

2006 Trends in Emergency Medicine and Trauma

Virginia Office of Emergency Medical Services
Division of Trauma and Critical Care



Highlights

- Patient volume for designated trauma centers and non-designated hospitals
- Medevac and EMS for Children data
- National facts from the IOM report
- New Virginia Poison Control Network service areas
- Regional response times and levels of care



A System Saving Lives



The following are excerpts from the *Code of Virginia* as well as the *Virginia Statewide Trauma Registry Reporting Requirements*. These documents provide an insight into the data that were used in creating this report.

§ 32.1-116.1. Prehospital patient care reporting procedure; trauma registry; confidentiality.

A. In order to collect data on the incidence, severity and cause of trauma, integrate the information available from other state agencies on trauma and improve the delivery of prehospital and hospital emergency medical services, there is hereby established the Emergency Medical Services Patient Care Information System. The Emergency Medical Services Patient Care Information System shall include the prehospital patient care reporting procedure and the trauma registry.

All licensed emergency medical services agencies shall participate in the prehospital patient care reporting procedure by making available to the Commissioner or his designees the minimum data set on forms prescribed by the Board or locally developed forms which contain equivalent information. The minimum data set shall include, but not be limited to, type of medical emergency or nature of the call, the response time, the treatment provided and other items as prescribed by the Board.

Each licensed emergency medical services agency shall upon request disclose the prehospital care report to law-enforcement officials (i) when the patient is the victim of a crime or (ii) when the patient is in the custody of the law-enforcement officials and has received emergency medical services or has refused emergency medical services.

The Commissioner may delegate the responsibility for collection of this data to the Regional Emergency Medical Services Councils, Department of Health personnel or individuals under contract to the Department. The Advisory Board shall assist in the design, implementation, subsequent revisions and analyses of the data of the prehospital patient care reporting procedures.

B. All licensed hospitals which render emergency medical services shall participate in the trauma registry by making available to the Commissioner or his designees abstracts of the records of all patients admitted to the institutions' trauma and general surgery services with diagnoses related to trauma. The abstracts shall be submitted on forms provided by the Department and shall include the minimum data set prescribed by the Board.

The Commissioner shall seek the advice and assistance of the Advisory Board and the Committee on Trauma of the Virginia Chapter of the American College of Surgeons in the design, implementation, subsequent revisions and analyses of the trauma registry.
(1987, c. 480; 2002, cc. 568, 658; 2003, c. 471.)

Cases required to be reported to the Virginia Statewide Trauma Registry:

1. Injured/Trauma patients admitted to the facility with ICD9-CM codes of 348.1, 800.0 - 959.9, 994.0 and 994.1, excluding 905-909 (late effect injuries), 910-924 (blisters, contusions, abrasions and insect bites), and 930-939 (foreign bodies).

This reporting includes ALL admissions, including 23 hours admits for observation, as an inpatient; NOT emergency room observation unless held in the emergency room due to no inpatient bed availability. Patients not admitted to an inpatient status do not need to be reported. It also includes reporting all admissions for patients where the trauma codes are secondary diagnoses

2. Injured/Trauma patients transferred from one hospital to another because of acute trauma, patient may be transferred directly from the emergency department or from an inpatient unit.

3. Victims of acute trauma that die within the hospital, including, the emergency department and those who are DOA *after arrival* to the hospital.

Office of Emergency Medical Services Mission Statement

To reduce death and disability resulting from sudden or serious injury and illness in the Commonwealth through planning and development of a comprehensive, coordinated statewide EMS system; and provision of other technical assistance and support to enable the EMS community to provide the highest quality emergency medical care possible to those in need.

2006 Trauma in Virginia -Designated Trauma Centers-

All licensed hospitals are required by the *Code of Virginia* to submit data on their trauma cases to the Virginia Statewide Trauma Registry. Of those 94 licensed hospitals, 13 have been recognized as designated trauma centers. A trauma center's designation is defined by the following criteria:

Level I

Level I trauma centers have an organized trauma response and are required to provide total care for every aspect of injury, from prevention through rehabilitation. These facilities must have adequate depth of resources and personnel with the capability of providing leadership, education, research and system planning.

Level II

Level II trauma centers have an organized trauma response and are also expected to provide initial definitive care, regardless of the severity of injury. The specialty requirements may be fulfilled by on call staff, that are promptly available to the patient. Due to limited resources, Level II centers may have to transfer more complex injuries to a Level I center. Level II centers should also take on responsibility for education and system leadership within their region.

Level III

Level III trauma centers, through an organized trauma response, can provide prompt assessment, resuscitation, stabilization, emergency operations and also arrange for the transfer of the patient to a facility that can provide definitive trauma care. Level III centers should also take on responsibility for education and system leadership within their region.

Level I Trauma Centers

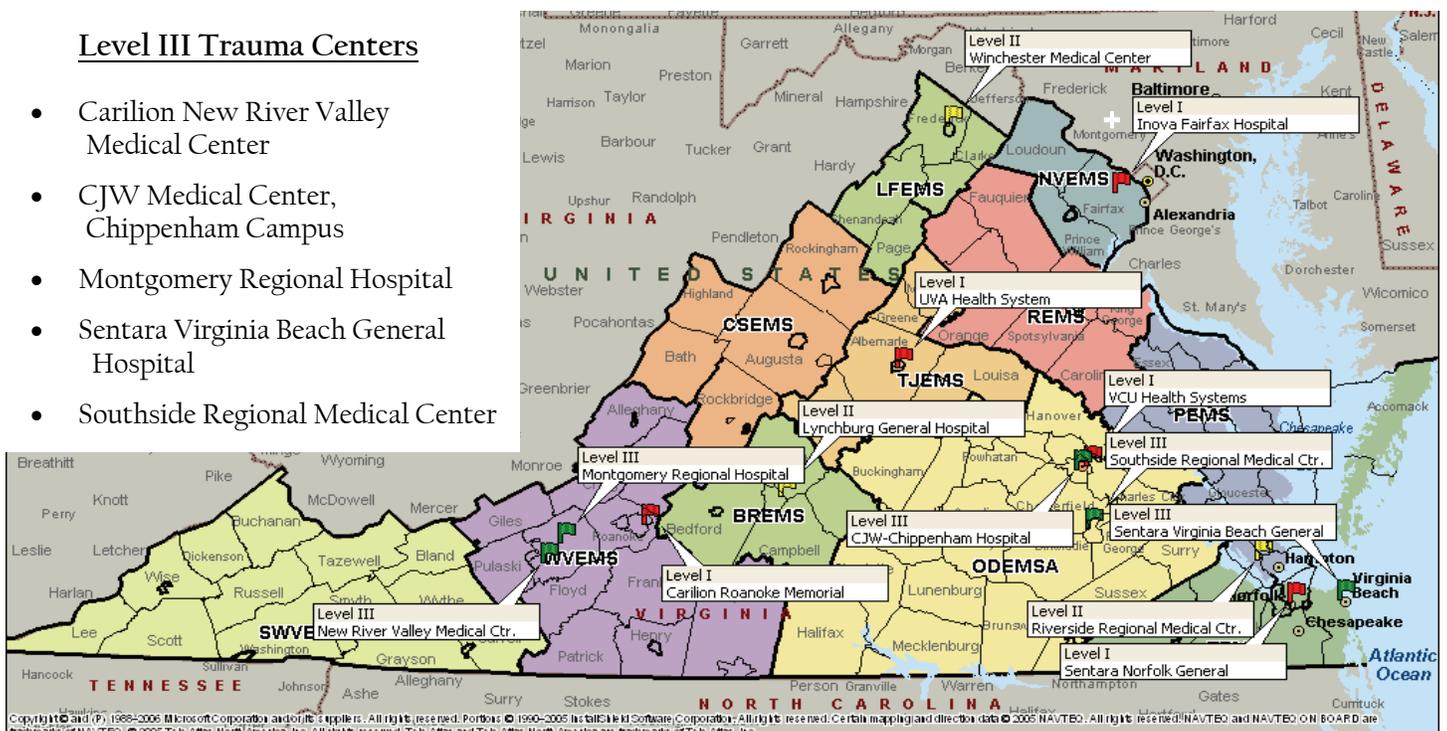
- Carilion Roanoke Memorial Hospital
- Inova Fairfax Hospital
- Sentara Norfolk General Hospital
- UVA Health System
- VCU Health Systems

Level II Trauma Centers

- Lynchburg General Hospital
- Riverside Regional Medical Center
- Winchester Medical Center

Level III Trauma Centers

- Carilion New River Valley Medical Center
- CJW Medical Center, Chippenham Campus
- Montgomery Regional Hospital
- Sentara Virginia Beach General Hospital
- Southside Regional Medical Center



2006 Trauma in Virginia -Triage-

Virginia's State Trauma Triage Plan

Under the *Code of Virginia* § 32.1-111.3, the Office of Emergency Medical Services (OEMS) acting on behalf of the Virginia Department of Health has been charged with the responsibility of developing a statewide trauma triage plan. This plan is to include pre-hospital and inter-hospital patient transfers.

The *Code* directs the collection of data through the EMS and state trauma registry and protects its ability to be used by trauma committees that report to the State EMS Advisory Board.

Recognizing the complexity of Virginia's variability in demographics and geography, the state trauma triage plan has been designed to set a template for the Regional EMS Councils to develop, monitor and revise a regional trauma triage plan. Through regional Trauma Performance Improvement Committees, issues in trauma care can be addressed.

Virginia's Trauma Triage Plan can be found at:
<http://www.vdh.virginia.gov/oems/trauma/traumacenters.asp>

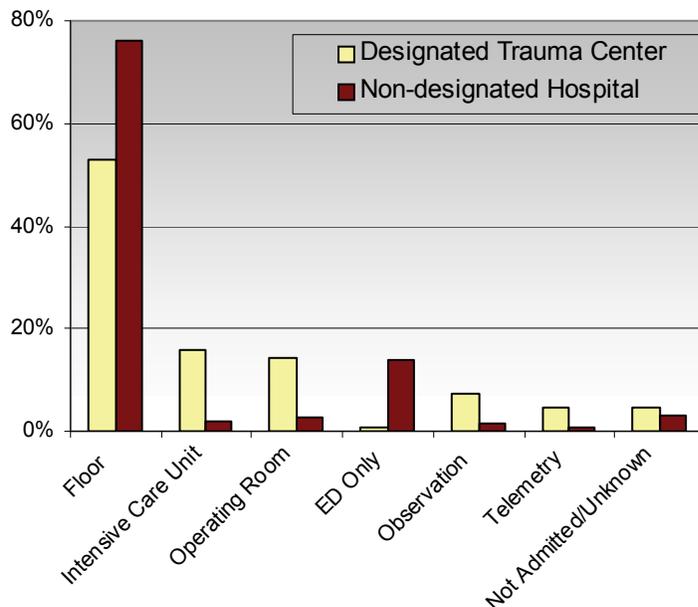
Injury Severity Scores (ISS)

DESIGNATED TRAUMA CENTER	AVERAGE ISS	NUMBER OF CASES*
—Level I—		
Carillion Roanoke Memorial	10	791
Inova Fairfax	11	2866
Sentara Norfolk General	11	1297
UVA	11	1435
VCU	11	3707
—Level II—		
Lynchburg General	8	1373
Riverside Regional	9	887
Winchester Medical	9	1219
—Level III—		
Carillion New River Valley	**	**
CJW-Chippenham	**	**
Montgomery Regional	**	**
Virginia Beach General	9	859
Southside Regional	**	**

*Represents the number of cases with a valid ISS reported

**Not currently reporting ISS

Location of Admission



Literature Brief:

Trauma Team Activation: Simplified Criteria Safely Reduces Over-triage *American Journal of Surgery, May 2007*

A retrospective review at a Level II trauma center was conducted to identify the most reliable variables for trauma triage. Logistic regression demonstrated that the following factors independently predicted the need for urgent intervention:

1. Prehospital Glasgow Coma Score <14
2. Hypotension
3. Altered respiratory effort
4. Penetrating truncal injury

When these four injuries were used as indicators, it significantly decreased over-triage and reliably identified patients with severe injury.

*Full citations of all articles can be found on page 27 of the appendix.

2006 Trauma in Virginia -Triage-

Literature Brief:

The Identification of Criteria to Evaluate Prehospital Trauma Care Using the Delphi Technique

The Journal of Trauma, March 2007

Trauma system performance improvement emphasizes outcome measures such as mortality and morbidity, with little focus upon the processes of pre-hospital trauma care. This study identifies the most important filters for auditing pre-hospital trauma care using the Delphi technique. This technique is used in research to achieve a consensus of expert opinion.

Eighty-one experts in trauma care from the United States were asked to generate filters that could be used in monitoring the pre-hospital aspect of the trauma system. They were then required to rank these questions/filters in order of importance.

Twenty-eight filters ranking in the highest tertile are proposed. The majority (54%) pertain to aspects of emergency medical services, which comprise seven of the top ten (70%) filters. Triage filters follow in priority ranking and filters concerning interfacility transfers and transportation ranked lowest.

The top ten filters of highest priority are as follows:

1. A patent airway should be maintained in all patients.
2. EMS must document the indication for cricothyroidotomy.
3. Hemorrhage control should be performed in all patients.
4. EMS must document the indication for rapid sequence intubation.
5. EMS proficiency in technical performance should be monitored annually.
6. EMS personnel should receive annual performance feedback.
7. Logistics of transportation should be a factor for dispatching air transportation.
8. Instances and causes of trauma center diversion should be monitored.
9. The indication for pre-hospital intubation should be monitored.
10. Cases of undertriage should be monitored to identify a cause.

