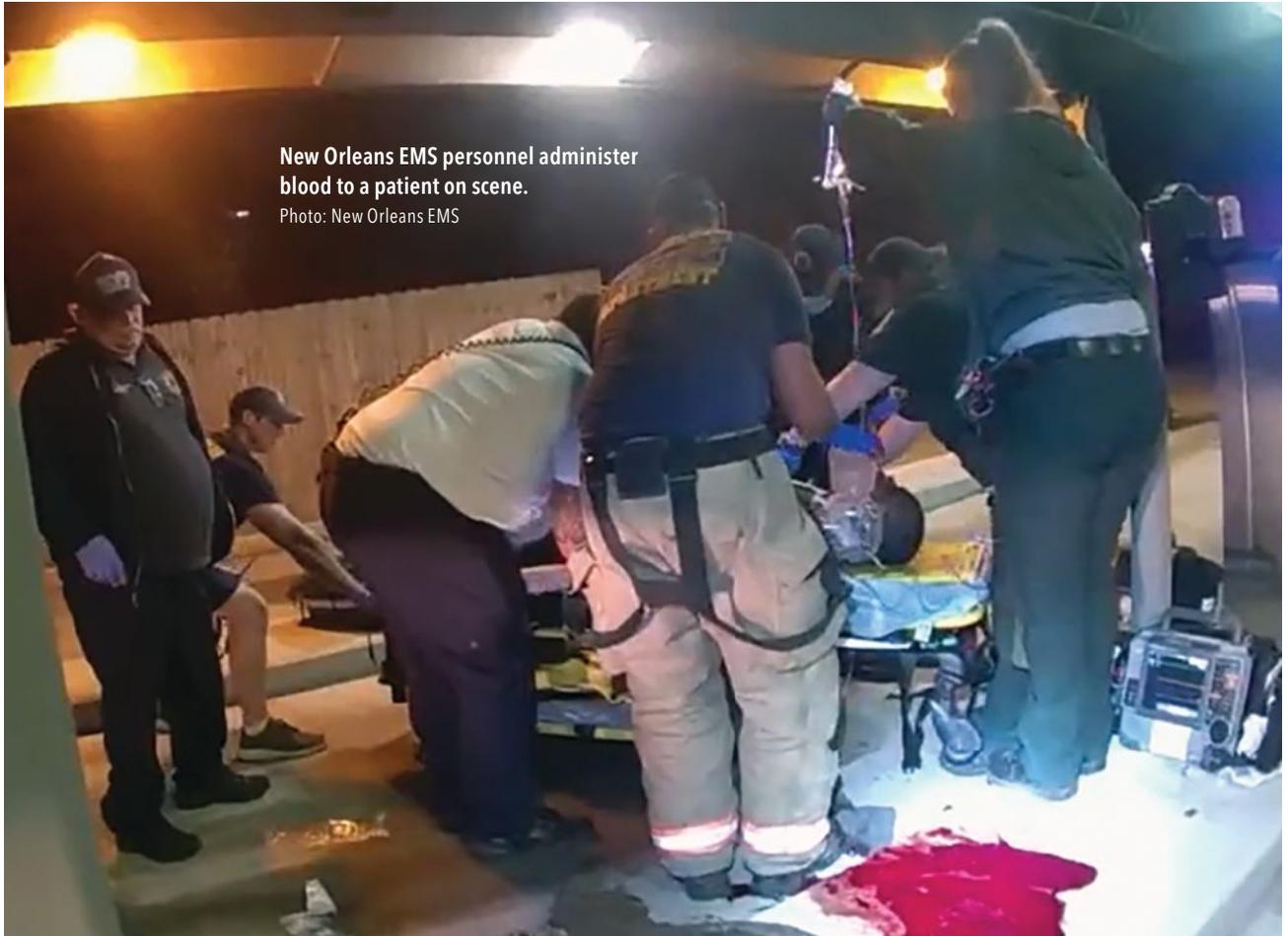


# NEW ORLEANS EMS TRAUMA BLOOD DELIVERY PROGRAM

By Meg Marino, MD, FAAP, and Tom Dransfield, EMT-P



New Orleans EMS personnel administer blood to a patient on scene.

