Trauma Care Performance Improvement Report

Baseline – Calendar Year 2013 Data

Overview

- § 32.1-111.3:B.3 states that TSO&MC advises OEMS on performance improvement process that supports:
  - Trauma center designation process
  - Trauma triage plan
  - Improvement of trauma care throughout Virginia
- Trauma Performance Improvement Committee (TPIC) tasked with developing a performance improvement program for monitoring the quality of trauma care
- This inaugural analysis of CY 2013 data focuses on
  - EMS trauma triage and trauma patient disposition
  - Interfacility transfer of trauma patients

TRAUMA TRIAGE BY EMS AGENCIES RESULTS

Trauma Triage by EMS Agencies

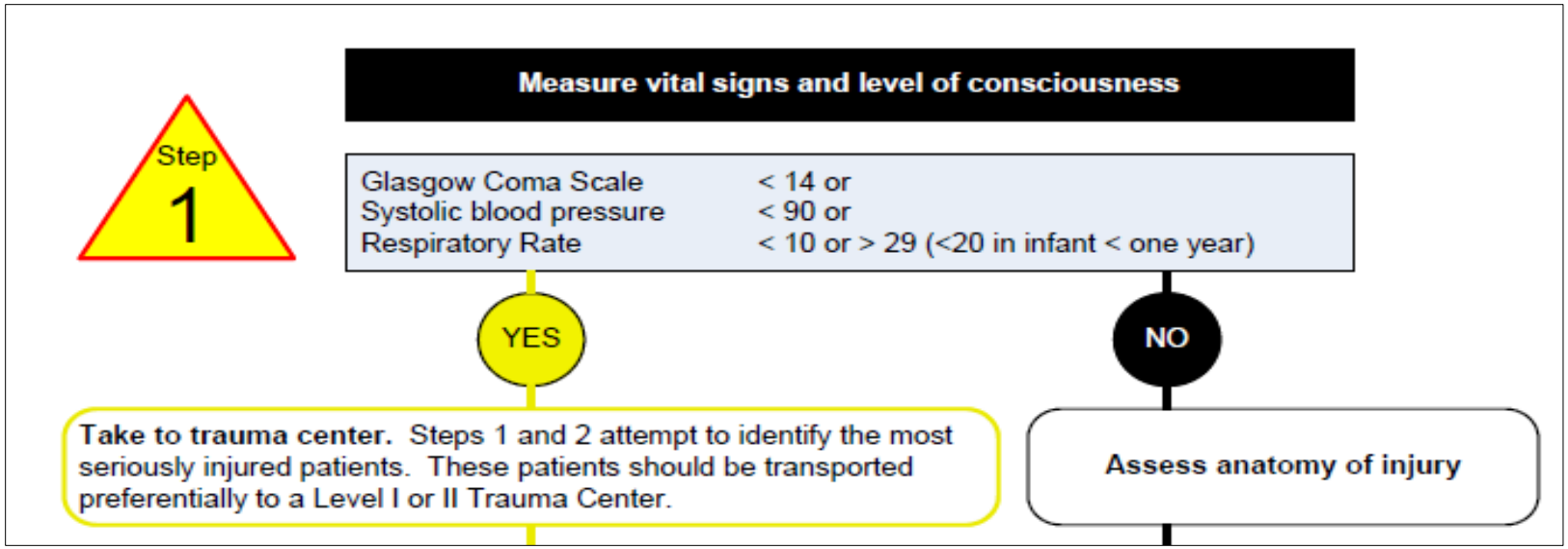
- Ideal situation:
  - Pre hospital cases that are deemed to be traumas (Table 1)
  - Where one or more of the Virginia Step 1 Field Trauma Triage Criteria (Figure 1) were met
  - *And* the patient was:
    - Transported to a Level I or Level II trauma center *or*
    - Taken by ground ambulance to landing zone or other such location for air EMS transport

Table 1. Definition of Trauma Patients for VPHIB Data

*NOTE: Both the **Complaint Reported by Dispatch** and the **Provider's Primary Impression** must be listed below in order to classify the record as a trauma case.*

Complaint Reported by Dispatch	
Assault	Hemorrhage/Laceration
Assault - Sexual	Industrial Accident/Inaccessible Incident/ Other Entrapments (Non-Vehicle)
Auto vs. Pedestrian	Ingestion/Poisoning
Burns	Machine/Equipment Injury
CO Poisoning/Hazmat	MCI (Multiple Casualty Incident)
Drowning	Stab/Gunshot Wound
Electrocution	Traffic/Transportation Accident
Eye Problem/Injury	Traumatic Injury
Fall Victim	
Provider's Primary Impression	
Bleeding	Smoke Inhalation
Electrocution	Toxic Exposure
Inhalation Injury (Toxic Gas)	Traumatic Injury
Poisoning/Drug Ingestion	

Figure 1. Virginia Field Trauma Triage Decision Scheme



Also need to consider the location of the nearest trauma center – see the next slide

Appendix A. Location of Trauma Centers and Hospitals in Virginia and Nearby Trauma Centers in Surrounding States

(Based on 2013 Data)

