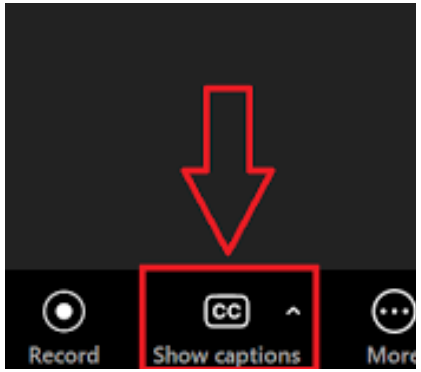
National Center for Rural Road Safety

A Federal Highway Administration Center for Excellence

Post Crash Care: Big League Safety Part 1

July 15, 2025 Webinar

Webinar Logistics



- Duration is 2 hours
- To activate closed captioning for the webinar:
  - Click on the “Show Captions” button at the bottom of your screen.
  - You may adjust captions under Caption Settings (same button).
- Recording webinar for website archival
  - https://ruralsafetycenter.org/webinar-archive/
- Q&A pod to ask questions of presenters and alert organizers of technical difficulties
- Handouts are available for download
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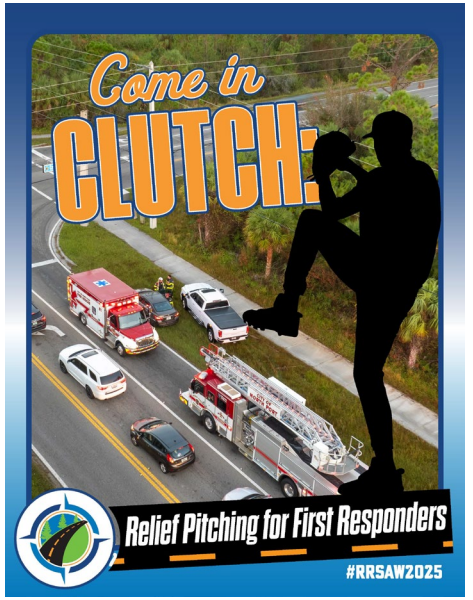
- Certificates of Completion/Application for CEUs will be provided
  - You must apply for CEUs via this link within 4 weeks of receiving this email
  - Failure to apply within 4 weeks may result in CEUs being unavailable

Happy Rural Road Safety Awareness Week!!!

- Don’t forget to use #RRSAW2025 and tag the National Center for Rural Road Safety
- Please share your proclamations and press releases with us at info@ruralsafetycenter.org
- Join NRTAP tomorrow at 2 pm ET for a Facebook Live for Rural Transit Day https://www.facebook.com/events/355518228144524 7
- Join us Thursday at 1 pm ET for Post Crash Care: Big League Safety Part 2



Road Safety Champion Program

- Safety 101 program
- Congratulations to our 69 most recent graduates!!
- Next round of modules starts August 19th
- Core Modules
  - Tuesdays 2-4 pm ET August and September
- Maintenance & Construction Pathway Modules and Planning & Engineering Pathway Modules
  - Tuesdays 2-4 pm ET October, November, and December
- *NEW* First responder and Public Health Module Pilots
  - Wednesdays 2-4 pm ET October, November, and December
  - Except PH4 and PH6 which will be 1-3 pm ET

Learn More!

Register Now!

Today's Presenters

Crystal Shelnutt, MPH, NRP

Regional Trauma Systems Development Manager

Georgia Trauma Care Network Commission

crystal.shelnutt@gtc.ga.gov

Eric Lind

Director

Accessibility Observatory at the Center for Transportation Studies at the University of Minnesota

elind@umn.edu

Dr. Robert Rosenbaum, MD, FACEP, FAEMS

Delaware Medical Director for EMS and Preparedness

Robert.Rosenbaum@delaware.gov

Questions

Please Reach Out!

- info@ruralsafetycenter.org
- www.ruralsafetycenter.org

@ruralroadsafety

National Center for Rural Road Safety

A Federal Highway Administration Center for Excellence

Seconds After Impact: Advancing Post-Crash Care through strong trauma system support.

Crystal Shelnutt, MPH, NRP

Regional Trauma System Development Manager

GEORGIA TRAUMA COMMISSION

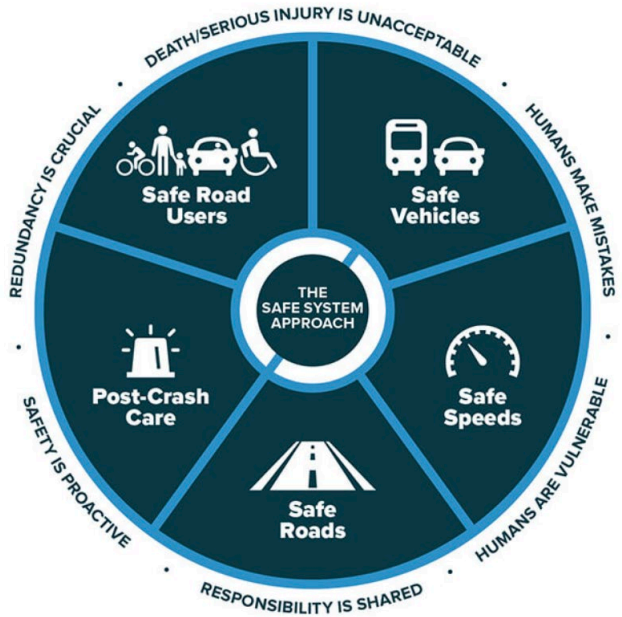
Importance of Rural EMS

- Disproportionate death burden on rural roads.
- Longer response intervals demand stronger pre-hospital capability.
- Community advocacy and often the only access to in-county healthcare.

Essential Services

- Police & fire protection
- Garbage / solid-waste collection & disposal
- Public health facilities & services
- Street & road construction & maintenance
- Parks, recreation programs & facilities
- Storm-water & sewage collection & disposal
- Water development, treatment & distribution
- Public housing
- Public transportation
- Libraries, archives, arts & sciences facilities
- Terminal, dock & parking facilities
- Building, housing, plumbing & electrical codes
- Air-quality control
- Retirement/pension systems for local/government employees
- Planning, zoning & community redevelopment
- Electric or gas utilities & street lighting (added 1993)

IS EMS ESSENTIAL?



Source: FHWA.

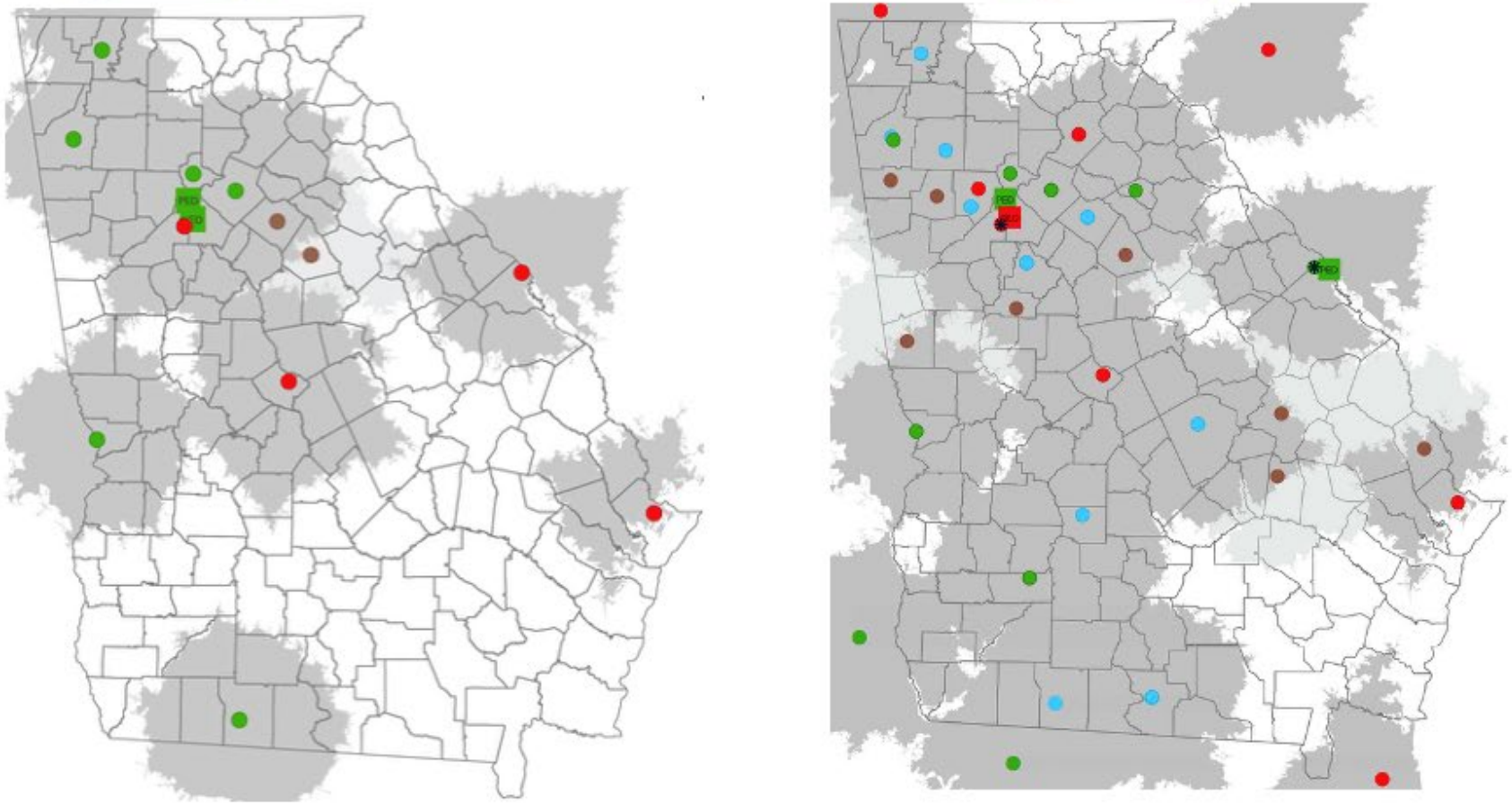
Our Mission

The Georgia Trauma Commission is dedicated to improving the health of injured Georgians by ensuring access to quality trauma care, coordinating key trauma system components, and educating trauma care providers.

- Trauma Center Support
- Georgia Quality Improvement Program
- Support for Emergency Medical Services

Trauma Care Access in Georgia | 2007 - 2024

2007 → 2024



Legend

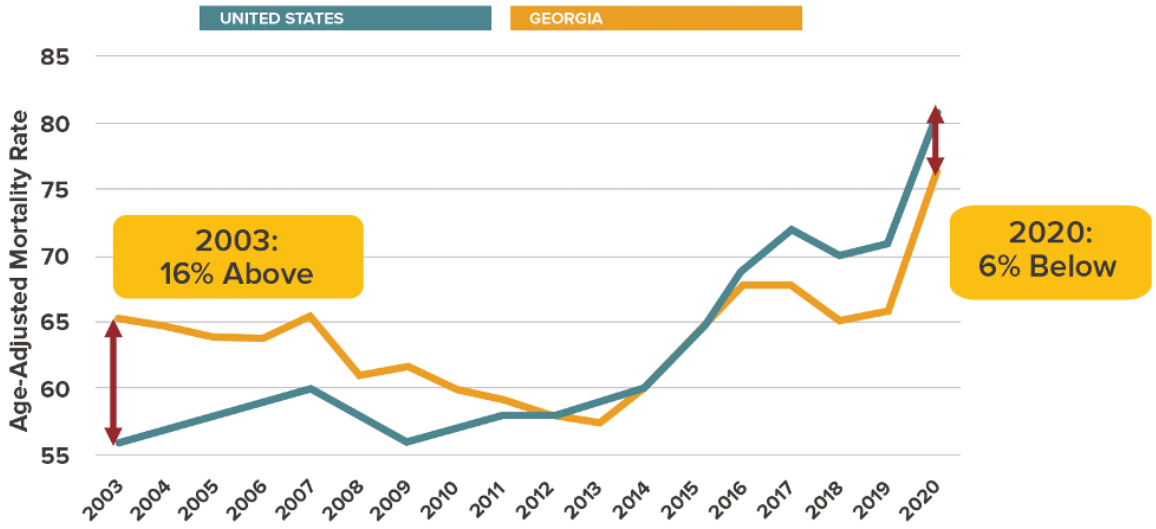
- BURN
- LEVEL I
- LEVEL II
- LEVEL III
- LEVEL IV
- PED LEVEL I
- PED LEVEL II
- Counties

1 hr Service Area to Current and Neighboring Facilities :

- LEVELS I, II, III, Burn, Pediatric
- LEVEL IV

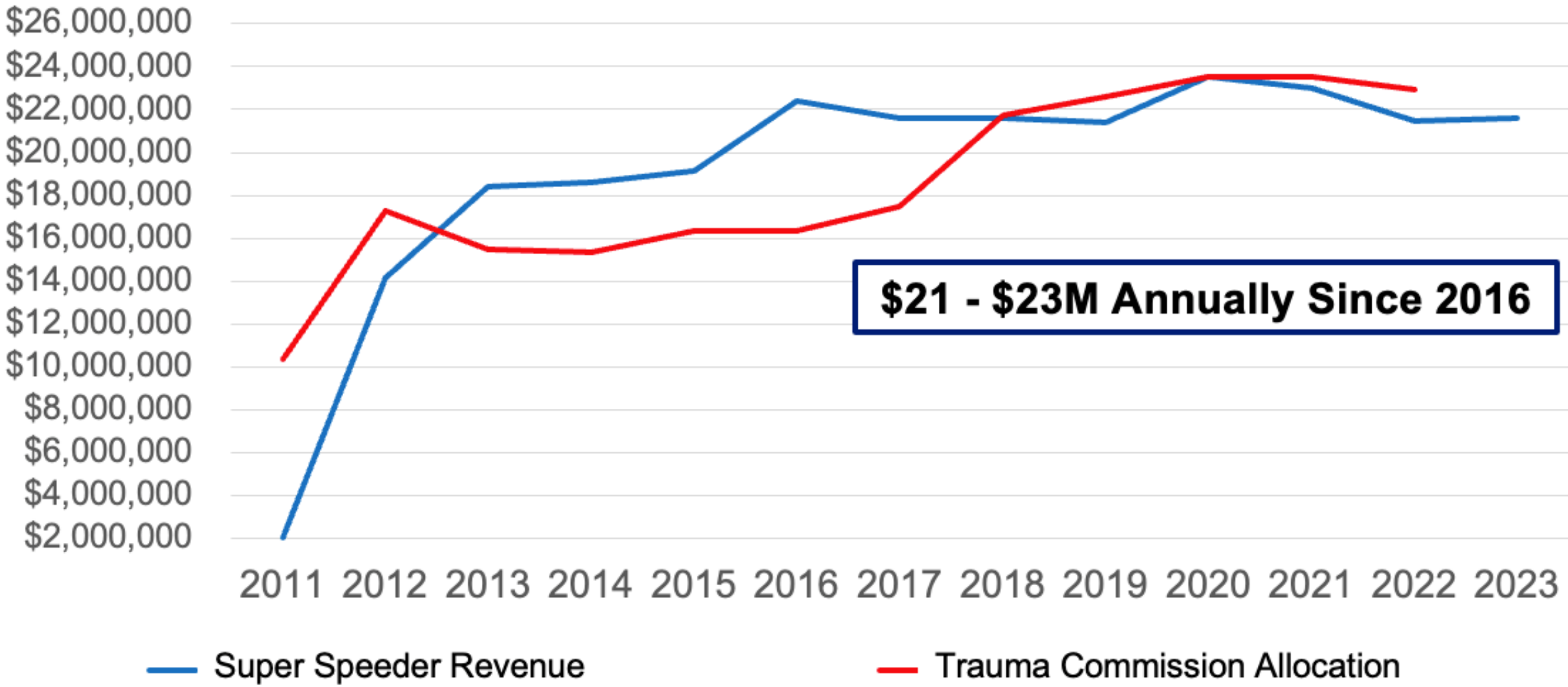
Post-Crash Care in Action: Building a Trauma System That Works

Age-Adjusted Injury-Related Death Rate Georgia Compared to National



CDC Web-based Injury Statistics Query and Reporting System (WISQARS)

Super Speeder Annual Revenues



Prehospital Support

Support for our prehospital partners offers critical access to supplies and training that can be difficult for rural partners to access.