Photo: New Orleans EMS

The New Orleans trauma blood project started in July 2019 with discussions, support, and advocacy by Juan Duchesne, MD, at the University Medical Center (UMC) New Orleans trauma center and Emily Nichols, MD, then the director and medical director of New Orleans EMS. We researched the number of trauma patients who received blood within the first 4 hours of EMS arrival at the trauma center to determine the number who could potentially benefit from receiving blood in the prehospital setting.

We then began discussions with the UMC blood bank to be our blood supplier and approached the Louisiana Bureau of EMS to ensure trauma blood administration would be covered under our scope of practice.

We discussed the purchase and use of a QinFlow Warrior blood-warmer device for delivery of blood but given cost constraints decided to proceed with cold blood administration.

We reached out to other systems that had implemented whole blood projects: the San Antonio (Texas) Fire Department; Harris County (Texas) Emergency Services

District 48; Cypress Creek (Texas) EMS; and Loudoun County (Virginia) Fire and Rescue.

## Unexpected Delays

Several events then caused us to pause our project:

- **November 2019**—The Hard Rock hotel collapse MCI in New Orleans resulted in a monthslong emergency.
- **December 2019**—A cyberattack across all city platforms interrupted access to our files and computers.
- **December 2019**—Winter holidays and New Year's Eve
- **February 2020**—Mardi Gras

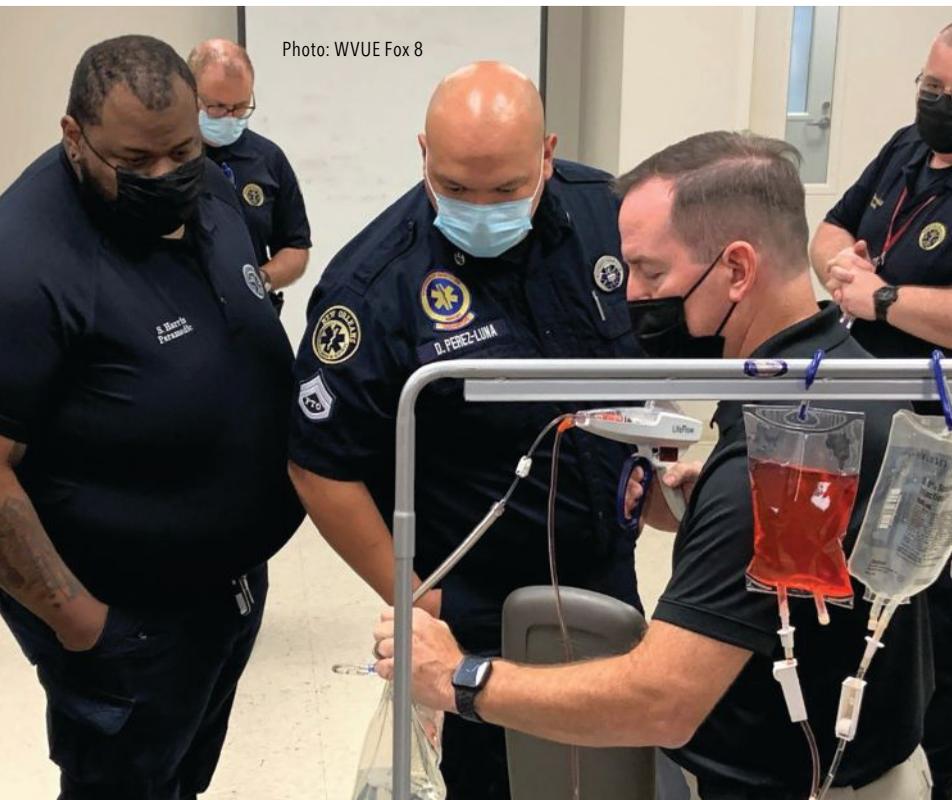


Photo: WVUE Fox 8

New Orleans EMS paramedics learn to administer blood through hands-on training sessions.



Photo: New Orleans EMS

We revisited the program in February 2020 but ran into legal obstacles with how to share and monitor blood between two separate organizations, so we decided to pause and regroup.

In March 2020 COVID-19 hit us hard; we focused on that and nothing else. Things began to level off in September 2020, and so we revisited the concept. We found a local blood center, restarted discussions, and looked at the costs and logistics needed to implement the program.

