note: There are no Trauma Centers in the Blue Ridge EMS Region.

Source: Statewide Trauma Registry Data, 1994, Office of EMS

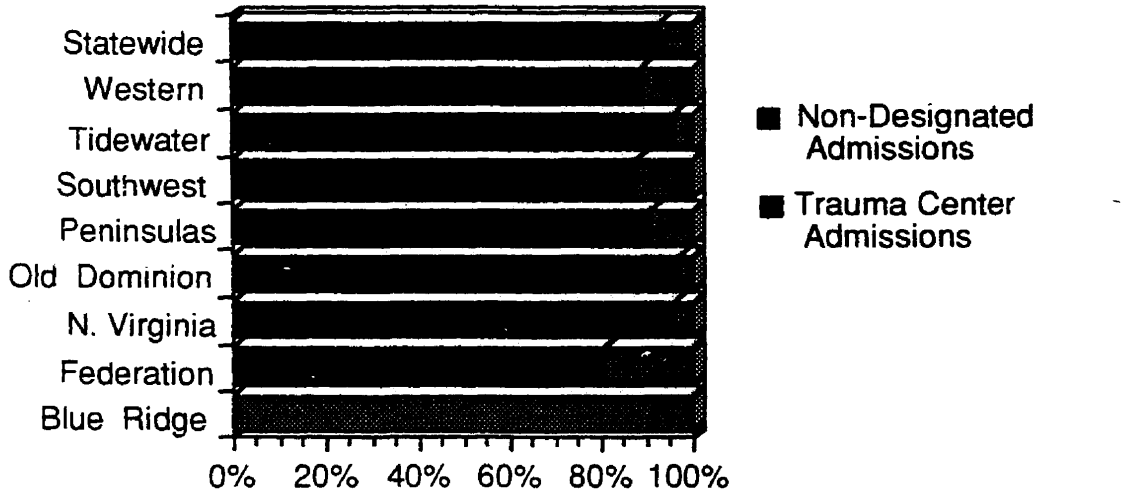
The Vast Majority of the Most Seriously Injured Patients (ISS >24) Were Admitted to Trauma Centers; However, Some Patients Were Admitted to Non-Designated Hospitals

Statewide trauma registry data indicate that the vast majority (93%) of the most seriously injured patients were admitted to the trauma centers. Of the 972 patients with an ISS >24, 899 were admitted to trauma centers, while 73 patients were admitted to non-designated hospitals. There is, however, variation among the regions in where these patients are admitted. Figure 14 illustrates the variation among the eight regions.

In reviewing the data in Figure 14, it is important to note the actual number of admissions to non-designated hospitals in some regions is quite small. The numbers of patients admitted to non-designated hospitals with an ISS >24 were as follows: Blue Ridge - 2, Federation - 29, Northern Virginia - 7, Old Dominion - 9, Peninsulas - 2, Southwest - 8, Tidewater - 6, and Western - 10.

Figure 14

Admissions of the 972 Most Seriously Injured Trauma Patients (ISS >24): Trauma Centers and Non-Designated Hospitals



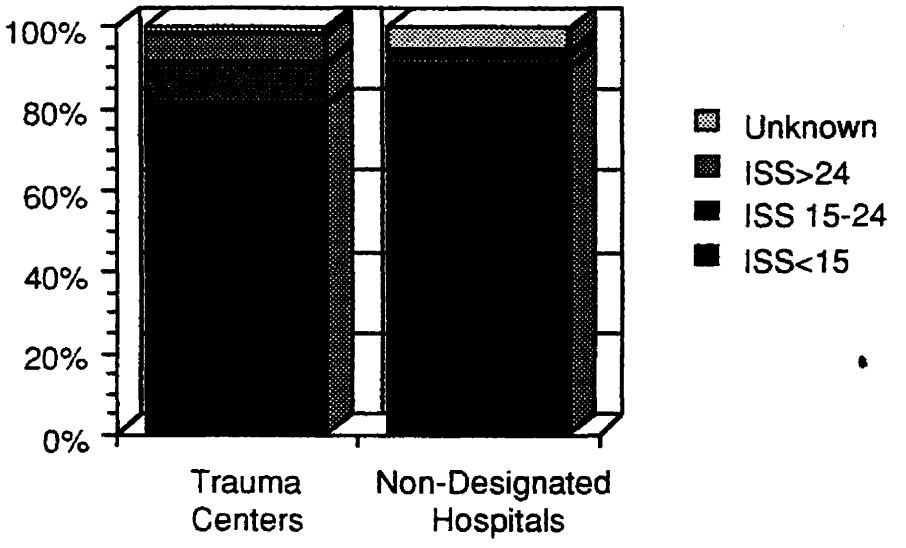
Note: There are no Trauma Centers in the Blue Ridge EMS Region.
Source: Statewide Trauma Registry Data. 1994, Office of EMS