- AVLS- Advanced Vehicle Location System
- Ambulance Equipment Grants
- EMS Education Programs
  - Initial Ed and CE programs
- Funding for Prehospital Blood*

Ambulance Equipment Grants

The goal is to provide financial support to every 911-zoned ambulance service across the state to ensure access to critical trauma-related supplies.

Very simple application process, with 99% of Georgia counties participating annually.

GEORGIA TRAUMA COMMISSION

EMS Trauma Care Related Equipment Grant

Revised 9/13/2024

Priority Trauma Care Supplies

- **IV Fluid Warming System**

ALS Equipment

- Equipment for Prehospital Blood Products Administration
- Chest Decompression Needles
- Disposable CPAP units
- Emergency Cricothyrotomy Kit
- Impedance Threshold devices (ITD)
- Infusion Pumps
- Intraosseous Supplies
- EtCO2 Monitoring Equipment
- Pressure infusion bags
- Transport Ventilator
- Video Laryngoscopy

Patient Movement, Extrication, Transport

- Ambulance Child Restraint devices
- Bariatric Ambulance Ramp
- Combi Extrication Tool
- Eject Helmet Removal System
- Portable, lightweight, patient lifting device (Binder Lift)

Technology Equipment

- Image Trend Kno2 Software
- Laptop/Toughbook
- Motorola Monitor VI Pagers
- Replacement AVLS Antennae
- Tablets
- Two-way Radios
- Batteries and Battery Chargers-for cardiac monitors, stretchers, two-way radios, etc.

Training Equipment

- Adult & Pediatric Airway Trainers
- Advanced Life Support Skill Mannequin Trainer
- Driving Simulator



EMS Education

- **Multiple initiatives to support and fund initial and continuing education courses with partnerships across the state.**
  - Initial Education- EMR, EMT, AEMT courses (includes books, instruction, testing software, jump bag)
  - Continuing Education- Skills Lab, Farm Medic, Tactical Emergency Casualty Care, Prehospital Trauma Life Support, Emergency Pediatric Care, Vehicle Extrication, etc.
  - Professional Development- Instructor Preparedness, Axioms of Leadership

Training first responders with super speeder fines

By **Nora Almazan** - February 12, 2024 | Updated: February 12

An edited image shows the complete layout for trauma training inside one of the gyms at the Habersham County Recreation Department. (GEMSA photo)

Stop The Bleed Training & Kits

99% of all public schools
95% of all buses
60% of Georgia counties

Training is available for any agency or organization!

Questions

Crystal.Shelnutt@gtc.ga.gov

trauma.georgia.gov

GEORGIA TRAUMA COMMISSION

Measuring access to trauma centers from Minnesota's state highway network: rural areas of risk

Eric Lind, PhD
Accessibility Observatory
University of Minnesota
July 15, 2025

How should we measure transportation?

network performance

- speed, delay, volume
- vehicle movement
- fastest is best

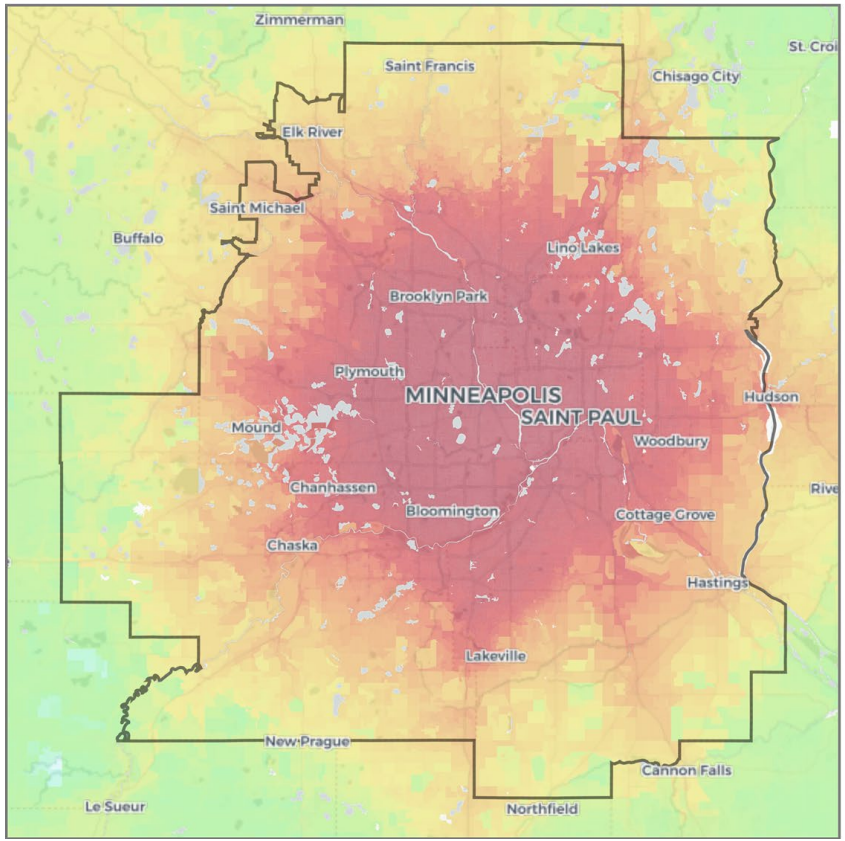
people performance

- can people reach destinations?
- slower is safer, closer is better
- easiest is best

What is Accessibility?

The *ease* with which a traveler *could* reach valued destinations

Metropolitan Council



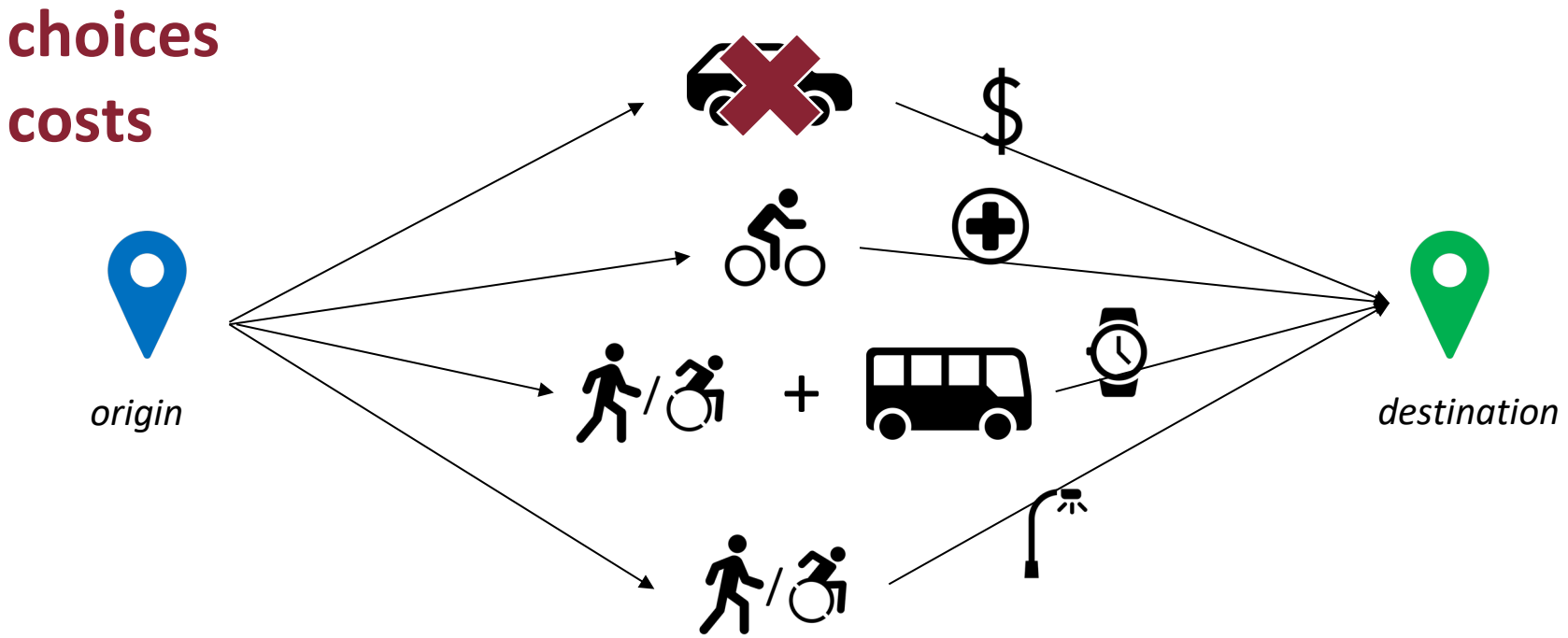
Jobs within 30 minutes
(Driving, AM peak)

- 0 – 1,000
- 1,000 – 2,500
- 2,500 – 5,000
- 5,000 – 7,500
- 7,500 – 10,000
- 10,000 – 25,000
- 25,000 – 50,000
- 50,000 – 75,000
- 75,000 – 100,000
- 100,000 – 250,000
- 250,000 – 500,000
- 500,000 – 750,000
- 750,000 – 1,000,000
- 1,000,000 – 2,500,000
- 2,500,000 – 5,000,000
- 5,000,000 – 7,500,000
- 7,500,000 – 10,000,000
- 10,000,000 +

State border
MPO boundary

what opportunities can be reached?

How is Accessibility Measured?



Calculating Accessibility

for each origin,

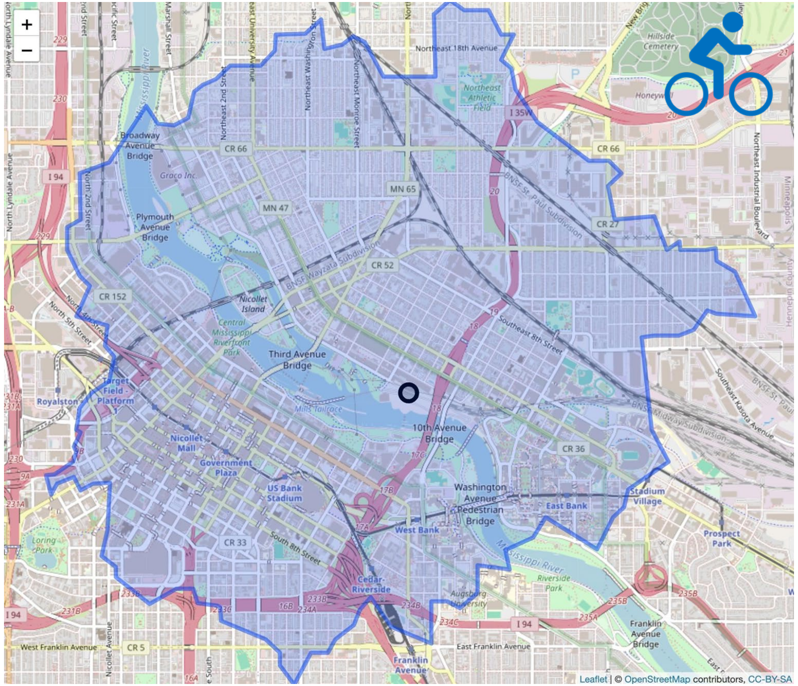
for each mode,

for each time of day,

measure *travel times* to destinations

for each travel time,

what can be reached?



Access to what kinds of Destinations?

Jobs

- Enumerated job sectors

Education

- Childcare centers
- Public and Private K-12
- Post-secondary schools

Healthcare

- Primary care clinics
- Urgent Care
- Trauma Centers

Food

- Grocery Stores (SNAP retailers)

Entertainment

- Convention Centers
- Major Sports Venue
- Fairgrounds

Intermodal Freight

- Airports with Cargo Facility
- Pipeline terminals
- Rail terminals
- Ports

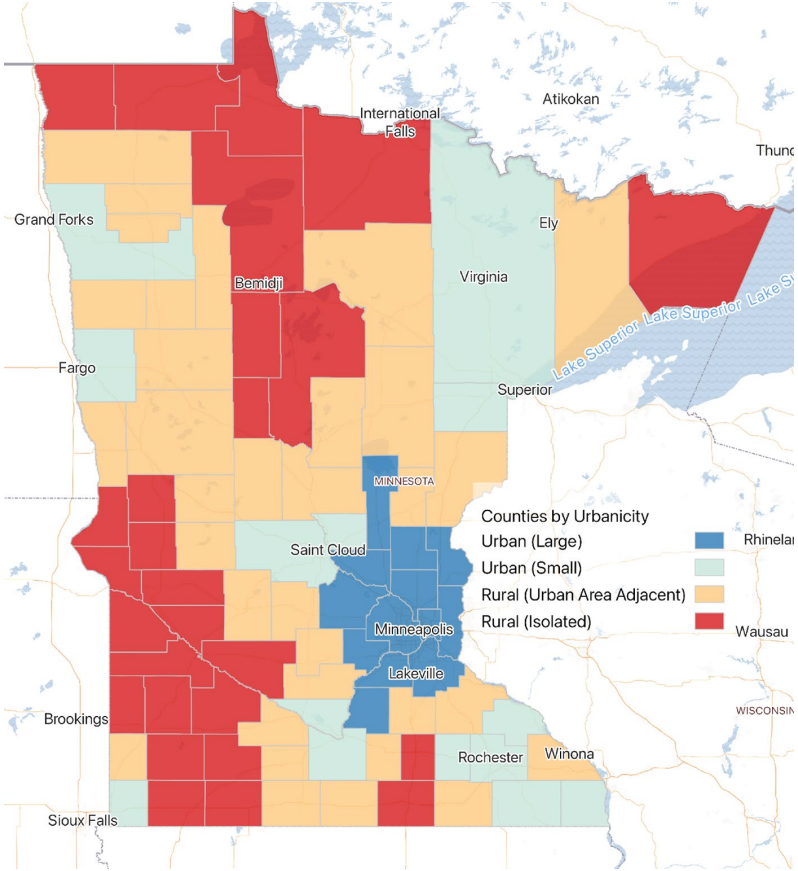
What's Local in Rural Minnesota?

