

# RETHINKING TRAUMA CARE TO REDUCE PREVENTABLE DEATHS FROM BLEEDING: TAKING THE TRAUMA SURGEON TO THE PATIENT

## CAPSULE SUMMARY

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Many injured patients bleed to death before or shortly after reaching the hospital. More innovative approaches to prehospital care – incorporating new technologies, and taking doctors to the scene – could help reduce preventable deaths after injury. **The Grand Challenge is to establish a prehospital and tactical trauma service, in order to reduce the number of preventable prehospital trauma deaths, to zero.** Such a service, focused on providing control of bleeding, would be the first of its kind in the United States, and the first to fuse both civilian and tactical prehospital care. It would benefit patients and community; put UAB at the cutting edge of trauma care delivery and research; and could serve as a model for similar services throughout the US.

## THE PROBLEM

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**Trauma is the leading cause of death and disability in children and young adults, (1) and bleeding is the most common cause of preventable death after injury.** (2, 3) Conventionally, injured patients are retrieved by Emergency Medical Services (EMS), and taken to a trauma center. Bleeding which is *compressible* (such as from the limbs) will be controlled with dressings and tourniquets, but bleeding which is *non-compressible* (typically from the torso) will continue until the patient arrives at the hospital, when transfusions are started, and operations are undertaken to stop the bleeding. However, by this stage, some patients may have lost too much blood to survive. **The Grand Challenge is to establish a prehospital and tactical trauma service, in order to reduce the number of preventable prehospital trauma deaths, to zero.**

## IMPORTANCE

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**To the United States.** A recent report by the National Academies of Sciences, Engineering, and Medicine presents a vision for a national trauma care system driven by a bold aim: to reduce preventable deaths after injury to zero. The report specifically identifies inconsistencies in patient management between prehospital and hospital-based care, and recommends that “Congress, in consultation with the U.S. Department of Health and Human Services, should identify, evaluate, and implement mechanisms that ensure the inclusion of prehospital care [...] as a seamless component of healthcare delivery rather than merely a transport mechanism.”

**To Alabama.** In 2017, 365 injured patients were admitted to UAB Hospital requiring activation of the Massive Transfusion Protocol – an indication of serious blood loss, which might have benefitted from earlier hemorrhage control, and transfusion. Around half were injured by firearms, and the remainder in motor vehicle collisions and high falls. Approximately one-third of these patients died. Many of these patients might have been helped by earlier intervention.

## CONCEPT

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**Physician-delivered prehospital care.** Recognition of the importance of timely hemorrhage control has led to attempts to provide such interventions earlier, closer to the point of injury. In the military setting, the traditional “Airway/Breathing/Circulation” paradigm has been replaced with “Control-of-exsanguinating-hemorrhage/Airway/Breathing/Circulation,” emphasizing the critical role of hemorrhage control. Physician-delivered prehospital care is not an entirely new concept: In other countries, such as the United Kingdom, France, and Germany, doctors are routinely

dispatched to the most serious incidents, either by ambulance, helicopter, or fast response vehicle. However, for a variety of reasons, this model of care has rarely been explored in the United States.

**Novel hemorrhage control techniques and earlier decision making.** Advances in endovascular techniques (such as Resuscitative Endovascular Balloon Occlusion of the Aorta, “REBOA”) have the potential to facilitate earlier control of hemorrhage. However, these interventions are complex, and require the presence of a doctor. Furthermore, if a patient is attended by a surgeon pre-hospital, who can then make a decision that an operation is required, that patient could be taken directly to an operating room on arrival, bypassing the emergency department (ED), and saving valuable time.

**Firearms violence and mass casualty incidents.** Over the past two years, the United States has experienced an increase in firearms violence.(4) The frequency of public mass shooting incidents has also increased. Recent events at UAB Highlands Hospital highlight that such incidents can occur “close to home.” The treatment of casualties in these settings is often delayed, as tactical considerations take priority. Doctors with additional training can make a difference in this specialized area of prehospital medicine: In France, the police counter-terrorism teams have embedded tactical emergency medical physicians, who are in charge of rescue planning and care delivery in a tactical environment. During the 2015 Paris attacks, these physicians, moving closely behind police operators, performed tactical triage, and administered lifesaving interventions.(5) There is also increasing interest in this approach in the United States.(6)

## VISION

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**We propose to develop and pilot a prehospital trauma service, consisting of trauma surgeons who will undergo additional training in prehospital and tactical emergency care.** The team will deploy either by fast response vehicle or by helicopter. The team’s operations will be focused on the treatment of hemorrhagic shock, the main cause of preventable death, and its capabilities will include endovascular control of hemorrhage, resuscitative thoracotomy, advanced circulatory access, airway management, and prehospital transfusion. As techniques evolve, there may be opportunities to develop even more novel approaches, such as extracorporeal life support techniques. The development of such a service is a complex undertaking, which will require extensive consultation, planning, training, and investment in people and infrastructure. However, UAB is uniquely positioned to support such a development. Several of the trauma surgeons at UAB have served in the military, and one already works with Birmingham Police Department SWAT, who have expressed a strong interest in the project. UAB Hospital furthermore hosts one of the US Air Force’s Special Operations Surgical Teams, providing additional local expertise.

## EVALUATION

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**Of the program as a whole.** We will perform a comprehensive evaluation of the development of the program, and its impact. This will include quantitative and qualitative approaches, to assess the value of the program, from the perspective of a range of stakeholders.

**Of novel interventions.** Prehospital care is an area of active research, and a physician-led platform will permit the evaluation of a number of new procedures and treatment strategies, such as REBOA, Selective Aortic Arch Perfusion, and prehospital transfusion.

## POINT OF CONTACT

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## POTENTIAL TEAM MEMBERS

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UAB Division of Acute Care Surgery  
Emergency Medical Services, Greater Birmingham Area  
Birmingham Regional Emergency Medical Services System (BREMSS)  
Trauma Communication Center, Birmingham  
US Air Force Special Operations Surgical Team (SOST), based at UAB Hospital

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