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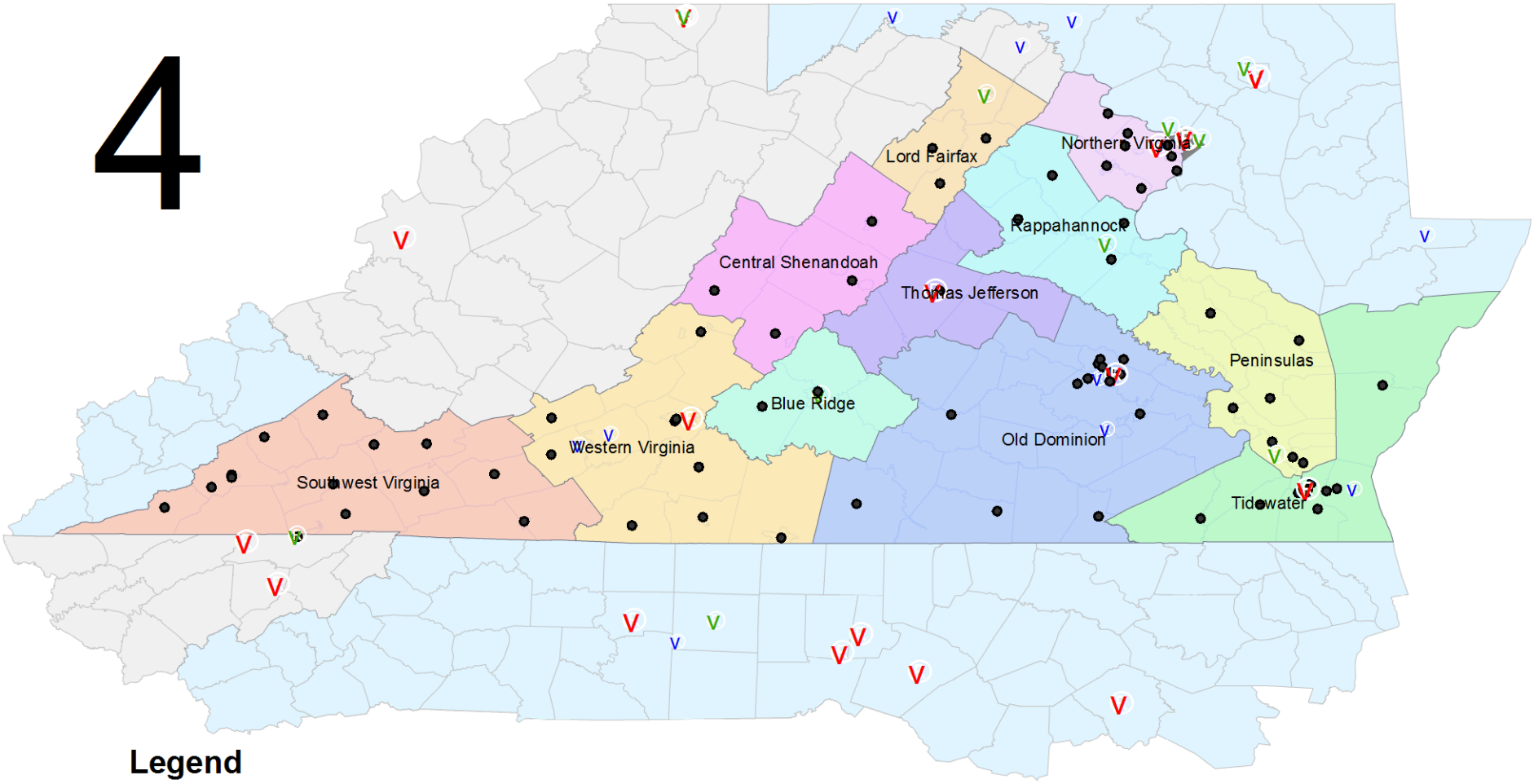

Legend

Hospitals

- Non Trauma Centers

Trauma Center Designation

- V Level I
- V Level II

EMS Regions

Names of Regions

- Blue Ridge
- Central Shenandoah
- Lord Fairfax
- Northern Virginia
- Old Dominion
- Peninsulas
- Rappahannock
- Southwest Virginia
- Thomas Jefferson
- Tidewater
- Western Virginia

Calendar Year 2013 Results (VPHIB)

- 5.2% (66,906/1,219,358) of VPHIB records classified as trauma cases
- Of these, 96.5% (64,543/66,906) were "True 911" calls
  - Type of service requested was 911 scene response
  - Patient was treated and transported by EMS
- 42.2% (27,210/64,543) of the "True 911" trauma cases were *missing* systolic blood pressure (SBP), respiratory rate (RR), *and* Glasgow Coma Scale (GCS) values
- Cannot report on the appropriateness of triaging trauma patients with missing data

Figure 2. Virginia Step 1 Trauma Triage Criteria Status for Pre Hospital Patients by EMS Council Regions

Includes All VPHIB Trauma Cases (N = 64,543)