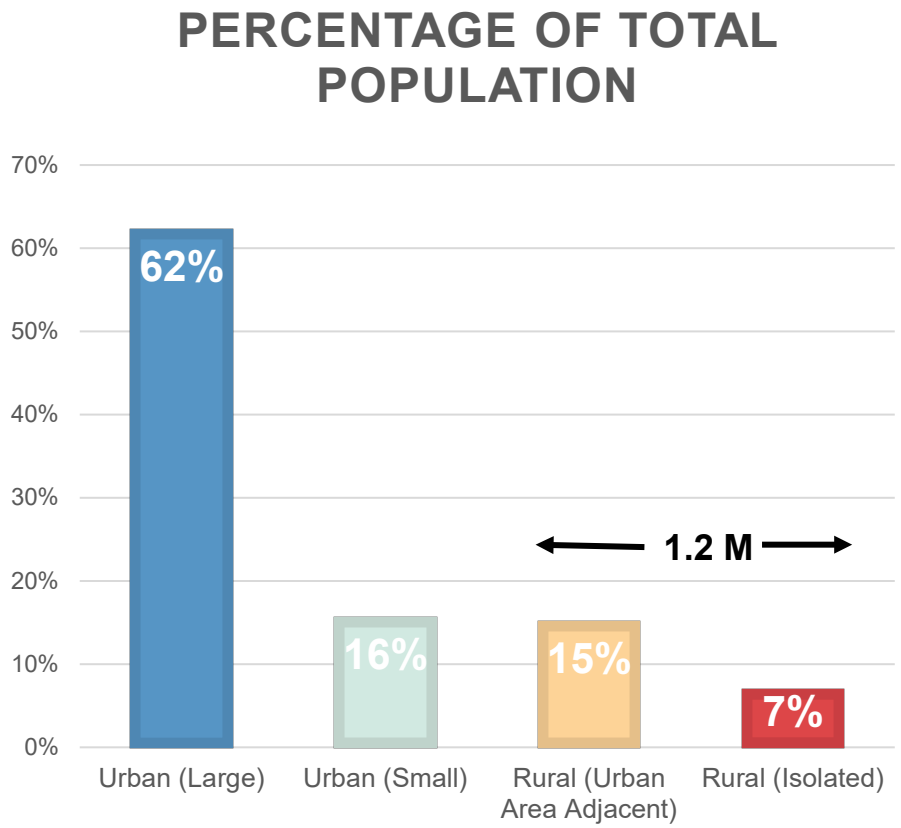
Measuring Accessibility to Essential Destinations in Rural Minnesota

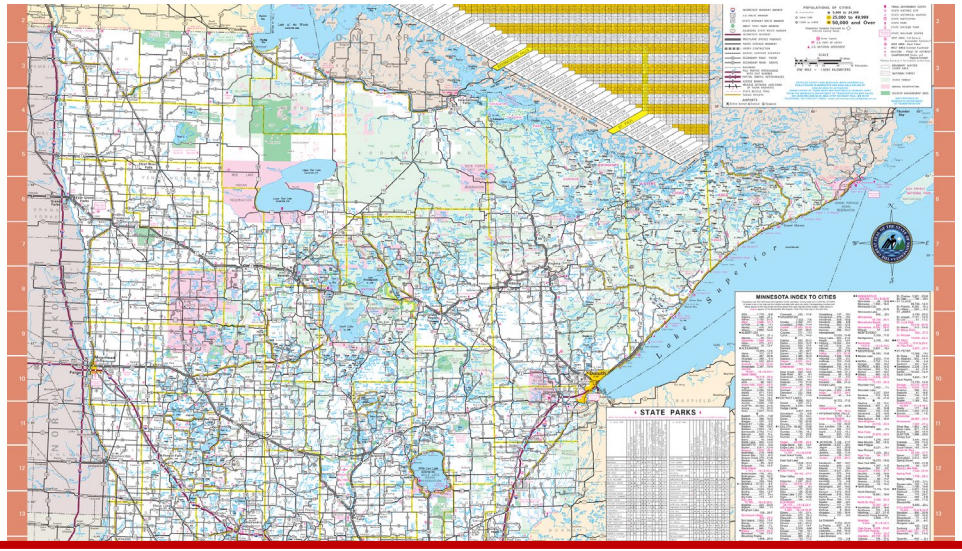
Accessibility Observatory, Center for Transportation Studies at UMN.

January 15, 2025

Minnesota Urbanicity and Population







Road Miles by State

1. Texas
2. California
3. Illinois
4. **Minnesota**
5. Kansas

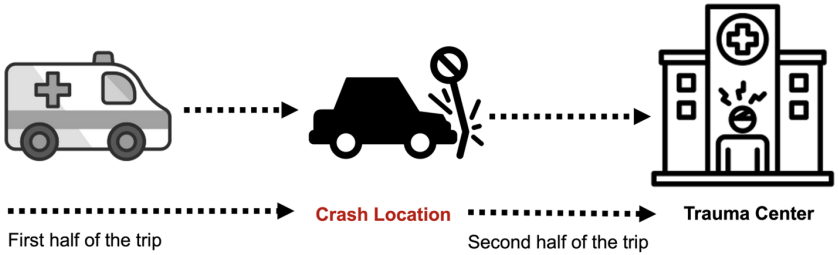
Minnesota Traffic Fatalities

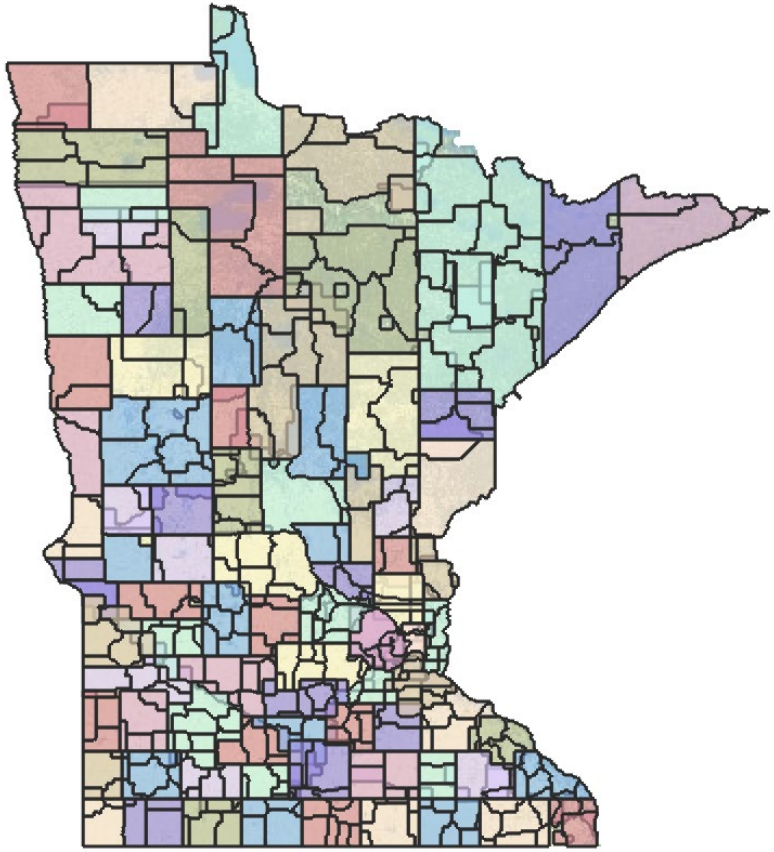
TZD Goal: No more than 225 by 2025

2025 YTD:	2024 YTD:	2024 Total:
176	225	477*

Preliminary

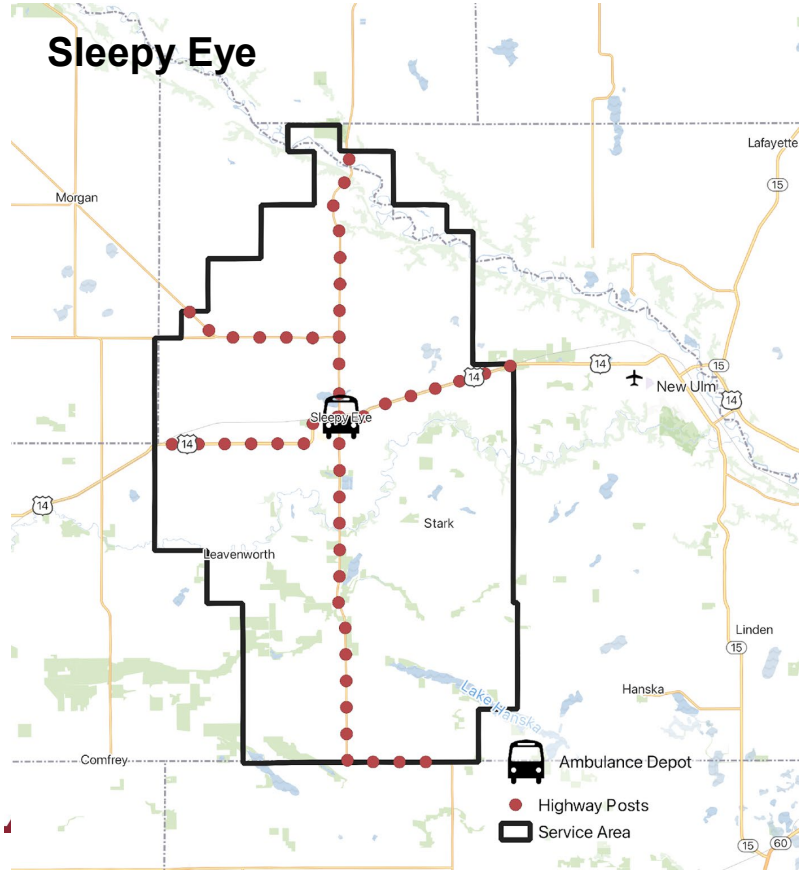
What are **response travel times** to traumatic crashes in Minnesota?





Minnesota EMS response boundaries & county boundaries

Methodology: Calculating Travel Times



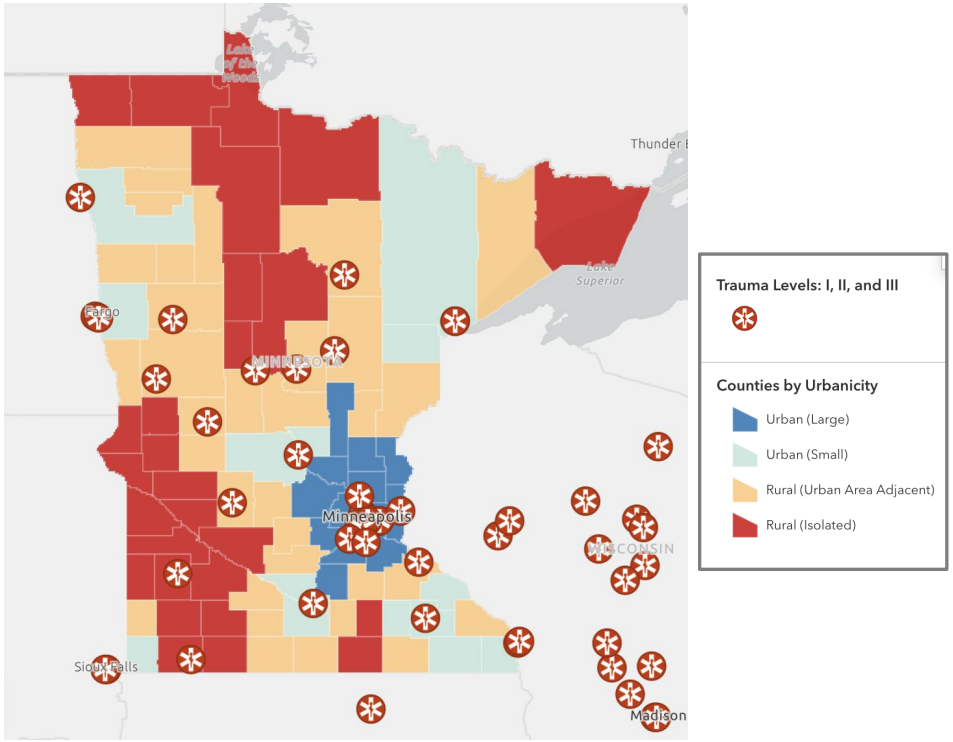
Step 1: Travel Time by EMS Service Area

- depot to each highway mile marker
- Average times by service area

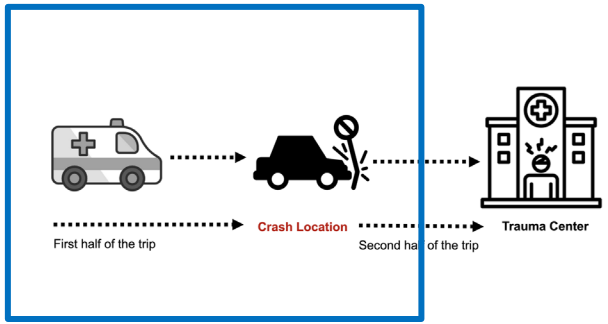
Methodology: Calculating Travel Times

Step 2: Travel time to Trauma Center

- travel time from each highway mile marker to reachable trauma centers
- take shortest time
- Level 1 and 2 centers *treat* severe injuries
- Level 3 centers *stabilize* patients