In October 2020 a fiscal crisis in our city led to furloughs and limited funding that impacted the project. But in November 2020 we learned the New Orleans Health Department had some grant funds available, and we used some to purchase a blood refrigerator in February 2021.

In June 2021 we met with our blood center representatives to discuss pricing and the varieties of blood available. We then drafted a contract that had to be reviewed and approved by both the city legal bureau and the blood center. It was a lengthy process.

In July 2021 we began to put together a draft guideline and training requirements in anticipation of rolling out that August or September. This was another long process. In August we revisited the issue of the blood-warming device and decided not to use it due to cost constraints.

We decided to use the LifeFlow PLUS blood and fluid infuser because it would allow us to quickly deliver large volumes of blood within our relatively short transport times. Current methods of blood and fluid delivery are too slow to quickly restore intravascular volume in patients with severe shock and hypotension.

For these patients “time is tissue,” meaning every minute of continued hypotension can result in increased organ injury. The LifeFlow device offers a simple way to restore perfusion with rapid and controlled delivery of fluids and blood. It delivers fluid effortlessly in 10-ml increments with each handle compression and allows the user to administer 1 unit of blood or 500 ml of fluid in less than 2 mins.

We scheduled training for mid to late August with LifeFlow representatives from

410 Medical. We trained one group, but then Hurricane Ida struck, so implementation was again put on hold. We rescheduled training for October and set a rollout date of October 18, 2021. The training consisted of 4 hrs of online training and 2 hrs of hands-on training.

## Prehospital Blood Administration

We developed traumatic shock guidelines as part of our regional prehospital protocols and guidelines. Our New Orleans EMS trauma blood administration guideline has provisions to administer whole blood, packed red blood cells (PRBCs), leukocyte-reduced red blood cells (LRBCs), or plasma, based on the availability of supply.

NOEMS “blood medics” carry the blood and fluids in a Peli BioThermal Crêdo ProMed 2-L cooler along with the LifeFlow device, as well as everything they need to care for trauma patients. They’re dispatched in either a sprint/supervisor car or rescue unit.

Each kit has everything needed to administer blood: a cooler with 2 units of blood products, 2 LifeFlow PLUS units, 2 g tranexamic acid (TXA), 2 g calcium chloride, CAT tourniquets, normal saline, a laser temperature gun, and a SAM junctional tourniquet. All the blood medic has to do is grab the kit and go (see *Figure 3*).

Blood products used in the New Orleans EMS trauma blood administration program are shown in *Figure 4*.

