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Pittsburgh EMS transforms trauma survival via rescue medicine program

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When a car slams into a telephone pole or a driver careens down a steep embankment, survival can hinge on what happens in the next few minutes — sometimes before a patient is even freed from twisted metal or moved to stable ground.

Three years ago, the Pittsburgh Bureau of EMS set out to transform what happens in those minutes. Called the Pittsburgh EMS Rescue Medicine Bundle, the quality improvement program prioritizes early paramedic access and advanced, on-scene treatment for people trapped in vehicle crashes, within confined spaces or on steep terrain requiring technical rescue, said Mark Pinchalk, Pittsburgh EMS division chief of training.

The focus is aggressively treating shock, hemorrhage, hypothermia, fractures and pain — during extrication, not after.

The results have been striking.

From 2022 to 2025, Pittsburgh EMS completed 118 rescues. Of those patients, 116 survived to hospital discharge. In 2025 alone, 38 rescue operations were performed with a 100% survival rate.

In 96 vehicle crash rescues over the past three years, 1% of patients did not survive, according to data provided by the bureau. Nationally, by comparison, 43% of vehicle crash fatalities occur after contact with paramedics, according to the National Highway Traffic Safety Administration.

Pinchalk said the philosophy behind the program is straightforward: Address every life threat early, and understand the ways a patient's prognosis can be affected by these threats.

"One of the key philosophies of the Rescue Medicine Program is bringing the medicine to the patient, instead of bringing the patient to the medicine," he said.

But key, too, is understanding the interplay of how conditions like shock and hypothermia can influence whether a severely injured patient survives or not. "Everything is kind of synergistic," Pinchalk said.

The approach is guided by an acronym known as MARCH — prioritizing massive hemorrhage, airway, respiratory issues, circulation and head injury/hypothermia — first developed in the military and increasingly adopted in civilian trauma care.

For example, "if you're bleeding and you get hypothermic, you'll bleed more" and suffer greater shock, Pinchalk said. Or, if a patient's airway is not clear, that can lead to respiratory problems, which, in turn, leads to shock.

“All of those immediately life-saving things can impact each other,” he said, and the program focuses on addressing those issues as quickly as possible.

Blood on board

One of the program’s most significant changes came in September, when whole blood was added to the city’s two rescue trucks. Each vehicle now carries two units, rotated every 15 days through local blood banks.

Historically, EMS agencies relied largely on saline in the field. It’s shelf stable and easy to store. But saline doesn’t carry oxygen or help blood clot.

Whole blood replaces lost red blood cells, improves oxygen delivery and supports clotting, Pinchalk said.

“We have a lot more tools than we had five years ago,” Pinchalk said. “The technology is really getting exciting, to be able to help resuscitate these patients in the field.”

So far, seven patients treated for hemorrhagic shock with whole blood have survived to hospital discharge, he said.

Pinchalk described one case involving a person who fell from a height and required a high-angle rescue, in which rescuers had to climb to reach and then stabilize the victim, before lowering him to ground level.

The patient arrived in shock, with altered mental status and multiple traumatic injuries — including open and closed fractures of the lower extremities, as well as liver, spleen and kidney lacerations.

“The crew put tourniquets on both legs to control bleeding,” Pinchalk said. “He got an IV, he got some saline,” blood and received IV antibiotics for his open fractures all before being loaded into an ambulance.

“So I’m convinced the patient may not have survived without the quality care” during those early moments.

Care during extrication

Technical rescues extend beyond highway crashes. They include patients who tumble down wooded slopes, become trapped in collapsed structures or fall from stadium decks, like three separate incidents in 2025 at Acrisure Stadium, PNC Park and PPG Paints Arena.

Pinchalk distinguishes between “low angle” rescues — such as someone injured on a steep hillside — and “high angle” operations requiring vertical lifts.

In all cases, paramedics aim to get hands on the patient immediately — even before hydraulic cutting tools or ropes and pulleys are deployed.

That means controlling bleeding, securing airways, starting IV access and beginning oxygen or blood transfusion while firefighters create an extrication pathway.

At the same time, EMS crews are mindful of protecting patients from the rescue process itself, so the rescue bundle kit includes tools such as tarps, eye and respiratory protection, helmets and warming blankets that activate when opened.

Protecting a patient from hypothermia is paramount, even in the summer months, he explained.

Even on an 85-degree day, a motionless, injured patient can rapidly lose heat to concrete or wet

ground. Once hypothermia sets in, bleeding worsens, he said.

Beyond survival

The bundle also includes splinting fractures, applying pelvic binders to reduce bleeding from broken pelvises, administering antibiotics for open fractures and providing pain control or sedation when necessary.

Pittsburgh's urban setting — with three adult Level I trauma centers and a pediatric trauma center — helps. Ready hospital resources are advantages not shared by rural systems.

"We're spoiled here," Pinchalk said. "We're in an urban system with short transport times."

Still, he emphasized that the fundamentals of emergency response medicine remain the same no matter the location: "Even if I'm resource poor, I've got to maximize what I'm doing."

Last year alone, Pittsburgh EMS responded to 3,871 traumatic injury calls. The bureau employs nearly 200 field providers — roughly 150 paramedics, 35 emergency medical technicians and seven advanced EMTs.

Each rescue case is reviewed. Feedback is shared. Protocols are refined.

Looking ahead, the bureau is participating in national trauma airway research and plans to study calcium use in hemorrhagic shock, Pinchalk said. There's interest in expanding pre-hospital ultrasound and handheld lab testing — tools once limited to hospital emergency departments.

"It's just about technology pushing the limits," Pinchalk said, noting there's always a push to continue to educate personnel and keep an eye out for ideas like the emergency medical bundle that will improve patient outcomes.