*Full citations of all articles can be found on page 27 of the appendix

Interfacility Transports

Interfacility transports can be used as an indicator of over/under triage. Below are several triage scenarios using 2006 VSTR data.

Transferred From	Transferred To	Total
Designated Trauma Center, Level I or II	Designated Trauma Center, Level II or III	0
Designated Trauma Center, Level II or III	Designated Trauma Center, Level I or II	277
Designated Trauma Center, Any Level	Non-designated Hospital	280
Non-designated Hospital	Designated Trauma Center, Any Level	1470

Initial Transport Method Utilized

	Designated Trauma Centers	Non-designated Hospitals	Total
Ambulance	10,534	6,607	17,141
Not listed	1,035	3,927	4,962
Private Vehicle	1,533	2,616	4,149
Helicopter	1,405	7	1,412
Walk In	609	549	1,158
N/A	807	0	807
Other	147	277	424
Police Vehicle	17	43	60
Public Transportation	2	10	12

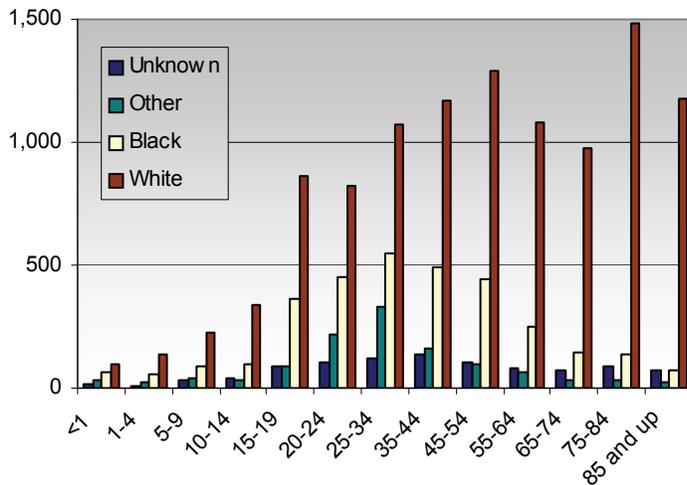
2006 Trauma in Virginia -Demographics-

National Fact:

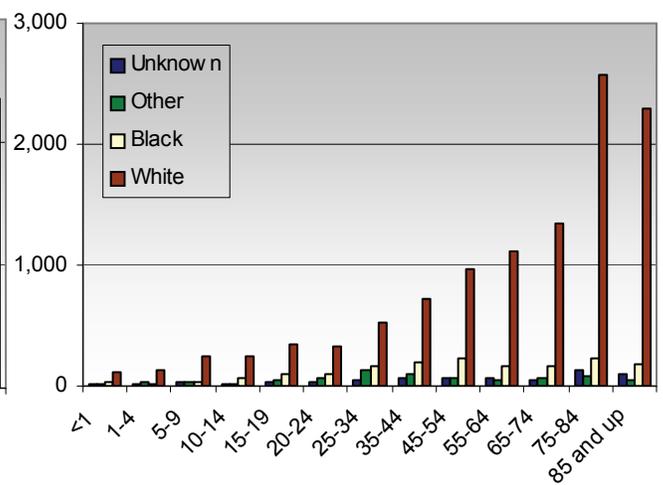
Emergency departments (ED's) today provide much of the medical care for patients without medical insurance. Insured patients also increasingly turn to the ED during times when their physician is unavailable, such as evenings and weekends, and they are often sent to the ED for tests and procedures that their physician can't easily perform in the office. In some rural communities, the hospital ED may be the main source of health care for a large percentage of residents.

2006 Institute of Medicine Report "Hospital-based Emergency Care at the Breaking Point"

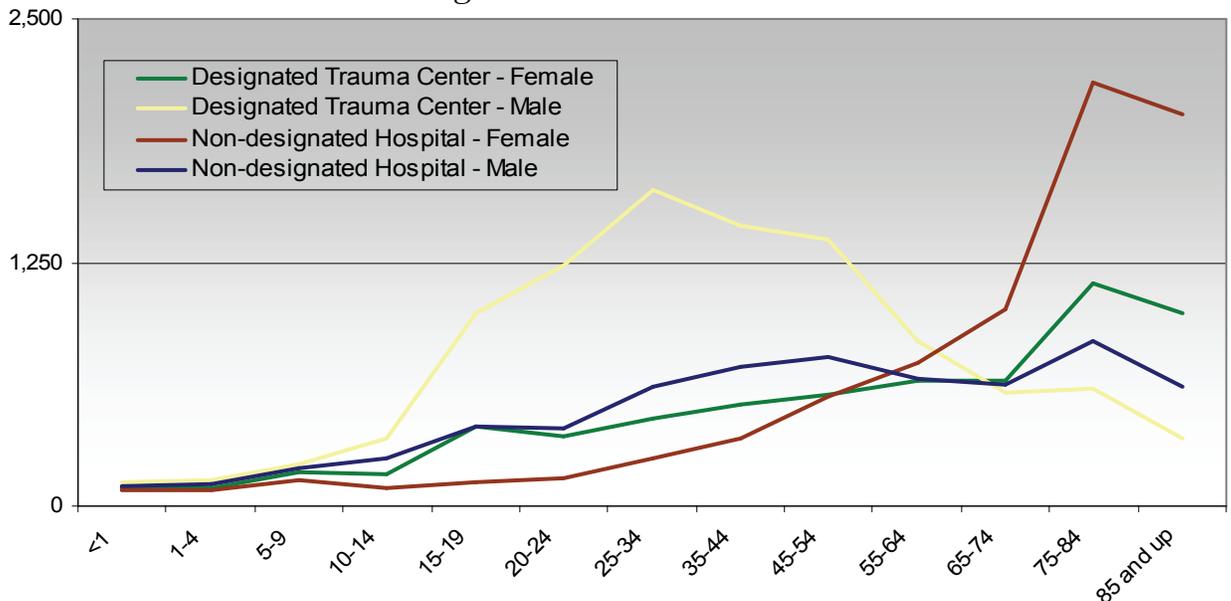
Age and Race Distribution
Designated Trauma Center



Age and Race Distribution
Non-designated Hospital



Age and Gender Distribution

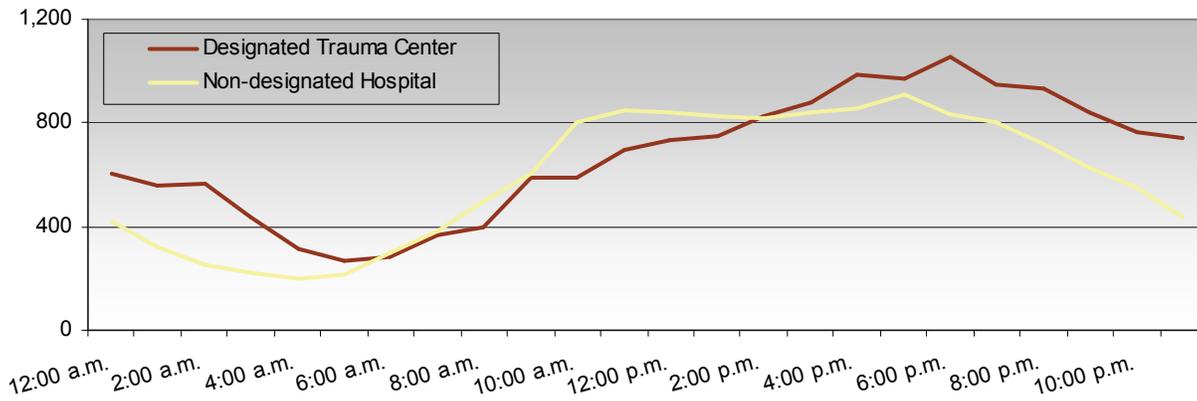


2006 Trauma in Virginia -Admissions-

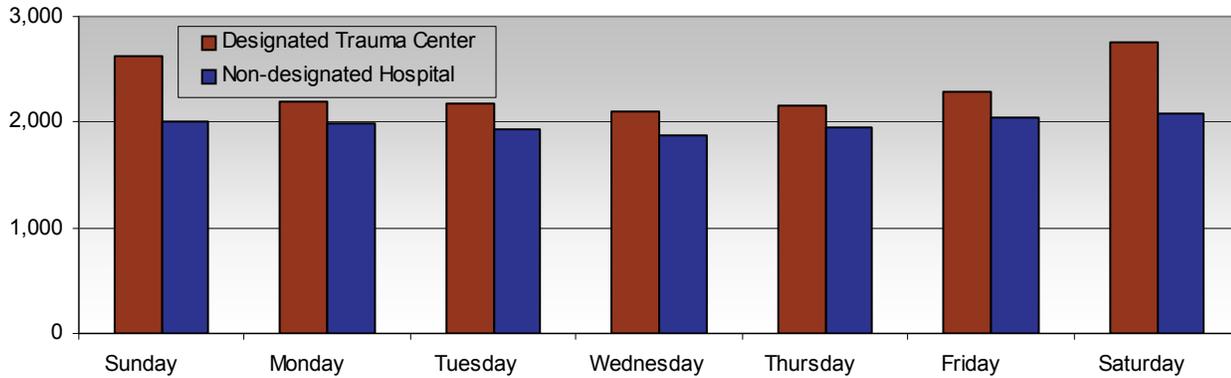
-Summary-

In 2006 there were 16,089 trauma admissions to designated trauma centers and 14,113 to non-designated hospitals. The number of admissions to non-designated hospitals rose 16% from last year while the number for trauma centers remained virtually the same.

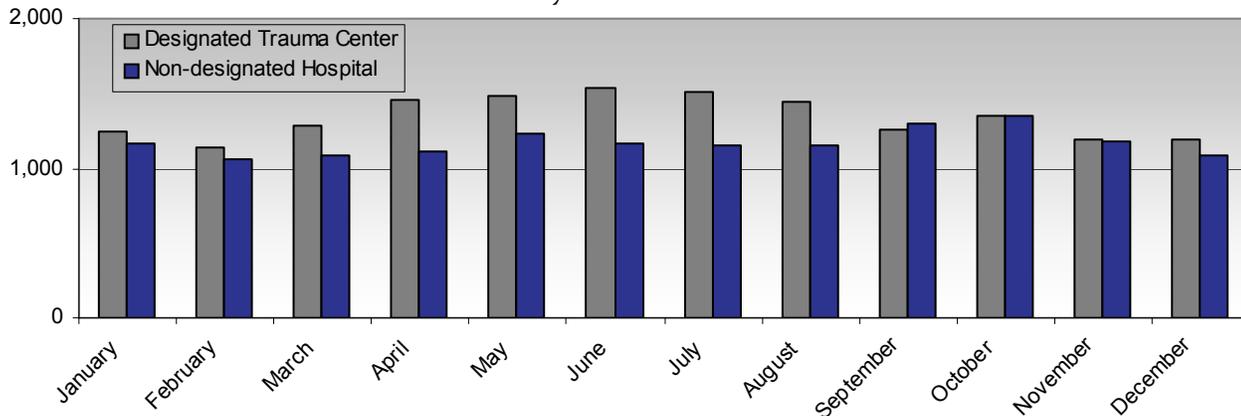
Hourly Trauma Distribution



Daily Trauma Distribution



Monthly Trauma Distribution



2006 Trauma in Virginia -Mechanism of Injury-

-Summary-

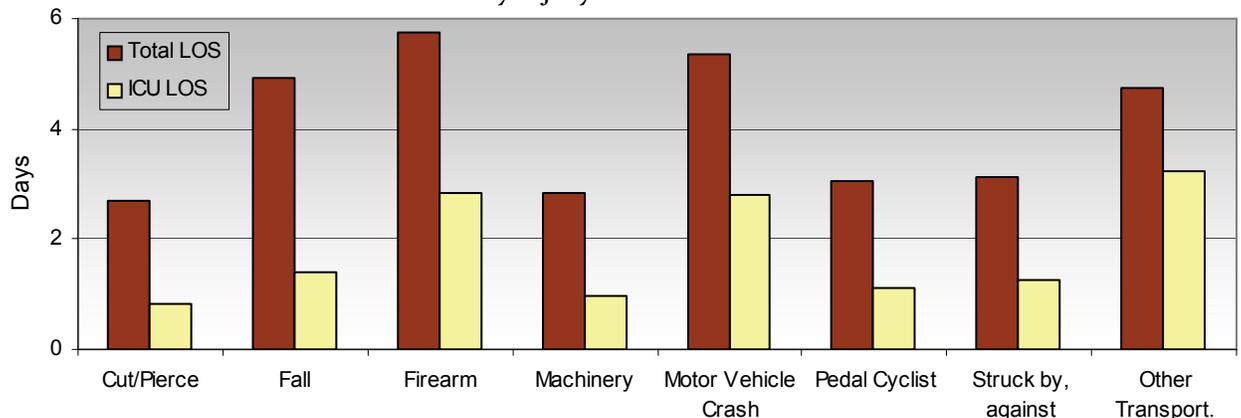
External injury codes (e-codes) permit classification of environmental events, circumstances, and conditions as the cause of injury, poisoning, and other adverse effects. For the trauma registry, e-codes relating to the mechanism of injury, as well as the location of the injury, are collected.

The table below shows the ten most commonly reported individual e-codes and the corresponding average and median length of stay. The graph on the bottom of the page shows the most common e-code groupings and the corresponding total length of stay and intensive care unit (ICU) length of stay, if applicable. In 2006 there were 467 unique e-codes reported, the ten most common (listed below) comprise 55% of all cases.