Overall, the Trauma Centers' Patient Mix Had a Greater Concentration of More Seriously Injured Patients than Non-Designated Hospitals

An analysis of the trauma patient census of trauma centers and non-designated hospitals indicates that there was a greater percentage of more seriously injured patients in the trauma centers than in the non-designated hospitals. As seen in Figure 15, 81% of the patients admitted to trauma centers had an ISS <15, whereas these patients represented 90% of trauma admissions at non-designated hospitals. Approximately 10% of the trauma centers' patients had an ISS between 15 and 24; these patients accounted for 3% of the admissions at non-designated hospitals. The most critically injured patients (ISS >24) comprised 7% of the trauma centers' admissions; these patients accounted for less than 1% of trauma admissions at non-designated hospitals.

Figure 15

Trauma Patient Mix in
Trauma Centers and Non-Designated Hospitals



Source: Statewide Trauma Registry Data, 1994, Office of EMS

V.
Pre-Hospital and Inter-Hospital Triage Plans in Other States

Eighteen States and the District of Columbia Have Administrative Organizations With Legal Authority to Establish Trauma Centers

Based on research published in 1995 by Bazzoli et al, 18 states (including Virginia) and the District of Columbia, have administrative organizations with legal authority to establish trauma centers. Three of the states, California, Florida and Massachusetts, have regional authorities that operate only in certain areas of the state.

The Trauma Systems in Other States Are Very Similar to Virginia

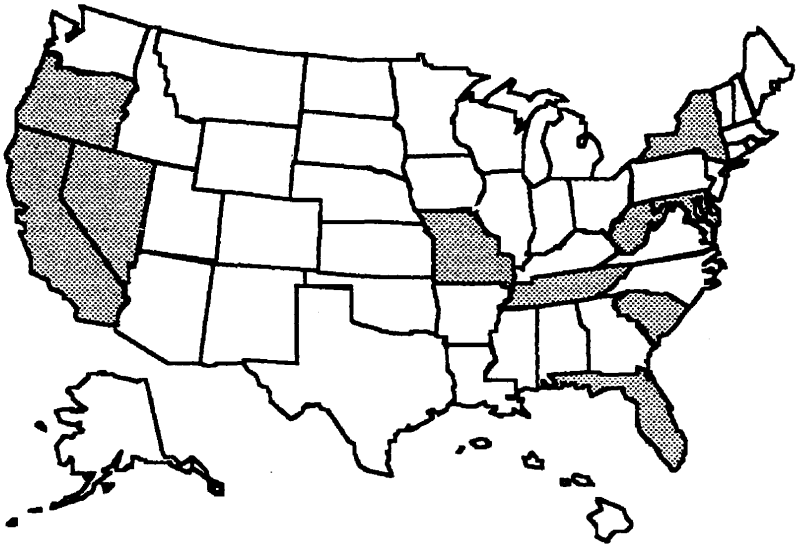
All of the 19 systems use the standards published by the American College of Surgeons for designating trauma centers. Like Virginia, nearly all of the 19 systems designate hospitals as Level I, Level II, or Level III trauma centers. There are formal designation processes in each system which require hospitals to meet specific criteria in order to be designated as a trauma center.

Trauma registries exist in each system in which data regarding trauma admissions is submitted to the system's administrative authority. While a trauma registry exists in each system, unlike Virginia, 13 states do not require non-designated centers to submit data. Thus, Virginia's trauma registry is more comprehensive.

11 of the 19 Trauma Systems Have Adopted Standardized Pre-Hospital Triage Protocols

According to the research by Bazzoli, et al, 11 of the 19 trauma systems across the country have adopted standardized pre-hospital triage protocols. Figure 16 identifies those states with standardized pre-hospital triage protocols.

