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**Virginia Department of Health**  
**Office of Emergency Medical Services (OEMS)**  
**Quarterly Report on Trauma Incidents**

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**Q3 2020**

Division of Trauma and Critical Care  
1041 Technology Park Drive  
Glen Allen, Virginia 23059  
Phone: (804) 888-9100

*This report is based on the deliberations of the System Improvement Committee and analyses performed by Office of EMS Epidemiology staff.*

## Introduction

Section B 3. of the Code of Virginia (§32.1-111.3) requires the monitoring of the quality of the Commonwealth's emergency medical services (EMS) and trauma services using data from the EMS patient care information system. The EMS Advisory Board reviews and analyzes such data quarterly and reports its findings to the Commissioner. The Advisory Board has delegated this function to the System Improvement Committee (formerly the Trauma Performance Improvement Committee).

This quarterly report focuses on four key areas:

1. Completeness of prehospital vital sign documentation (blood pressure, respiratory rate, and Glasgow Coma Score) as required in Step 1 of the Virginia Field Trauma Triage Decision Scheme.
2. The number of trauma patients treated and transported by EMS agencies.
3. The number of trauma patients who met Step 1 (vitals), Step 2 (anatomy of injury), and Step 3 (mechanism of injury/impact) Virginia Field Trauma Triage Criteria.
4. The number of patients meeting trauma triage criteria transported to hospitals not designated as trauma centers.

The results reported here represent a high-level summary of the findings. This report describes how each EMS Council Region is performing. The report will be provided to the appropriate Regional EMS Council Director for each region. The Directors will be given an opportunity to provide feedback, which may explain special circumstances for which an exception occurred. The findings of this report and any feedback from the Directors will be used to drive education and improve the Trauma Triage Plan.

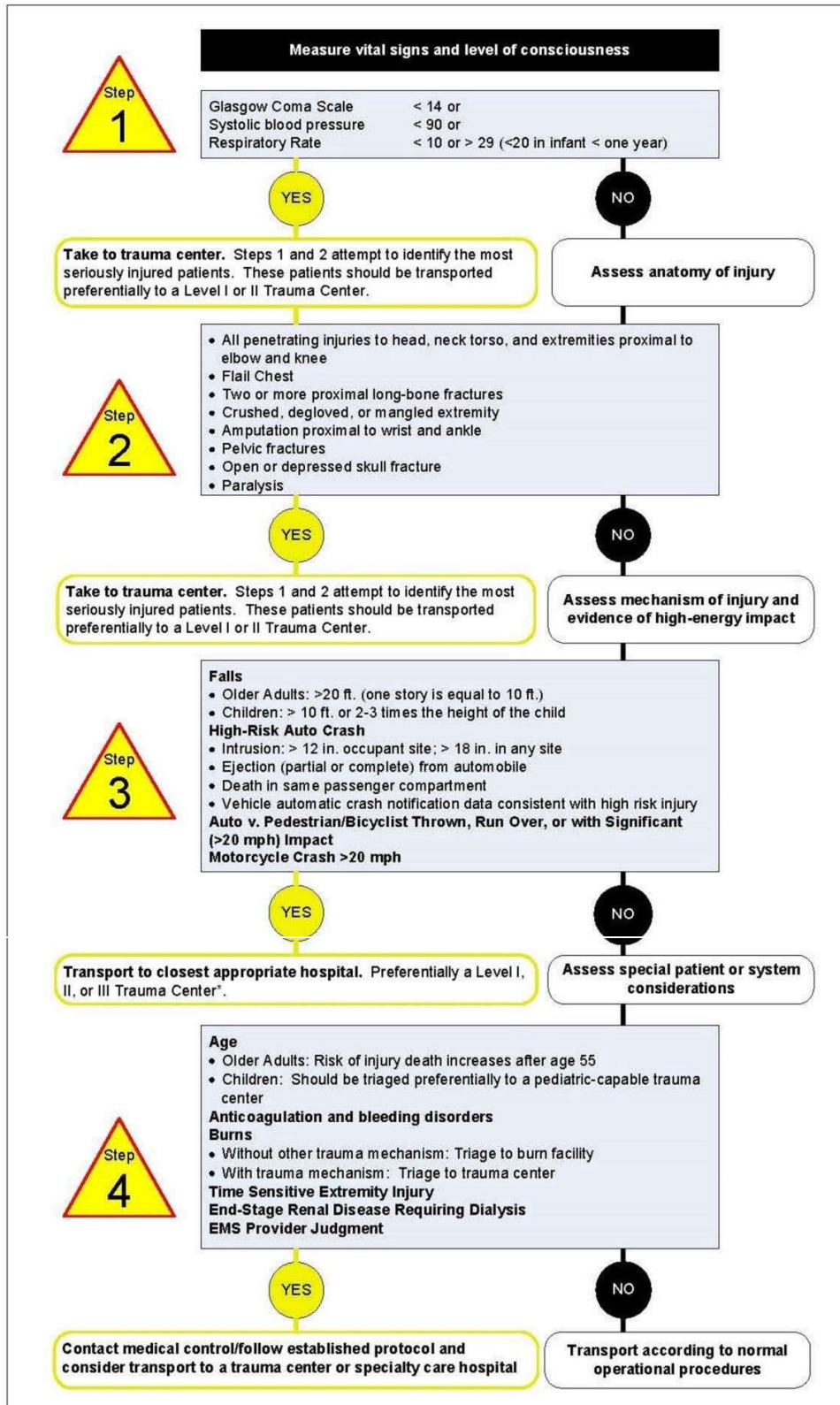
EMS patient data is extracted from patient medical records submitted by EMS agencies to the Virginia Pre-Hospital Information Bridge (VPHIB) program (Elite v3) maintained within the Virginia Department of Health's (VDH) Office of Emergency Medical Services (OEMS) Division of Trauma/Critical Care. Data summarized in this report represent EMS responses that occurred during the third quarter of 2020 (July through September) and were entered into VPHIB v3 as of 2/04/2020. VPHIB v3 data are based on the National EMS Information System (NEMSIS) standards.