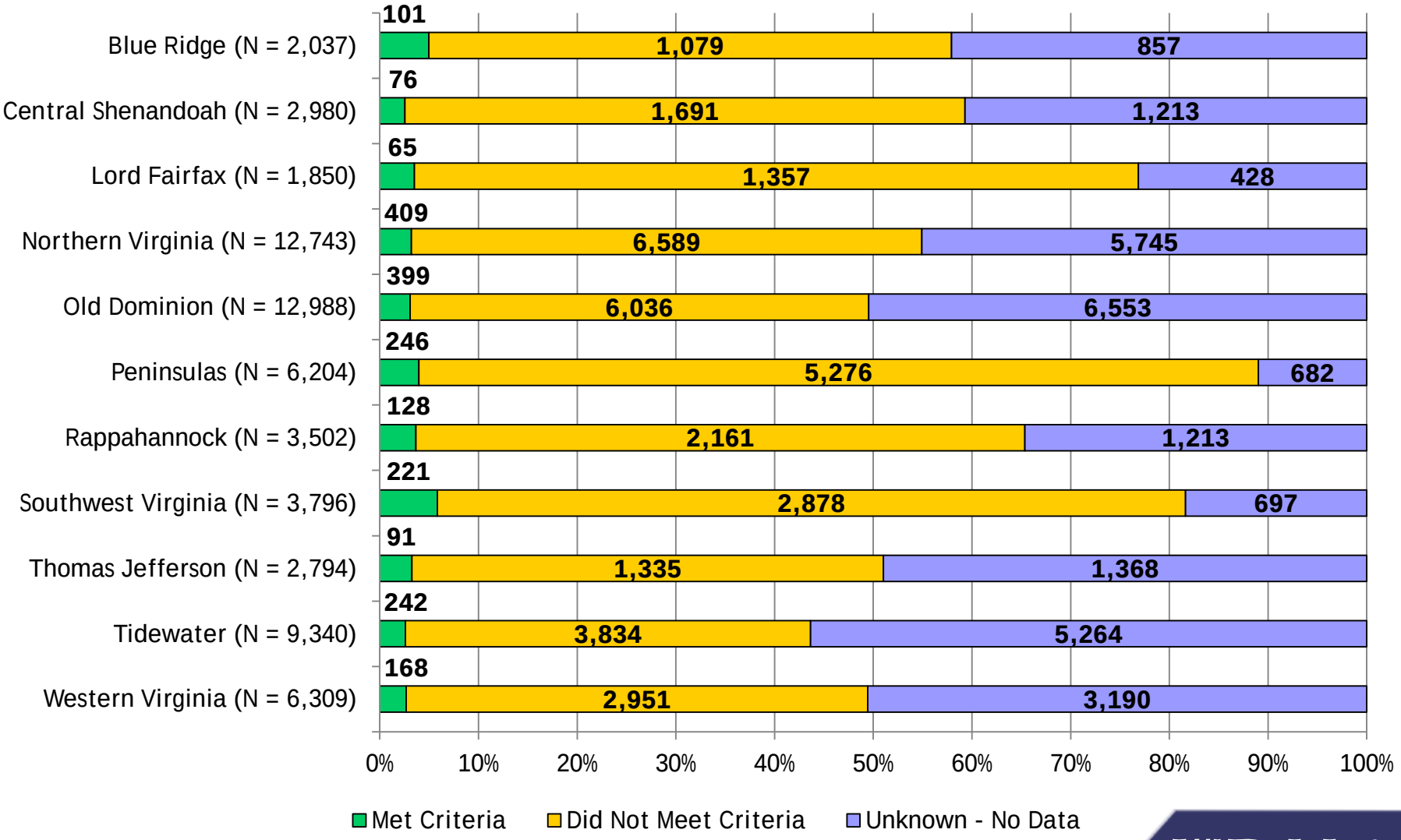

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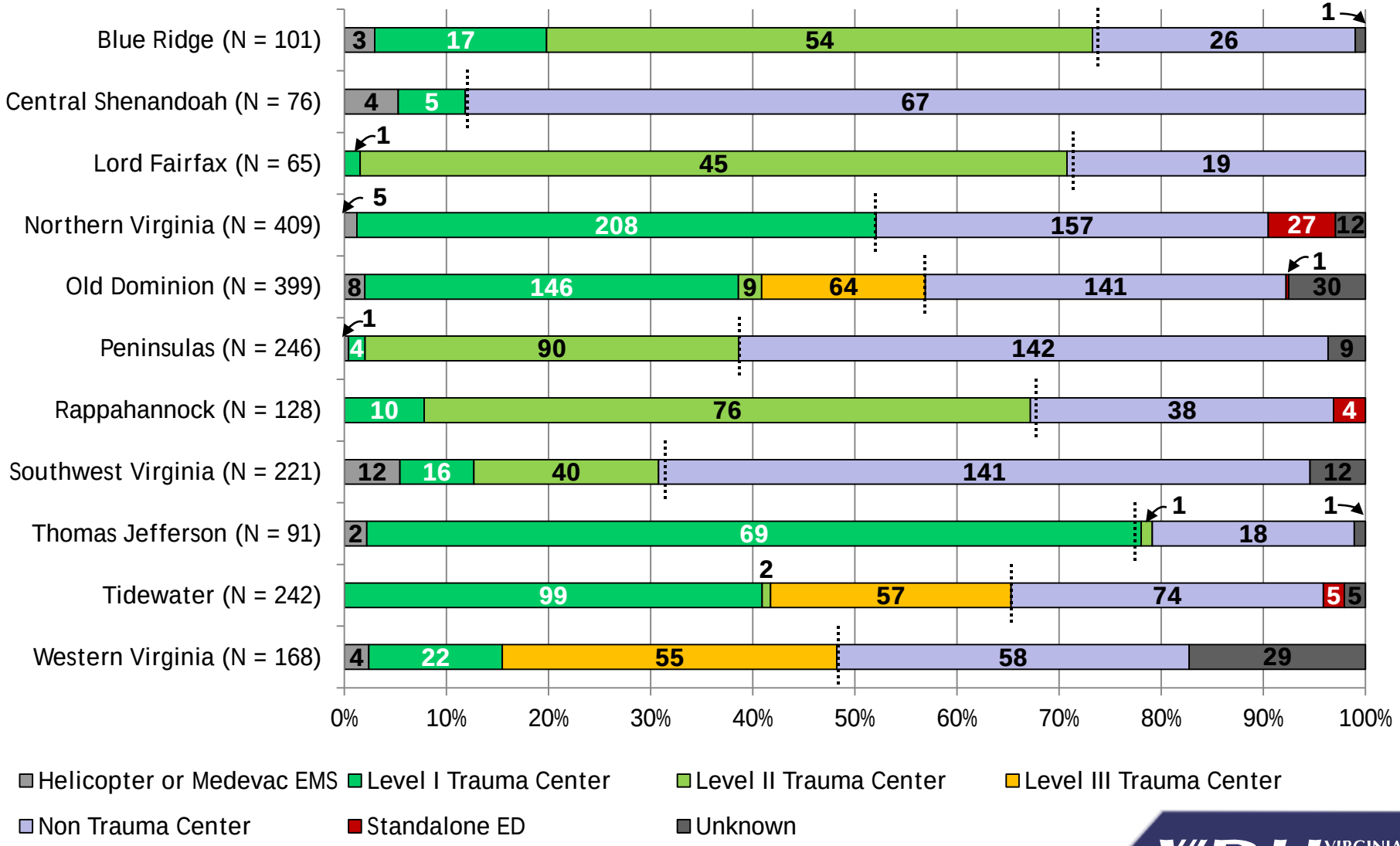
Figure 3. Destinations of Pre Hospital Patients Meeting One or More Virginia Step 1 Trauma Triage Criteria by Virginia EMS Region *(N = 2,146)- 5.7%*