Figure 16
Standardized Pre-Hospital Triage Protocols in Other States



Note: California and Florida are regional systems

Source: Bazzoli, et al, Journal of American Medical Association, Feb. 1995, Vol. 273, No. 5

While these 11 systems have adopted standardized protocols, it is unknown whether the protocols include specific guidance as to when a patient should be transported to a trauma center. For instance, the Maryland Medical Protocols include a section specifically for trauma patients. This section of the protocols includes specific instructions as to what care the pre-hospital provider should render to a trauma victim; however, the protocols do not include specific statements as to when patients should be transported to a trauma center versus a non-designated hospital. The Maryland protocol entitled "Indication for Referral To Trauma Center" simply states "*...The goal of pre-hospital care is to deliver a viable patient to definitive care. Ten trauma centers in the state are available to provide definitive care.*" The protocols identify criteria for use in the triage decision, but stops short of identifying which patients should be transported to a trauma center.

Standardized Protocols for Inter-Hospital Transfer of Trauma Patients Exist in Only Seven Trauma Systems

Bazzoli identified seven trauma systems (California, Illinois, Maryland, New York, Oregon, South Carolina, and Washington, D.C.) as having standardized protocols for inter-hospital transfer of trauma patients. (In California, inter-hospital protocols exist in 9 of the 12 regional systems; in Florida, 4 of the 5 regional systems have protocols.)

The protocols in four of these systems (Maryland, New York, Oregon, and Washington, D.C.) specifically identify which patients are to be transferred.

VI.
Summary

Research Has Shown That Trauma Centers and Trauma Systems Reduce Mortality and Morbidity of Critically Injured Patients

There are numerous studies which have shown that the implementation of a trauma system with designated trauma centers reduces preventable deaths, and reduces the disabilities often associated with trauma injuries. Several researchers have concluded that critically injured trauma patients treated in trauma centers have better survival rates than those treated at non-designated hospitals.

There is general agreement that the in-house surgical staff and immediate access to surgical procedures 24 hours per day in trauma centers is the single most valuable feature of the trauma center.

Virginia Has Implemented a Trauma System and Trauma Center Designation Program; However, No Statewide Pre-Hospital or Inter-Hospital Triage Protocols Exist

Virginia has implemented a statewide trauma system and a trauma center designation program which parallel those implemented in other states. The system includes many of the same features that exist in other states. The trauma center designation program is based on universally accepted criteria for recognizing hospitals as Level I, Level II or Level III Trauma Centers.

While there is a formal program for designating trauma centers in Virginia, there currently are no statewide protocols in place to assure that injured patients are transported to the nearest, most appropriate acute care facility. Protocols for inter-hospital transfer of critically injured patients also are lacking.

Trauma Registry Data Indicate That Nearly All of the Most Critically Injured Trauma Patients are Being Admitted to Trauma Centers, However, There is a Significant Number of Seriously Injured Patients Who Are Not Being Admitted to Trauma Centers; Variation In Triage Practices Exists Among the EMS Regions

The trauma registry data for 1994 indicate that most of the seriously injured patients, those with an Injury Severity Score (ISS) greater than 15, were admitted to the trauma centers. This is particularly true for the most critically injured patients (i.e. ISS>24). Approximately 93% of these patients were admitted to a trauma center. Only 73 of the 972 patients with the most critical injuries were admitted to a non-designated hospital. While this number is small

relative to the total number of trauma victims in Virginia, research suggests that patients with these critical injuries have a greater chance of survival in a trauma center.

For those seriously injured patients with an ISS between 15 and 24, nearly one-quarter (24%) of these patients were not admitted to a trauma center. Moreover, there is substantial variation in how trauma victims are triaged among the eight EMS Regions. The percentage of patients with an ISS of 15-24 admitted to non-designated hospitals ranged from 13% in the Tidewater Region to 32% in the Federation region and 31% in Northern Virginia and Southwest regions. Of these patients initially admitted to a non-designated hospital, only 11% were transferred to a trauma center. Again, there is variation among the EMS Regions with respect to patient transfer practices, ranging from 3% in the Blue Ridge Region to 19% in the Old Dominion Region.