This report includes all EMS responses categorized as trauma incidents using the following guidelines (Table 1).

Table 1. Definition of Trauma Patients within VPHIB version 3

Type of Service Requested	
911 Response (Scene)	
Incident/Patient Disposition	
Patient Treated, Transported by this EMS unit	
Situation Provider Primary Impression (ICD-10-CM)	
<ul style="list-style-type: none"> <li>• S00-S09 (Injuries to the head)</li> <li>• S10-S19 (Injuries to the neck)</li> <li>• S20-S29 (Injuries to the thorax)</li> <li>• S30-S39 (Injuries to the abdomen, lower back, lumbar spine, pelvis, and external genitals)</li> <li>• S40-S49 (Injuries to the shoulder and upper arm)</li> <li>• S50-S59 (Injuries to the elbow and forearm)</li> <li>• S60-S69 (Injuries to the wrist, hand, and fingers)</li> <li>• S70-S79 (Injuries to the hip and thigh)</li> <li>• S80-S89 (Injuries to the knee and lower leg)</li> <li>• S90-S99 (Injuries to the ankle and foot)</li> <li>• T07 (Injuries involving multiple body regions)</li> <li>• T14 (Injury of unspecified body region)</li> <li>• T20-T25 (Burns and corrosions of external body surfaces, specified by site)</li> <li>• T26-T28 (Burns and corrosions confined to eye and internal organs)</li> <li>• T30-T32 (Burns and corrosions of multiple and unspecified body regions)</li> <li>• T75.0 (Effects of lightning)</li> <li>• T75.4 (Electrocution) (With 7th digit character modifier of A, B, or C; D through S are excluded)</li> </ul>	<p><i>Excluding:</i></p> <ul style="list-style-type: none"> <li>• <i>S00 (Superficial injuries of the head)</i></li> <li>• <i>S10 (Superficial injuries of the neck)</i></li> <li>• <i>S20 (Superficial injuries of the thorax)</i></li> <li>• <i>S30 (Superficial injuries of the abdomen, pelvis, lower back and external genitals)</i></li> <li>• <i>S40 (Superficial injuries of shoulder and upper arm)</i></li> <li>• <i>S50 (Superficial injuries of elbow and forearm)</i></li> <li>• <i>S60 (Superficial injuries of wrist, hand, and fingers)</i></li> <li>• <i>S70 (Superficial injuries of hip and thigh)</i></li> <li>• <i>S80 (Superficial injuries of knee and lower leg)</i></li> <li>• <i>S90 (Superficial injuries of ankle, foot, and toes)</i></li> </ul>

Figure 1. Virginia Field Trauma Triage Decision Scheme



## Virginia Trauma Summary, Third Quarter, 2020

EMS agencies in Virginia responded to a total of 398,252 EMS calls; of that total, 265,197 (66.6%) patients had a disposition of treated and transported by the unit, 46,080 (11.6%) had a disposition of canceled, 28,018 (7.0%) patients had a disposition of EMS assist, 4,904 (1.2%) patients had a disposition of treated and transferred care to another unit, 3,930 (1.0%) patients were documented as dead at the scene, and 50,123 (12.6%) patients had some other incident disposition (e.g., patient treated and released AMA, patient treated and transported by private vehicle, etc.). Out of the total EMS calls, **22,977 (5.8%)** incidents were classified as trauma incidents in VPHIB. The Northern Virginia EMS Council had the highest number of trauma calls (5,016; 21.8%), followed by the Old Dominion EMS Alliance (4,875; 21.2%). Trauma incident numbers for the quarter, broken down by month and Regional EMS Council, are shown in Figure 2. Tables 2-4 summarize the body regions most frequently affected by trauma, the top 10 hospitals receiving trauma transports, and vital signs data quality for trauma incidents.

Figure 2. Monthly Trauma Incidents by Regional EMS Council, Third Quarter 2020, Virginia