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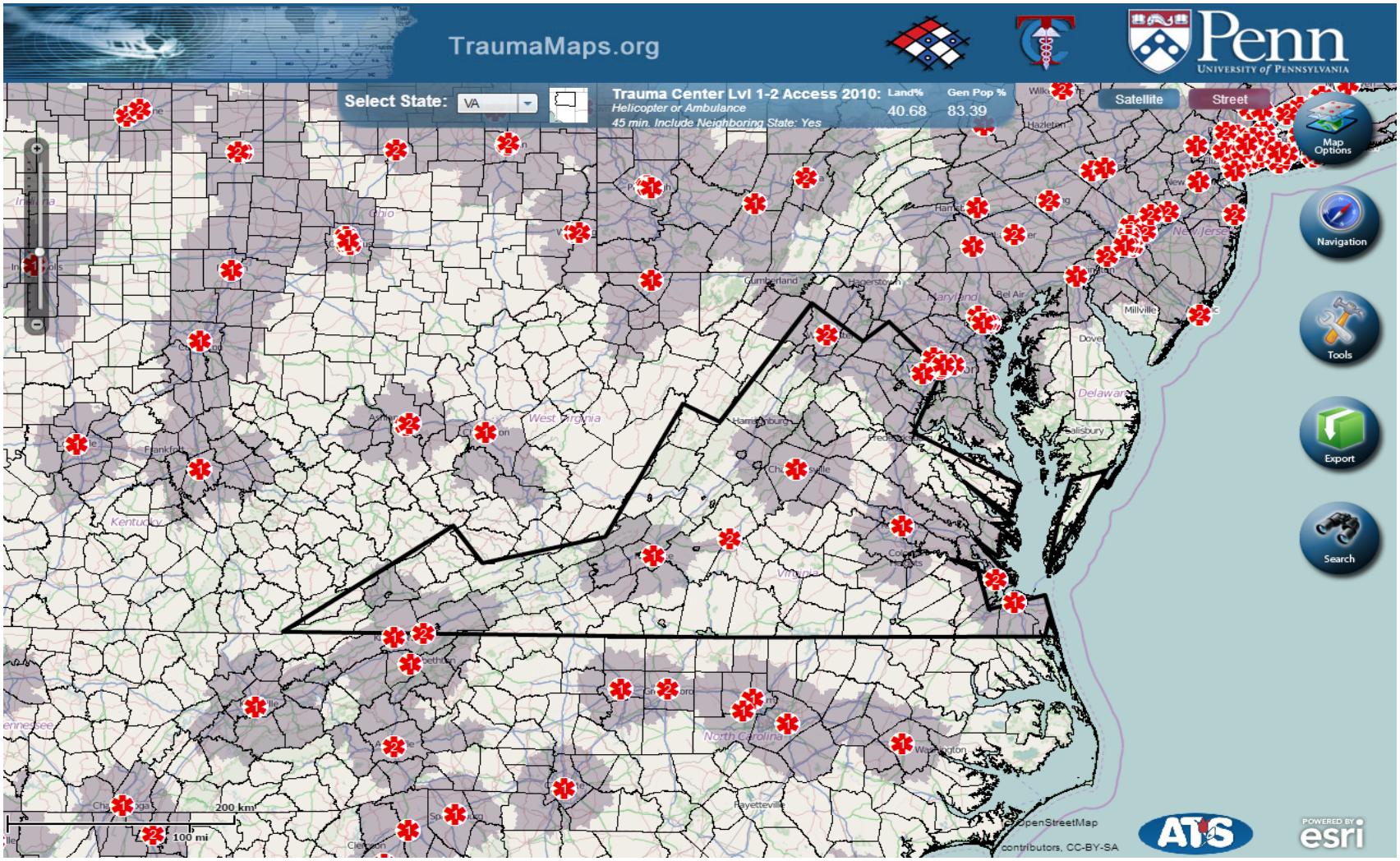
Standalone Emergency Departments

- 2.8% (1,833/64,543) of trauma cases were transported to a standalone ED
  - 2.0% (37/1,833) met one or more trauma triage criteria
  - 57.9% (1,061/1,833) did not meet any trauma triage criteria
  - 40.1% (735/1,833) did not have any SBP, RR, or GCS values
- This trend should be monitored in the future

Other Considerations

- Trauma center resources are not equally distributed across the state
  - Appendix B – accessibility within 45 minutes by helicopter *or* ambulance
  - Appendix C – accessibility within 45 minutes for ground ambulance transport *only*
- Also need to consider
  - Geographic barriers
    - Mountains in the west
    - Water in the east
  - Weather factors for air EMS