While This Study Does Not Evaluate the Level or Quality of Care Provided at Virginia's Trauma Centers or Non-Designated Hospitals, In View of the Research That Indicates Trauma Centers Have Better Survival Rates and Outcomes, Critically Injured Patients Not Admitted to Trauma Centers May Be Experiencing Less Than Optimal Outcomes

As noted previously, this study does not attempt to evaluate the level, appropriateness or quality of care provided by Virginia's trauma centers and non-designated hospitals. Detailed analysis far beyond the scope of this study would be needed to conduct such an evaluation. However, in view of the substantial amount of research that indicates trauma patients admitted to trauma centers have higher survival rates and lower morbidity, those seriously injured patients (ISS>15) in Virginia who are not being admitted or transferred to a trauma center may be experiencing less than optimal outcomes.

Statewide Triage Protocols for Trauma Patients May Enhance the Effectiveness of Virginia's Trauma System

Inasmuch as triage protocols direct critically injured patients to the nearest, most appropriate acute care facility, implementing such protocols in Virginia may enhance the effectiveness of Virginia's trauma system. Such protocols could enhance patient care for trauma victims, and make more efficient use of Virginia's trauma centers. Triage protocols likely would increase the number of more critically injured patients being admitted to trauma centers, and increase the number of less seriously injured patients being admitted to non-designated centers.

Statewide protocols, if implemented, would have to be developed with input from various emergency medical personnel at the non-designated hospitals and the trauma centers, as well as the State EMS Advisory Board, the Critical Care Committee, the Office of EMS, the Regional EMS Councils and pre-hospital providers. Statewide protocols would have to include sufficient flexibility to accommodate unique circumstances that exist locally. Input and acceptance of the criteria from non-designated hospitals and pre-hospital providers would be critical to the success of such guidelines.

VII.
Policy Options

Based on the analysis and findings of this study, the following policy options are offered for consideration by the Joint Commission on Health Care.

Option I: Maintain the status quo.

Option I would maintain the status quo and not pursue implementation of a statewide pre-hospital and inter-hospital triage plan.

Option II: Introduce a Study Resolution Directing the Office of EMS, in Cooperation with the EMS Advisory Board, the Critical Care Committee, the Regional EMS Councils, and Representatives of the Emergency Medical Services Community to Study Further the Number of Preventable Trauma Deaths in Virginia and Ascertain Whether a Statewide Triage Plan Would Reduce These Preventable Deaths

While the analysis in this study indicates that some critically injured patients are not being admitted or transferred to a trauma center for care, the analysis does not indicate whether there are preventable deaths and increased morbidity resulting from these hospital admission patterns. Option II would call for a more detailed study into this issue to determine the degree to which the current triage of patients may be resulting in preventable deaths and increased morbidity.

Option III: Introduce a Resolution Directing the Office of EMS, in Cooperation with the EMS Advisory Board, the Critical Care Committee, the Regional EMS Councils, the Trauma Centers, the Virginia Hospital Association, the Virginia Chapter of the American College of Emergency Physicians, Representatives of the Emergency Medical Services Community and Pre-Hospital Providers, and Other Appropriate Organizations to Develop a Draft Statewide Pre-Hospital and Inter-Hospital Triage Plan and Present the Draft Plan to the Governor and the Joint Commission on Health Care

In Option III, the Joint Commission would introduce a resolution directing the Office of EMS to coordinate the development of a draft statewide pre-hospital and inter-hospital triage plan and present the plan to the Governor and the Joint Commission on Health Care. Presenting a draft triage plan would ensure sufficient input into the process by the various interested parties, and would allow for review of the plan prior to deciding whether to introduce legislation to implement the plan.

Option IV: Introduce Legislation Requiring the Board of Health to Establish and Implement a Statewide Pre-Hospital and Inter-Hospital Triage Plan

In Option IV, the Joint Commission would introduce legislation to include the development and implementation of a statewide pre-hospital and inter-hospital triage plan as part of the Board of Health's overall responsibility for administering the state's trauma system.

Appendix A

American College of Surgeons' Hospital Criteria for Trauma Facility Designation

CHAPTER 6

HOSPITAL CRITERIA

The following table shows levels of categorization and their essential (E) or desirable (D) characteristics.