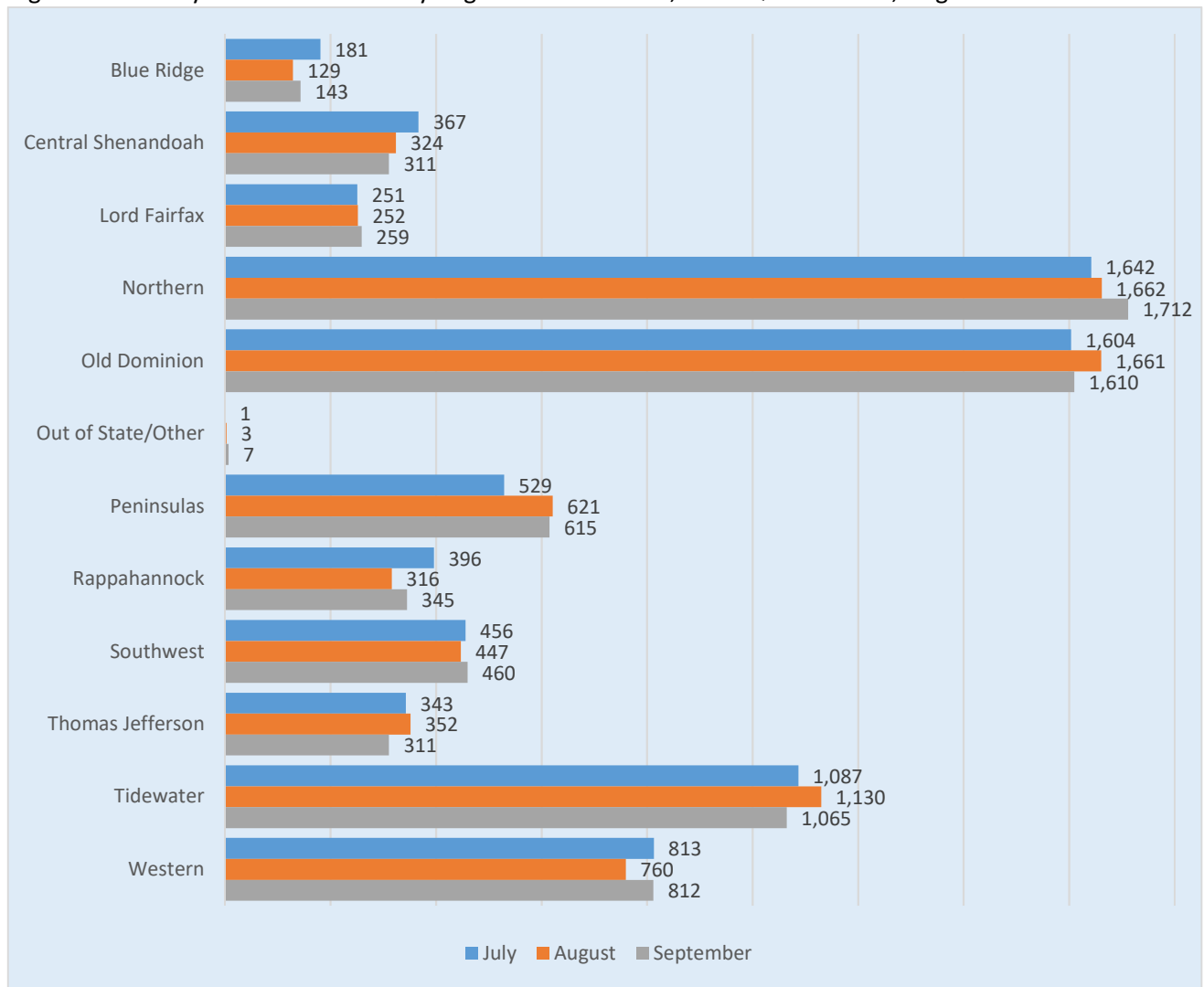


Table 2. Trauma Incidents by Abbreviated Injury Scale (AIS) Body Region, Third Quarter 2020, Virginia

Body Region	Counts of Incidents
Head	4,232 (18.4%)
Face	1,612 (7.0%)
Neck	877 (3.8%)
Thorax	601 (2.6%)
Abdomen	499 (2.2%)
Spine	1,374 (6.0%)
Upper Extremity	3,611 (15.7%)
Lower Extremity	5,279 (23.0%)
Unspecified	4,847 (21.1%)
Multiple Injuries	45 (0.2%)

Table 3: Top Ten Hospital Destinations for Trauma Incidents, Third Quarter 2020, Virginia

Destination Hospital For Trauma Incidents	Counts of Incidents
Fairfax Hospital	1,214 (5.3%)
Roanoke Memorial Hospital	950 (4.1%)
VCU Health	935 (4.1%)
Norfolk General Hospital	823 (3.6%)
Riverside Regional Medical Center	719 (3.1%)
Chippenham Hospital	707 (3.1%)
UVA Health System	700 (3.0%)
Virginia Beach General Hospital	636 (2.8%)
Northern Virginia Medical Center	590 (2.6%)
Mary Washington Hospital	535 (2.3%)

Table 4. Vital Signs Data Quality for Trauma Incidents, Third Quarter 2020, Virginia

Vital Signs Data Quality	Counts of Incidents
Total Number of Trauma Incidents	22,977
Patients with All 3 Vital Signs Reported	22,355 (97.3%)
Patients with Incomplete* Vital Signs	622 (2.7%)
Patients with Systolic Blood Pressure Reported	22,852 (99.5%)
Patients with Respiratory Rate Reported	22,678 (98.7%)
Patients with Glasgow Coma Score Reported	22,681 (98.7%)

\*Incomplete vital signs are missing one or more of the vital signs required in Step 1 of the Trauma Triage algorithm (e.g., Systolic Blood Pressure, Respiratory Rate, or Glasgow Coma Score).

### Trauma Incidents Meeting Virginia Trauma Triage Criteria

- Of the 22,977 trauma incidents reported by EMS during the third quarter of 2020, 1,862 (8.1%) met Trauma Triage Step 1 criteria, 547 (2.4%) met Step 2 criteria, and 6 (<0.1%) met Step 3 criteria. Incidents can meet criteria for more than one step; those incidents were classified into the highest severity level met. For example, if an incident met both Step 1 and Step 2 criteria, it was counted as a Step 1 incident.
- Among the incidents meeting Step 1 criteria, 1,540 (82.7%) were classified as meeting Step 1 based on reported vital signs (see Appendix 1). The remaining 322 (17.3%) incidents were classified as meeting Step 1 based on the provider’s impression, as reported in the “Trauma Triage Criteria” field in the patient care report.
- Incidents meeting Step 2 and Step 3 were based solely on the “Trauma Triage Criteria” field.