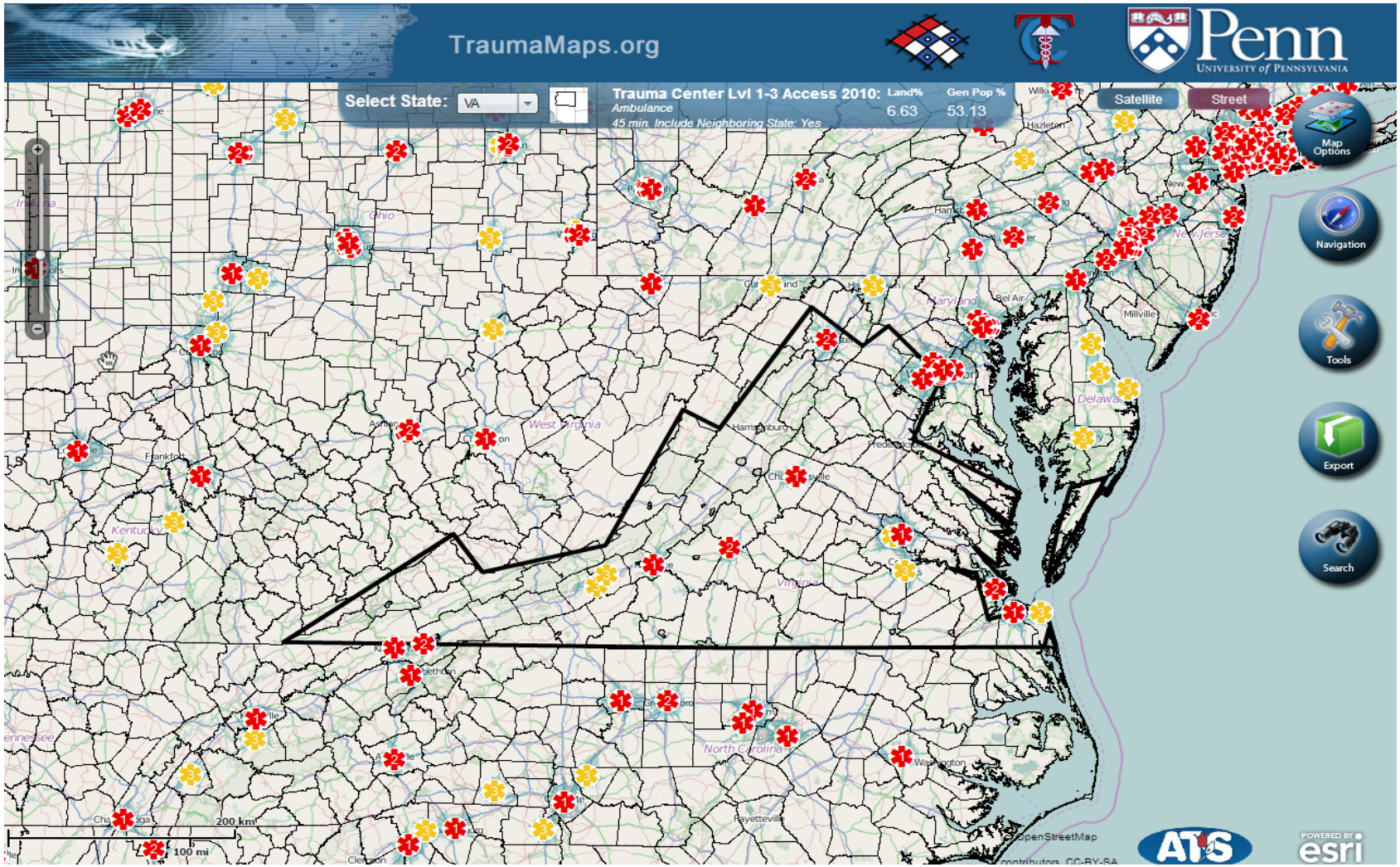
Appendix B. Adult Level I and II Trauma Centers within 45 Minutes Access Time via Helicopter or Ambulance for Virginia and Neighboring States



Source: www.traumamaps.org, accessed 12/04/2014

Note: Mary Washington Hospital (Level 2, Fredericksburg) is missing

Appendix C. Adult Level I and II Trauma Centers within 45 Minutes Access Time via Ambulance Only for Virginia and Neighboring States



Source: www.traumamaps.org, accessed 12/04/2014

Note: Mary Washington Hospital (Level 2, Fredericksburg) is missing

INTERFACILITY TRANSFER OF TRAUMA PATIENTS RESULTS

Interfacility Transfer of Trauma Patients

- *Virginia Department of Health Prehospital and Interhospital State Trauma Triage Plan*
  - Factors to consider regarding correctness of interfacility transfer of adult trauma patients (Table 2)
  - Many considerations cannot be evaluated because necessary information is not included in the Virginia Statewide Trauma Registry (VSTR)
  - With the exception of the Central Nervous System Triage Criterion of *GCS* < *13*, missing information was not an issue in this analysis

Table 2. Adult Criteria

Based on the *Resources for Optimal Care of the Injured Patient: 1999* (American College of Surgeons, 1999) and adapted by the TSO&MC

Respiratory
Bilateral thoracic injuries
Significant unilateral injuries in patients under age 60 (e.g. pneumothorax, hemo-pneumothorax, pulmonary contusion, >5 rib fractures)
Significant unilateral injuries in patients with pre-existing cardiac and/or respiratory disease
Respiratory compromise requiring intubation
Flail chest
Central Nervous System
Unable to follow commands
Open skull fracture
Extra-axial hemorrhage on CT, or any intracranial blood
Paralysis
Focal neurological deficits
Glasgow Coma Scale (GCS) ≤ 12

Cardiovascular
Hemodynamic instability as determined by the treating physician
Persistent hypotension
Systolic B/P (<100) without immediate availability of surgical team
Injuries
Any penetrating injury to the head, neck, torso or extremities proximal to the elbow or knee without a surgical team immediately available.
Serious burns/burns with trauma
Significant abdominal to thoracic injuries in patients where the physician in charge feels treatment of injuries would exceed capabilities of the medical center
Special Considerations
Trauma in pregnancy (≥ 24 weeks gestation)
Special needs individuals
Geriatric
Bariatric

Table 3. Overall Percentage Values for the Four Possible Patient Scenarios

	Patients Initially Taken to a Level I or Level II Trauma Center (Ideal)	Patients Initially Taken Elsewhere, But Were:			Overall Potentially Less Than Ideal
		Transferred to a Level I or Level II Trauma Center (Potentially Ideal)	Transferred Elsewhere (Potentially Less Than Ideal)	Not Transferred (Potentially Less Than Ideal)	
Significant Lung Injuries in Patients < 60 yo	80.8	5.6	12.2	1.4	13.6
Flail Chest	82.4	5.3	10.7	1.5	12.2
Open Skull Fracture	90.0	6.7	2.8	0.6	3.3
GCS < 13	78.9	5.1	14.4	1.6	16.0
Serious Burns *	59.7	22.5	14.9**	2.9	17.8
Geriatric	36.0	5.5	55.4	3.1	58.5

* Values for Serious Burns use ***Burn Centers*** rather than *Level I or Level II trauma centers*