	LEVELS			
	I	II	III	IV
A. HOSPITAL ORGANIZATION				
1. Trauma Service (see chapter 5)	E	E	E	—
2. Trauma Service Director (see chapter 5)	E	E	E	—
3. Trauma Multidisciplinary Committee (see chapter 16, table 2)	E	E	D	—
4. Hospital Departments/Divisions/Sections				
a. General Surgery	E	E	E	D
b. Neurologic Surgery	E	E	D	—
c. Orthopaedic Surgery	E	E	D	—
d. Emergency Services	E	E	E	D
e. Anesthesia	E	E	E	—
B. CLINICAL CAPABILITIES				
Specialty Availability				
1. In-house 24 hours a day:				
a. General Surgery	E[1]	E[1]	—	—
b. Neurologic Surgery	E[2]	E[2]	—	—
c. Emergency Medicine	E[3]	E[3]	E[4]	—
d. Anesthesiology	E[5]	E[5,6]	—	—
2. On call and promptly available[7]				
a. Anesthesiology	—	—	E[8]	D
b. Cardiac Surgery	E	D	—	—
c. Cardiology	E	E	D	—
d. General Surgery	—	—	E[9]	D
e. Hand Surgery	E	D	—	—
f. Infectious Disease	E	D	—	—
g. Internal Medicine	E[10]	E[10]	E[10]	—
h. Microvascular Surgery (replant/flaps)	E	D	—	—
i. Neurologic Surgery	—	—	D	—
j. Obstetric/Gynecologic Surgery	E	E	D	—
k. Ophthalmic Surgery	E	E	D	—
l. Oral/Maxillofacial Surgery	E	E	—	—
m. Orthopaedic Surgery	E	E	D	—

	LEVELS I	II	III	IV
n. Pediatric Surgery[11]	E	D	—	—
o. Pediatrics[10]	E	E	D	—
p. Plastic Surgery	E	E	D	—
q. Pulmonary Medicine	E	E	—	—
r. Radiology	E	E	D	D
s. Thoracic Surgery	E[12]	E[12]	—	—
t. Urologic Surgery	E	E	D	—
C. FACILITIES/RESOURCES/CAPABILITIES				
1. Emergency department (ED)				
a. Personnel (see chapter 5)				
1) Designated physician director	E	E	E	D
2) Physician who has special competence in care of critically injured and who is a designated member of the trauma team and is physically present in the ED 24 hours a day	E[3]	E[3]	E	—
3) Nursing personnel with special capability in trauma care who provide continual monitoring of the trauma patient from hospital arrival to disposition in ICU, OR, or patient care unit	E	E	E	D
b. Equipment for resuscitation of patients of all ages shall include but not be limited to:				
1) Airway control and ventilation equipment, including laryngoscopes and endotracheal tubes of all sizes, bag-mask resuscitator, pocket masks, and oxygen	E	E	E	E
2) Pulse oximetry	E	E	E	D
3) End-tidal CO_2 determination	E	E	D	D
4) Suction devices	E	E	E	E
5) Electrocardiograph-oscilloscope-defibrillator	E	E	E	E
6) Apparatus to establish central venous pressure monitoring	E	E	E	D
7) Standard intravenous fluids and administration devices, including large-bore intravenous catheters	E	E	E	E
8) Sterile surgical sets for				
a) Airway control/cricothyrotomy	E	E	E	E
b) Thoracotomy	E	E	E	D
c) Vascular access	E	E	E	E
d) Chest decompression	E	E	E	E
9) Gastric decompression	E	E	E	E
10) Drugs necessary for emergency care	E	E	E	E
11) X-ray availability, 24 hours a day	E	E	E	D
12) Two-way communication with vehicles of emergency transport system	E	E	E	E
13) Skeletal traction devices, including capability for cervical traction	E	E	E	D
14) Arterial catheters	E	E	D	D
15) Thermal control equipment				
a) For patient	E	E	E	E
b) For blood and fluids	E	E	E	D