### Pediatric Patients (Age < 15)

Trauma patients <15 years old are considered pediatric patients per trauma triage criteria. Of the 22,977 trauma incidents reported by EMS during the third quarter of 2020, 1,088 (4.7%) occurred among pediatric patients. Of the 1,862 Virginia trauma incidents meeting Step 1 trauma criteria, 158 (8.5%) occurred among pediatric patients (further details are shown below).

Table 5. Hospital Destination Type for Pediatric Patients Meeting Step 1 Criteria by Regional EMS Council, Third Quarter 2020, Virginia

Regional EMS Council	Met Step 1	Trauma Hospital				Non-Trauma Hospital
		Level I	Level II	Level III	Pediatric Trauma Center	
Blue Ridge	2	1	1	0	0	0
Central Shenandoah	8	1	0	0	0	7
Lord Fairfax	5	0	2	0	0	3
Northern	33	13	1	5	3	11
Old Dominion	34	7	0	2	15	10
Peninsulas	10	0	4	0	4	2
Rappahannock	8	0	3	0	1	4
Southwest	6	0	0	1	0	5
Thomas Jefferson	12	10	0	0	0	2
Tidewater	22	2	0	2	13	5
Western	18	1	0	2	8	7
<b>Grand Total</b>	<b>158</b>	<b>35 (22.2%)</b>	<b>11 (7.0%)</b>	<b>12 (7.6%)</b>	<b>44 (27.9%)</b>	<b>56 (35.4%)</b>

- There were 68 incidents involving pediatric patients that met Step 1 trauma criteria that were taken to a Level III trauma center or lower designation. OEMS queried the Virginia State Trauma Registry data to locate those patients and were able to match 8 (11.8%) patients. The deterministic match was performed using the patient’s first name, last name, transfer of care date, emergency department (ED) admission date, incident destination hospital, and date of birth as the matching variables. For the 8 patients who matched, patient dispositions included the following:
  - Seven (87.5%) patients were transferred to another hospital.
  - One (12.5%) patient was admitted to the hospital and was later discharged.
- There were 23 pediatric patients who met Step 2 triage criteria. Thirteen (56.5%) were taken to a pediatric trauma center, 5 (21.7%) was taken to a Level I trauma center, 1 (4.3%) was taken to a Level II trauma center, and 4 (17.4%) were taken to non-trauma designated hospitals.
- None of the pediatric patients met Step 3 triage criteria.
- There were 109 pediatric patients who received a medication other than oxygen. Of those, 81 (74.3%) patients had a weight recorded; all weights documented were recorded in kilograms.

### Geriatric Patients (Age ≥ 65)

There were 9,008 (39.2% of total trauma incidents) reports of trauma among geriatric patients during the third quarter of 2020. Of the 1,862 Virginia trauma incidents meeting Step 1 trauma criteria, 673 (36.1%) occurred among geriatric patients (further details are shown below).

Table 6. Hospital Destination Type for Geriatric Patients Meeting Step 1 Criteria by Regional EMS Council, Third Quarter 2020, Virginia

Regional EMS Council	Met Step 1	Trauma Hospital			Non-Trauma Hospital
		Level I	Level II	Level III	
Blue Ridge	18	2	10	0	6
Central Shenandoah	33	2	0	0	31
Lord Fairfax	28	0	14	0	14
Northern	117	35	11	13	58
Old Dominion	150	45	11	22	72
Peninsulas	52	0	22	0	30
Rappahannock	32	0	10	0	22
Southwest	63	0	5	0	58
Thomas Jefferson	38	23	0	0	15
Tidewater	70	13	0	17	40
Western	72	24	1	16	31
Out of State	0	0	0	0	0
<b>Grand Total</b>	<b>673</b>	<b>144 (21.4%)</b>	<b>84 (12.5%)</b>	<b>68 (10.1%)</b>	<b>377 (56.0%)</b>



- There were 445 incidents involving geriatric patients who met Step 1 trauma criteria who were taken to a Level III trauma center or lower designation. OEMS queried the Virginia State Trauma Registry data to locate those patients and were able to match 73 (16.4%) patients. The deterministic match was performed using the patient's first name, last name, transfer of care date, ED admission date, incident destination hospital, and date of birth as the matching variables. For the 73 patients that matched, patient dispositions included the following:
  - Thirty-five (47.9%) patients were admitted to the hospital; of those, 34 patients were later discharged and one patient had a hospital discharge disposition of 'Another type of institution not defined elsewhere.'
  - Twenty (27.4%) patients were transferred to another hospital.
  - Seven (9.6%) patients were admitted to the intensive care unit; of those, six were later discharged from the hospital and one died at the hospital.
  - Five (6.8%) patients were admitted to telemetry; of those, 4 patients were later discharged and one patient was sent to inpatient rehabilitation.
  - Two (2.7%) patients were kept in an observation unit and were later discharged.
  - Two (2.7%) patients were taken to the operating room and were later discharged.
  - One (1.4%) patient died at the ED of the hospital.
  - One (1.4%) patient was discharged from the ED of the hospital.
- Of the 377 geriatric patients who met Step 1 criteria and were taken to non-trauma designated hospitals, 55 (14.6%) had an EMS provider primary impression of an isolated hip injury.
- There were 97 geriatric patients who met Step 2 trauma triage criteria. Of those, 34 (35.1%) patients were taken to a Level I trauma center, 13 (13.4%) were taken to a Level II trauma center, 11 (11.3 %) were taken to a Level III trauma center, and 39 (40.2%) were taken to non-trauma designated hospitals.
- One geriatric patient met Step 3 trauma triage criteria and the patient was taken to a Level I trauma center.
- For 61 incidents, patient age was recorded to be greater than 100. Quality assurance of a 30% random sample of these incidents showed that 16.7% of the entered ages were incorrect.