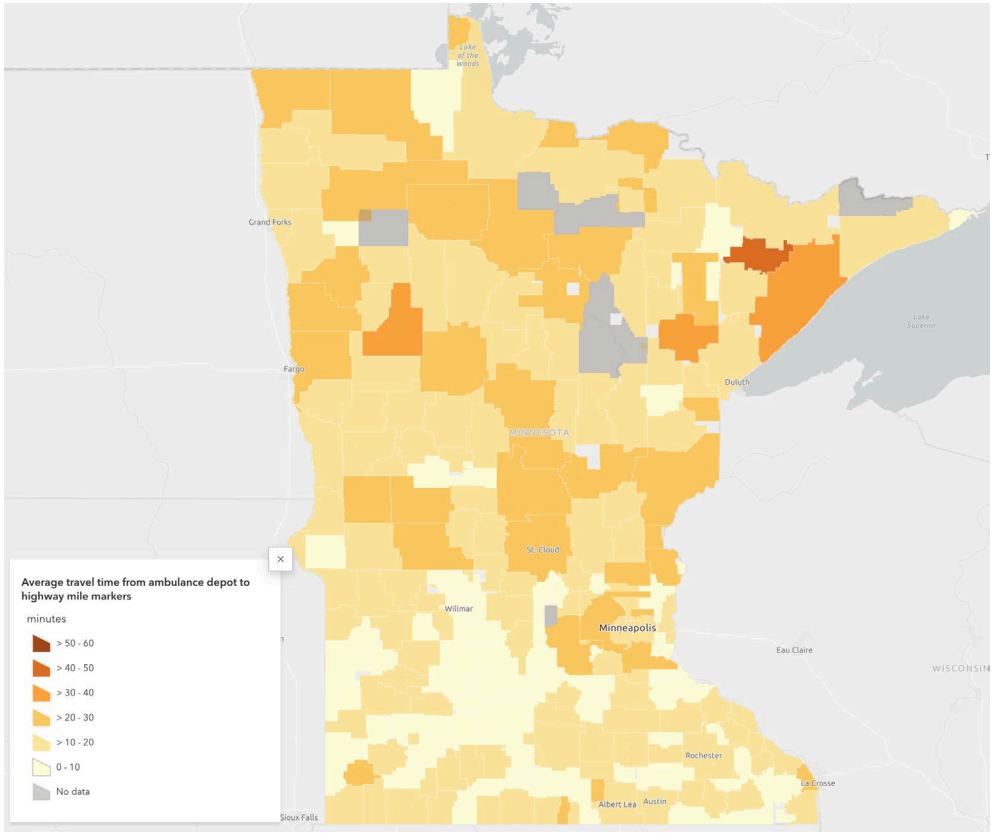
Mapping Travel Times



Average travel time from ambulance depot to highway mile markers

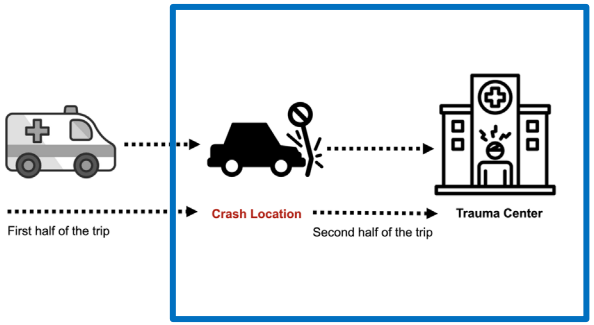
minutes

- > 50 - 60
- > 40 - 50
- > 30 - 40
- > 20 - 30
- > 10 - 20
- 0 - 10
- No data



EMS to Highway Roadside

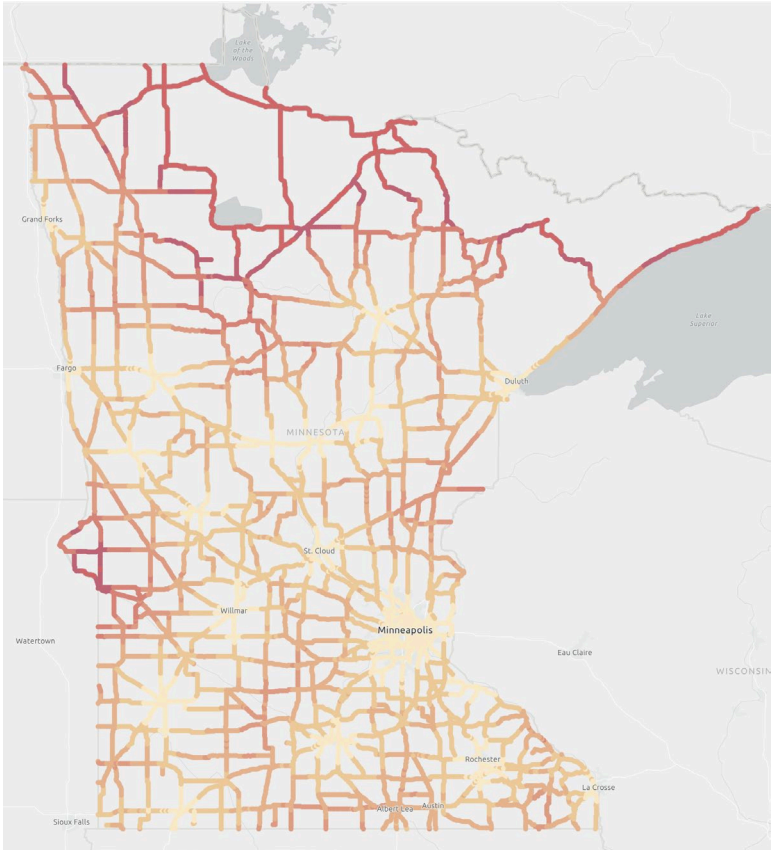
Mapping Travel Times



Travel time from highway mile marker to nearest trauma center

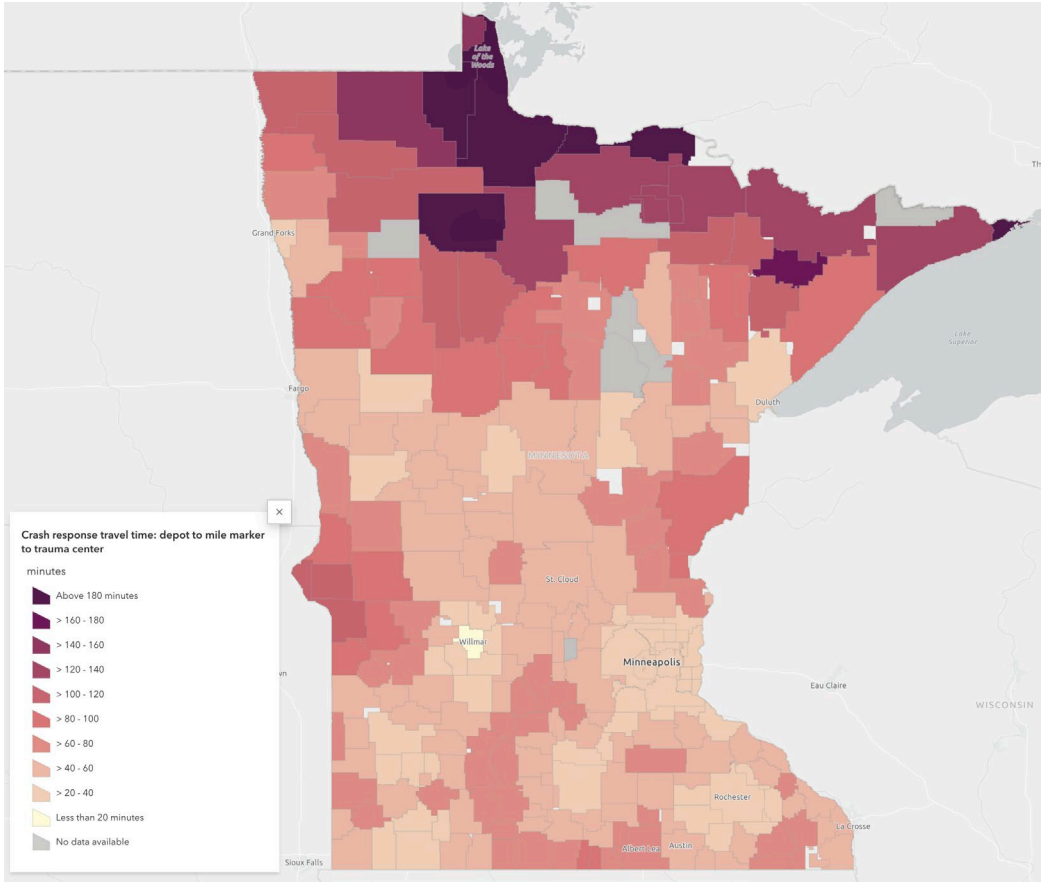
minutes

- > 100 - 120
- > 80 - 100
- > 60 - 80
- > 40 - 60
- > 20 - 40
- Less than 20 minutes
- More than 120 minutes



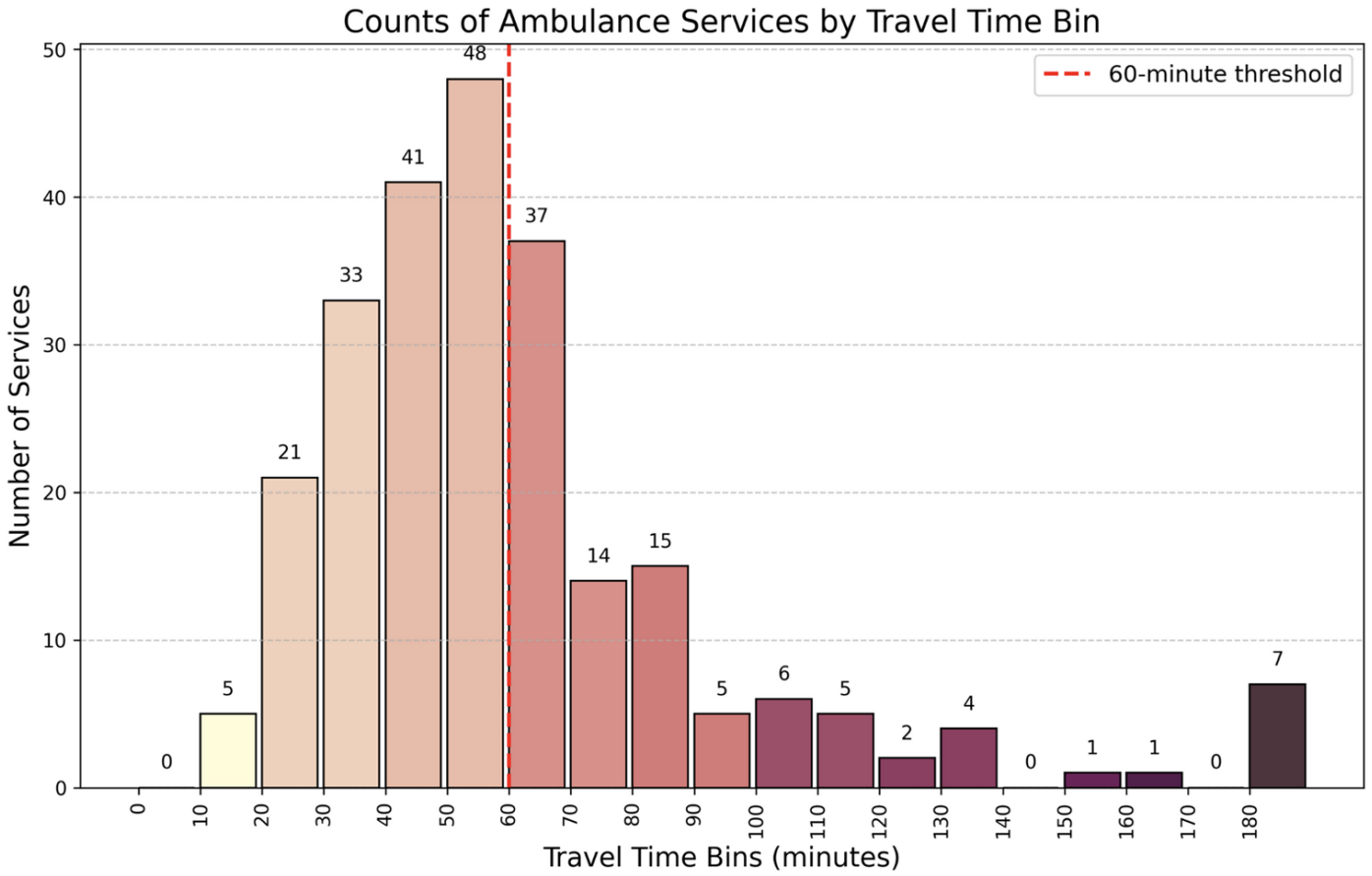
Roadside to Trauma Center

Access to Trauma Centers: Total Travel Time



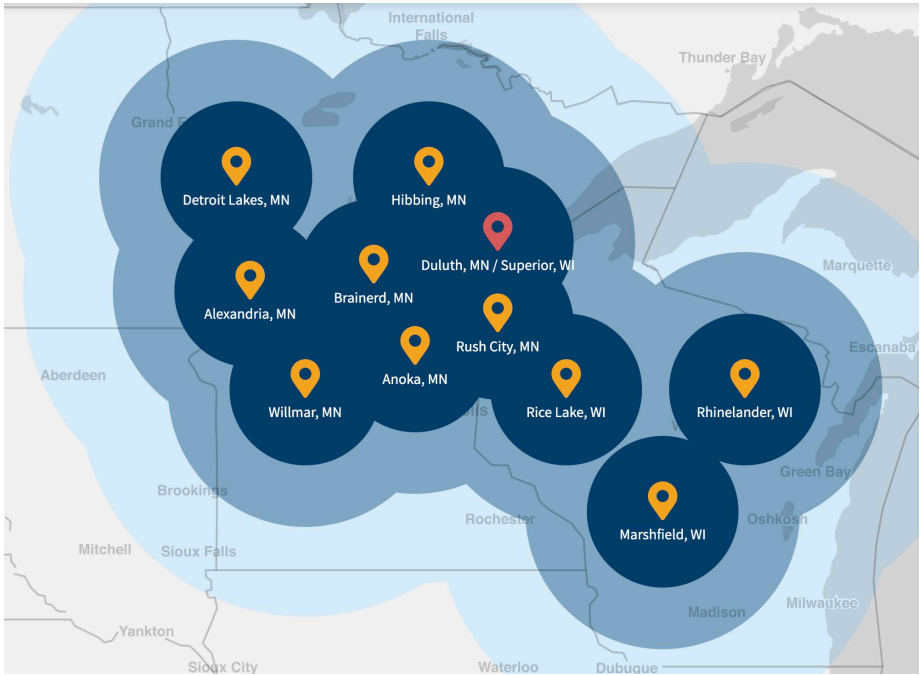
- Total travel times added across stages.
- Some depots take over 2 hours to get to nearest trauma center.
- Travel times vary widely by rural areas.

Access to Trauma Centers: Total Travel Time



Other dimensions

- air transport
- weather
- EMS skill set
- telemedicine



Thank you!

elind@umn.edu

Development of a Statewide EMS Whole Blood Program

First State- First with Statewide EMS Whole Blood

Robert Rosenbaum, MD FAEMS

State Medical Director, Delaware EMS and Preparedness

Received: 3 September 2024 | Revised: 24 January 2025 | Accepted: 29 January 2025

DOI: 10.1111/trf.18160

TRANSFUSION

HOW DO I DO IT

Transfusion Practice

How do we implement a prehospital whole blood administration program for shock trauma patients on a statewide basis?