	LEVELS I	II	III	IV
2. Operating suite				
a. Personnel and operating room				
Operating room adequately staffed in-house and immediately available 24 hours a day	E	E	D	—
b. Equipment for all ages shall include but not be limited to:				
1) Cardiopulmonary bypass capability	E	D	—	—
2) Operating microscope	E	D	—	—
3) Thermal control equipment				
a) For patient	E	E	E	—
b) For blood and fluids	E	E	E	—
4) X-ray capability including c-arm image intensifier available 24 hours a day	E	E	D	—
5) Endoscopes	E	E	D	—
6) Craniotomy instruments	E	E	D	—
7) Equipment appropriate for fixation of long-bone and pelvic fractures	E	E	D	—
3. Postanesthetic recovery room (surgical intensive care unit is acceptable)				
a. Registered nurses and other essential personnel 24 hours a day	E	E	E	—
b. Equipment for the continuous monitoring of temperature, hemodynamics, and gas exchange	E	E	E	—
c. Equipment for the continuous monitoring of intracranial pressure	E	E	D	—
d. Pulse oximetry	E	E	E	—
e. End-tidal CO_2 determination	E	E	D	—
f. Thermal control	E	E	E	—
4. Intensive care units (ICUs) for trauma patients				
a. Personnel				
1) Designated surgical director of trauma patients	E	E	E	—
2) Physician, with privileges in clinical care and approved by the trauma director, on duty in ICU 24 hours a day or immediately available in hospital (see chapter 16)	E	E[1]	D	—
b. Equipment				
Appropriate monitoring and resuscitation equipment (see chapter 10)	E	E	E	—
c. Support services				
Immediate access to clinical diagnostic services	E[2]	E[2]	E[2]	—
5. Acute hemodialysis capability	E	D	—	—
6. Organized burn care	E	E	E	E
a. Physician-directed burn center staffed by nursing personnel trained in burn care and equipped properly for care of the extensively burned patient (see chapter 12)				
OR				
b. Transfer agreement with burn center				
7. Acute spinal cord/head injury management capability	E	E	E	E
a. In circumstances in which a designated spinal cord injury rehabilitation center exists in the region, early transfer should be considered; transfer agreements should be in effect				

	LEVELS I	II	III	
OR				
b. In circumstances in which a head injury center exists in the region, transfer should be considered in selected patients; transfer agreements should be in effect				
8. Radiological special capabilities				
a. In-house radiology technician 24 hours a day	E	E	E[14]	—
b. Angiography	E	E	D	—
c. Sonography	E	E	D	—
d. Nuclear scanning	E	D	D	—
e. Computed tomography (CT)	E	E	D	—
f. In-house CT technician 24 hours a day	E[14]	E[14]	D	—
g. Neuroradiology	E	D	—	—
9. Rehabilitation				
a. Rehabilitation service staffed by personnel trained in rehabilitation care and equipped properly for acute care of the critically injured patient	E	E	D	—
b. Full in-house service or transfer agreement to a rehabilitation service for long-term care	E	E	E	E
10. Clinical laboratory service (available 24 hours a day)				
a. Standard analyses of blood, urine, and other body fluids	E	E	E	D
b. Blood typing and cross-matching	E	E	E	D
c. Coagulation studies	E	E	E	D
d. Comprehensive blood bank or access to a community central blood bank and adequate storage facilities	E	E	E	D
e. Blood gases and pH determinations	E	E	E	D
f. Microbiology	E	E	E	D
g. Drug and alcohol screening	E	E	D	D
D. QUALITY IMPROVEMENT				
1. Quality improvement programs (see chapter 16)	E	E	E	E
2. Trauma registry	E	E	E	E
3. Special audit for all trauma deaths	E	E	E	E
4. Morbidity and mortality review	E	E	E	E
5. Trauma conference, multidisciplinary	E	E	E	D
6. Medical nursing audit, utilization review, tissue review	E	E	E	E
7. Review of prehospital trauma care	E	E	E	D
8. Published on-call schedule must be maintained for surgeons, neurosurgeons, orthopaedic surgeons, and other major specialists	E	E	E	D
9. Times of and reasons for trauma-related bypass must be documented and reviewed by quality improvement program	E	E	E	—
10. Quality improvement personnel dedicated to and specific for the trauma program	E	E	D	D
E. OUTREACH PROGRAM				
Telephone and on-site consultations with physicians of the community and outlying areas	E	E	—	—

