Supplementary Online Content

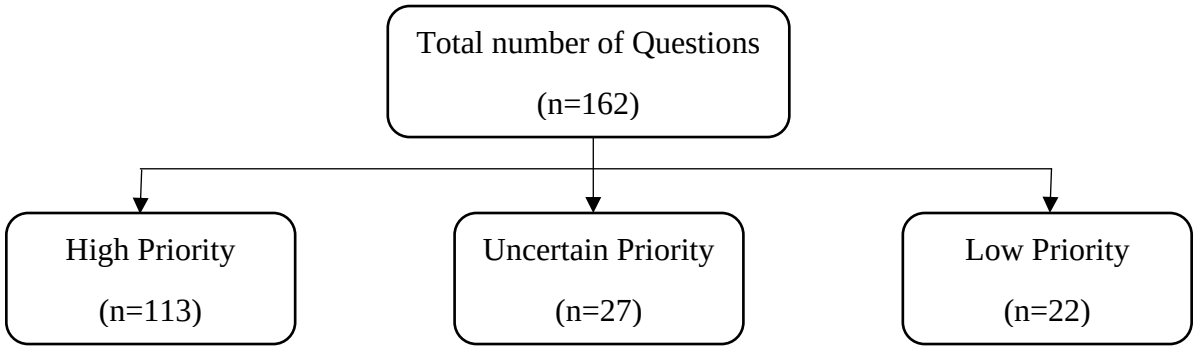
Goralnick E, Ezeibe C, Chaudhary MA, et al; Stop the Bleed National Research Agenda Consensus Conference Working Group. Defining a research agenda for layperson prehospital hemorrhage control: a consensus statement. *JAMA Netw Open*. 2020;3(7):e209393. doi:10.1001/jamanetworkopen.2020.9393

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable. Strict and Relaxed Criteria for Prioritization

Strict Criteria	Relaxed Criteria
• High priority consensus – defined as a median vote between 7-9, with no more than 4 votes in the low priority range (1-3) • Low priority consensus – defined as a median vote between 1-3, with no more than 4 votes in the high priority range (7-9) • Uncertain priority consensus – defined as a median vote between 4-6 or more than 4 votes in either extreme (high or low) priority range	• High priority consensus – defined as a median vote between 7-9, with no more than 5 votes in the low priority range (1-3) • Low priority consensus – defined as a median vote between 1-3, with no more than 5 votes in the high priority range (7-9) • Uncertain priority consensus – defined as a median vote between 4-6 or more than 5 votes in either extreme (high or low) priority range

eFigure. Categorized Research Priorities by Theme



Epidemiology and Effectiveness

High-priority Consensus	
How do needs differ in rural vs. urban areas?	What is the incidence and prevalence of wound packing/pressure in life-threatening injuries?
In what public areas do bleeding incidents occur?	What are the barriers to implementation of bleeding control modalities in the civilian sector?
What is the geographic and socioeconomic distribution of pre-hospital mortality due to bleeding?	How can we identify the incidence/burden of disease for injuries amenable to "STB" interventions?
What resources/training are tailored to areas with high incidence of penetrating trauma? (i.e. Baltimore, Chicago)	What is the rate of potentially survivable prehospital injury mortality due to hemorrhage?
What is the radius of population density for optimal deployment of bleeding control material?	What is the relative rate of injury amenable to "STB" interventions by mechanism? (i.e. violence, transportation, industrial, etc.)
What types of events/causes results in life-threatening hemorrhaging?	Which bleeding control interventions used by bystanders most effective? ?
What is the importance and impact of the "bystander effect" on pre-hospital bleeding control?	What are the essential elements of information needed in a registry of efforts made by a bystander to stop life threatening bleeding?
How can we assess the impact/effectiveness of tourniquet use?	What is the major source of mortality and morbidity in mass casualty incidents?
Does the collection of medical examiner data help to identify injury mortality with life-threatening extremity injury?	How many people need to be trained to have "herd immunity"?
How do we standardize prehospital trauma care data collection?	Does bleeding control impact morbidity?
What is the importance of improvised tourniquets in pre-hospital bleeding control strategies?	How many injuries per year could benefit civilian bleeding control?
What are the effects of hemostatic agents in in various traumatic scenarios?	How do we document and track the use of immediate responder hemorrhage control devices?
What are the social determinants of epidemiology of life-threatening hemorrhage?	Can we develop a registry of people who benefit from bystander bleeding control interventions?