Length of Stay (LOS) for the Ten Most Common Injury Mechanisms

e-code	Mechanism Description	Average LOS (days)	Median LOS (days)	Frequency
885.9	Fall on same level, slip/trip/stumble: Other	5	4	4,822
888.9	Unspecified fall	5	4	4,097
816.0	Motor vehicle traffic accident due to loss of control, without collision on the highway: Driver of motor vehicle other than motorcycle	5	2	1,703
812.0	Other motor vehicle traffic accident involving collision with motor vehicle: Driver of motor vehicle other than motorcycle	5	2	1,397
880.9	Fall on/from stairs/steps	4	3	1,215
884.9	Fall from one level to another	4	2	964
888.8	Other unspecified fall	6	4	617
816.1	Motor vehicle traffic accident due to loss of control, without collision on the highway: Passenger in motor vehicle other than motorcycle	6	2	593
812.1	Other motor vehicle traffic accident involving collision with motor vehicle: Passenger in motor vehicle other than motorcycle	4	2	582
881.0	Fall from ladder	4	2	566

Average Total and ICU Length of Stay
by Injury Mechanism

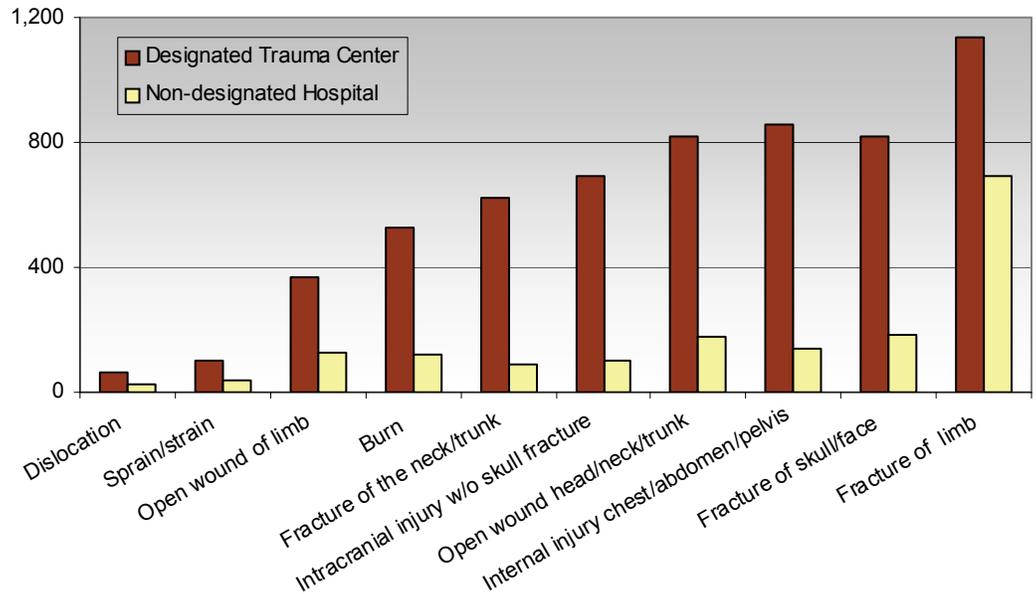


2006 Trauma in Virginia -Mechanism/Diagnosis-

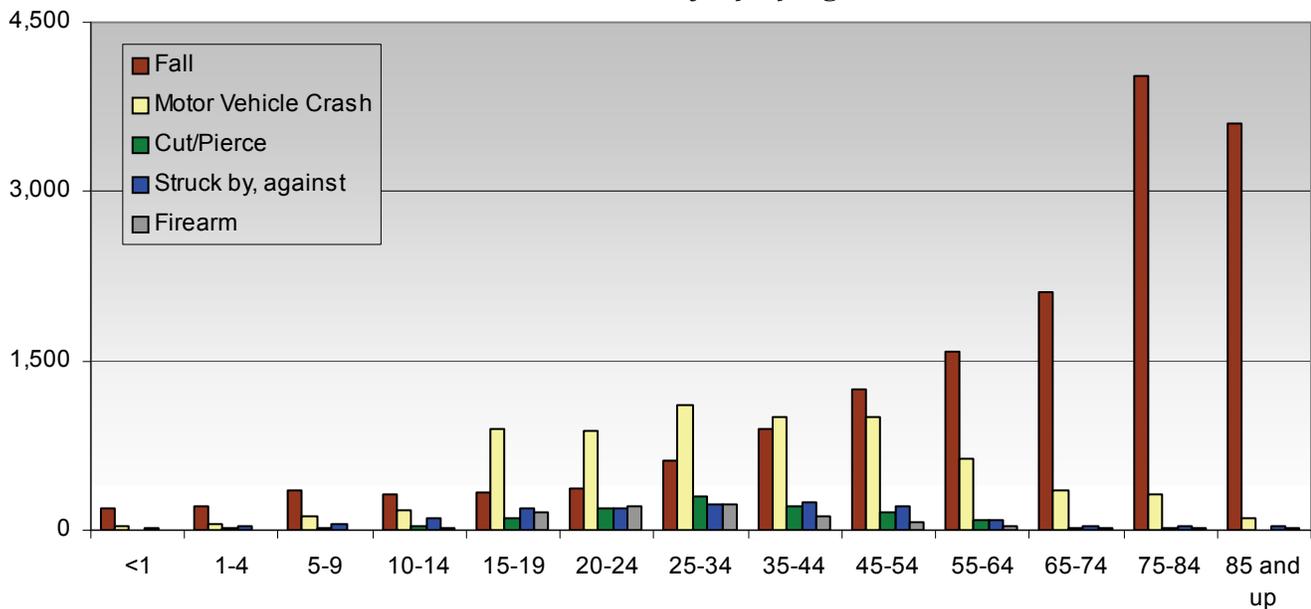
Top Ten Injury Locations

- Home
- Street/Highway
- Unspecified
- Residential institution
- Other specified place of occurrence
- Place for recreation and sport
- Industrial premises
- Public building
- Farm
- Mine/Quarry

Ten Most Common Diagnosis Groups



Mechanism of Injury by Age



National Fact:

The number of patients visiting emergency departments has been growing rapidly. There were 113.9 million ED visits in 2003, up from 90.3 million a decade earlier. During the same time, the number of facilities available to deal with these visits has been declining. Between 1993 and 2003, the total number of hospitals in the United States decreased by 703, the number of hospital beds dropped by 198,000, and the number of emergency departments fell by 425.

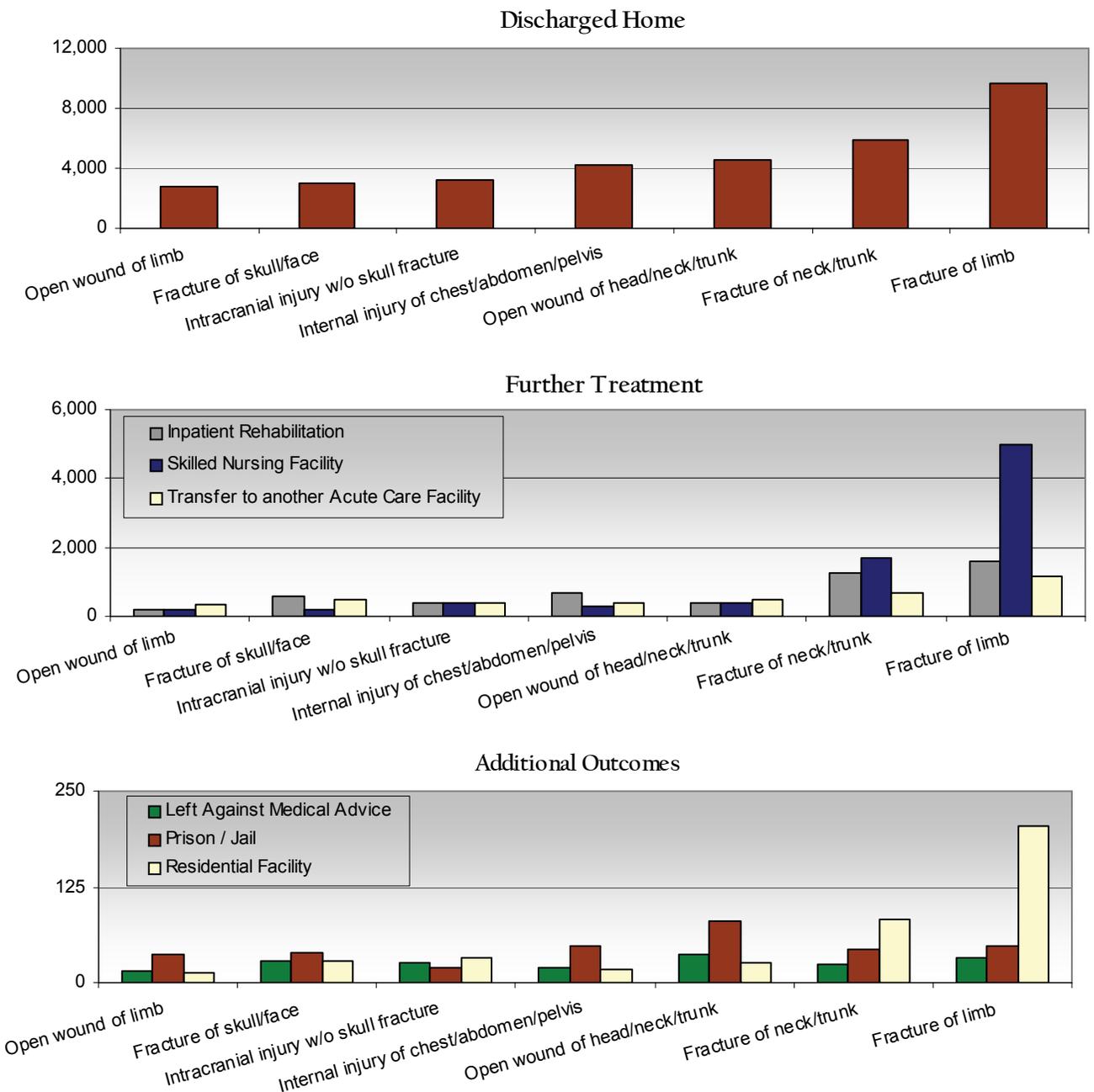
2006 Institute of Medicine Report "Hospital-based Emergency Care at the Breaking Point"

2006 Trauma in Virginia -Outcomes-

-Summary-

The overwhelming majority of trauma patients, in both designated trauma centers and non-designated hospitals, are discharged to their home. A smaller number of patients receive some type of further treatment such as being discharged to an inpatient rehabilitation or a skilled nursing facility. Those cases are primarily older patients that have suffered from pelvic/hip fractures. Transfers to another acute care facility occur when patients need a definitive level of trauma care that cannot be obtained at a Level III or non-designated hospital. The total number of deaths attributed to a traumatic injury in 2006 was just under 1,000.

Figures do not represent unique patients. A single patient may have more than one diagnosis code, for example, a patient that was 'discharged home' that had numerous fractures may be listed under 'fracture of limb' as well as 'fracture of neck/trunk', for example.



2006 Trauma in Virginia -Trauma Fund-

-Summary-

Since 2004 the Virginia Trauma Center Fund distributes funds to Virginia Designated Trauma Centers to offset the costs associated with being designated. The funds are collected from several sources including DMV license reinstatement fees and DUI fines. OEMS is the designee that is charged with developing a distribution model for these funds and providing payment to Virginia designated trauma centers. 100% of the funds collected are passed on to the qualifying hospitals on a quarterly basis.

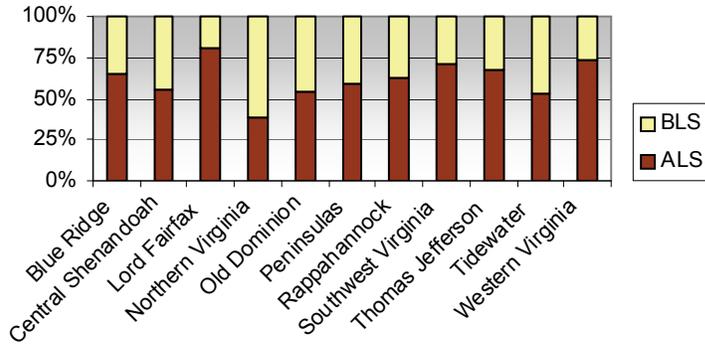
Trauma Center Level	Percent Distribution	Previous Distributions	July 2007 Payment	Total Funds Received
I				
Roanoke Memorial Hospital	7.21%	\$1,890,998.21	\$414,011.43	\$2,305,009.64
Inova Fairfax Hospital	23.54%	\$3,603,046.01	\$788,843.81	\$4,391,889.82
Norfolk General Hospital	11.83%	\$1,981,808.85	\$433,893.34	\$2,415,702.19
UVA Health System	12.99%	\$1,766,881.30	\$386,820.00	\$2,153,701.30
VCU Health Systems	29.11%	\$2,321,013.33	\$508,158.10	\$2,829,171.43
II				
Lynchburg General Hospital	2.81%	\$149,570.47	\$32,746.67	\$182,317.14
Riverside Regional Medical Ctr.	3.45%	\$185,627.65	\$40,640.95	\$226,268.60
Winchester Medical Ctr.	4.19%	\$356,565.34	\$78,065.71	\$434,631.05
III				
New River Valley Medical Ctr.	0.22%	\$33,386.28	\$7,309.52	\$40,695.80
CJW Medical Ctr.	0.24%	\$241,716.58	\$52,920.95	\$294,637.53
Montgomery Regional Hospital	0.17%	\$86,804.30	\$19,004.76	\$105,809.06
Southside Regional Medical Ctr.	0.39%	\$99,590.98	\$18,712.38	\$118,303.36
Virginia Beach Gen'l Hospital	3.84%	\$651,699.94	\$142,681.91	\$794,381.85
Total	100.00%		\$2,923,809.53	\$16,292,518.77

To offset the cost of programs required by Virginia trauma center designation Trauma Center Fund monies are to be used to support the following general activities:

- An administrative infrastructure dedicated to the trauma program as required for designation, such as a trauma medical director, trauma nurse coordinator, etc.
- Higher staffing levels required to provide quality trauma care.
- Trauma specific training such as physician continuing medical education (CME), nursing education, educational materials etc.
- Injury prevention/community outreach projects.
- Outreach efforts such as those envisioned through the State Trauma Triage Plan i.e. communicating with EMS agencies and non-designated hospitals.
- Trauma specific research to assist in improving trauma care system wide.