	LEVELS I	II	III	IV
F. PREVENTION/PUBLIC EDUCATION				
1. Epidemiology research				
a. Conduct studies in injury control	E	D	—	—
b. Collaborate with other institutions in research	E	D	D	D
c. Monitor progress of prevention programs	E	D	D	D
d. Consult with qualified researchers on evaluation measures[15]	E	D	D	D
2. Surveillance				
a. Special ED and field collection projects[16]	E	D	—	—
b. Expanded trauma registry data[17]	E	D	D	—
c. Minimal trauma registry data	E	E	E	D
3. Prevention				
a. Designated prevention coordinator[18]	E	E	D	—
b. Outreach activities and program development	E	E	D	—
c. Information resource	E	E	D	—
d. Collaboration with existing national, regional, and state programs	E	E	D	D
G. TRAUMA RESEARCH PROGRAM[19]				
1. Organized program with designated director	E	D	—	—
2. Regular meeting of research group	E	D	—	—
3. Evidence of productivity				
a. Proposals reviewed by IRB	E	D	—	—
b. Presentation at local/regional/national meetings	E	D	—	—
c. Publications in peer-reviewed journals	E	D	—	—
H. CONTINUING EDUCATION				
Formal programs in continuing education provided by hospital for:				
1. Staff physicians	E	E	D	—
2. Nurses	E	E	E	D
3. Allied health personnel	E	E	E	D
4. Community physicians	E	E	D	—
I. TRAUMA SERVICE SUPPORT PERSONNEL				
Trauma coordinator	E	E	D	D
J. ORGAN PROCUREMENT ACTIVITY				
(See appendix B)	E	E	E	—
K. TRANSFER AGREEMENTS				
1. As transferring facility	D	E	E	E
2. As receiving facility	E	E	D	—

NOTES

The Committee on Trauma believes the active involvement of the trauma surgeon is crucial to optimal care of the injured patient in all phases of management, including resuscitation, identification and prioritization of injuries, therapeutic decisions, and operative procedures.

In both Level I and II facilities the 24-hour in-house availability of the attending trauma surgeon is the most direct method for providing this involvement. However, alternative methods for providing immediate availability of the attending surgeon are also acceptable.

In hospitals with residency programs, evaluation and treatment may be started by a team of surgeons that will include a PGY4 or

APPENDIX B

SENATE JOINT RESOLUTION NO. 353

Requesting the Joint Commission on Health Care to study the need for and efficacy of establishing a pre-hospital and inter-hospital triage and transport plan to ensure that trauma patients are being served in the closest appropriate trauma facility.

Agreed to by the Senate, February 7, 1995
Agreed to by the House of Delegates, February 22, 1995

WHEREAS, delivery of health care services to critically injured patients in a timely and proper manner is a matter of life or death; and

WHEREAS, medical research and literature confirm that getting a trauma patient to the nearest appropriate trauma facility capable of caring for that patient saves lives and health care costs and can mean a difference in patient outcome; and

WHEREAS, several states have developed plans and implemented systems to ensure that pre-hospital assessments (triage) are done and the patient is delivered to the nearest appropriate trauma center capable of caring for those identified medical needs; and

WHEREAS, there is evidence that citizens of the Commonwealth are being transported by pre-hospital providers by ground and air transport to trauma centers which are not closest to the scene, and in some cases patients are taken out of state, when appropriate level trauma centers are available in closer proximity to the patient; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That the Joint Commission on Health Care be requested to study the need and efficacy of establishing a pre-hospital and inter-hospital triage and transport plan to ensure that trauma patients are being served in the closest trauma facility. In conducting this study, the joint commission shall seek the input and expertise of representatives of the Emergency Medical Services (EMS) and other interested parties.

The Joint Commission on Health Care shall provide staff support for the study. All agencies of the Commonwealth shall provide assistance to the commission, upon request.

The Joint Commission on Health Care shall complete its work in time to submit its findings and recommendations to the Governor and the 1996 Session of the General Assembly as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents.