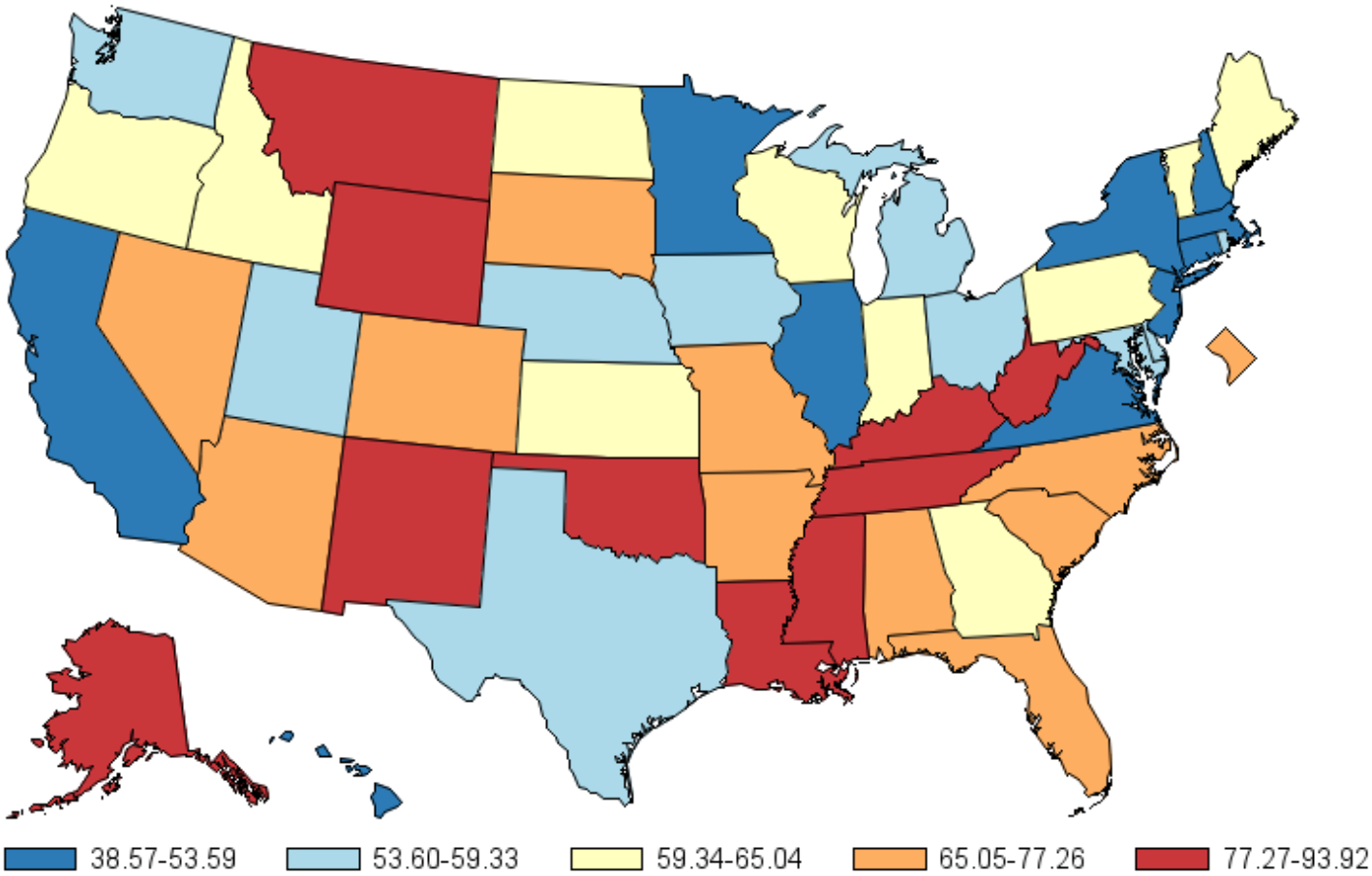
** Approximately half of the serious burn patients that were transferred elsewhere were transferred to a Level I or Level II trauma center

Additional Observations

- Virginia is in lowest quintile nationally for overall injury deaths (Appendix E)
- Overall injury death for Virginia is 52.59 per 100K (Appendix F)
  - Values range from 25.04 per 100K to 141.14 per 100K
  - Loudoun County - minimum value for state and nation
  - Dickenson County - maximum value for state and in 99th percentile for nation
- Overall deaths per 100K had similar patterns (Appendix G)

2004-2010, United States
Death Rates per 100,000 Population

All Injury, All Intents, All Races, All Ethnicities, Both Sexes, All Ages
Annualized Crude Rate for United States: 58.92