2006 Trauma in Virginia -Cardiac Arrest-

Level of Care by Region

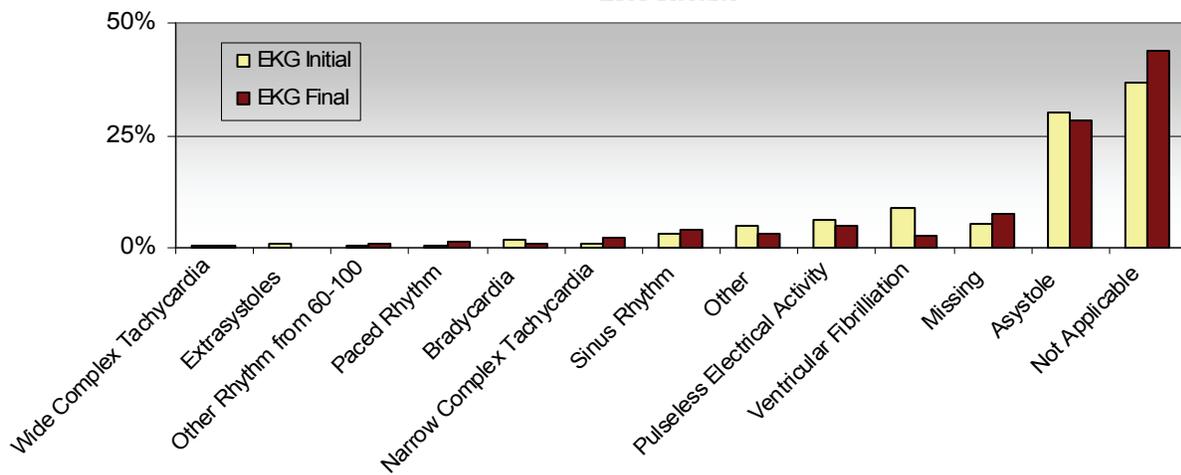


-Summary-

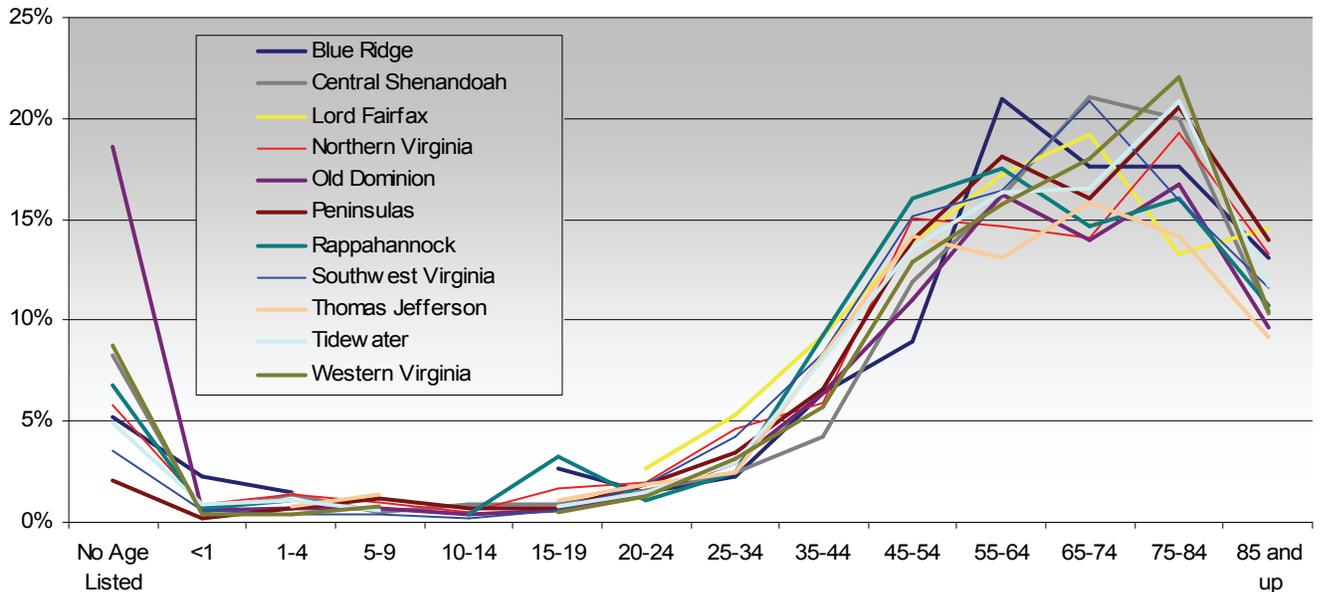
In 2006 there were 7,392 reports of "cardiac arrest", down slightly from 2005. 221 cases were under the age of 19.

Graphs on this page represent data from the 7,392 cardiac arrest cases. Of calls deemed to be a cardiac arrest, 62% were treated and transported; 25% were reported to be dead at the scene.

EKG Results



Age by Region



2006 Pre-hospital Care -Call Volume-

-Summary-

Every emergency medical service (EMS) agency operating in Virginia must comply with the specifications of section 32.1-116.1 of the *Code of Virginia*. This section requires all licensed EMS agencies to participate in the pre-hospital patient care reporting procedure by making available the minimum data set which is currently comprised of 62 data elements.

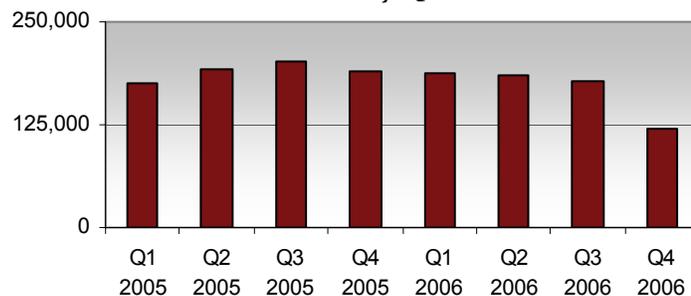
The Pre-hospital Patient Care Report (PPCR) form is completed by EMS providers on every call to document the response, care and/or services provided to every patient. The PPCR system is the pre-hospital electronic medical records database of EMS information and is designed to be a critical link to the future of EMS in Virginia. The PPCR system provides a method for every licensed EMS agency in Virginia to enter patient care data into a central database.

The Pre-hospital Patient Data Record (PPDR) is based on every PPCR form completed for every patient. PPDR software is available, at no cost, through OEMS.

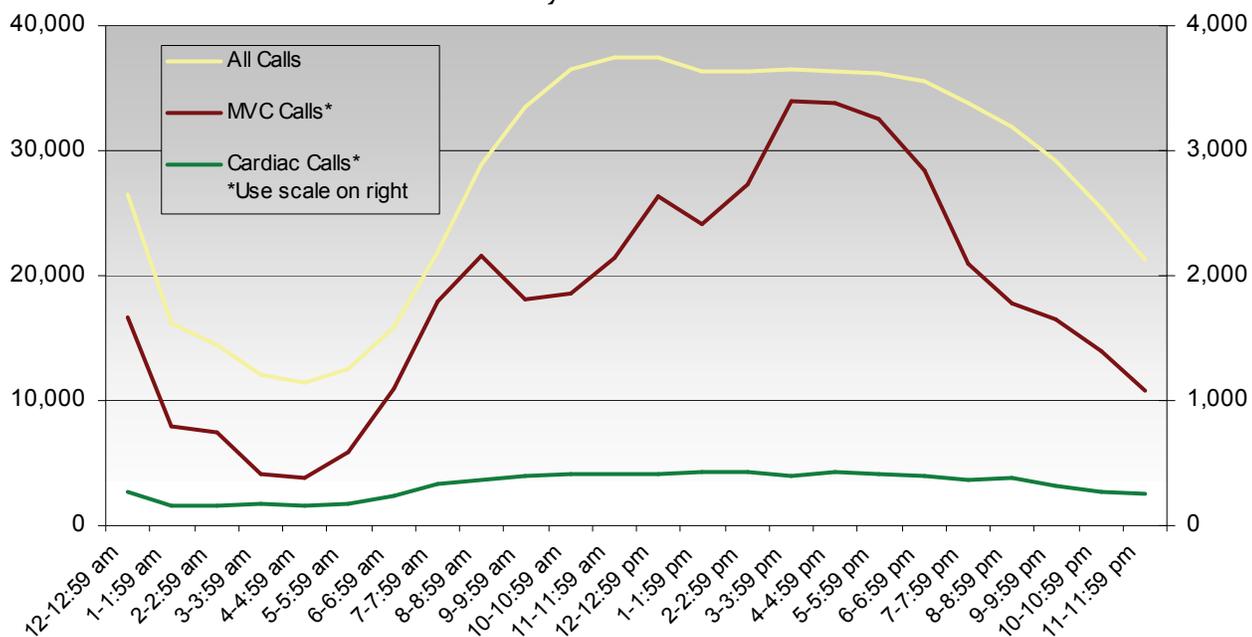
Call Distribution by
Day of the Week

Sunday	92,377
Monday	95,597
Tuesday	93,907
Wednesday	94,188
Thursday	94,741
Friday	97,739
Saturday	95,685

Call Volume by Quarter



Hourly Call Distribution



2006 Pre-hospital Care -Reporting-

The Future of Virginia's Pre-hospital Patient Care Reporting System

Web based PPCR/PPDR— The new, proposed, EMS Registry will be a Web based data collection tool that utilizes electronic medical record technology and will eliminate the current paper based system. By converting to a Web based electronic patient care report (e-PCR), data submission will no longer be a separate function for the over 700 hundred EMS agencies. Instead, data submission will occur as a normal part of medical record charting through an e-PCR.

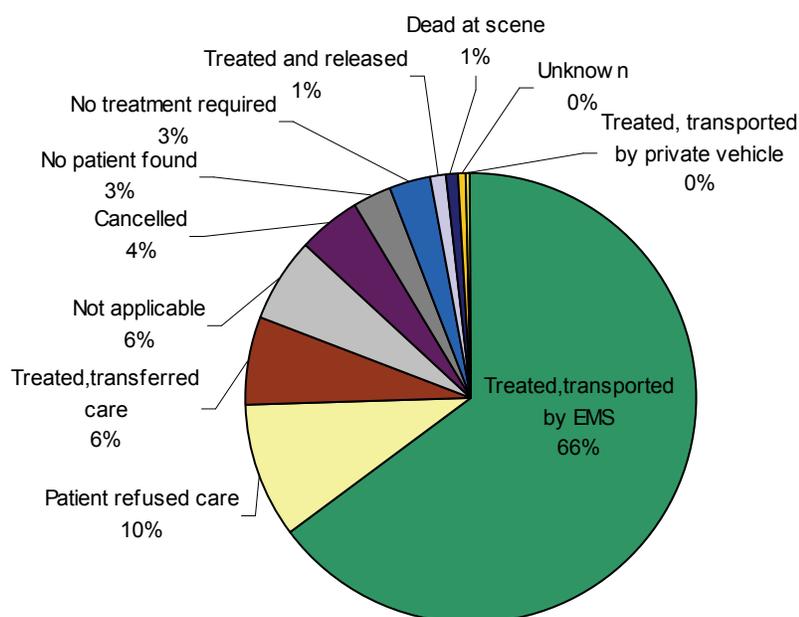
By converting the current outdated technology with the proposed program, data will become near real time (within 24-48 hours), and therefore a degree of health care surveillance will be added to the system. In addition, EMS treatment can be assessed, and new innovations in emergency care, as well as systems issues can begin sooner. Poor compliance will also be resolved by having an electronic data collection system, as transcribing patient encounters manually will no longer be required.

Most important is the fact that with the initiation of this project, OEMS will put into place the national dataset as agreed to in a 2003 memorandum of understanding with the National EMS Information System (NEMSIS). This monumental effort is to assure that each data element collected by the localities, the regions, the state and the national database are exactly the same, for more reliable analysis.

NEMSIS will create a standardized method in which every state collects pre-hospital data. Such standardization will allow agencies throughout the country to make comparisons on an agency, city/county, and state level. This will facilitate quality improvement programs, encourage research efforts, help prioritize limited funds for appropriate equipment and education, and enable benchmarking at local, state, and national levels.

More information about NEMSIS is available at www.nemsis.org.

