

Tourniquet practice adopted from the military saves lives and limbs in civilians

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Civilian trauma medicine has adopted many methods and techniques that have been developed and tested on the battlefield. One such technique, the use of tourniquets to stanch early bleeding in arms and legs, has been shown to improve a trauma victim's chance of survival. Although the use of tourniquets in civilians had been previously studied, its survival benefit had remained unclear. However, new study results published as an "article in press" on the website of the *Journal of the American College of Surgeons* demonstrate that the use of tourniquets improves survival in civilian trauma victims. These findings are very timely as the first ever National Stop the Bleed Day was just observed across the U.S. on March 31.

"This is the first time that we were actually able to prove the [survival benefit](#) of using the tourniquet in the [civilian population](#)," said lead study author and trauma surgeon Pedro G. R. Teixeira, MD, FACS, of the University of Texas at Austin, Dell Medical School.

While tourniquets may seem like a simple way to stop serious bleeding, their use had fallen out of favor in both civilian and military medicine in the 20th Century. "During the Korean and the World Wars, there was a lot of concern about tourniquet use and they got a bad reputation, but much of the problem was that tourniquets were left in place too long, cutting circulation to the extremity for many, many hours," Dr. Teixeira said. Since then, trauma surgeons have become more sophisticated about tourniquet use.

"What we learned from more recent conflicts in the Middle East is that when tourniquets are applied early and removed in a timely fashion and the definitive repair is performed, also in a timely fashion, they actually have a significant role in preventing death from severe blood loss from an extremity injury," Dr. Teixeira said.

For the study, the Texas Tourniquet Study Group evaluated 1,026 patients with vascular injuries of the arms or legs admitted to 11 urban Level I trauma centers—the highest level for trauma centers—in Texas from 2011 to 2016. A prehospital tourniquet was used in 17.6 percent of the cases, although tourniquet use varied widely among individual centers, ranging from 62 percent to 1.4 percent.

Overall, 9.6 percent of the study patients had amputations, but more than one-third of them—35.7 percent—had received a tourniquet. Among the amputation patients, those who received a tourniquet had significantly lower mortality rates than those who did not—2.9 percent vs. 7.9 percent (adjusted $p=0.015$). The non-tourniquet group had almost six times greater odds of death (odds ratio 5.86, 95 percent confidence interval, range 1.41 to 24.47).

Dr. Teixeira explained that the types of civilian settings in which tourniquets can be used are automobile and motorcycle accidents, pedestrian struck by a vehicle, stab wounds, and gunshot wounds. "All these types of mechanisms that have a major hemorrhage coming from either an arm or a leg are amendable to having a tourniquet placed to stop that bleeding and allow that patient to survive long enough to reach a [trauma](#) center and get taken care of," Dr. Teixeira said.

Tourniquets work best when they are applied as early as possible at the site of the injury. "The ideal person to apply that tourniquet is the person who can do it the quickest immediately after the wound is identified," said Dr. Teixeira. "That scenario is the highest chance for the patient to survive."

The study noted efforts to increase the use of tourniquets in the civilian population, most notably the American College of Surgeons forming the Joint Committee to Create a National Policy to Enhance Survivability From Mass Casualty Shooting Events

as a response to recent mass shootings. Their recommendations became known as the "Hartford Consensus." In 2015, the White House issued a call to action called the Stop the Bleed campaign to train bystanders to help in a bleeding emergency. Tourniquet use is a key component of that call to action.

"The idea is that the same way that we have defibrillators in public spaces for patients that have a cardiac arrest, we would have bleeding control kits in public spaces too, allowing for tourniquet application by someone who has had minimal training for a patient that has an injury resulting in bleeding from a limb," Dr. Teixeira said.

He acknowledged that there is a cost involved in having tourniquets available for general use, but the study may help justify that cost. "Being able to demonstrate that tourniquets actually do the job they're supposed to do is important and supports the recommendations by the Stop the Bleed campaign, contributing to reducing mortality from bleeding on the streets of America and elsewhere," Dr. Teixeira said.

The study results were first presented in September 2017 at the 76th annual meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery in Baltimore.

More information: Pedro G.R. Teixeira et al. Civilian Prehospital Tourniquet Use Is Associated with Improved Survival in Patients with Peripheral Vascular Injury, *Journal of the American College of Surgeons* (2018). DOI: [10.1016/j.jamcollsurg.2018.01.047](https://doi.org/10.1016/j.jamcollsurg.2018.01.047)

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