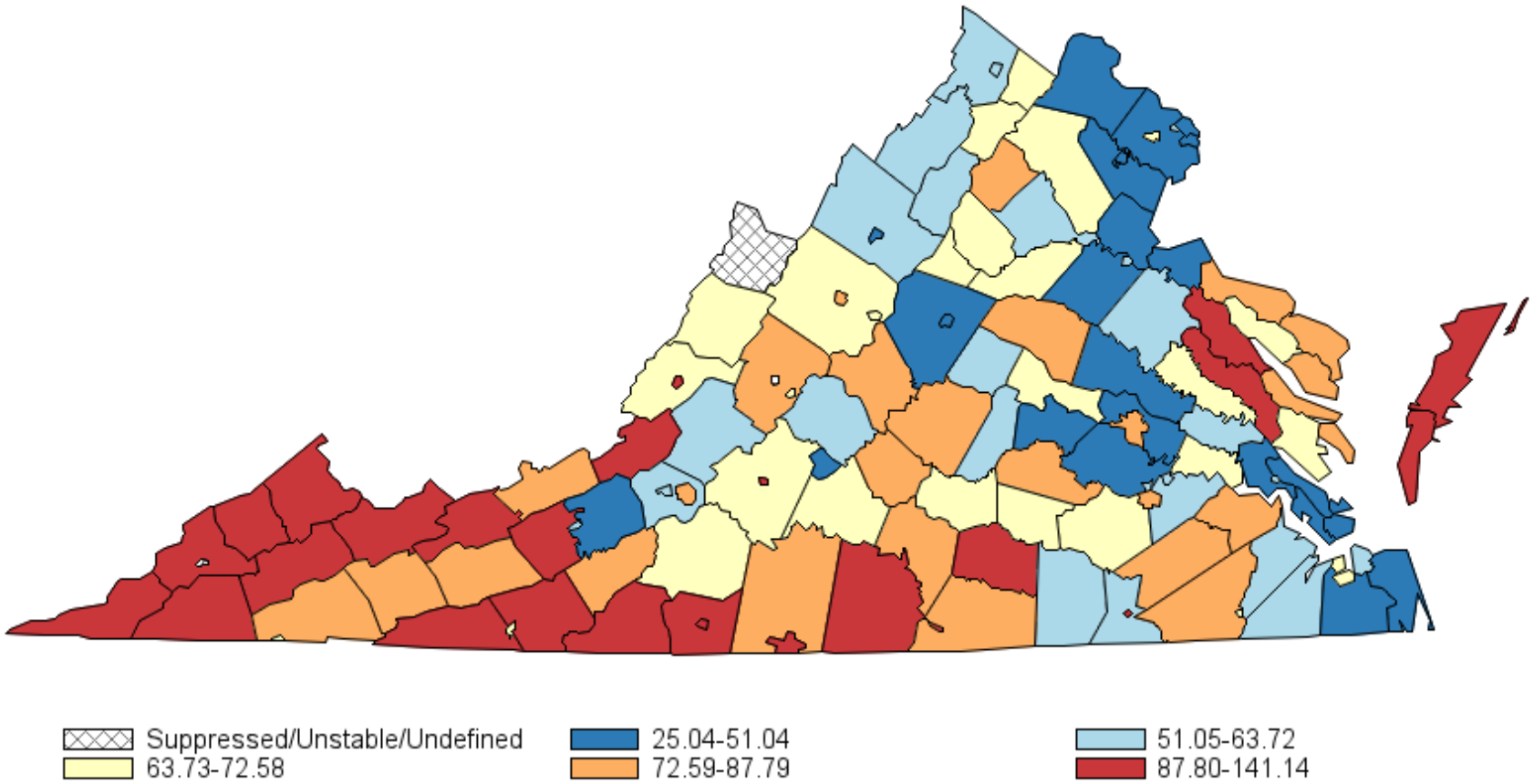


Reports for All Ages include those of unknown age.
* Rates based on 20 or fewer deaths may be unstable. States with these rates are cross-hatched in the map (see legend above). Such rates have an asterisk

Source: *http://wisqars.cdc.gov:8080/cdcMapFramework/mapModuleInterface.jsp, accessed 12/04/2014*

Produced by: the Statistics, Programming & Economics Branch, National Center for Injury Prevention & Control, CDC
Data Sources: NCHS National Vital Statistics System for numbers of deaths; US Census Bureau for population estimates.

Appendix F. 2004-2010, Virginia
Death Rates per 100,000 Population
All Injury, All Intents, All Races, All Ethnicities, Both Sexes, All Ages
Annualized Crude Rate for Virginia: 52.59

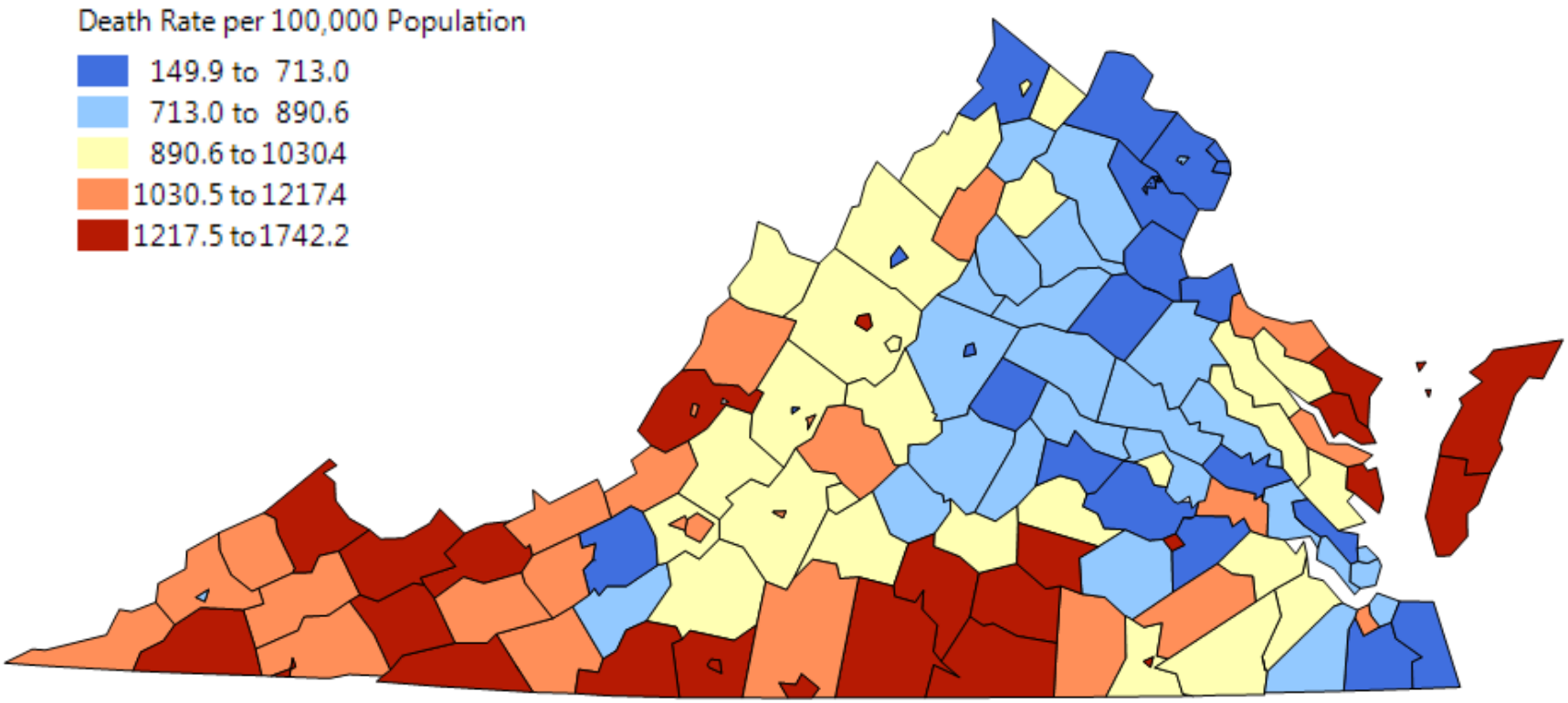


Reports for All Ages include those of unknown age.
* Rates based on 20 or fewer deaths may be unstable. These rates are suppressed for counties (see legend above); such rates in the title have an asterisk.