Incident Disposition



Type of Call

Type of Call	Count
Medical Emergency	418,396
Injury not listed/Other	67,596
Accident/Motor vehicle collision	58,977
Transport/Routine	14,613
Assault	8,619
Mutual Aid/Standby	5,721
Public Service	4,965
Fire	4,636
Accident/Industrial/Construction	4,248

2006 Pre-hospital Care -Response Times-

-Summary-

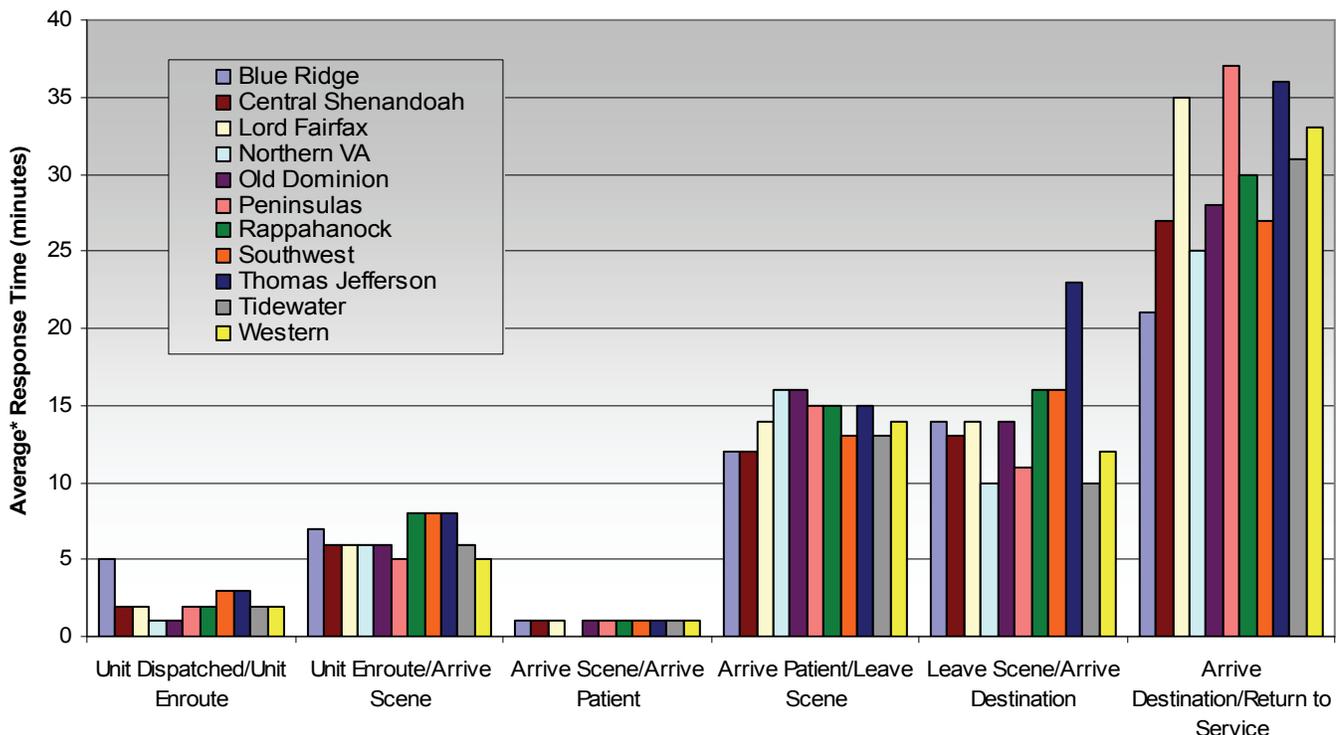
As PPCR reporting compliance increases, statewide and regional response times can be calculated. There are many reasons why reporting frequency differs for each portion of the call. Reasons may include: a call being cancelled before personnel arrive at the scene, no patient being found at the scene or no transport necessary once providers have evaluated the patient. Due to these inconsistencies, the calls were broken down and separate averages were calculated for each stage of the response. A 95% trimmed mean was used to eliminate the highest and lowest 2.5% of responses. This method provides an unbiased, objective way to eliminate nonsense entries across the board.

The total number of calls used to calculate the regional response times as well as definitions of each stage of the response can be found on page 26 of the appendix.

Statewide Response Times

	Average* (minutes)	Number of Calls
Unit Dispatched/ Unit Enroute	2	646,084
Unit Enroute/ Arrive Scene	6	617,804
Arrive Scene/Arrive Patient	5	525,529
Arrive Patient/ Leave Scene	17	482,794
Leave Scene/ Arrive Destination	15	468,840
Arrive Destination/ Return to Service	29	449,722

Response Time by Region



*95% trimmed mean

2006 Pre-hospital Care -Level of Care-

-Summary-

Level of Care: Statewide, 78% of all EMS calls provided basic life support (BLS) care. The level of care provided varies by region. Across the state, Central Shenandoah had the highest percentage of BLS calls while Western, Southwest and Thomas Jefferson had the highest percentage of ALS calls, each at 27% of their call volume.

Attendant in Charge: In over one-third of cases (36%), statewide, the attendant in charge (AIC) was an emergency medical technician (EMT) basic. The AIC distribution for the remaining cases are as follows:

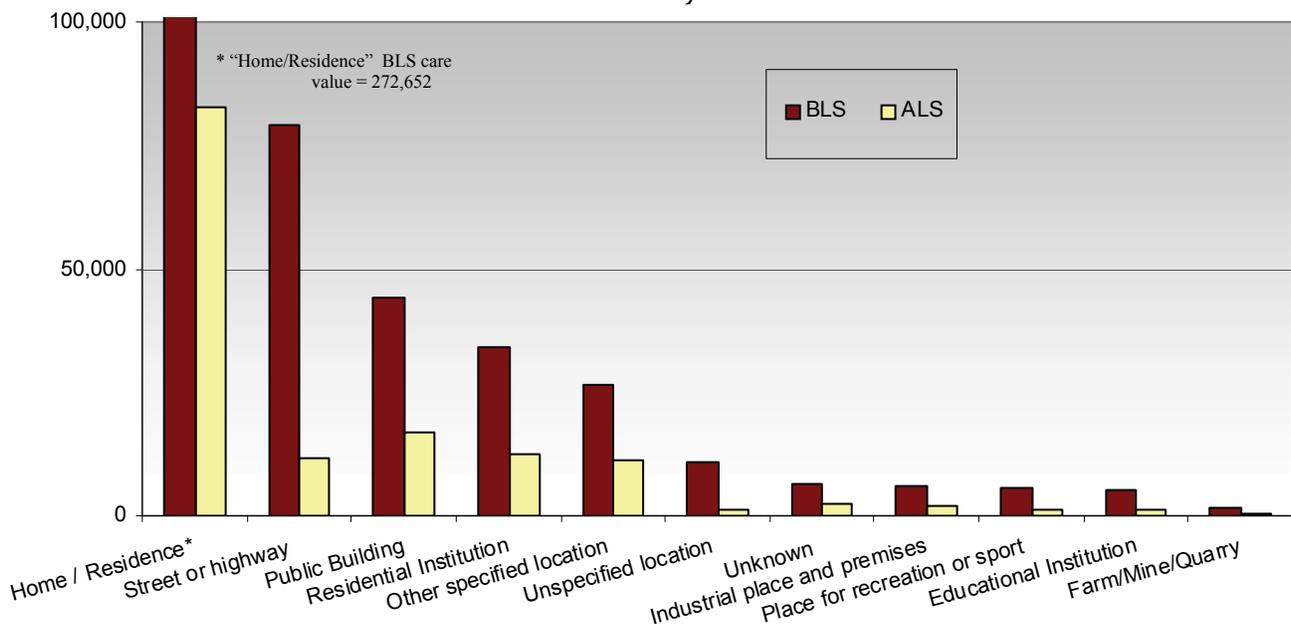
- 32% EMT Paramedic
- 16% EMT Intermediate
- 7% EMT Cardiac Technician
- 5% EMT Shock Trauma
- 2% Other Healthcare Professional
- 1% Nurse
- <1% Other

Location: Pre-hospital care is given in the home almost four times more than any other location. In 2005, 23% of calls to the home required ALS care. This figure has remained constant in 2006.

Level of Care by Region

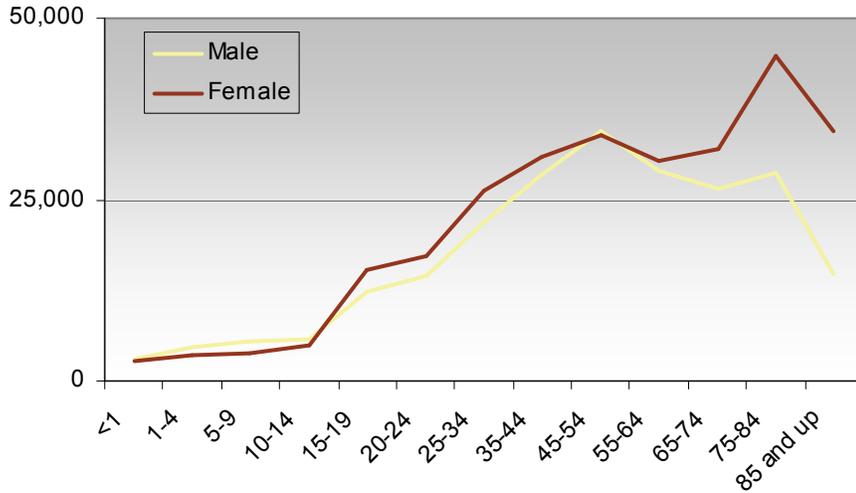
	Number of Calls	Percent ALS
Southwest	50,903	27
Thomas Jefferson	21,182	27
Western Virginia	77,364	27
Lord Fairfax	18,845	26
Old Dominion	156,095	24
Peninsulas	42,183	22
Tidewater	111,595	19
Blue Ridge	26,181	18
Rappahannock	41,138	17
Northern Virginia	79,143	15
Central Shenandoah	38,600	11

Level of Care by Location



2006 Pre-hospital Care -Demographics-

Age and Gender Distribution

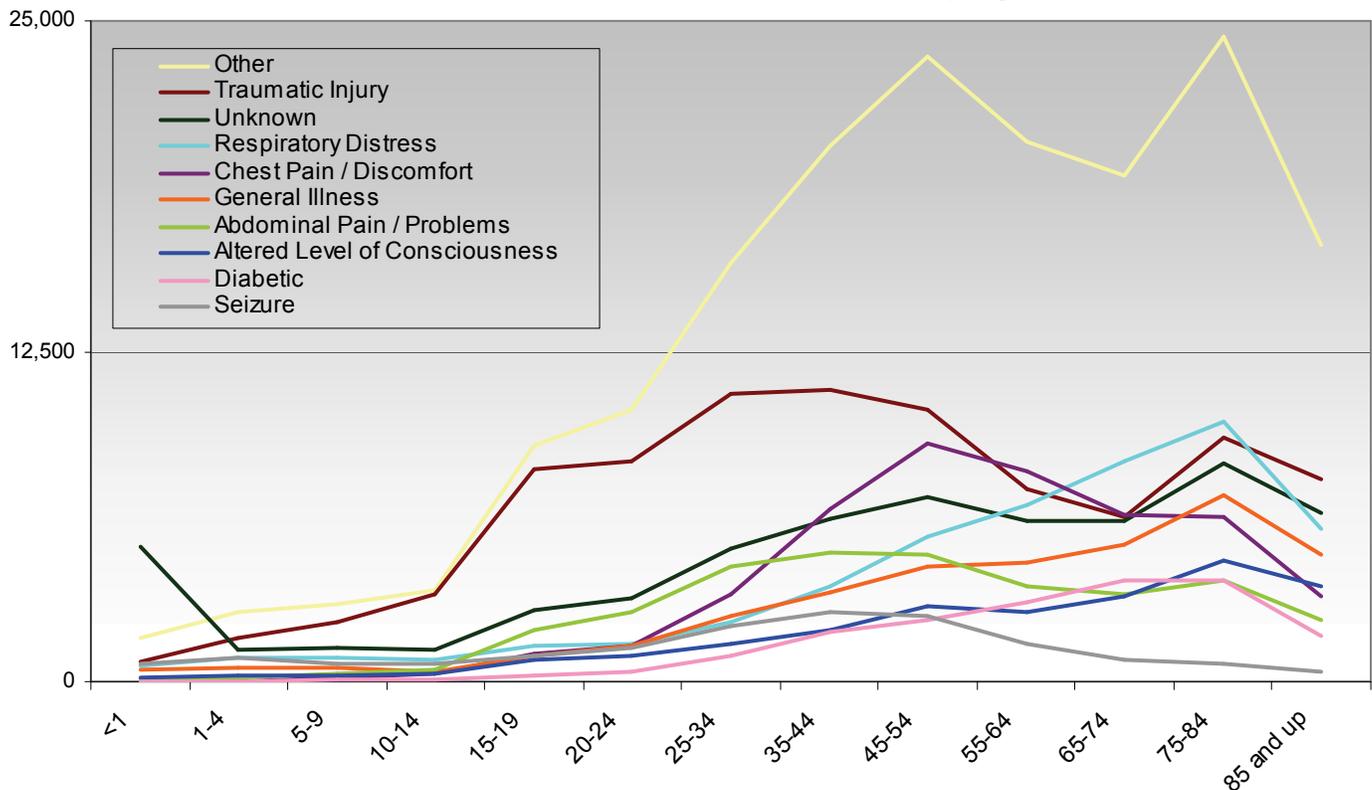


Approximately 20% of cases did not report a patient gender.

