

2022 SCAC Awards Program

This application is for:

J. Mitchell Graham Memorial Award

Project Title

Pre-Hospital Whole Blood Administration by Paramedics

County/Counties

Colleton

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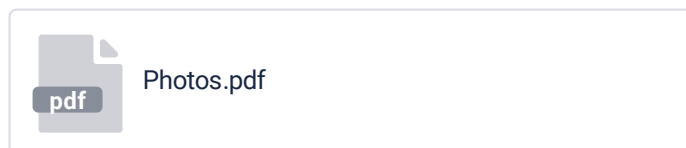
Please provide a summary of your entry (no more than 100 words) to be used in a handout for the awards competition and included in press releases/publications. You may either type the summary in the text box or upload it as an attachment below.

Colleton County's Fire-Rescue Department saw a need in rural communities to deliver whole blood products to individuals who were sick or injured and were often over an hour away from definitive care. The Fire-Rescue Department along with County Council, County Administration, community and state partners, developed a Pre-Hospital Whole Blood Administration by Paramedics pilot program, which delivered this critical resource to those citizens in need. The success of this program has culminated in this lifesaving treatment becoming a standard of practice in South Carolina.

Presentations may include more than one speaker; however, each speaker should be aware that the 10-minute time limit is strictly enforced. Please list the name, title, and e-mail address of each speaker:

Name	Title	Email
Joseph Campbell	Battalion Chief	jcampbell@colletoncounty.org

To submit these attachments online, please upload Microsoft Word or PDF documents below.





colletoncountyprehospitalbloodadministratio...

Please check boxes for attachments you will submit as part of your application

A concise Project Description to explain the purpose and significance of the entry (up to eight pages). Please follow the prescribed naming convention for your Project Description file.

Any additional materials needed to support your application (up to five pages).



South Carolina Association of Counties

J. Mitchell Graham Award

2022 Submission

1919 Thurmond Mall Dr, Columbia, SC 29202



Project

**Pre-Hospital Whole Blood Administration by
Paramedics**

Colleton County South Carolina

109 Benson St, PO Box 157, Walterboro, SC 29488

Phone: 843-549-5221

J. Mitchell Graham Award

Project: Pre-Hospital Whole Blood Administration by Paramedics

Colleton County

Fiscal Year 2021-2022

Importance

In rural South Carolina, access to specialty care Trauma Centers is difficult due to disbursement of such facilities and the amount of time it takes a trauma patient to reach them. Many citizens, especially in Colleton County, live a great distance away from these specialty care trauma facilities. Initially, it was these distance and time factors that drove the decision for Colleton County Fire Rescue to initiate and receive approval for a pilot project to administer whole blood products on ambulances in Colleton County to critically injured trauma patients in the pre-hospital setting. This pre-hospital whole blood project proposal was submitted to and approved by the South Carolina Department of Health and Environmental Control Division of Emergency Medical Services. During the planning phase, it was determined that an additional population of patients that included massive gastrointestinal bleeding were also candidates for prehospital blood transfusion and resuscitation. Data from the Southwest Texas Regional Advisory Council concerning the use of whole blood during resuscitation of trauma patients was used to establish the mean probability of success of this project.

Colleton County is a rural community in the Lowcountry of South Carolina that covers 1,182 square miles and a population of approximately 40,000 people with limited access to Level I or Level II trauma centers because of distance. Transport times to our Community Hospital for gastrointestinal bleeding can also be extensive due the sheer size of Colleton County. The closest trauma center is Trident Medical Center which could be a transport time of thirty minutes in the closest areas of our County and up to 60 minutes in the most remote. Prior to this project there has been no whole blood applications by any paramedic/ambulance units in the state.

See Figure 1.1

In order to deal with this significant problem a project for whole blood administration by paramedics was a project undertaken in Colleton County to provide rural South Carolinians who suffer from significant traumatic injuries and life threatening gastrointestinal bleeding the benefit of receiving whole type O blood products in the prehospital setting on the ambulance. The successful completion of this project changed the Paramedic Scope of Practice as related to the treatment of hypovolemic (loss of blood) emergencies resulting from trauma or gastrointestinal bleeding throughout South Carolina. It has also led EMS agencies from other States to reach out and begin similar projects.