Robert A. Rosenbaum[1] | Mollee Dworkin[1] | Justin Eisenman[1] | Paul Cowan[1] | Kyle Burch[1] | Jordan Dattoli[2] | David Aber[3] | Kelli Starr-Leach[3] | John Wright[2] | Robert Mauch[2] | Michael Nichols[3] | Mark Logemann[3] | Christopher Johnson[3] | Britany Huss[1] | Michelle E. Jones[1] | Dawn Shane[1] | Sydney Kappers[1] | Bruce S. Sachais[4] | Kristin M. Frederick[4]

[1]State of Delaware, Department of Health and Social Services, Delaware Division of Public Health, Emergency Medical Services and Preparedness Section, Delaware, USA

[2]Sussex County Emergency Medical Services, Georgetown, USA

[3]New Castle County Emergency Medical Services, New Castle, USA

[4]Blood Bank of Delmarva, New York Blood Center Enterprises, Newark, Delaware, USA

Highlights

Development

Expansion

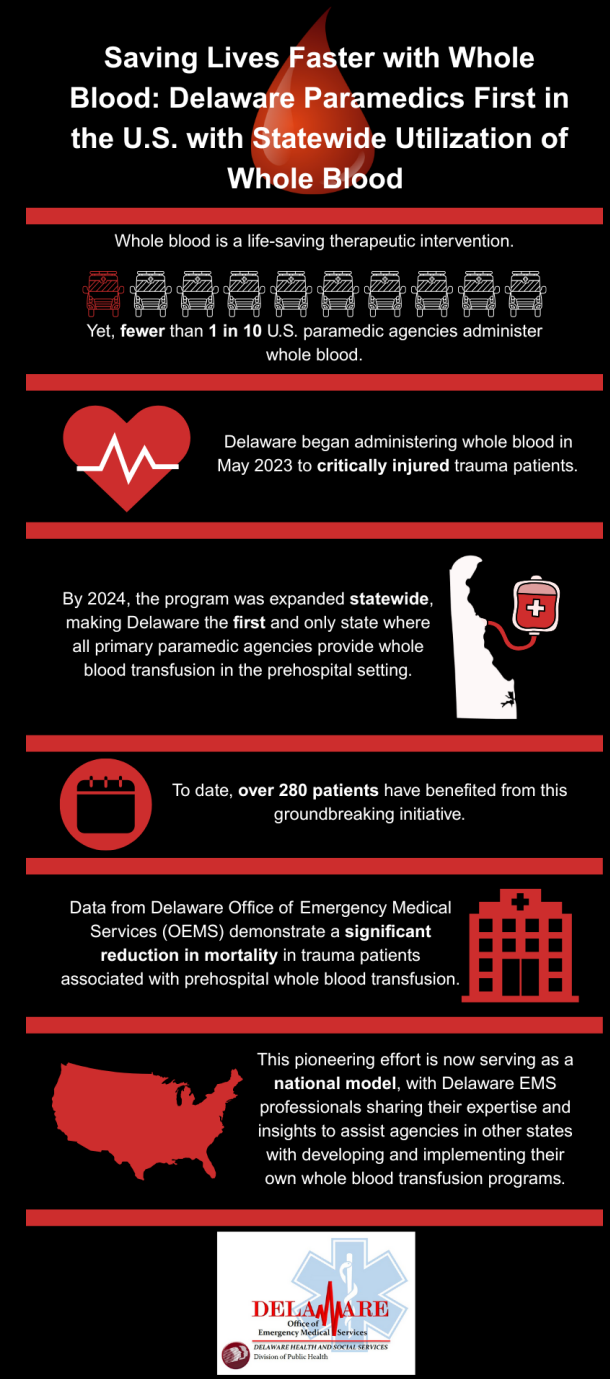
Quality management and metrics

Report on experiences

- Updates to protocols
- System improvements
- Case examples

EMS Whole Blood

- Trauma Care Impact
- Limited Use
  - Logistics
  - Cost
  - Skill requirements
- Program build-up
  - Pilot stage
- First state with ALL prehospital paramedic agencies carrying and transfusing whole blood.



Citation: Rosenbaum RA, Dworkin M, Eisenman J, Cowan P, Burch K, Dattoli J, Aber D, Starr-Leach K, Wright J, Mauch R, Nichols M, Logemann M, Johnson C, Huss B, Jories ME, Shane D, Kappers S, Sachais BS, Frederick KM. How do we implement a prehospital whole blood administration program for shock trauma patients on a statewide basis? Transfusion. 2025 Feb 13. doi: 10.1111/trf.18160. Epub ahead of print. PMID: 39949114.

Saving Lives Faster with Whole Blood: Delaware Paramedics First in the U.S. with Statewide Utilization of Whole Blood

Whole blood is a life-saving therapeutic intervention.

Yet, **fewer** than **1 in 10** U.S. paramedic agencies administer whole blood.

Delaware began administering whole blood in May 2023 to **critically injured** trauma patients.

By 2024, the program was expanded **statewide**, making Delaware the **first** and only state where all primary paramedic agencies provide whole blood transfusion in the prehospital setting.

To date, **over 280 patients** have benefited from this groundbreaking initiative.

Data from Delaware Office of Emergency Medical Services (OEMS) demonstrate a **significant reduction in mortality** in trauma patients associated with prehospital whole blood transfusion.

This pioneering effort is now serving as a **national model**, with Delaware EMS professionals sharing their expertise and insights to assist agencies in other states with developing and implementing their own whole blood transfusion programs.

DELAWARE
Office of Emergency Medical Services
DELAWARE HEALTH AND SOCIAL SERVICES
Division of Public Health

Citation: Rosenbaum RA, Dworkin M, Eisenman J, Cowan P, Burch K, Dattoli J, Aber D, Starr-Leach K, Wright J, Mauch R, Nichols M, Logemann M, Johnson C, Huss B, Jones ME, Shane D, Kappers S, Sachais BS, Frederick KM. How do we implement a prehospital whole blood administration program for shock trauma patients on a statewide basis? Transfusion. 2025 Feb 13. doi: 10.1111/trf.18160. Epub ahead of print. PMID: 39949114.

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2025 IMPACT Awards from Delaware Health and Social Services

2025 DHSS Impact Award Winners List

2025 DHSS Impact Award Winners – Judged Competition

1) Saving Lives Faster with Whole Blood: Delaware Paramedics First in the U.S. with Statewide Utilization of Whole Blood (Library blog | Kaleidoscope)	Rob Rosenbaum, MD, FAEMS; Mollee Dworkin, MS; Paul Cowan, DO; Justin Eisenman, DO; Dawn Shane, Britany Huss
2) Tick Detectives: Unmasking the Mystery of Ticks in Delaware with Citizen Science (Library blog | Kaleidoscope)	Antonio Alvarado, Jamie Kananen, Kathy Jo Kuhns
3) Effect of Recreational Marijuana Sales in DE (Library blog | Kaleidoscope)	Virginia Novak

How did we get here?

Concept proposal

Sussex County Paramedics and New Castle County Paramedics

- Initial discussions 2021
- THOR: Trauma Hemostasis and Oxygenation Research
- Modelled programs in San Antonio and others

Projections on Impact

Frequency of use based on TXA administration

- Model timing of blood arrival without delay

How many units at risk of expiration?

- Administration projections vs blood product 21-day shelf life

Trauma System of Care Support

Advanced through:

Division of Public Health

Dept of Health and Social Service

Dept of Homeland Security

State Emergency Management

Board of Medical Licensure

Challenges and Barriers: Spring 2022

Overcoming Barriers

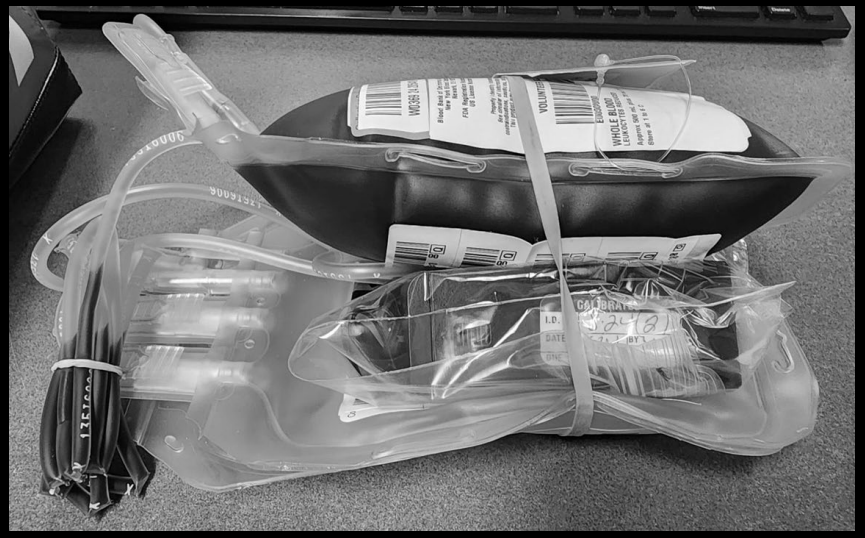
BLOOD BANK PARTNERSHIP

GIS MAPPING AND UTILIZATION PROJECTION

PUBLIC HEALTH SUPPORT

ACTIVE SHOOTER TRAINING EVENT

EMS Protocol 2022



HEMODYNAMICALLY COMPROMISING HEMORRHAGE

INDICATIONS: This protocol is for use in the hemodynamically unstable patient, presenting with signs or symptoms of hemorrhagic shock with suspected need for massive blood transfusion due to suspected marked internal and, or external blood loss presenting with sustained tachycardia greater than 110 BPM or sustained hypotension less than 90 mmHg, or a shock index greater than 1.0 (Calculated by HR/SBP).

****Do not delay transport to initiate blood products. ****

Traumatic Hemorrhage:

- Isotonic Crystalloids (0.9 Sodium Chloride)
- Tranexamic Acid 2 grams IV/IO
- Consider Blood Transfusion with On-Line Medical Control (OLMC)
- Calcium Chloride 1g IV/IO over 3 minutes after each unit of transfused blood

Injured patients with traumatic brain injury (TBI) who have systolic blood pressure under 110 mm Hg should receive IV fluid volume to prevent hypotension. Whole blood is the recommended fluid if blood is available.

EMS Protocol 2022

TRANSFUSION OF BLOOD PRODUCTS

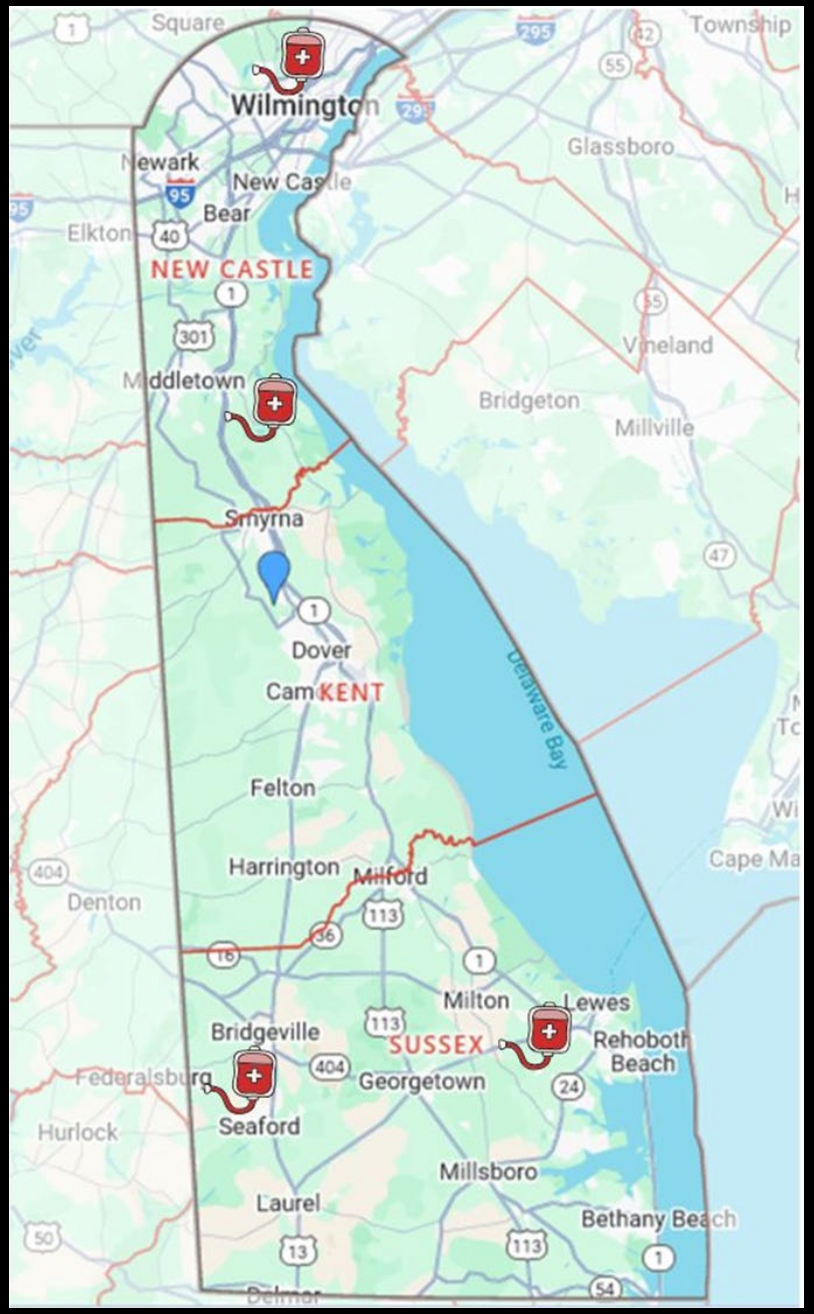
The paramedic must contact online medical control (OLMC) and obtain orders to administer blood products. The paramedic must **speak directly** to the medical control physician. With OLMC approval, Low Titer O Positive Whole Blood (LTOWB) may be administered in accordance with the following indications and the following guidelines:

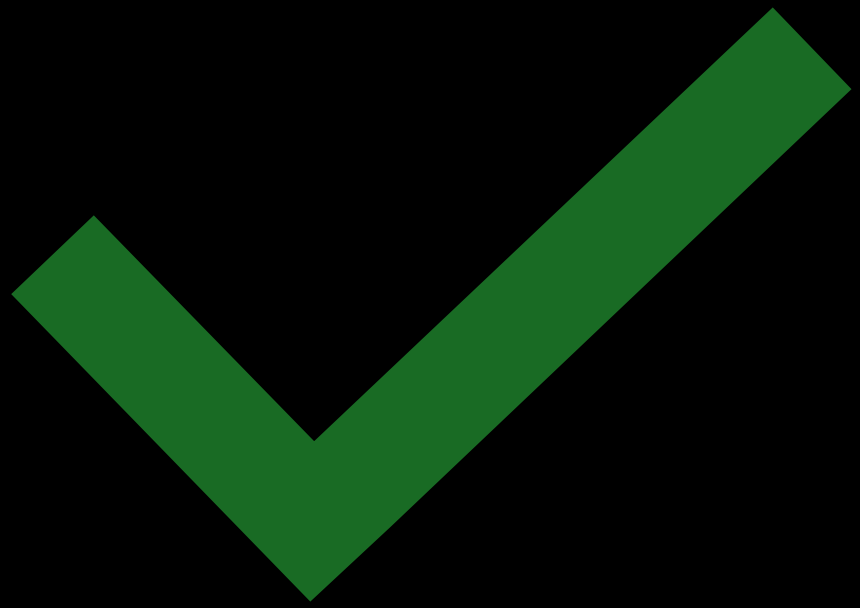
A. Indications for transfusion

1. Hemorrhagic Shock: Patients with ongoing, or suspected ongoing, major hemorrhage, based on their presenting injury or diagnosis, and with the clinical signs of shock should be given blood (LTOWB) when the normal IV fluid volume replacement has not corrected the problem. Clinical indications of shock include:
    - Shock Index greater than 1
    - ETCO2 less than 25
    - Tachycardia
    - Delayed capillary refill
    - Hypotension
    - Mental status changes

2. Injured patients with traumatic brain injury (TBI) who have systolic blood pressure under 110 mm Hg should receive IV fluid volume to prevent hypotension. **Whole blood is the recommended fluid in systems that carry blood.**