### **Adult Patients (15 ≥ Age < 65)**

The majority of trauma cases that occurred during the third quarter of 2020 were among adult patients (n=12,877; 56.0% of all trauma incidents). Of the 1,862 Virginia trauma incidents meeting Step 1 trauma criteria, 1,030 (55.3%) occurred among adult patients. The hospital destination type for adult trauma incidents meeting Step 1 criteria is shown below by Regional EMS Council (Table 7).

Table 7. Hospital Destination Type for Adult Patients Meeting Step 1 Criteria by Regional EMS Council, Third Quarter 2020, Virginia

Regional EMS Council	Met Step 1	Trauma Hospital			Non-Trauma Hospital
		Level I	Level II	Level III	
Blue Ridge	24	10	11	0	3
Central Shenandoah	35	6	0	0	29
Lord Fairfax	27	0	22	0	5
Northern	220	103	28	7	82
Old Dominion	248	149	23	24	52
Peninsulas	68	9	43	0	16
Rappahannock	47	2	26	0	19
Southwest	61	5	15	4	37
Thomas Jefferson	34	30	1	0	3
Tidewater	147	65	3	53	26
Western	119	70	1	14	34
Out of State	0	0	0	0	0
<b>Grand Total</b>	<b>1,030</b>	<b>449 (43.6%)</b>	<b>173 (16.8%)</b>	<b>102 (9.9%)</b>	<b>306 (29.7%)</b>

- There were 408 incidents involving adult patients who met Step 1 trauma criteria who were taken to a Level III trauma center or lower designation. OEMS queried the Virginia State Trauma Registry data to locate those patients and were able to match 70 (17.2%) patients. The deterministic match was performed using the patient’s first name, last name, transfer of care date, incident destination hospital, ED admission date, and date of birth as the matching variables. For the 70 patients that matched, patient dispositions included the following:
  - Twenty-three (32.9%) patients were transferred to another hospital.
  - Thirteen (18.6%) patients were discharged from the ED of the hospital.
  - Nine (12.9%) patients were admitted to the intensive care unit; of those, seven patients were later discharged, one patient was sent to inpatient rehabilitation, and one patient died at the hospital.
  - Seven (10%) patients were admitted to telemetry and were later discharged.
  - Six (8.6%) patients were admitted to the hospital and were later discharged.
  - Five (7.1%) patients were kept in an observation unit and were later discharged.
  - Four (5.7%) patients were taken to the operating room; of those, two were discharged and two were sent to inpatient rehabilitation.
  - Two (2.9%) patients did not have ED discharge disposition information; of those, one patient had a hospital discharge disposition of ‘Discharged’ and the other patient did not have hospital discharge disposition information.
  - One (1.4%) patient died at the ED of the hospital.

- There were 427 adult patients who met Step 2 criteria. Of those, 261 (61.1%) patients were taken to a Level I trauma center, 54 (12.6%) patients were taken to a Level II trauma center, 45 (10.5%) were taken to a Level III trauma center, and 67 (15.7%) patients were taken to non-trauma designated hospitals.
- There were 5 adult patients who met Step 3 criteria. Of those, 3 (60.0%) were taken to a Level I trauma center and 2 (40.0%) were taken to a Level II trauma center.

### Air-Medical EMS Transport

There were 401 trauma patient transports by an air-medical ambulance during the third quarter of 2020. Of those:

- Twenty-four (6.0%) were pediatric transports, of which:
  - Nine were taken to a pediatric trauma center, 14 were taken to a Level I trauma center, and 1 was taken to a Level II trauma center.
- Eighty (20%) were geriatric transports, of which:
  - Fifty-seven were taken to a Level I trauma center, 18 were taken to a Level II trauma center, 2 were taken to a Level III trauma center, and 3 were taken to a non-trauma designated hospital.
- Two-hundred and ninety-seven (74.1%) were adult transports, of which:
  - Two-hundred and thirty-eight were taken to a Level I trauma center, 52 were taken to a Level II trauma center, 2 were taken to a Level III trauma center, and 5 were taken to a non-trauma designated hospital.

### Causes of Injury

Trauma patient records were analyzed to identify the causes of injuries in the Commonwealth of Virginia. Fall injuries occurred most commonly, followed by motor vehicle collision injuries. Causes of injury for the third quarter of 2020 are shown in Table 8.

Table 8. Frequencies and Percentages of Causes of Injury, Third Quarter 2020, Virginia

Causes of Injury	Frequency	Percentage of the Total
Falls, slips/trips	8,791	38.3%
MVC-related	4,575	19.9%
Blunt force trauma	1,024	4.5%
Penetrating trauma	617	2.7%
Non-motorized transport	398	1.7%
Firearm	348	1.5%
Machine-related	163	0.7%
Animal-related	144	0.6%
Burn, smoke inhalation, electrocution, explosion	99	0.4%
Self-harm	88	0.4%
Recreational	38	0.2%
Abuse	29	0.1%
Poisoning	17	0.1%

Table 8. Frequencies and Percentages of Causes of Injury, Third Quarter 2020, Virginia (continued)