Race

Race	Percentage
White, Non-hispanic	50.3
Black, Non-hispanic	21.6
Missing	13.0
Unknown	9.0
White, Hispanic	1.9
Not Applicable	1.5
Other	1.4
Asian / Pacific Islander	0.6
Black, Hispanic	0.5
American Indian / Alaska Native	0.1

Ten Most Common Clinical Assessments by Age



2006 Pre-hospital Care -Mechanism of Injury-

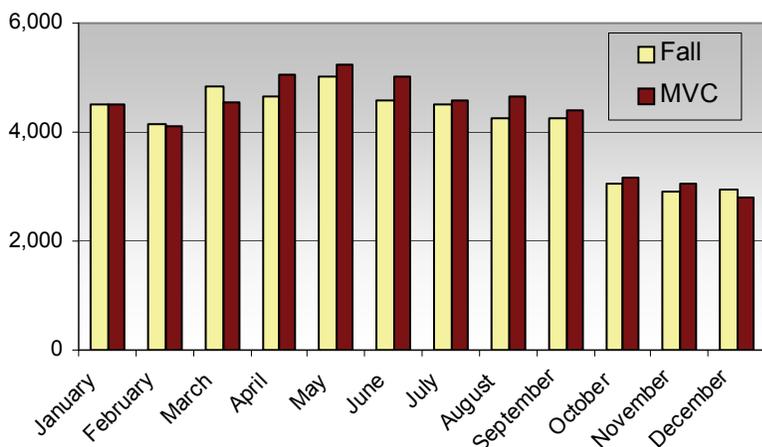
-Summary-

Falls and motor vehicle collisions comprise 65% of all cases with known injury mechanisms.

Falls are most prevalent in the elderly population, peaking in the 74-85 year age range. Motor vehicle collisions occur in a bell shaped, or normal distribution, peaking in the 25-34 age range.

The majority of calls receive BLS care and cases where ALS care is provided follow the same age distribution as BLS cases but at a much smaller percentage.

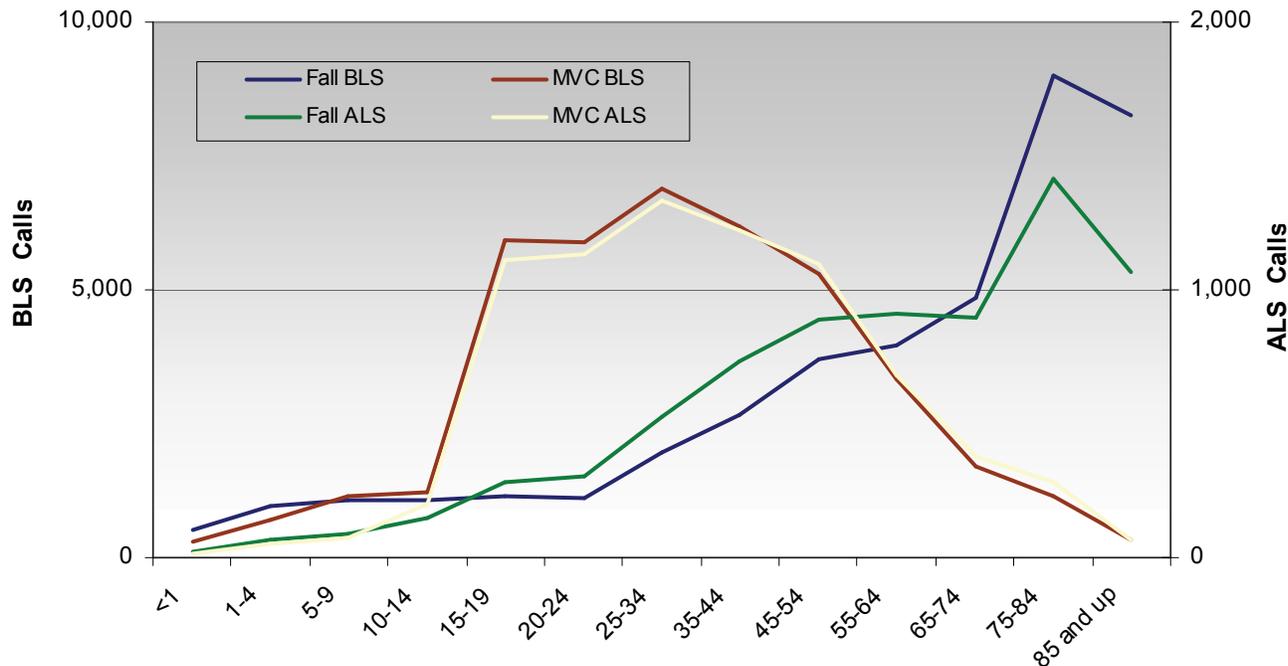
Distribution of Falls and
Motor Vehicle Collisions (MVC) by Month



Top Ten Mechanisms of Injury

- Falls
- Motor vehicle collision-
(public road)
- Unknown
- Other
- Assault
- Motor vehicle collision-
(non-public/off-road)
- Drug poisoning
- Sports injury
- Machinery accident
- Bicycle accident

Level of Care by Age for Falls and Motor Vehicle Collisions



2006 Pre-hospital Care -General Information-

National Fact:

Half a million times each year an ambulance carrying an emergency patient is diverted from an emergency department that is full and sent to one that is farther away.

2006 Institute of Medicine Report, "Emergency Medical Services at the Crossroads"

Top Ten Signs and Symptoms

Breathing difficulty
Chest pain
Weakness
Abdominal pain
Back pain
Nausea
Dizziness
Headache
Vomiting
Unresponsive/
Unconscious

Ten Most Common Procedures Performed

ECG monitoring	112,911
Intravenous catheter	104,062
Oxygen by cannula	86,753
Intravenous fluids	69,260
Oxygen by mask	63,686
Medication administration	48,252
Spinal immobilization	29,513
Backboard	28,603
Bleeding controlled	17,079
Extremity immobilization	11,442

Literature brief:

Secondary Triage: Early Identification of High-risk Trauma Patients Presenting to Non-tertiary Hospitals Pre-hospital Emergency Care 2007

A retrospective cohort analysis of injured adults was conducted to identify clinical variables that could be used to quickly identify and treat a subset of high-need injured patients that initially presented to non-tertiary hospitals. Over 12,000 persons were included in the analysis, of which almost 1/3 had one or more of the outcome measures.

Results showed that the variables of greatest importance in identifying high-risk injured adults included (in order of priority):

- Emergent airway intervention (pre-hospital or ED)
- Initial ED Glasgow Coma Score (GCS) < 11
- ED blood transfusion
- Initial ED systolic blood pressure < 100 or >220 mmHg
- ED respiratory rate < 10 or >32

If validated, the presence of these criteria may justify early higher level of care transfers by EMS, or mobilization of trauma resources without waiting for results of further diagnostic studies.

*Full citation of all articles can be found on page 27 of the appendix

2006 Pre-hospital Care -Poison Control Network-

-Summary-

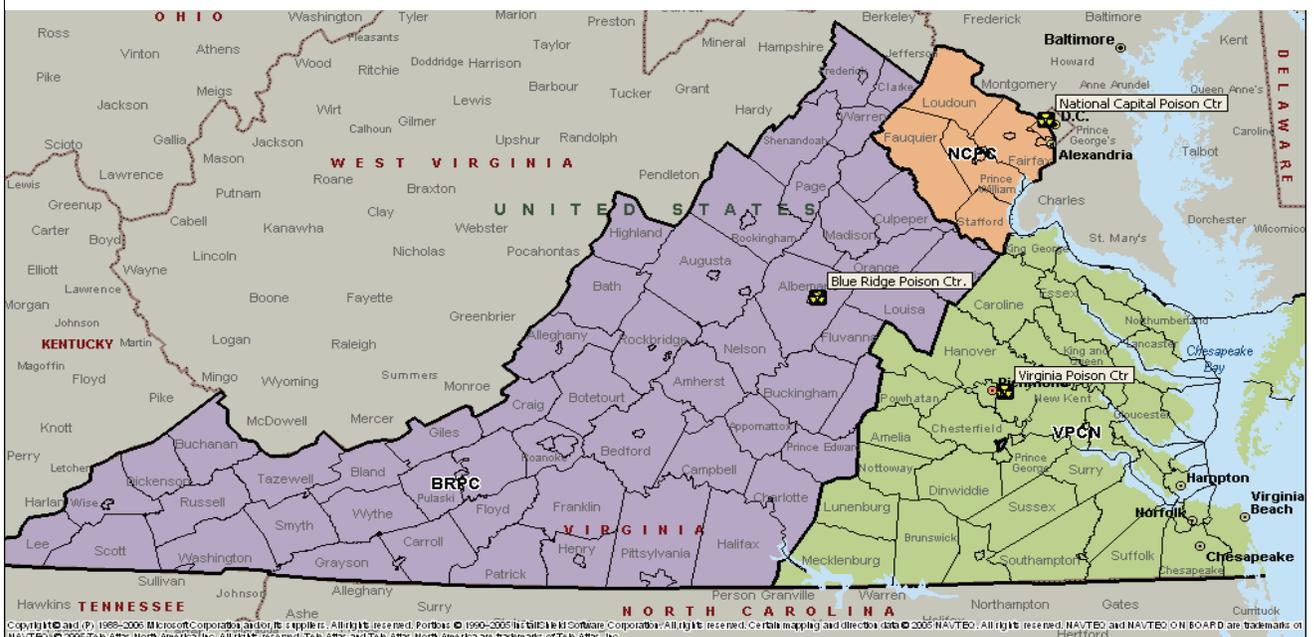
§ 32.1-111.15 of the *Code of Virginia* established the Virginia Poison Control Network (VPCN) in 1996 to provide Virginians with free access to health professionals that specialize in consultative services regarding the ingestion or application of substances, including determinations of emergency treatment 24 hours per day. In Virginia, the three centers that form the VPCN are the Blue Ridge Poison Center located at the University of Virginia, the National Capital Poison Center in Washington D.C., and the Virginia Poison Center located at Virginia Commonwealth University.



Virginia Poison Control Activity

	Fiscal year 1998	Calendar Year 2006
Human exposure cases received during year in Virginia	56,164	66,667
Total calls handled during year (includes calls for human and animal exposures and information requests)	77,767	95,050
Total Virginia population served by center during quarter	6,566,598	7,642,884
Number of lectures given by staff during year to health care professionals	133	369
Number of health professional trainees rotating through center during year	332	514
Number of poison prevention packets/sets of materials distributed during the year	543,715	2,270,342

Virginia Poison Control Network Areas as of July 1, 2007



2006 Pre-hospital Care -Medevac-

Excerpt from: The 1999 JLARC Review of Air Medevac Services in Virginia

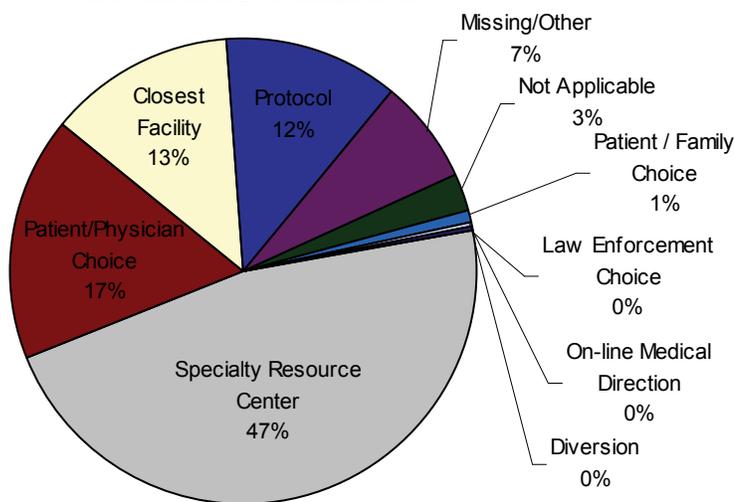
Air medical evacuation (medevac) services play an important role in the spectrum of emergency medical care. The key advantage of the providers of these services is that they quickly deliver a high level of medical care to the site of an accident or medical emergency, and rapidly transport seriously ill and injured patients to higher levels of medical care. In addition, in many accident situations, the medevac crew provides the highest level of medical care on site.

The Virginia Medevac System is comprised of 12 licensed agencies, three which are based out of state. At the time of analysis, eight of the nine in-state agencies were active with their PPCR data submissions. Pegasus was the only agency considered to be non-compliant and that is due to under-reporting. Not included in the analysis are: Healthnet, Med-flight of East Kentucky and Med Star, none of which submitted 2006 data. Data submission is required by the Code of Virginia and OEMS is actively working with the aforementioned agencies to provide the necessary support for them to regain compliance and maintain their licensure.