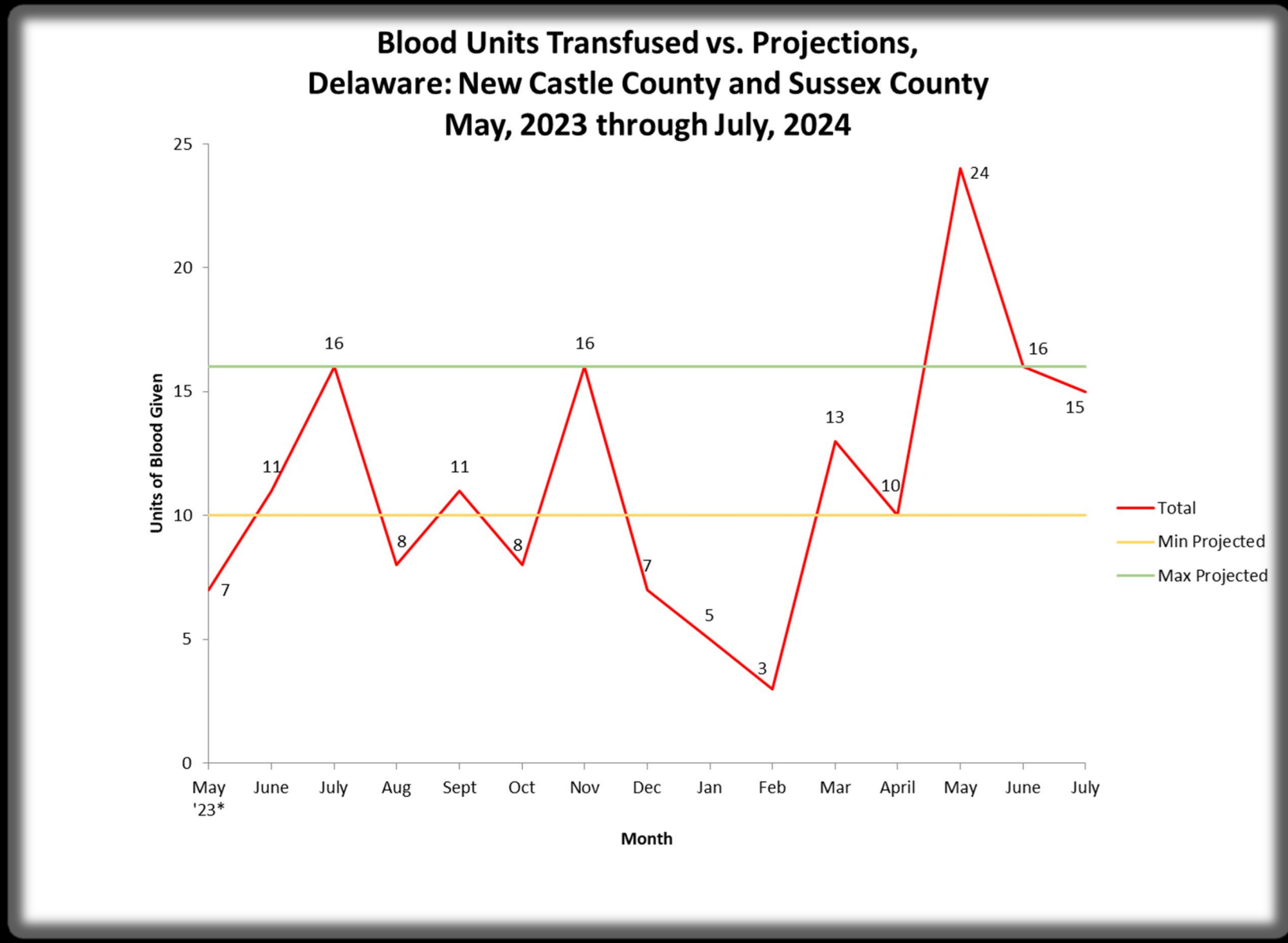
Initial Deployment



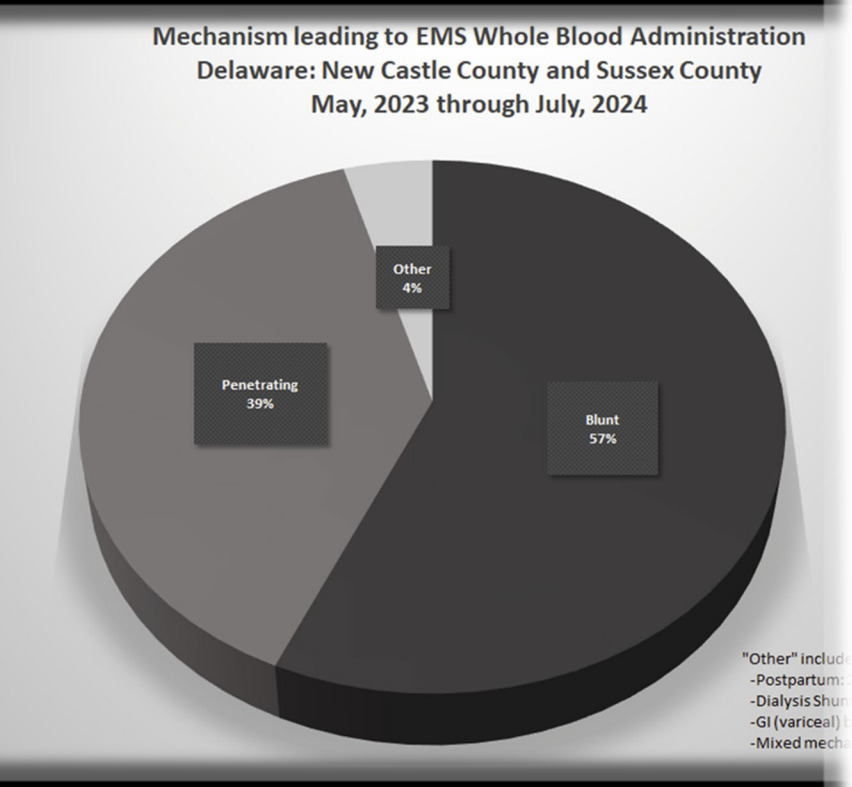


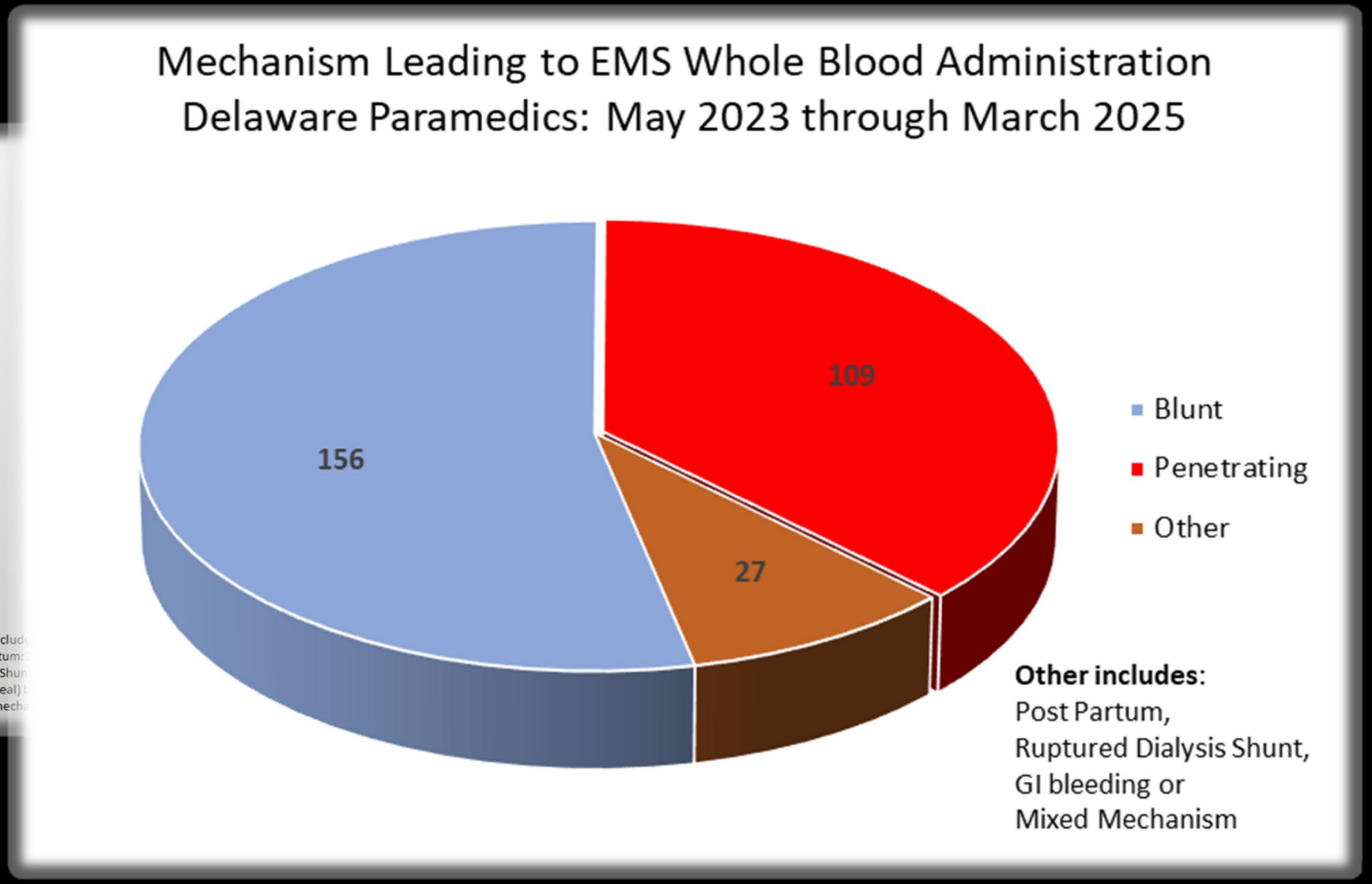
Pilot Phase Outcomes

Projections Vs. Utilization

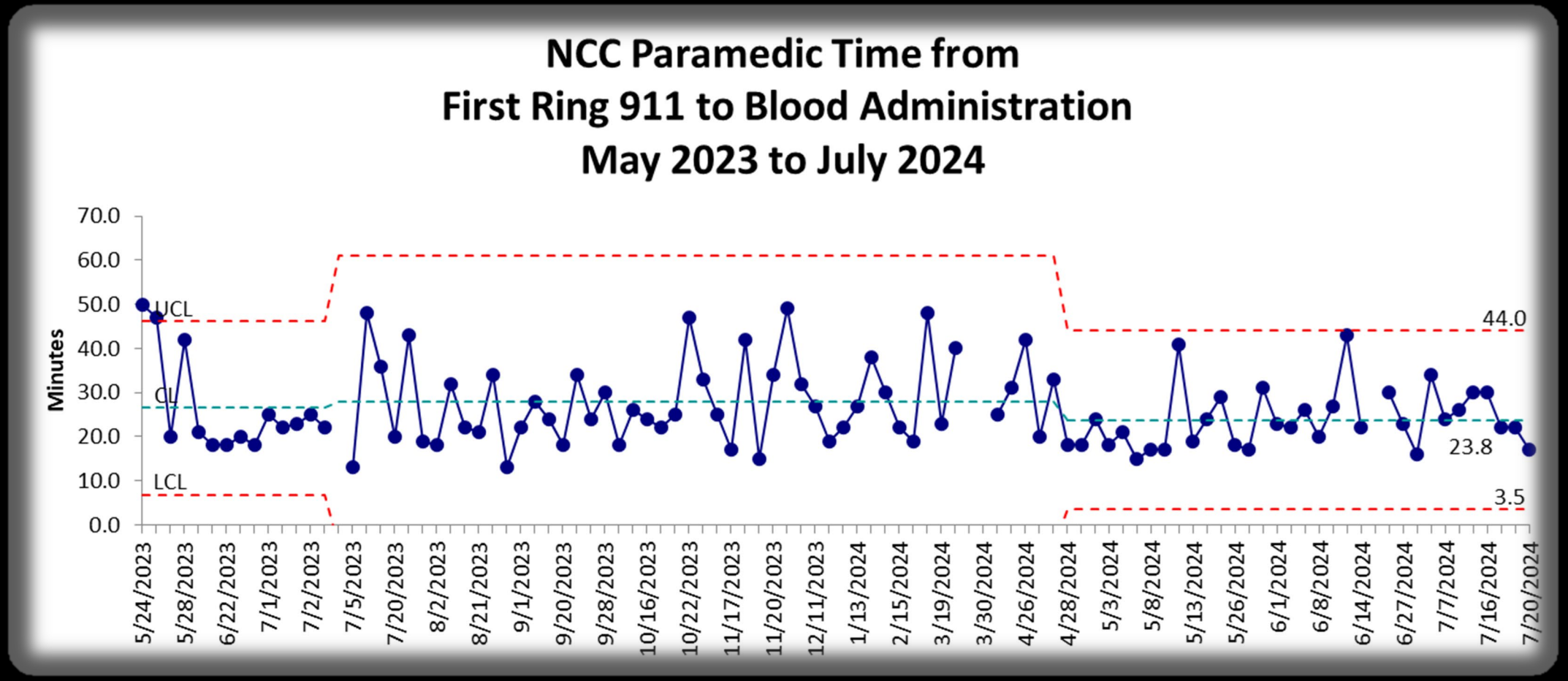


Indications for Blood Administration

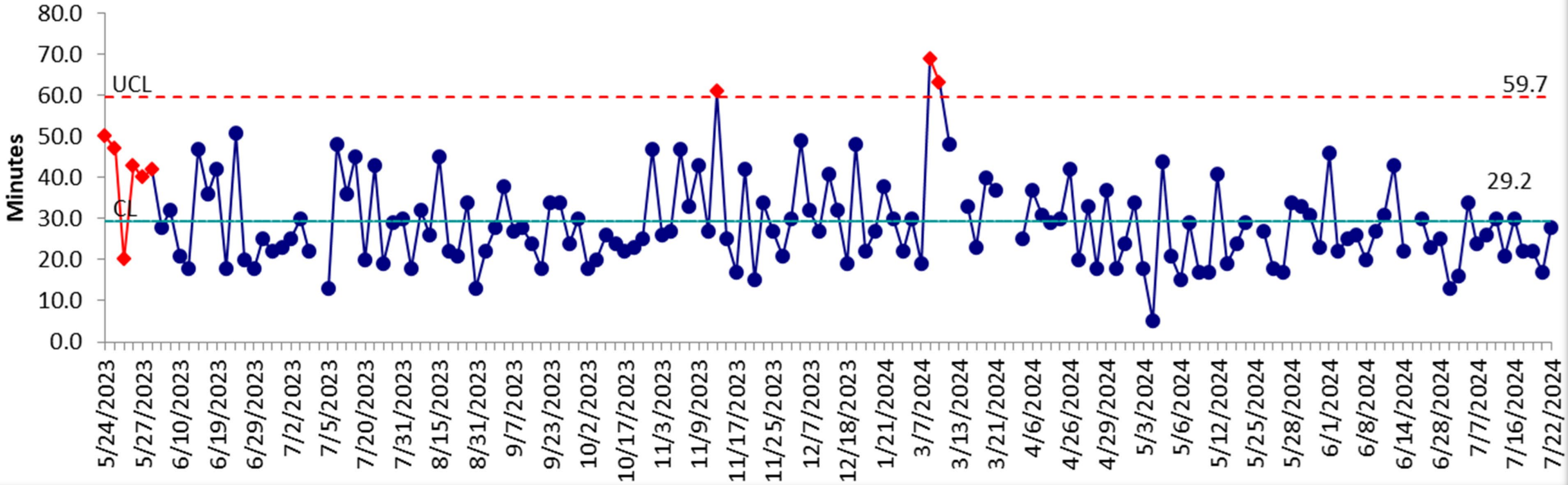




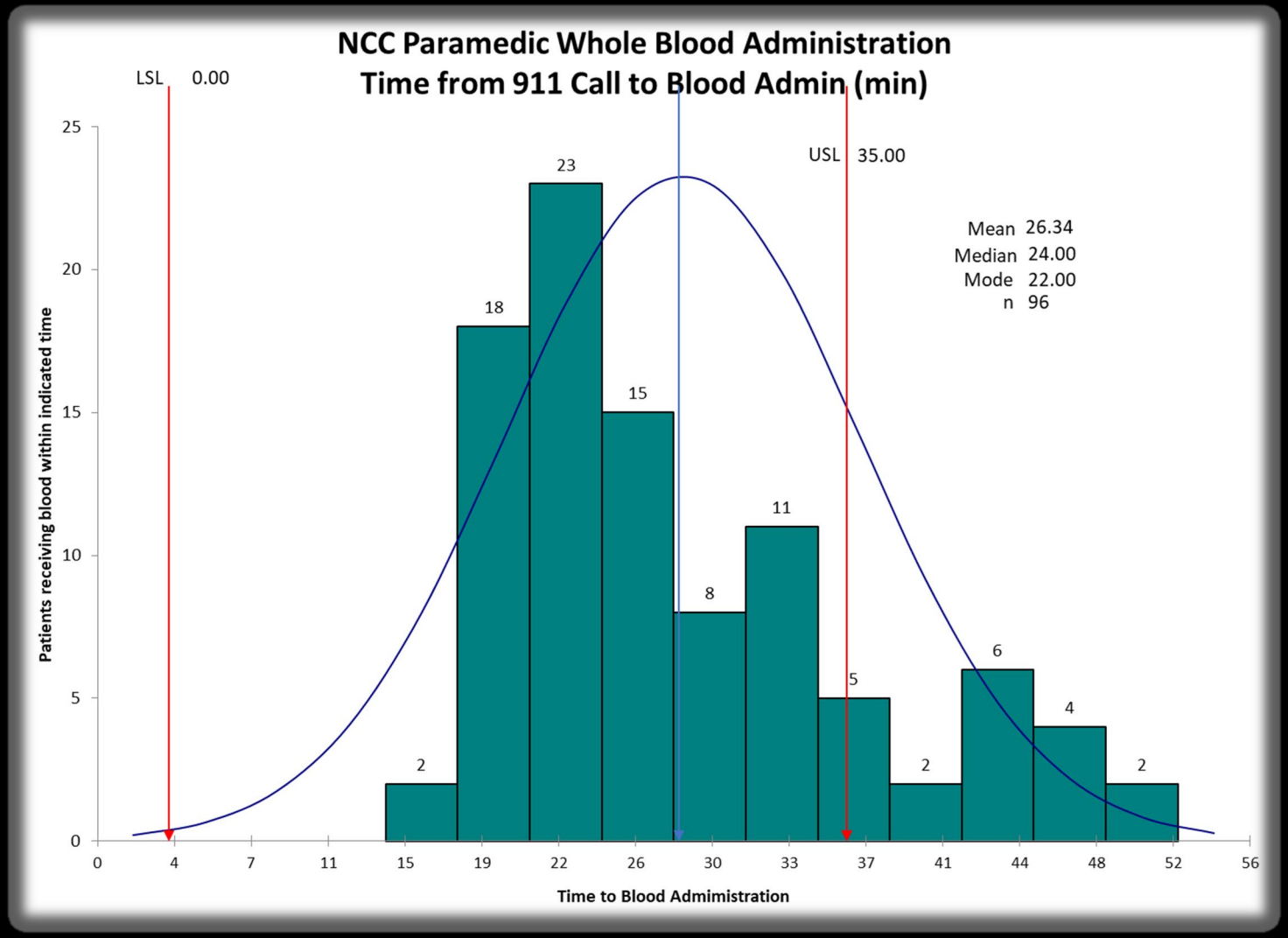
Timeliness


NCC Paramedic Time from
First Ring 911 to Blood Administration
May 2023 to July 2024
Minutes
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
UCL
CL
LCL
44.0
23.8
3.5
5/24/2023
5/28/2023
6/22/2023
7/1/2023
7/2/2023
7/5/2023
7/20/2023
8/2/2023
8/21/2023
9/1/2023
9/20/2023
9/28/2023
10/16/2023
10/22/2023
11/17/2023
11/20/2023
12/11/2023
1/13/2024
2/15/2024
3/19/2024
3/30/2024
4/26/2024
4/28/2024
5/3/2024
5/8/2024
5/13/2024
5/26/2024
6/1/2024
6/8/2024
6/14/2024
6/27/2024
7/7/2024
7/16/2024
7/20/2024

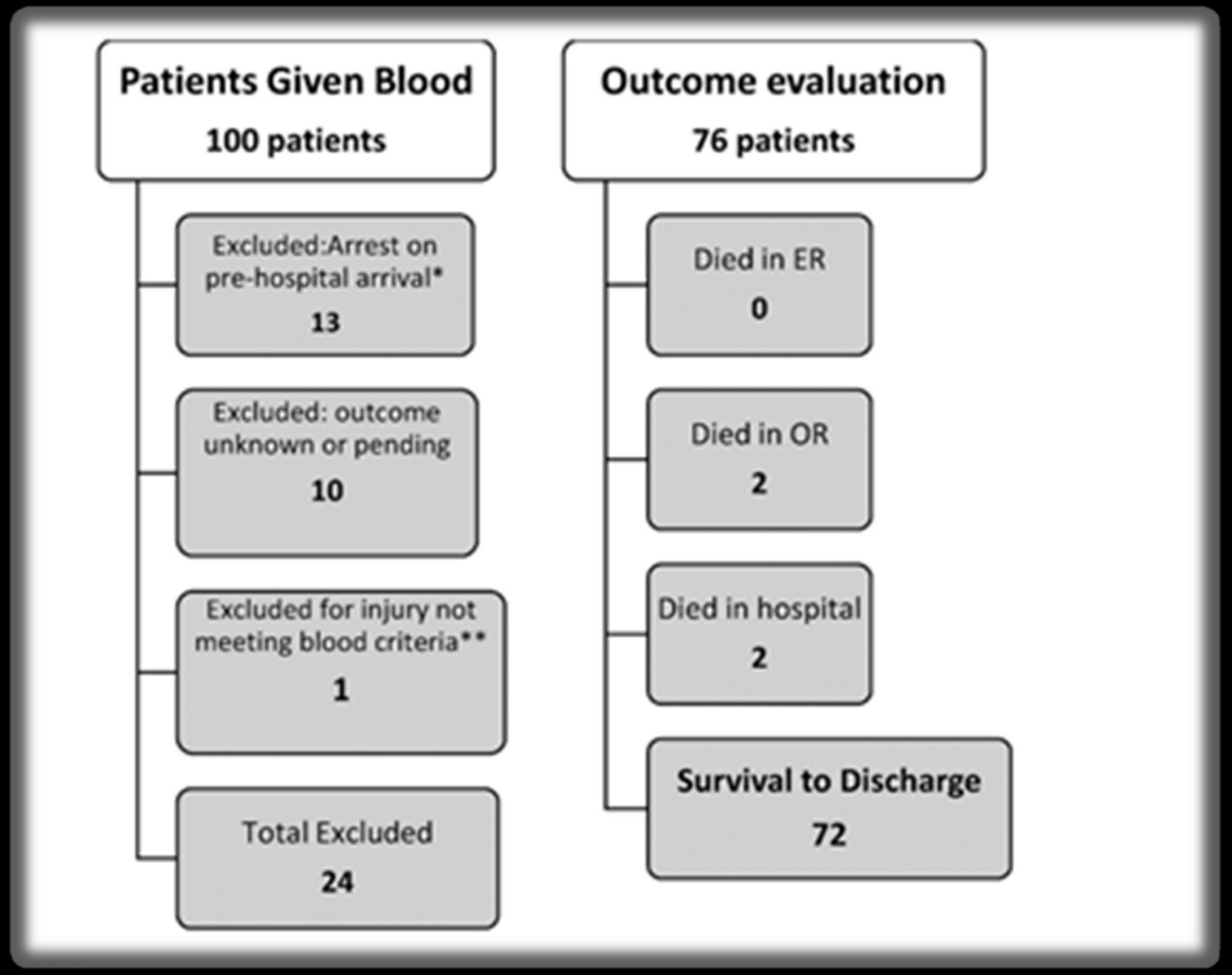
Delaware Paramedic Time from First Ring 911 to Blood Adinistration May 2023 to July 2024



Early Intervention



Outcome: First 100 NCC patients



Successful Pilot

- Utilization rate above expected
- Correct utilization over 98% within protocol
- Reliability of blood handling and temperature
- No delays in care; transfusion average within 30 minutes
- Impact on outcomes
- Minimal expiration or waste

Progression

Statewide Implementation

- Kent County Paramedics: November 2024
- Delaware State Police: February 2025

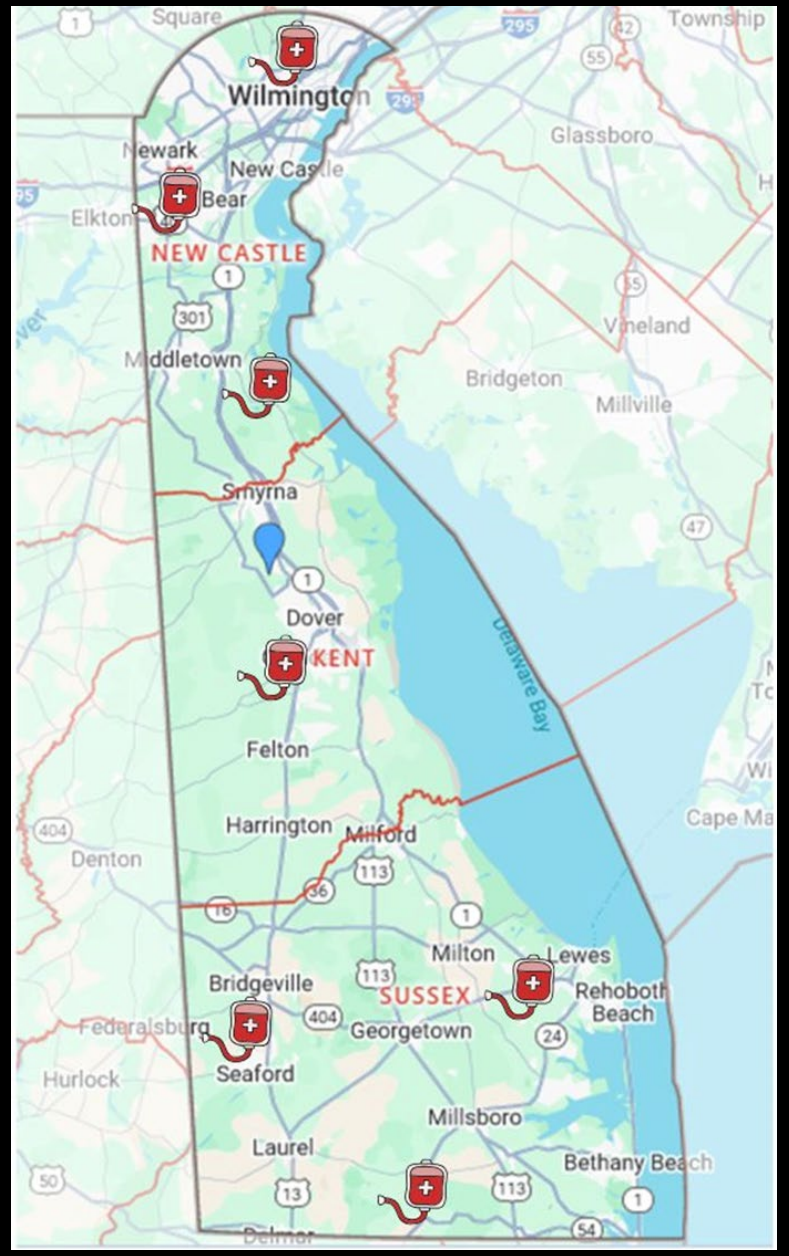
Updated Protocols

- Pediatric Trauma: age 5 and up
- Medical Indications
- Post-partum and obstetrics