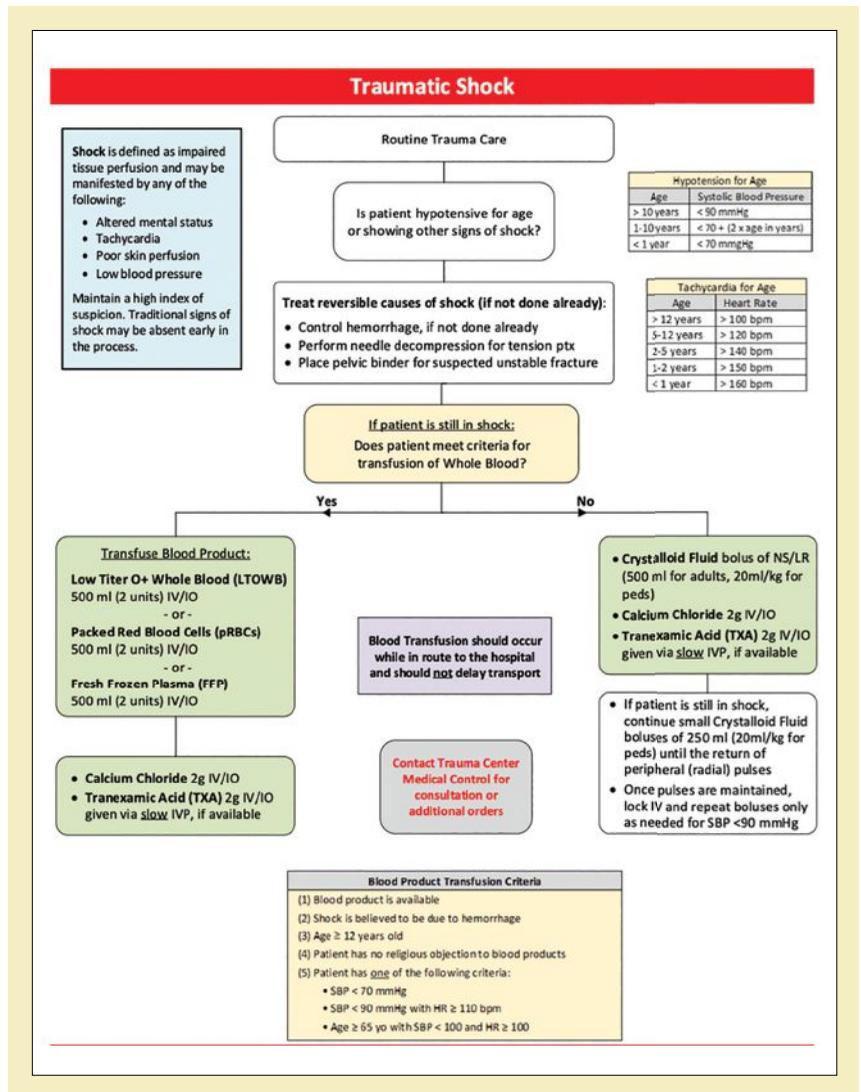


Figure 1: New Orleans EMS traumatic shock protocol

Photo: New Orleans EMS

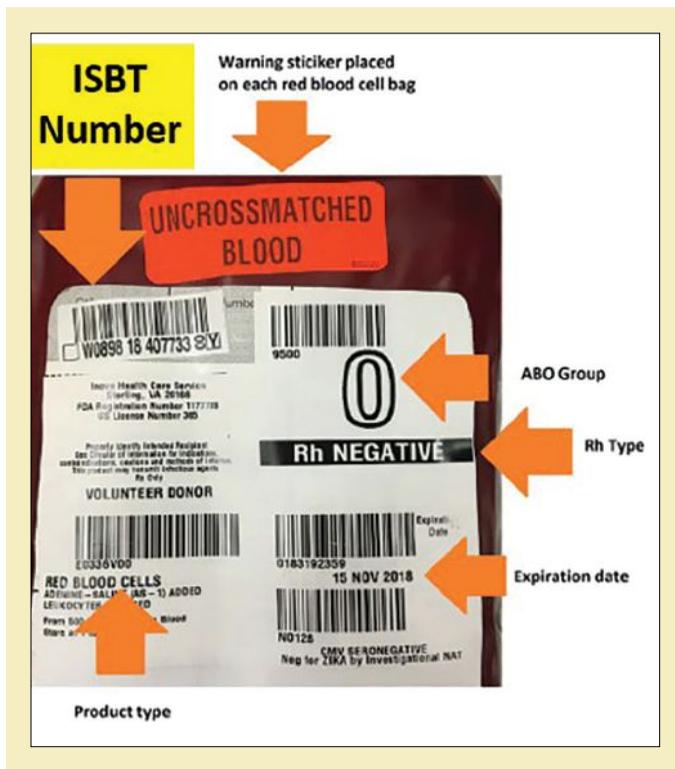


Figure 2: New Orleans EMS sprint/supervisor car (left) and rescue unit

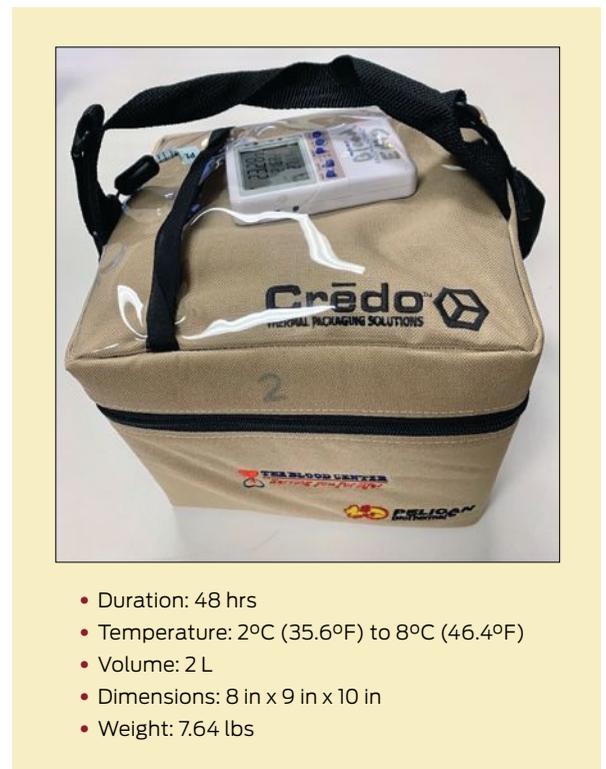
Photo: New Orleans EMS



**Figure 3: New Orleans EMS trauma blood administration kit**  
Photos: New Orleans EMS



**Figure 4: Labels on blood products**  
Photo: Northern Virginia EMS Council



**Figure 5: Peli BioThermal Crêdo ProMed blood cooler**  
Photo: New Orleans EMS

The Crêdo ProMed coolers are designed specifically for the dynamic needs of first responders. Each cooler consists of 3 different-size temperature-controlled portable medical transport bags that thermally protect the integrity of medical payloads for 48–96 hrs (see *Figure 5*).

Each outer bag is constructed of highly durable ballistic nylon fabric. Inside, the patented thermal insulation chamber (TIC) panels with phase-change material and vacuum-insulated panel components are qualified to consistently protect medical materials such as blood and platelets within 2–8°C (35.6–46.4°F).

The highly durable and convenient-to-use soft-sided bags offer easy conditioning of the TIC system panels, which makes the cooler simple, nimble, and consistently reliable. Once the TIC system panels are staged and placed, medics simply insert the payload content and are ready to respond. We rotate the TIC every



**Figure 6: Thomas Traceable Excursion-Trac thermometer**

Photo: Thomas Scientific

12 hours to ensure temperatures are held to the correct level.

Each bag also features rugged and sturdy supportive interior side panels, double-stitched seams, reinforced protective corners, durable buckle straps, a comfortable padded shoulder strap, a water- and soil-resistant protective bottom panel, and a clear-view pocket for essential checklists, thermometer, and other essentials, as well as a sturdy elastic backstrap designed to slip over telescoping stretcher handles to enable secure transport.