Uncertain-priority Consensus	
Are there disparities in mortality in uncontrolled bleeding?	Can we identify a small number of "reference sites" for STB efforts?
What is the effectiveness of hemorrhage control interventions in special populations (pediatric, geriatric, etc.)?	How can we examine the cost and benefit analysis of hemostatic dressings?

Low-priority Consensus	
Is there a need to broaden the assessment of civilian injuries (non-traumatic injuries vs traumatic injuries?	Does EMS bleeding control practice impact civilian use of bleeding control?
Is there an importance in standardizing trauma terminology?	Should we encourage the public to purchase their own bleeding control kits?

Materials

High-priority Consensus	
What are the components that can be standardized in an improvised tourniquet (what qualities are needed for improvised tourniquets, mechanical principles)?	What is the cost associated with placement of hemorrhage control kits in a mass gathering site/ national implementation?
What is the effectiveness of different type of improvised tourniquets in laypeople?	What is the comparative effectiveness of different tourniquets in hemorrhage control in lay people?
What is the effectiveness of low fidelity training models for tourniquet models (for tourniquet training in lay people)?	What is the incremental benefit of adding hemostatic gauze in trauma kits?
What measures in training model need to be standardized for training public? (force/ tension/ pressure/ distal pulse/ pulse ox/ time to application)	Comparative effectiveness of tourniquets vs. hemostatic gauze vs. direct pressure?
What are the most effective audio and visual instructions for layperson tourniquet application?	Is their geographic clustering of tourniquet use that can be used to allocate public kits?
How do we set and ensure Identify a unified protocol or a unified organization to set standards for and approves hemorrhage control devices?	What is the optimum number of these kits in public venues?
Identify a standardized hemorrhage control kit for public placement	What is the optimum location of hemorrhage control kit within a mass gathering venue?
How do we standardize Tourniquets for lay people use?	What are the optimum components of a hemorrhage kit?
Identify standardized characteristics that all device manufacturers have to follow?	What are the design elements associated with high effectiveness of laypeople placed tourniquets?
What are the real-life issues people face when confronted with controlling hemorrhage? (focus group of stakeholders)	How can automated Just-In-Time instructions improve layperson hemorrhage control?
Identify streams for funding public placement of hemorrhage control devices (government, private groups, location owner, community)	How can smartphone applications or app- based innovations improve layperson tourniquet use?
How to improve packaging of hemostatic devices to improve usability?	Can a self-application tourniquet be used to achieve hemorrhage control by laypeople?

Uncertain-priority Consensus	
How do we teach placement of improvised tourniquet to laypeople?	What is the optimum size of a kit (no. of tourniquets and no. of gauze)?
Could manufacturers provide input and take on responsibilities in clinical data collection, training, and effectiveness studies?	Accessibility and effectiveness of updated technology in tourniquet delivery (e.g. drones)?

Low-priority Consensus

Can junctional tourniquets be improvised by laypeople?	Creating pediatric, geriatric, and population specific tourniquet designs
Identify an easy-to use or self-application junctional tourniquet for lay people use	How do we design tourniquets for people with special needs to apply?
How to optimize hemostatic gauze to minimize complications and increase shelf life?	

Education

High-priority Consensus	
What are the essential standardized elements of bleeding control curriculum?	What populations should be targeted for bleeding control training? (e.g. lay vs. professional, school age, Lyft/Uber drivers)
Who should teach bleeding control course/requirements to be instructors?	Should bleeding control training be tailored to specific audience? (e.g. lay vs. professional, age groups)
Should training be tailored to the target audience? (e.g. medical staff, students)	Should bleeding control training include specific resilience training?
Can a layperson judge severity of injury?	Does bleeding control training change resilience for participants?
Is a layperson able to follow decision algorithm (pressure vs. tourniquet)?	Are laypeople willing to apply bleeding control interventions after training?
What is the effectiveness of teaching laypeople to use improvised tourniquets?	What are the psychosocial barriers for laypeople applying bleeding control principles in a real-life scenario?
Who should govern bleeding control curriculum?	How well do trained lay responders perform in stressful scenarios?
How long do laypeople retain bleeding control knowledge and skills?	How many lives will layperson bleeding control training save?
Can/should bleeding control be added to existing first aid training (e.g. BLS, CPR)?	Can we develop standardized, valid, and reliable assessment tools for bleeding control knowledge/efficacy?
What is the best mode of training for scalability (e.g. in-person, 911 dispatch, just-in-time cards, online, etc.)?	What is the cost effectiveness of bleeding control training?
Should bleeding control training require hands on training?	