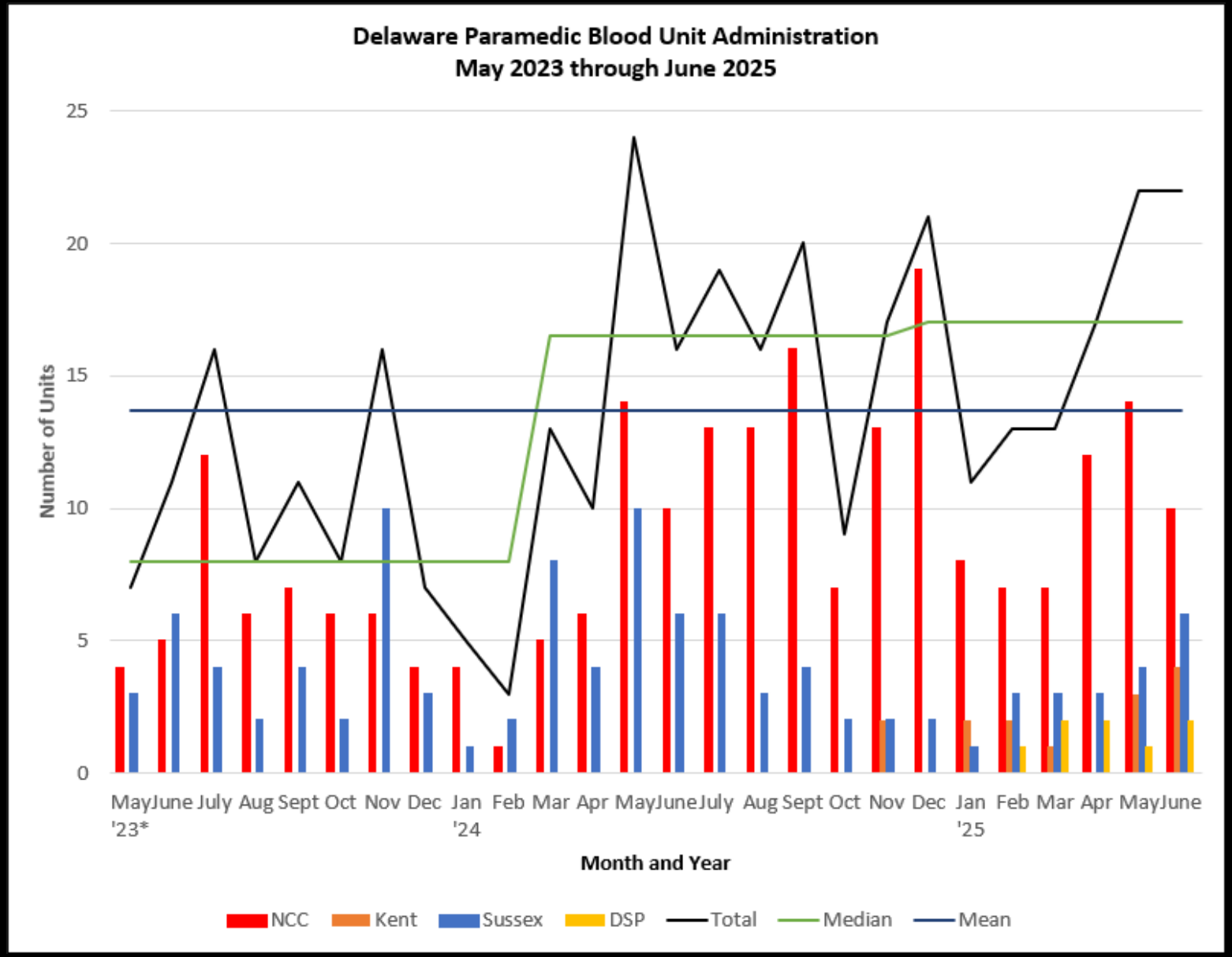
Recovery plan to avoid expiring units

- EMS, Blood Bank and Christiana Care extract PRBCs before expiration

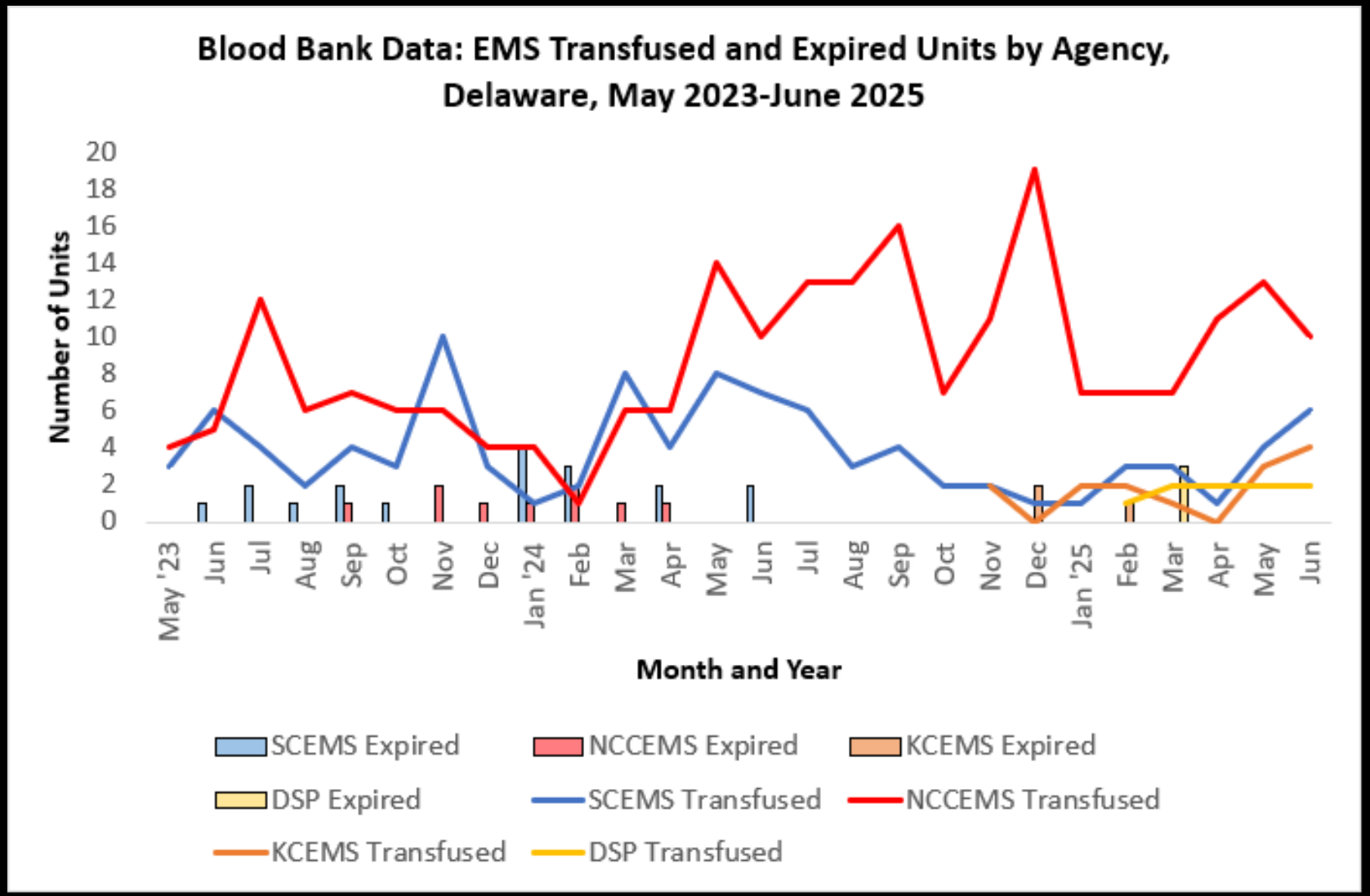
Statewide Deployment



Whole Blood Utilization



UPDATED Monthly graph



Blood Bank EMS Data

DE EMS LTOWB Data				
Month/Year	SEMS	NEMS	KEMS	DSP
	Transfused	Transfused	Transfused	Transfused
May-23	3	4		
Jun-23	6	5		
Jul-23	4	12		
Aug-23	2	6		
Sep-23	4	7		
Oct-23	3	6		
Nov-23	10	6		
Dec-23	3	4		
Jan-24	1	4		
Feb-24	2	1		
Mar-24	8	6		
Apr-24	4	6		
May-24	8	14		
Jun-24	7	10		
Jul-24	6	13		
Aug-24	3	13		
Sep-24	4	16		
Oct-24	2	7		
Nov-24	2	11	2	
Dec-24	1	19	0	
Jan-25	1	7	2	
Feb-25	3	7	2	1
Mar-25	3	7	1	2
Apr-25	1	11	0	2
May-25	4	13	3	2
Jun-25	6	10	4	2
Total	101	225	14	9
Total Transfused Products		349		
Total Zero Waste Products		52		
Total Expired Products		42		

Blood Bank of Delmarva

- Units administered through 3/2025:
  - 291 of 324 units (89.8% utilization)
- Minimize waste
  - May 2024 recoup plan
  - New agencies must show reliability
- Over 350 units through early July
- Increasing number of patients with more than one unit from EMS

Data tracking

- Statewide registry for blood utilization
- Demographics and multiple pre-post data points
- As many as possible extractable from EMS record automatically
- Validate decision making
- Show impact of intervention
- Work with State Trauma System of Care to get OUTCOME data

Database for DE EMS Whole Blood

Initial Notification/911 Call Date/Time	Time of EMS/Medic Dispatch	Time of First EMS/Medic Arrival on Scene	Time Blood Arrived on Scene	Time of Arrival to ED	Time of Blood Infusion Start	CALCULATED: Time from blood unit arrival till blood administration (minutes)	CALCULATED: Time from medic arrival till blood administration (minutes)	CALCULATED: Time from initial 911 call time to blood administration (minutes)	CALCULATED: Prehospital Time (minutes)

Blunt vs Penetrating	Mechanism of Injury	Symptom to Activate Protocol	Pelvic Binder (or Other Compression Device) Used?	Patient Warming Devices Used	Prehospital TXA (grams)	Prehospital CaCl2 (grams)	Prehospital crystalloid fluid in mL (saline)	ETCO2	Patient Initial Temperature (Celsius)	SBP before blood	HR before blood	Lowest GCS before blood	Cardiac Arrest? (Y/N)	CALCULATED: Early Transfusion Needs Score (-4-17)	Shock Index before blood

Prehospital blood resuscitation in units	IV site	IV Size	Administration issues	Patient Temperature after treatment (Celsius)	SBP after blood	HR after blood	Shock Index after blood	Shock Index Change

Criteria? (Y/N)	Additional Transfusion Needs?	MTP Activated? (Y/N)	Survival to Discharge (Y/N)	Patient Discharged to? (home, rehab, etc.)	Discharge Injury Severity Score

System Assessment

Early Blood Transfusion Needs Score

TABLE 3. EARLY BLOOD TRANSFUSION NEEDS SCORE.	
Risk factors	**Score**
Age (years)	
0 - 55	**0**
56 - 70	**1**
> 70	**2**
Type of injury	
Penetrating injury	**2**
Non-penetrating injury	**0**
Pulse (beats/min)	
< 60	**-4**
60 - 119	**0**
≥ 120	**3**
Systolic blood pressure (mm Hg)	
< 90	**7**
≥ 90	**0**
Glasgow coma scale	
3 - 8	**3**
9 - 13	**1**
14 - 15	**0**
Total score	**Range of -4 to 17**

Pediatric use

New addition in 2024

Lower limit of age decreased

- age 15 during Pilot to age 5 currently

Pediatric specific protocol

- Volume based 15ml/kg
- Lower dose of TXA at 1 gram
- No Calcium:
  - concerns from Peds EM on venous injury

Prior Use in Peds

One out of protocol use in pilot phase

- Large stature 12-year-old with GSW

Learning and Future Directions

- Pediatric focus
- Entrapment in MVC
- Dispatch code analysis
  - In progress for 200 calls in NCC

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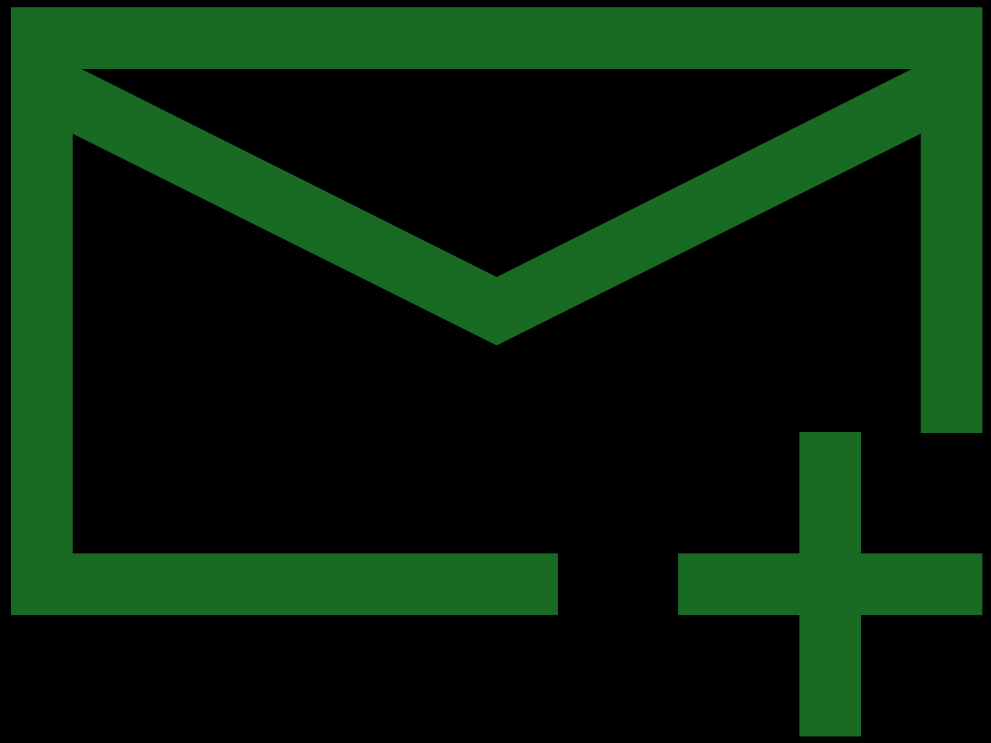

DELAWARE HEALTH AND SOCIAL SERVICES
Division of Public Health