Causes of Injury	Frequency	Percentage of the Total
Overexertion/strain	10	<0.1%
Asphyxiation	9	<0.1%
Environment/weather related	7	<0.1%
Human bite	6	<0.1%
Drowning	3	<0.1%
Aircraft	3	<0.1%
Unspecified	6,608	28.8%
<b>Grand Total</b>	<b>22,977</b>	<b>100.0%</b>

### Under-Triage of Trauma Incidents Heat Map

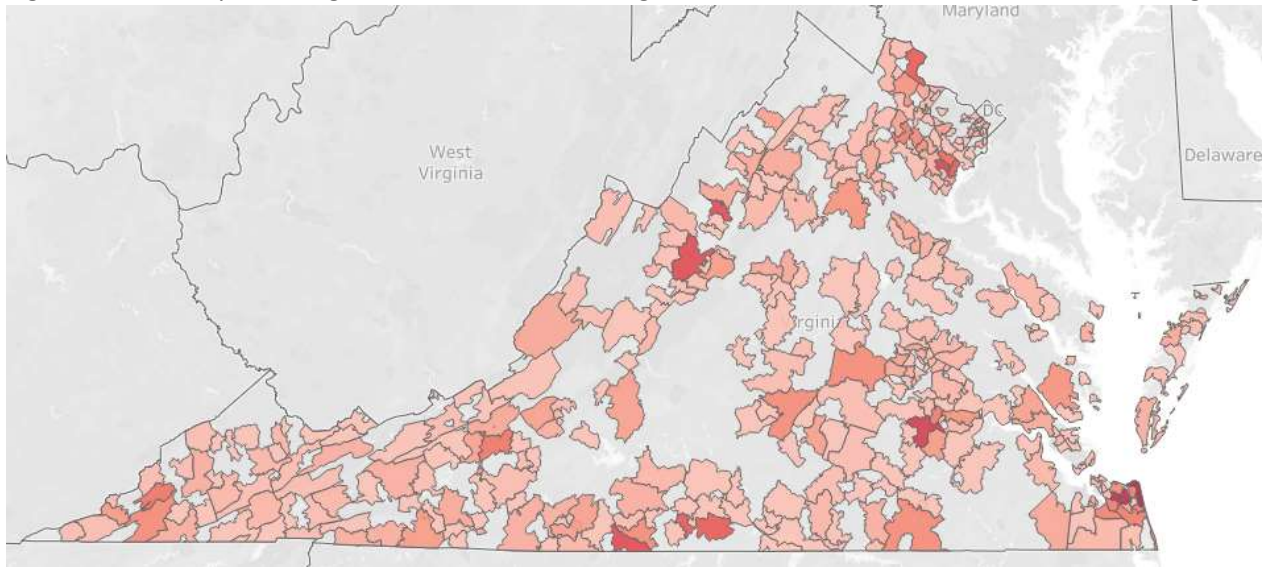
A trauma incident is considered to be under-triaged if the incident met Step 1 or Step 2 trauma triage criteria and the patient was taken to either a Level III trauma center or a non-trauma designated hospital. Injuries to the head, arms, or legs occurred most often among the under-triaged incidents (Table 9).

Table 9. Frequencies and Percentages of Under-Triaged Trauma Patients by AIS Body Region of Injury, Third Quarter 2020, Virginia

AIS Region	Frequency	Percentage among Under-Triaged Patients
Head	293	27.0%
Unspecified	274	25.2%
Lower Extremities	199	18.3%
Upper Extremities	112	10.3%
Face	88	8.1%
Thorax	34	3.2%
Spine	33	3.0%
Neck	29	2.7%
Abdomen	24	2.2%
Multiple	1	0.1%
<b>Grand Total</b>	<b>1,087</b>	<b>100%</b>

A heat map of under-triaged trauma incidents based on the incident zip code is shown in Figure 3. The heat map shows where the problem is most prominent and serves as a resource planning tool.

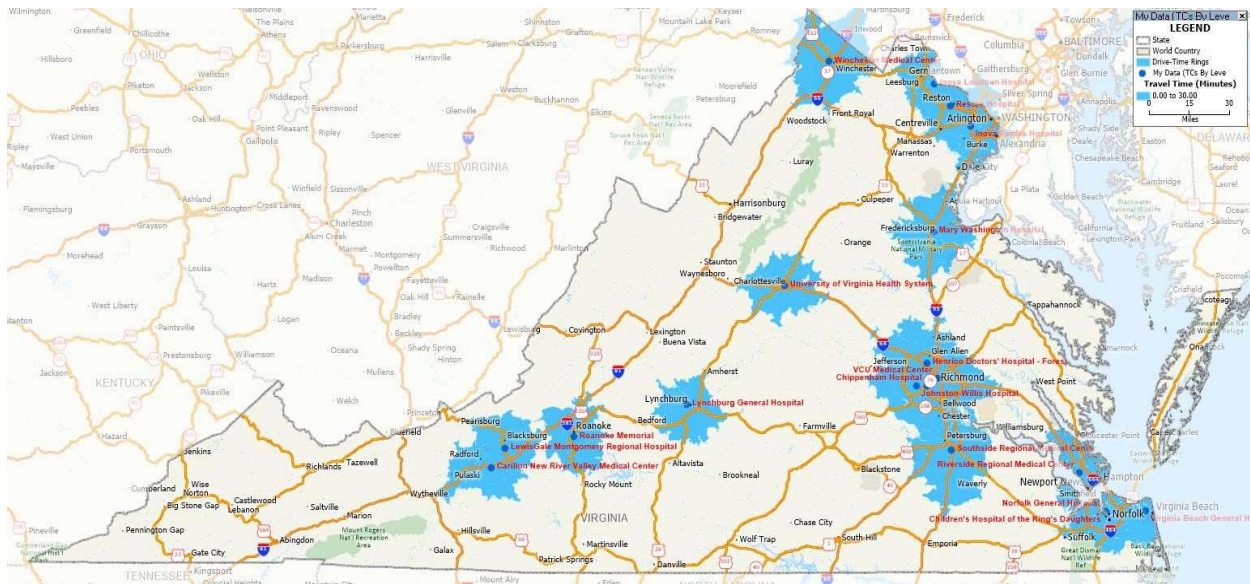
Figure 3. Heat Map Showing the Extent of Under-Triage of Trauma Patients, Third Quarter 2020, Virginia



