

# Study shows adult tourniquet suitable for school-age children

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Researchers with Nemours Children's Health System have shown the effectiveness of an adult tourniquet for use in children, according to a study published today by the journal *Pediatrics*. While developed for adults, the military's Combat Application Tourniquet (CAT) is effective in controlling blood flow in children's arms and legs, as measured by Doppler pulse, in 100 percent of cases involving upper extremities and 93 percent for lower extremities. This is the first, prospective study on the device's use in children. Past anecdotal, retrospective reports from international warzones have indicated the CAT is being used in pediatric trauma cases.

"Firearm injuries and death are unfortunately not uncommon, and we need an effective tool for treating extremity hemorrhage in children in traumatic situations. Tourniquets have the potential to save lives from gunshot injuries since a severely injured child could bleed to death before medical help can arrive." said H. Theodore (Ted) Harcke, MD, lead author of the study and physician and researcher at Nemours/Alfred I. duPont Hospital for Children. Dr. Harcke is also a retired US Army Colonel and serves as forensic radiologist for the Armed Forces Medical Examiner System. "Our data shows that the tourniquet used by the military is easy to apply and suitable for use in the school age population."

In the study, the Nemours research team applied a CAT to an upper arm and thigh of 60 volunteer participants, aged six to 16 years, and monitored their pulse using vascular Doppler ultrasound. The tourniquet

was applied according to the manufacturer's guidelines. The study sample was reflective of U.S. school populations. Participants included 36 boys and 24 girls, with body mass index (BMI) ranging from underweight to obese.

The Pediatric Trauma Society supports tourniquet use for life-threatening hemorrhage caused by extremity trauma. Additionally, Stop the Bleed, an initiative of the American College of Surgeons and the Hartford Consensus, is currently instructing school staff, faculty, and students how to use tourniquets. However, since tourniquets generally are not designed for children, the authors' chief concern was the safety and effectiveness of use in younger children with smaller limbs.

The protocol allowed no more than three turns of the tourniquet windlass, to avoid pain to participants. The three-turn maximum allowed by the protocol was enough for all upper extremities and all but three lower extremities. Three turns did not completely arrest the pulse in three older, obese subjects (BMI > 30) who were adult-sized. The team anticipates that additional windlass turns, as used in actual trauma care, would stop [blood flow](#) in an injured lower limb in these cases.

The study's greatest impact may be on pre-hospital care. However, the researchers note its relevance to all pediatricians, who should be familiar with tourniquet use in [children](#) to ensure that development of guidelines for training and application are appropriate and medically correct.

**More information:** *Pediatrics* (2019). [DOI: 10.1542/peds.2018-3447](https://doi.org/10.1542/peds.2018-3447)

Provided by Nemours Children's Health System

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