APPENDIX C

Joint Commission on Health Care

Summary of Public Comments on Draft Issue Brief 7:
Pre-Hospital and Inter-Hospital Triage of Trauma Patients

Comments regarding the "Pre-Hospital and Inter-Hospital Triage of Trauma Patients" Issue Brief were received from the following 5 interested parties:

Sentara Health System
The League of Virginia Health Systems
Dr. David H. Lander, M.D., Montgomery Regional Hospital
Chippenham Medical Center
The Virginia Chapter of the American College of Surgeons

Policy Options Presented in Issue Brief

Four policy options were presented in the Issue Brief for consideration by the Joint Commission on Health Care.

Option I: Maintain the status quo.

Option II: Introduce a Study Resolution Directing the Office of EMS, in Cooperation with the EMS Advisory Board, the Critical Care Committee, the Regional EMS Councils, and Representatives of the Emergency Medical Services Community to Study Further the Number of Preventable Trauma Deaths in Virginia and Ascertain Whether a Statewide Triage Plan Would Reduce These Preventable Deaths

Option III: Introduce a Resolution Directing the Office of EMS, in Cooperation with the EMS Advisory Board, the Critical Care Committee, the Regional EMS Councils, the Trauma Centers, the Virginia Hospital Association, the Virginia Chapter of the American College of Emergency Physicians, Representatives of the Emergency Medical Services Community and Pre-Hospital Providers, and Other

Appropriate Organizations to Develop a Draft Statewide Pre-Hospital and Inter-Hospital Triage Plan and Present the Draft Plan to the Governor and the Joint Commission on Health Care

Option IV: Introduce Legislation Requiring the Board of Health to Establish and Implement a Statewide Pre-Hospital and Inter-Hospital Triage Plan

Summary of Comments

In summary, the comments indicated that the report accurately described the current status of trauma care and triage of trauma patients in Virginia. Overall, the commenters supported Option III.

Summary of Individual Public Comments

Sentara Health System

Ms. Patti Forrester, Director of Public Affairs, commented in support of Option III. She stated that there is a significant number of seriously injured patients not being admitted to the appropriate trauma centers. She also indicated that the lack of consistent protocols, developed by the appropriate bodies of decision makers, contributes to this serious and life-threatening problem. Ms. Forrester commented that the requirements to be designated as a trauma center impose significant financial burdens on the institutions. She suggested that the Joint Commission seriously consider a recommendation to the General Assembly to support the cost of operating Level I trauma centers throughout the state by offering an amendment to the state budget.

The League of Virginia Health Systems

Donald L. Harris, Senior Vice President of Government Relations for INOVA Health System, commented that the League of Virginia Health Systems (the League) concurs with the study findings that trauma centers reduce mortality and morbidity of critically injured patients. He indicated that transporting patients to the closest appropriate center has been shown to significantly improve patient recovery prospects, and that triage protocols throughout Virginia should be uniform statewide to enhance the effectiveness of the trauma system. Mr. Harris strongly recommended that the Joint Commission adopt either Option III or Option IV.

Dr. David H. Lander, M.D., Montgomery Regional Hospital

Dr. Lander, Director of Emergency Services, commented that triage tools do not work very well and much ongoing controversy swirls around their utilization. He indicated, however, that he would still support the development of triage protocols. He recommended a "tiered" approach that starts with general statewide guidelines and relies heavily on a regional approach to triage guidelines. He also cautioned that protocols could disrupt appropriate patient flow, over-utilize trauma centers, and move patients away from the support of their families. He also commented that truly seriously injured patients are transported based on their medical needs, and not on any inappropriate factors.

Chippenham Medical Center

Margaret Lewis, Assistant Administrator , commented that Chippenham Medical Center and Johnston-Willis Hospital are of the opinion that there is an appropriate place for a Trauma Center designation for major head and multi-system trauma patients. She stated that the hospitals do not believe it is appropriate to extrapolate data from other regions and apply it to Virginia. She recommended Option II be pursued.

The Virginia Chapter of the American College of Surgeons (ACS)

Leonard J. Weireter, Jr., M.D., commented that the Virginia Chapter of the ACS endorses the report as an accurate description of trauma as a disease in the United States and as an accurate description of trauma care in Virginia. He stated that the Virginia State Trauma Registry has had difficulty collecting, validating and reporting data primarily due to constraints imposed by the Office of Emergency Medical Services. He commented that Option III is enthusiastically endorsed by the Virginia Chapter of the ACS.

JOINT COMMISSION ON HEALTH CARE

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