Uncertain-priority Consensus	
What is the ideal duration of training courses?	Do high fidelity simulations improve training?
How much can a layperson learn in a bleeding control training session?	Is large scale implementation of automated bleeding control kits (similar to AEDs) feasible?
What are the currently existing bleeding control training programs?	How should laypeople be retrained for bleeding control?
How culturally competent/dexterous are bleeding control training programs?	

Low-priority Consensus	
Should bleeding control training be tailored to specific scenarios? (e.g. motor vehicle crash, mass casualty)	Who has already been trained in bleed control (need for a registry)?

Global Health

High-priority Consensus

Should hemorrhage control courses be combined with existing programs such as i.e. ATLS, BLS, etc.?	What is the best approach to teaching hemorrhage control courses in environments without trauma system infrastructures?
Should hemorrhage control programs be implemented in a standardized way "one size fits all" or tailored to region specific needs?	Should an international clearing house for research, materials and education be created?
Is there a need for an individual assessment by country/region to guide targeted interventions to specific populations?	Can stop the bleed program be used as a starting point to push the development of health system?
Do we need to identify cultural and resource barriers from a geographical standpoint?	What other countries have initiated bleeding control programs for lay-persons and what are their lessons learned i.e. UK?
Should we partner with foundations and/or non-profit organizations?	What is the epidemiology of preventable hemorrhage deaths in low and middle income countries?
Should we identify thought leaders and trauma leaders to champion national programs?	What is the economic impact of bleeding deaths worldwide?
Should implementation science studies on how best to use existing professional and governmental networks be performed?	Should the hemorrhage control initiatives focus away from disasters?
How to spread the message of the courses?	What is the best approach to teaching hemorrhage control courses based on region?
What is the best approach to teaching hemorrhage control courses?	Will prehospital hemorrhage control affect injury outcomes secondary to health care infrastructure?
What is the current status of stop the bleed program in the world?	

Uncertain-priority Consensus	
How do we message that this is a relatively inexpensive and effective solution for the whole world?	What are the best methods to cross-language barriers?
Which population should be trained in low/middle income countries?	Should an analysis of grey literature for degree of trauma care related recommendations be conducted?
Is there an affordable equipment set for LMIC?	

Low-priority Consensus	
Is there a need to do an assessment of injury evacuation methods to definitive care by country/region?	Should military to military training in bleeding control be performed?
Should the global impact of an organized effort in the US be investigated?	How have other countries implemented civic responsibility into schools?
What countries are manufacturing/distributing bleeding control materials?	Is the supply chain for bleeding control materials understood? How much of it comes out from low/middle-income countries (LMIC)?
Can materials be locally sourced?	

Health Policy

High-priority Consensus	
How can we link existent datasets to study bleeding control?	What are the most effective health policy approaches to get kits in public spaces?
How can we standardize lexicon and data across the continuum of care?	Should STB training be mandated for students?
What is incidence of preventable hemorrhage deaths?	What is the coverage of existing Samaritan laws on bleeding control?

How can we measure outcomes from health policies for bleeding control training?	What are the gaps in legislation at national, state, and local levels?
How to improve data collection on bleeding control?	What is the ideal model legislation related to training and equipment?
How can we advocate about the importance of STB to policy-makers?	What are the national requirements for bleeding control legislation?
How to implement policies related to equipment accessibility in public places and what are the barriers?	What is the cost-effectiveness of STB campaign?
Who are the stakeholders involved in regulations related to bleeding control?	What are the factors of success or failure of legislation related to training high schoolers?
What are the legal precedents for lawsuits regarding bleeding rescue - commission or omission?	What is the impact of STB campaign on the decrease in lawsuit liability?
What are the legal barriers to train and to make equipment accessible?	What are the unintended consequences of STB program at the national level?
Are there scalable policy best practices related to bleeding control?	How to develop a framework for public program performance assessment of stop the bleed programs?

Uncertain-priority Consensus	
How many participants need to be included for an effective research program?	How can we educate on the importance of STB campaign?
Should everyone with a tourniquet be transported to a level 1 trauma center?	Can public facilities reduce insurance premiums with bleeding control training?
How to get funding to grassroots movements related to bleeding control?	Do states have mandates requiring STB training or equipment; efficacy and/or strengths?
How to measure efficacy of professional organizations on program outreach?	Should training be mandatory nationally? Who enforces it?

Low-priority Consensus	
How many level-1 trauma centers are implementing the STB as part of their trauma training program?	How to get endorsements from key players for STB campaign?
What are the risks of the new legislation on bleeding control? Would it affect innovation?	Should private organizations (industry) establish key partnerships with policymakers?