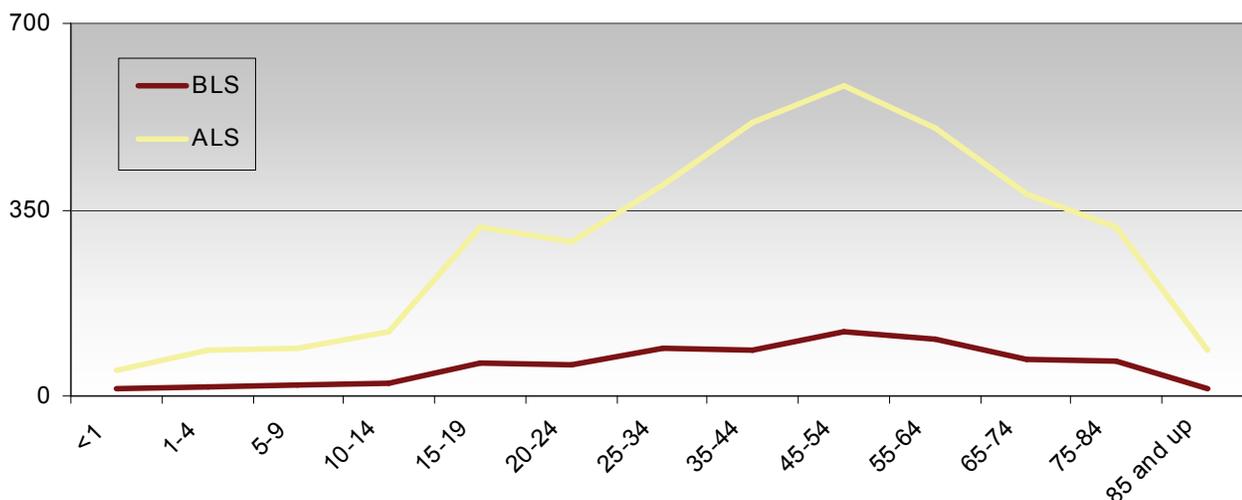
Top Ten Signs/Symptoms

Other
Chest pain
Unresponsive/
unconscious
Breathing difficulty
Back pain
Abdominal pain
Headache
Vomiting
Weakness/malaise
Seizures/convulsions

Destination Determination



Level of Care by Age



2006 Pre-hospital Care -Medevac-

Excerpt from 'Aviation Safety' February 2007

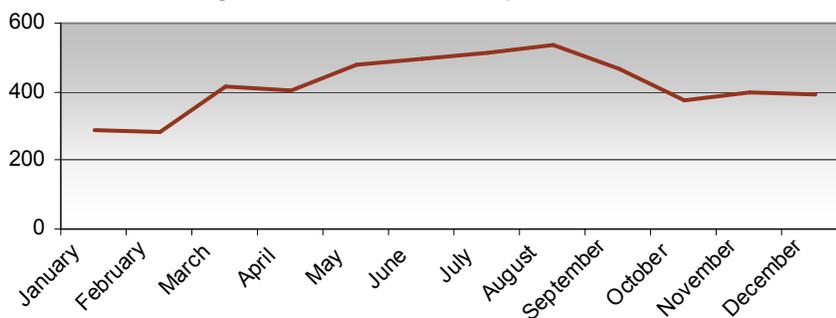
Report from the United States Government Accountability Office

The air ambulance industry has experienced recent growth, primarily in stand-alone (independent) operations, and an increase in the number of accidents, resulting in increased efforts to make safety-related improvements. There are limited or incomplete data available on basic aspects of the industry, including the number of air ambulance helicopters and the number of hours flown by air ambulances. Although data limitations preclude a complete understanding of the industry, including its growth, available data for 2003 to 2005 show the number of helicopters involved exclusively in air ambulance operations increased 38 percent (from 545 to 753), while the number of locations from which they operate grew by 30 percent (from 472 to 614).

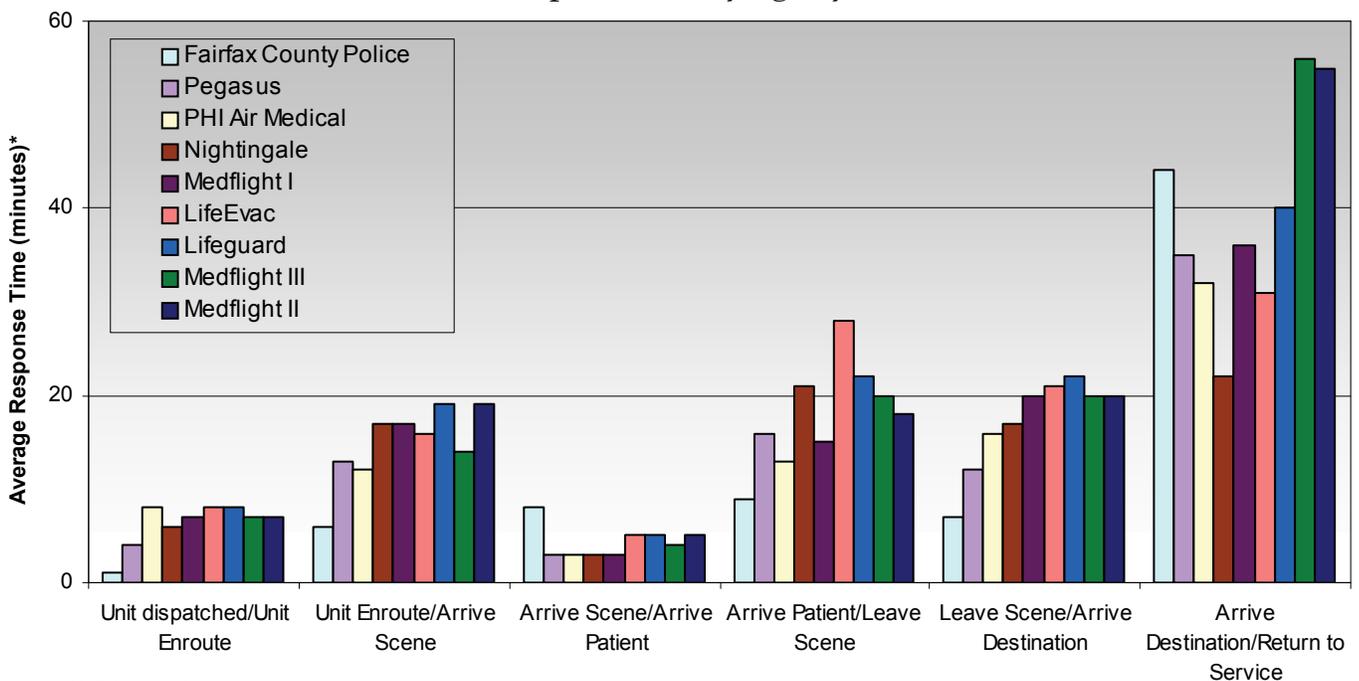
In Virginia there were approximately 16 permitted helicopters in 1999. Currently there are 38 permitted helicopters, an increase of 42 percent in less than ten years.

A copy of the full report can be found at: http://www.vdh.virginia.gov/oems/Files_page/trauma/Medevac/GAO_Report.pdf

Virginia's Medevac Monthly Call Volume



Response Time by Agency



*95% Trimmed Mean

2006 Pre-hospital Care EMS for Children

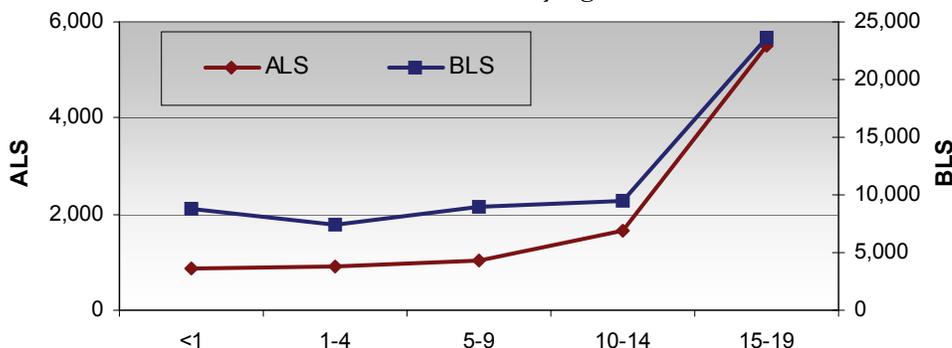
-Summary-

Emergency care providers face special challenges when confronted with ill and injured children. Children have unique physical presentations, differing body responses to illness and injury, and a need for appropriately-sized medical equipment and drug preparations. Therefore, targeted education and equipment needs are necessary to effectively care for children.

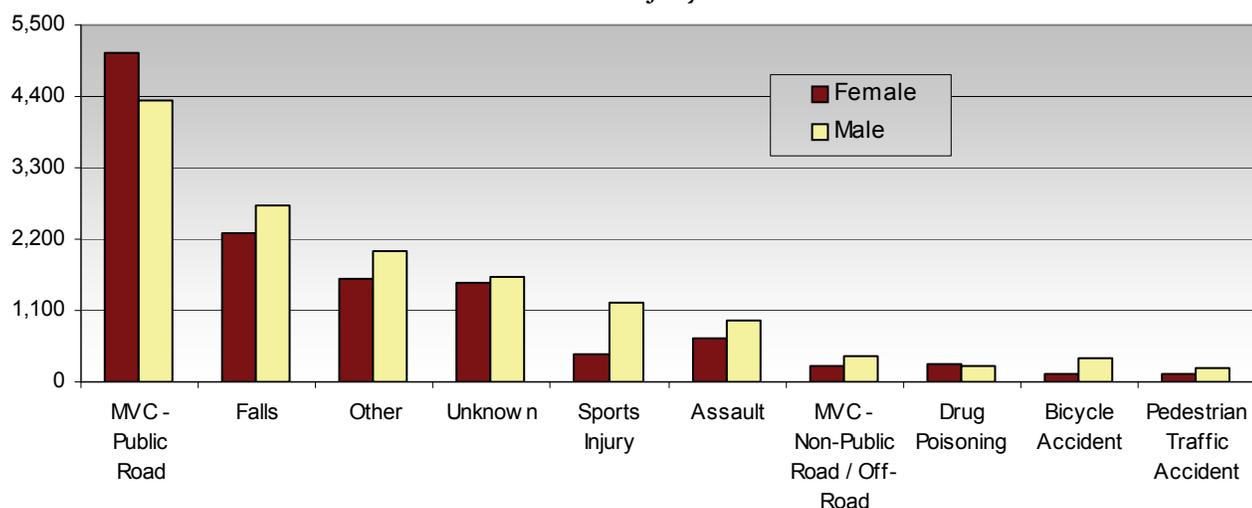
Virginia's Emergency Medical Services for Children Program (EMSC) aims to improve pediatric emergency care capabilities within the Commonwealth. In 2006, the program was moved from Virginia Commonwealth University to the OEMS Division of Trauma and Critical Care. By focusing on the systems that provide this care, as well as the providers who administer care within those systems, the program will assist facilities and agencies in assessing their current ability to care for children. Where opportunities for improvement are identified, the EMSC program will foster system development initiatives to facilitate movement toward that improvement.

As the Commonwealth's ability to gather pediatric data improves, EMSC will share data with health care systems and providers as well as facilitate investment in childhood injury and illness prevention initiatives. By integrating pediatric care concerns into every level of the patient care spectrum, from prevention to pre-hospital care, to hospital acute care and rehabilitation services, Virginia is committed to providing the best care possible for children and adolescents.

Level of Care by Age

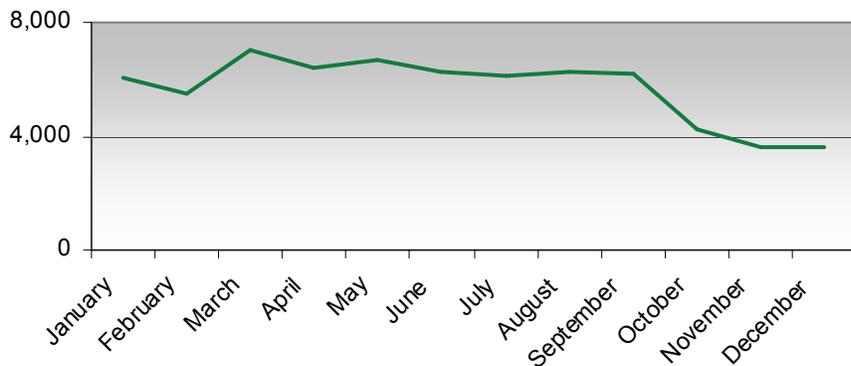


10 Most Common Injury Mechanisms



2006 Pre-hospital Care EMS for Children

Call Distribution by Month



National Fact:

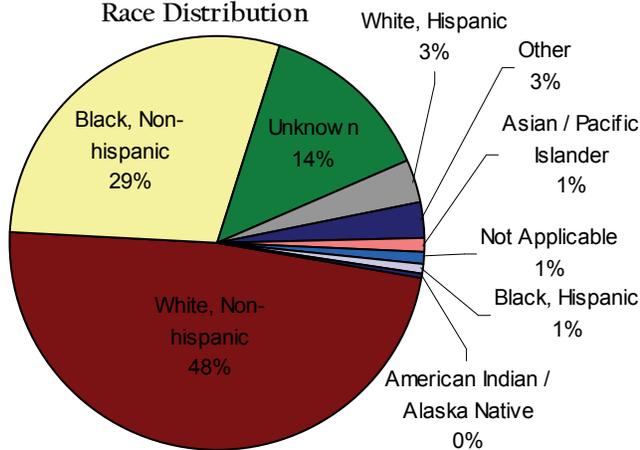
Although children make up 27 percent of all visits to the emergency department, many hospitals and EMS agencies are not well equipped to handle these patients.