### Distribution of Trauma Facilities across Virginia

Trauma centers across Virginia are not uniformly distributed. The upper part of the Northern Virginia EMS Council and parts of Central Virginia (e.g., the greater Richmond area) have greater access to trauma centers, as multiple trauma centers are located within close proximity. Most parts of the Old Dominion EMS Alliance, Central Shenandoah EMS Council, and Western Virginia EMS Council have very limited access to trauma centers. The Central Shenandoah EMS Council and Southwest Virginia EMS Council have no trauma centers within their EMS regions, but are reasonably close to Level II trauma centers in other EMS regions or states. The distribution of trauma centers across Virginia, surrounded by rings showing the geographical areas within a 30-minute drive of each trauma center, is shown below (Figure 4). This map displays which parts of Virginia have limited access to a trauma center.

Figure 4. Trauma Centers across Virginia, Surrounded by 30-Minute Drive Time Rings



## Data Quality

Virginia EMS agencies have been working very hard to make sure they provide optimal care to their patients while also making efforts to improve data quality. Over the past years, there has been a significant improvement in trauma triage data quality. Continuation of this improvement is what the System Improvement Committee expects. The OEMS conducted quality assurance checks on trauma triage records from the third quarter of 2020, as described below.

- **Blank Vital Signs:** There were a total of 125 incidents without systolic blood pressure documented, 299 incidents without respiratory rate documented, and 296 incidents without GCS documented. Ten percent of the incidents from each category were randomly selected for further review; the findings are listed below.
  - In some instances, the time vital signs were taken was not documented. This may occur when vital signs are taken before EMS arrival or when the time is not entered into the record by an EMS provider. When this occurs, Elite v3 is not able to identify any initial vital signs contained in the record. As a result, initial vital signs are identified as missing, even when they are recorded. To improve this data point, the time vital signs are taken should be recorded for every instance, when possible.
  - In some cases, vitals are unable to be obtained due to patient refusal or because the patient is a child. Such cases should be documented as Pertinent Negatives (e.g., “Refused” or “Unable to Complete”). Leaving the vital sign field blank and reporting such cases only in the patient care narrative will result in the vital sign being identified as missing.
  - Of the records sampled, **25%** of records missing systolic blood pressure, **83.3%** of records missing respiratory rate, and **82.8%** of records missing GCS were found to have blank data points because the vital signs were not recorded anywhere in the patient record (i.e., the vital sign field or the patient care narrative).



- **Atypical Vital Signs:** Atypical vital signs are vitals with extreme values. The cutoff values for vitals to be considered atypical are chosen arbitrarily only for quality check and validation purposes. For this report, systolic blood pressures with values of less than 40 or greater than 250 and respiratory rates of less than 3 or greater than 100 were deemed extreme values. There were 69 instances of extreme values. Thirty percent of the incidents were randomly selected for further review.
  - Among reviewed incidents with extreme values, 68.2% had the same values captured in the narrative and are therefore considered to be valid.
  - Another 22.7% of the vital signs were not supported by the narrative and are considered to be incorrect.
  - In 9.1% of the cases, vitals were documented as such when the providers were unsuccessful in obtaining the vitals. For such cases, vital signs should be documented as “Unable to Complete.” Entering extreme values in the record makes the data less accurate and causes the results of any data analysis to be unreliable.
- **Not Applicable/Not Recorded/Blank Trauma Triage Criteria:** There were 21,625 trauma incidents where the “Trauma Triage Criteria” field was reported to be Not Applicable or was Not Recorded or Blank. It is understandable that not all trauma incidents meet trauma triage criteria; however, some of these records are incorrectly classified or do not report important information.
  - Of those incidents, 1,069 (4.9%) had recorded vitals meeting Step 1 trauma triage criteria.
  - Step 2 and Step 3 trauma triage incidents may also be missing trauma triage criteria and therefore may also be incorrectly classified. However, Steps 2 and 3 trauma triage criteria are not based on vital signs, so the exact amount of misclassification cannot be identified.
- **Blank Age**
  - There were 6 incident records where age was left blank; of those incidents, patient age was found in the patient care narratives for 2 patients and were updated. Of the remaining 4 incidents with missing age, one incident met Step 1 trauma triage criteria and was taken to a Level I Trauma Center.

## Conclusions

Many factors influence the decision regarding where a patient is transported. As noted above, trauma centers are not equally distributed across Virginia. In some areas (Southwest Virginia and Northern Virginia), out of state trauma center resources are available. Despite having a total of 12 Level I and Level II trauma centers (combined) in Virginia, as well as access to several other similar facilities in surrounding states, large areas of Virginia remain underserved. The variability of resources across Virginia is often compounded by geographic and (especially in the case of Helicopter or Medevac EMS) weather factors. Although a solution to this problem is beyond the scope of this report, this variability needs to be considered when comparing the outcomes of pre-hospital trauma patients in Virginia.