The Thomas Traceable Excursion-Trac Model 6430 thermometer, carried in the clear-view cover pocket of the Crêdo ProMed case, is highly accurate and reliable. Powered by 2 AAA batteries, it's just 1 in long by 1 in high, features high and low alarms and time/date stamps, data logging, and allows for USB data transfer (see Figure 6).

The LifeFlow PLUS rapid fluid infusion device from 410 Medical is stored next to the cooler within our blood bag. Our paramedics have found that even in a chaotic environment, it's easy to set up and use and allows us to deliver 500 ml of blood in as little as 2 mins. We've therefore been able to provide effective resuscitation within our short transport times (see Figure 7).

The LifeFlow can be operated with one hand, leaving the paramedic's other hand free to address other clinical issues, monitor the infusion site, and assess patient response.

## Training 'Blood Medics'

Our blood medics are experienced senior paramedics who receive extra training in the handling of blood products and pre-hospital blood administration. We use a 2-medic model when administering blood.

The blood medic solely manages the blood administration, and the second or transport medic primarily addresses other patient issues such as vital signs, airway, and IV access and can assist the blood medic as needed.

## Program Results

With more than 30 blood administrations so far, we've seen some very promising results. Patients who receive blood quickly on scene are surviving their life-threatening injuries. Patients have been predominantly younger males with penetrating torso injuries and a high severity of illness.