2006 Institute of Medicine Report
"Emergency Care for Children-Growing Pains"

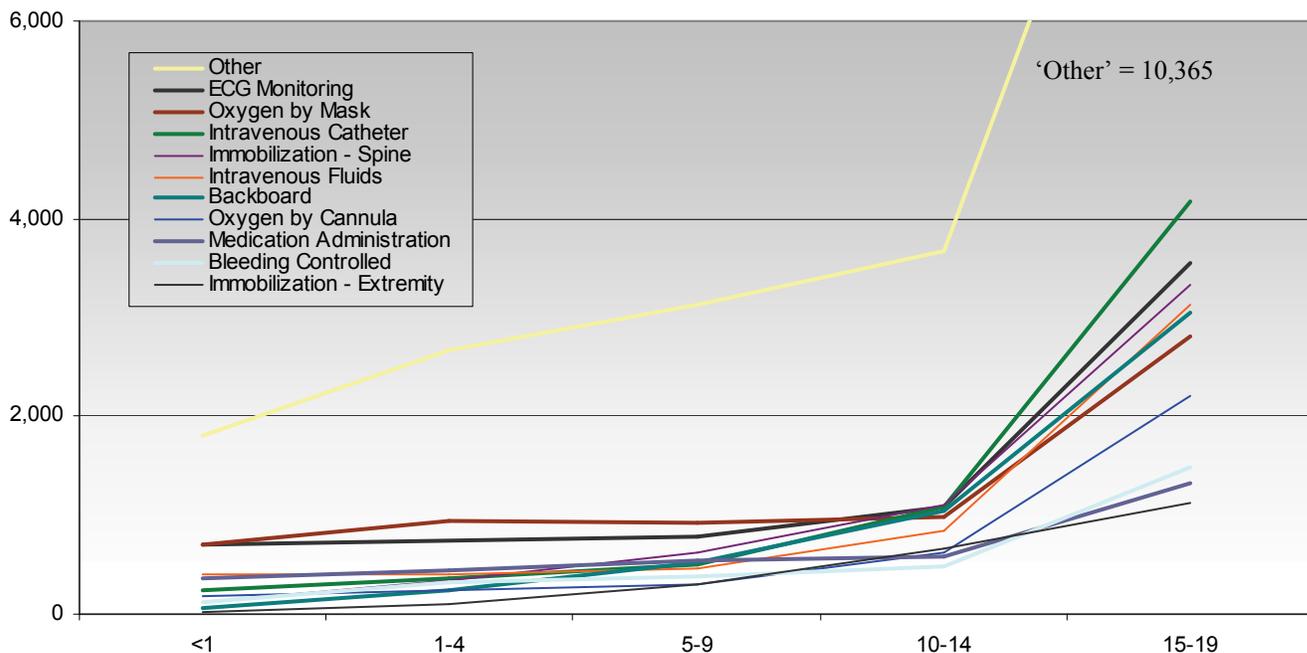
**Top Ten
Signs and Symptoms**

- Other
- Breathing difficulty
- Seizures/Convulsions
- Headache
- Abdominal pain
- Vomiting
- Back pain
- Fever/Hyperthermia
- Chest pain
- Nausea

Race Distribution



Most Common Procedures by Age



Appendix

Medevac Level of Care by Age		
Age	BLS	ALS
<1	15	50
1-4	17	86
5-9	20	89
10-14	23	120
15-19	61	317
20-24	58	291
25-34	88	396
35-44	87	514
45-54	121	582
55-64	106	505
65-74	70	380
75-84	64	318
85 and up	13	85

Medevac Destination Determination	
Specialty Resource Center	2,358
Patient/Physician Choice	853
Closest Facility	655
Protocol	622
Missing/Other	357
Not Applicable	136
Patient / Family Choice	35
On-line Medical Direction	17
Diversion	11
Law Enforcement Choice	2

Age and Gender		
	Male	Female
<1	2,998	2,601
1-4	4,537	3,444
5-9	5,526	3,939
10-14	5,687	4,818
15-19	12,256	15,358
20-24	14,362	17,186
25-34	21,771	26,183
35-44	28,337	30,894
45-54	34,474	33,767
55-64	28,999	30,392
65-74	26,465	31,882
75-84	28,745	44,865
85 and up	14,804	34,533

Incident Disposition	
Treated, transported by EMS	424,238
Patient refused care	63,311
Treated, transferred care	41,212
Not applicable	39,528
Cancelled	29,018
No patient found	19,995
No treatment required	19,081
Treated and released	7,164
Dead at scene	6,012
Unknown	2,694
Treated, transported by private vehicle	2,330

Medevac Signs/Symptoms	
Other	2,282
Chest Pain	701
Unresponsive / Unconscious	461
Breathing Difficulty	377
Back Pain	335
Abdominal Pain	297
Headache	234
Vomiting	85
Weakness (malaise)	84
Seizures / Convulsions	76

Most Common Injury Locations

Location	Designated Trauma Center	Hospital	Total
Place of occurrence, Mine And Quarry	9	14	23
Place of occurrence, Farm	101	38	139
Place of occurrence, Public Building	638	296	934
Place of occurrence, Industrial Places And Premises	410	581	991
Place of occurrence, Place For Recreation And Sport	426	568	994
Other specified place of occurrence	702	474	1,176
Place of occurrence, Residential Institution	1,024	736	1,760
Unspecified place of occurrence	2,760	2,483	5,243
Place of occurrence, Street And Highway	3,750	4,238	7,988
Place of occurrence, Home	6,269	4,678	10,947

Appendix

Definitions:

Unit Dispatched- Time the response unit was notified by dispatch.

Unit Enroute ('Responding')- Time the response unit notified dispatch that the unit was responding to the incident

Arrive Scene- Time the response unit notified dispatch that the unit had physically arrived at the incident/patient location

Arrive Patient- Time the response unit notified dispatch that the unit's personnel had physically arrived at the patient's side and could now establish direct contact

Leave Scene- Time the response unit notified dispatch that the unit had physically left the incident/patient location

Arrive Destination- Time the response unit notified dispatch that the patient arrives at the destination or transfer point.

Return to Service- Time the response unit notified dispatch that the unit was back in service and available for responses

Call Distribution by Month		10 Most Common Injury Mechanisms	
January	6,067	Mechanism	Frequency
February	5,500	Falls	48,804
March	7,050	MVC - Public Road	47,261
April	6,420	Unknown	33,103
May	6,694	Other	24,311
June	6,271	Assault	9,747
July	6,134	MVC - Non-Public Road / Off-Road	2,845
August	6,240	Drug poisoning	2,674
September	6,217	Sports injury	2,658
October	4,264	Machinery accidents	1,624
November	3,628	Bicycle accident	1,428
December	3,639		

Regional Reported Call Volume

	Unit dispatched/Unit Enroute	Unit Enroute/Arrive Scene	Arrive Scene/Arrive Patient	Arrive Patient/Leave Scene	Leave Scene/Arrive Destination	Arrive Destination/Return to Service	Total	Percentage of calls
Blue Ridge	25,148	24,982	23,637	23,382	22,473	22,430	142,052	5%
Central Shenandoah	35,986	33,639	29,093	27,340	22,055	19,463	167,576	6%
Lord Fairfax	15,222	14,691	11,784	11,326	11,041	10,988	75,052	3%
Northern VA	77,233	72,836	67,520	63,589	60,395	51,611	393,184	13%
Old Dominion	153,230	143,840	110,838	94,019	97,397	96,151	695,475	23%
Peninsulas	41,332	40,644	39,493	38,345	35,664	35,595	231,073	8%
Rappahannock	39,590	36,044	32,886	31,421	27,407	25,718	193,066	1%
Southwest	49,814	49,096	47,716	47,452	44,917	44,557	283,552	9%
Thomas Jefferson	20,659	19,812	17,514	16,237	13,993	13,945	102,160	3%
Tidewater	107,291	103,941	75,650	72,358	81,220	75,498	515,958	17%
Western	75,757	73,463	64,631	53,090	51,373	50,868	369,182	12%

Call Volume by Quarter		Attendant in Charge Level		Level of Care by Location		
Q1 2005	174,726		Frequency		BLS	ALS
Q2 2005	192,135	EMT	222,020	Home / Residence	272,652	82,540
Q3 2005	202,544	EMT Paramedic	200,416	Street or highway	78,920	11,697
Q4 2005	188,710	EMT Intermediate	97,849	Public Building	44,120	16,755
Q1 2006	186,626	EMT Cardiac Technician	40,673	Residential institution	34,072	12,627
Q2 2006	184,310	EMT Shock Trauma	35,118	Other specified location	26,377	11,221
Q3 2006	177,539	Other Healthcare Professional	15,961	Unspecified location	10,691	1,195
Q4 2006	121,323	Nurse	4,103	Unknown	6,619	2,367
		Other	2,107	Industrial place and premises	5,831	2,130
				Place for recreation or sport	5,703	1,314
				Educational institution	5,299	1,358
				Farm/Mine/Quarry	1,546	460

Appendix

Hourly Call Distribution

Time	All Calls	MVC Calls	Cardiac Calls
12-12:59 am	26,498	1,661	274
1-1:59 am	16,253	792	164
2-2:59 am	14,414	748	153
3-3:59 am	12,022	414	172
4-4:59 am	11,424	380	153
5-5:59 am	12,472	592	180
6-6:59 am	15,889	1,099	239
7-7:59 am	21,957	1,799	330
8-8:59 am	28,817	2,161	366
9-9:59 am	33,541	1,810	400
10-10:59 am	36,438	1,860	413
11-11:59 am	37,408	2,148	410
12-12:59 pm	37,535	2,627	408
1-1:59 pm	36,343	2,420	433
2-2:59 pm	36,361	2,734	427
3-3:59 pm	36,500	3,402	402
4-4:59 pm	36,359	3,383	421
5-5:59 pm	36,154	3,260	409
6-6:59 pm	35,488	2,842	390
7-7:59 pm	33,806	2,094	372
8-8:59 pm	31,923	1,771	380
9-9:59 pm	29,175	1,651	325
10-10:59 pm	25,461	1,391	276
11-11:59 pm	21,308	1,078	249

References:

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- Newgrad C.D., Hedges J.R., Adams, A, Mullins, R.J. (2007). Secondary triage: early identification of high-risk trauma patients presenting to non-tertiary hospitals. *Pre-hospital Emergency Care*, 11, 154-63.
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Monthly Distribution of Falls and MVC's

	Falls	MVC
January	4,491	4,514
February	4,129	4,112
March	4,821	4,528
April	4,663	5,070
May	5,003	5,239
June	4,572	5,006
July	4,495	4,579
August	4,269	4,650
September	4,270	4,401
October	3,050	3,165
November	2,907	3,049
December	2,948	2,818

10 Most Common Signs/Symptoms

Breathing difficulty	71,859
Chest pain	55,593
Weakness	47,539
Abdominal pain	37,972
Back pain	30,437
Nausea	30,294
Dizziness	27,156
Headache	26,408
Vomiting	25,062
Unresponsive/Unconscious	17,705

Pre-hospital Care Race

Race	Frequency	Percent
White, Non-Hispanic	337,191	50.3
Black, Non-Hispanic	144,984	21.6
Missing	87,081	13.0
Unknown	60,217	9.0
White, Hispanic	12,849	1.9
Not Applicable	9,825	1.5
Other	9,283	1.4
Asian / Pacific Islander	4,231	0.6
Black, Hispanic	3,185	0.5
Amer. Indian / AK Native	952	0.1

Most Common Diagnosis Groups

Diagnosis Group	Designated Trauma Center	Non-designated Hospital
Dislocations	66	26
Sprains/strains	100	36
Open wound of limb	371	130
Burns	525	119
Fracture of the Neck/Trunk	622	87
Intracranial injury w/o skull fracture	690	104
Open wound head/neck/trunk	821	175
Internal injury chest/abdomen/pelvis	860	141
Fracture of skull/face	819	183
Fracture of limb	1,134	691

Appendix

**Level of Care by Age
Falls and MVC's**

Age	Falls BLS	Falls ALS	MVC BLS	MVC ALS
<1	507	20	304	16
1-4	978	66	720	49
5-9	1,076	87	1,163	74
10-14	1,082	150	1,226	198
15-19	1,149	280	5,919	1,114
20-24	1,128	304	5,872	1,130
25-34	1,955	525	6,891	1,333
35-44	2,674	730	6,203	1,223
45-54	3,702	889	5,279	1,093
55-64	3,973	908	3,339	685
65-74	4,839	893	1,686	381
75-84	8,985	1,412	1,149	280
85 and up	8,254	1,070	339	63

EMSC Procedures by Age

	<1	1-4	5-9	10-14	15-19
Other	1,810	2,672	3,129	3,678	10,365
ECG Monitoring	708	738	777	1,088	3,558
Oxygen by Mask	697	948	916	979	2,814
Intravenous Catheter	239	353	499	1,076	4,177
Immobilization - Spine	119	343	627	1,100	3,337
Intravenous Fluids	408	410	454	851	3,138
Backboard	60	236	513	1,037	3,049
Oxygen by Cannula	182	232	293	631	2,206
Medication Administration	360	440	540	584	1,321
Bleeding Controlled	113	318	388	475	1,491
Immobilization - Extremity	30	92	297	672	1,121

**EMSC
Top 10 Injury Mechanisms**

	Female	Male
MVC - Public Road	5,067	4,341
Unknown	1,522	1,622
Falls	2,296	2,731
Other	1,602	2,026
Sports injury	414	1,231
Assault	671	951
MVC - Non-Public Road /Off-Road	257	404
Drug poisoning	289	234
Bicycle accident	115	368
Pedestrian traffic accident	127	219

**EMSC
Top 10 Signs and Symptoms**

	Frequency
Other	41,721
Breathing difficulty	6,558
Seizures / Convulsions	3,740
Headache	3,671
Abdominal pain	3,561
Vomiting	2,857
Back pain	2,589
Fever / Hyperthermia	2,378
Chest pain	2,328
Nausea	2,107

**EMSC
Race**

White, Non-Hispanic	32,118
Black, Non-Hispanic	19,312
Unknown	9,114
White, Hispanic	2,330
Other	1,796
Asian / Pacific Islander	733
Not Applicable	638
Black, Hispanic	553
American Indian / Alaska Native	110

Mechanism of Injury by Age

	<1	1-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65-74	75-84	85 and up	Total
Fall	198	214	360	317	328	371	624	888	1,255	1,589	2,105	4,019	3,608	15,876
Motor Vehicle Crash	39	61	128	183	898	881	1,103	1,000	999	633	357	313	104	6,699
Cut/Pierce	3	13	17	27	99	191	298	219	157	80	26	13	7	1,150
Struck by, against	11	30	54	110	196	187	230	240	217	93	40	35	33	1,476
Firearm	3	2	5	19	152	211	222	118	75	34	10	13	10	874