Source: *http://wisqars.cdc.gov:8080/cdcMapFramework/mapModuleInterface.jsp, accessed 12/04/2014*

Produced by: the Statistics, Programming & Economics Branch, National Center for Injury Prevention & Control, CDC
Data Sources: NCHS National Vital Statistics System for numbers of deaths; US Census Bureau for population estimates.

Appendix G. Virginia Comprehensive Death Rates per 100,000 Population for 2013



Data Source: http://www.census.gov/popest/data/counties/totals/2013/files/CO-EST2013-Alldata.csv, accessed 12/04/2014

IN SUMMARY

Trauma Triage by EMS Agencies

- Missing vital signs data – obvious starting place
  - Report based on 2013 data
- Analyses will be repeated using 2014 data
  - Revised results will be given to EMS regions for follow up with agencies
  - Feedback will be sought to determine explanatory factors and used to improve process

Interfacility Transfer of Trauma Cases

- Only a few of the interfacility triage criteria could be evaluated
  - Will focus on learning reasons for less than optimal interfacility transfers for trauma patients meeting the Geriatric and Serious Burns criteria
- Missing vital signs – predominantly GCS values – were also a problem
  - Prevention of missing data will be another area of focus for improvement

Questions?

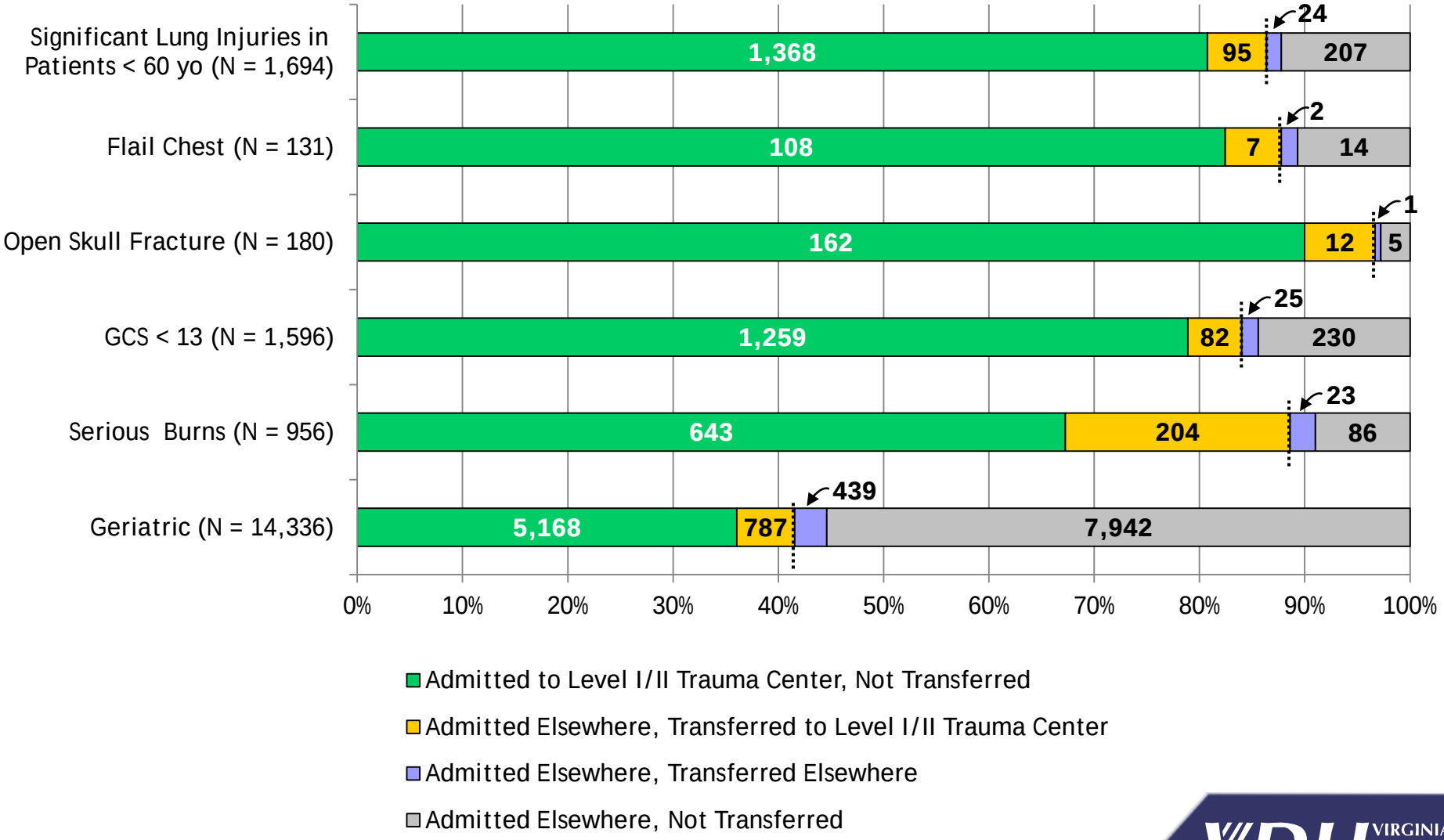



Figure 4. Admission and Transfer Status for Trauma Registry Cases *(N = 31,472)* Meeting Any of the Adult Triage Criteria for Interfacility Transfer