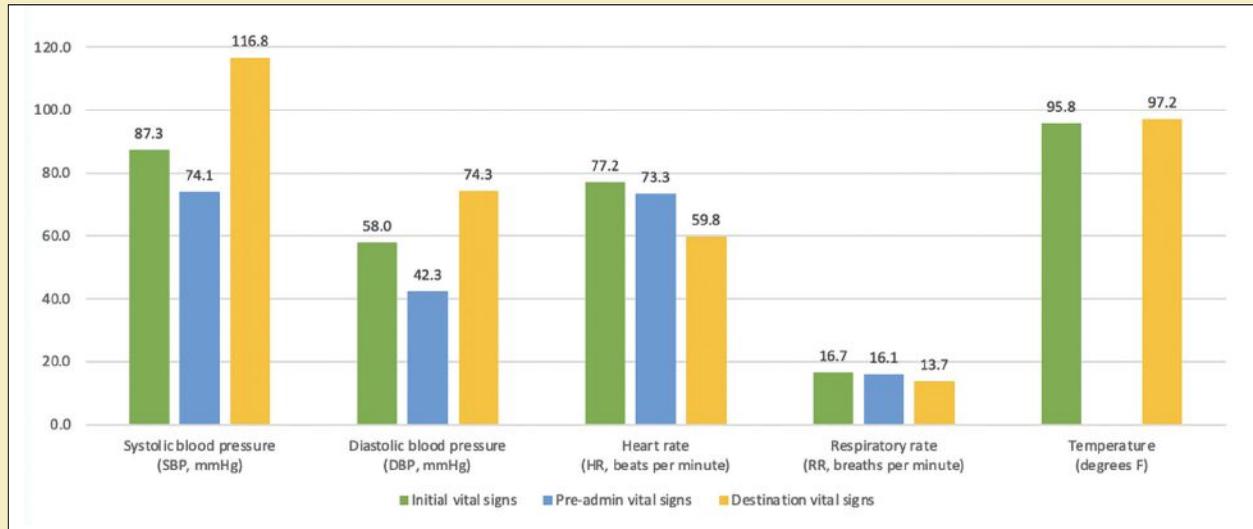
**Figure 7: LifeFlow PLUS rapid fluid infusion device**

Photos: 410 Medical



**Figure 8: Vital signs for 21 patients in New Orleans EMS trauma blood administration program**

Data: New Orleans EMS



## Vital Signs Highlights

- Systolic blood pressure and diastolic blood pressure improved in all patients treated.
- Heart and respiratory rates decreased after blood administration, reducing the chance of irreversible shock. Note that heart rate averages currently include patients in pulseless electrical activity (PEA), with heart rate of 0 recorded at the scene.
- The patient temperature level was, on average, elevated from 95.8°F (35.4°C) to 97.2°F (36.2°C).

## Demographics, Mortality, and Dispositions

Patient demographics, mortality, and disposition information for the first 3 months of the New Orleans EMS trauma blood administration program.

- A total of 21 patients were treated under the program from October 18, 2021 to January 21, 2022.
- 85.7% were Black males, and 14.3% were White females.
- Gunshot wounds represented 81% of the mechanisms of injury, followed by stab wounds (14.3%) and blunt trauma (4.7%).
- The average number of blood units administered was 1.7.
- The average volume administered prehospitally was 489 ml.
- The average time to administer blood products was 9.7 mins.
- Blood was administered on scene 47.6% of the time and en route 52.3% of the time.
- 7 of the 21 patients (33.3%) died in the ED. All were in traumatic arrest on EMS scene arrival.
- Of the 14 patients (66.7%) who survived to ED admission, 6 (42.9%) survived directly to the operating room; 7 (50%) were admitted to the ICU; and 1 (7.1%) was discharged home.
- Of the 14 patients who were admitted to the ED, all 14 (100%) were alive 72 hours after their injury, and all have since been discharged.
- The average length of stay for the 13 admitted patients was 16.5 days.
- 9 of the 13 admitted patients (69.2%) were discharged home, with only 1 patient (7.6%) discharged to inpatient rehab.
- 3 patients (13.1%) remained hospitalized for more than 72 hours, with an average length of stay of 26.7 days.

In our first analysis preadministration systolic blood pressure (SBP) averaged just over 70 mmHg, with an average SBP on arrival of 116 mmHg after 2 units of blood.

Remarkably, all patients who had not experienced traumatic arrest on scene survived, 40% went directly to the oper-

ating room, and only 1 required a massive blood transfusion. It appears our ability to quickly reverse shock in the field is improving outcomes for these patients. (See Figure 8 and its sidebar for data and patient demographics, as well as mortality and patient disposition information for the first 3 months of the program.)

## ABOUT THE AUTHORS



**Meg Marino, MD, FAAP**, is the interim director and medical director for New Orleans EMS. She's director of pediatric prehospital education for Ochsner Health and a pediatric emergency medicine physician.



**Tom Dransfield, EMT-P**, is quality assurance and safety officer for New Orleans EMS.