Missing vital signs data in EMS records continues to be an area of focus for performance improvement efforts. Currently, about one out of every 37 patients (2.7%) have incomplete vital signs

data. During the third quarter of 2020, 39.7% of patients who met Step 1 trauma triage criteria and 20.1% of patients who met Step 2 criteria were taken to non-trauma centers. Acknowledging these data, there may be a need to re-examine how trauma triage criteria are being applied in the field, with an eye towards the existing barriers to trauma center access, including the absence of trauma centers in broad swaths of Virginia. Whether the addition of trauma center resources would allow for improved access and care requires further study.

OEMS staff performed quality assurance on trauma triage data from the third quarter of 2020. Specifically, the data values that were reviewed included the vital signs used in Step 1 trauma triage criteria designation, atypical vital sign values, and trauma triage criteria fields listed as not applicable, not recorded, or blank. OEMS will continue to perform these data quality checks and will summarize findings for inclusion in future trauma triage reports.



Appendix 1: Elite v3 Data Dictionary Elements for Trauma Triage Vital Signs and Trauma Triage Criteria

**eVitals.06 - SBP (Systolic Blood Pressure)**

Definition

The patient's systolic blood pressure.

National Element	Yes	Pertinent Negatives (PN)	Yes
State Element	Yes	NOT Values	Yes
Version 2 Element	E14_04	Is Nillable	Yes
Usage	Required	Recurrence	1 : 1

Associated Performance Measure Initiatives

Airway    Cardiac Arrest    Pediatric    STEMI    Stroke    Trauma

Attributes

**NOT Values (NV)**

7701001 - Not Applicable                      7701003 - Not Recorded

**Pertinent Negatives (PN)**

8801005 - Exam Finding Not Present    8801019 - Refused                      8801023 - Unable to Complete

Constraints

Data Type	minInclusive	maxInclusive
integer	0	500

Data Element Comment

Required for ACS-Field Triage and other patient scoring systems.

**eVitals.14 - Respiratory Rate**

Definition

The patient's respiratory rate expressed as a number per minute.

National Element	Yes	Pertinent Negatives (PN)	Yes
State Element	Yes	NOT Values	Yes
Version 2 Element	E14_11	Is Nillable	Yes
Usage	Required	Recurrence	1 : 1

Associated Performance Measure Initiatives

Airway    Cardiac Arrest    Pediatric    STEMI    Stroke    Trauma

Attributes

**NOT Values (NV)**

7701001 - Not Applicable                      7701003 - Not Recorded

**Pertinent Negatives (PN)**

8801005 - Exam Finding Not Present    8801019 - Refused                      8801023 - Unable to Complete

Constraints

Data Type	minInclusive	maxInclusive
integer	0	300

Data Element Comment

## eVitals.23 - Total Glasgow Coma Score

### Definition

The patient's total Glasgow Coma Score.

National Element	No	Pertinent Negatives (PN)	Yes
State Element	Yes	NOT Values	Yes
Version 2 Element	E14_19	Is Nillable	Yes
Usage	Required	Recurrence	1 : 1

### Associated Performance Measure Initiatives

Airway    Cardiac Arrest    Pediatric    STEMI    Stroke    Trauma

### Attributes

#### NOT Values (NV)

7701001 - Not Applicable

7701003 - Not Recorded

7701005 - Not Reporting

#### Pertinent Negatives (PN)

8801019 - Refused

8801023 - Unable to Complete

### Constraints

Data Type	minInclusive	maxInclusive
integer	3	15

### Data Element Comment

Can be documented or calculated from EVitals.19 (GCS-Eye), EVitals.20 (GCS-Verbal), and EVitals.21 (GCS-Motor).

## eInjury.03 - Trauma Center Criteria

### Definition

Physiologic and Anatomic Field Trauma Triage Criteria (steps 1 and 2) as defined by the Centers for Disease Control.

National Element	Yes	Pertinent Negatives (PN)	No
State Element	Yes	NOT Values	Yes
Version 2 Element		Is Nillable	Yes
Usage	Required	Recurrence	1 : M

### Associated Performance Measure Initiatives

Trauma

### Attributes

#### NOT Values (NV)

7701001 - Not Applicable                      7701003 - Not Recorded

#### CorrelationID

**Data Type:** string                      **minLength:** 0                      **maxLength:** 255

### Code List

Code	Description
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2903001	Amputation proximal to wrist or ankle
2903003	Crushed, degloved, mangled, or pulseless extremity
2903005	Chest wall instability or deformity (e.g., flail chest)
2903007	Glasgow Coma Score <= 13
2903009	Open or depressed skull fracture
2903011	Paralysis
2903013	Pelvic fractures
2903015	All penetrating injuries to head, neck, torso, and extremities proximal to elbow or knee
2903017	Respiratory Rate <10 or >29 breaths per minute (<20 in infants aged <1 year) or need for ventilatory support
2903019	Systolic Blood Pressure <90 mmHg
2903021	Two or more proximal long-bone fractures

### Data Element Comment

2011 Guidelines for the Field Triage of Injured Patients - value choices for Steps 1 and 2. For falls, one story is equal to 10 feet.

Code 7701001 - Not Applicable should be used when none of the values listed in the code list for element eInjury.03 apply.

### Version 3 Changes Implemented

Added to better evaluate the CDC-ACS 2011 Guidelines for the Field Triage of Injured Patients.

Website: <http://www.cdc.gov/FieldTriage/>