According to Biospatial data (app.biospatial.io/dashboard, 2016-2022) Colleton County has one of the highest rates of trauma per capita of any of the 46 South Carolina counties annually. The standard of care is to have severely injured trauma patients at a trauma center in one hour or less from the time of injury, often known as the Golden Hour. Response times and scene times meeting

this Golden Hour standard is difficult not only for Colleton County Fire-Rescue, but many other EMS Services that serve rural counties in our state. Being able to provide whole blood resuscitation in the pre-hospital setting allows rural EMS providers to hemodynamically stabilize patients to a much higher degree during transport and gives the receiving trauma center or other receiving facility the opportunity to adequately continue resuscitation and ultimately treat a patient more effectively. Therefore, saving more lives.

Trauma and gastrointestinal bleeding in Colleton County is equally distributed through the population and there is no statistical difference in any specific population as to the nature or frequency of trauma. This project was specifically designed to benefit the entire trauma and gastrointestinal bleeding population who suffer from hemodynamic instability. Secondly, citizens of Colleton County could be assured that if they received a traumatic injury or severe hemorrhage, they would receive the most up to date, research supported and advanced care available in any pre-hospital system.

The pilot project was initially approved for twelve months. Prisma Health Oconee was allowed to participate in the project to create a very robust data set. Colleton County's Fire-Rescue Department was the lead agency as it initiated the project and managed the data. The project was extended to eighteen months and ended in October of 2021 because of the impact that COVID 19 had on trauma responses. The data was analyzed and it was clearly determined that all patients who received prehospital blood transfusion with type O positive blood had better overall outcomes, positive vital sign changes, with no increase to average scene or transport times.

See Figure 1.2

Project Effort and Difficulty

To accomplish our goal the scope of the project had to be outlined and the necessary hardware and supply of blood products had to be secured and funded. Colleton County's Fire-Rescue Department Fire Chief Barry McRoy secured funding through cooperation with Colleton County Council. An initial fiscal budget of \$60,000.00 was assigned to the project to secure the necessary components and to assure proper program maintenance.

Colleton County's Fire-Rescue Department was assisted by South Carolina Department of Health and Environmental Control Division of Emergency Medical Services and its Ad HOC Medical Control Committee, Trauma Advisory Committee, Training Committee and EMS for Children Committee. Each committee advises over their particular area of expertise and is composed of doctors, nurses and subject matter experts. The Medical Control Committee oversaw compliance and overall operation of the program from a regulatory perspective with each committee offering its expertise in development of protocols and guidelines. The South Carolina Nursing Board and its Officers also fully supported this project and offered resources at their disposal. The initial meeting phase began in March of 2019. Battalion Chief and Chief Medical Officer Joseph Campbell served as the representative for Colleton County's Fire-Rescue Department and attended regular, often weekly and monthly meetings in Columbia, SC to discuss the project and its goals.

There were several obstacles to overcome. There have been attempts in the 40 plus year EMS history to bring a project similar to this to fruition, but no one was ever able to convince the regulatory community including SC DHEC, its committees and associated physicians that it was medically necessary, medically safe, and logistically and financially feasible. Since a project of this depth and possible impact had not ever been fully realized in South Carolina, many of the same questions arose. There was no training for Paramedics in the area of blood administration. Physicians wanted to see a robust training curriculum that included both cognitive, psychomotor and affective components. Several physicians were hesitant as they themselves were unfamiliar with blood administration as it was a skill generally left up to Registered Nurses. Physicians merely ordered it. The question of supply of blood products and blood supply stewardship arose and had to be answered as blood is a very precious medical commodity. A protocol had to be developed that was easy to follow, capable of being incorporated into all EMS Advanced Life Support protocols in the state and specific as to which patients would be candidates for prehospital blood transfusion, and include the quality assurance/quality improvement requirements. Finally, a supply chain had to be developed for prehospital providers to obtain the blood they would be administering.

Colleton County's Fire-Rescue Department executes a contract with MedTrans Corporation to provide trained and qualified Firefighter Flight Paramedics for their Commission on Accreditation of Medical Transport Systems (CAMTS) accredited C.A.R.E. Flight medical helicopter based at Colleton Medical Center in Walterboro South Carolina. Each Firefighter Flight Paramedic holds multiple different State certifications as well as Flight Paramedic Certifications through the International Board of Specialty Certification (IBSC). Since our association with the Med-Trans Helicopter, we feel that our Firefighter-Paramedics should be administering the same level of prehospital care that is available on the helicopter, Blood Administration being one of those skills. When available, we use Air Medical mainly for speed. A training program was created in partnership with MedTrans Corporation that included aspects they had already established as quality practice. Colleton County's Fire-Rescue Department also was able to borrow the MedTrans protocols to assist in formulating a more comprehensive guideline for ground based ambulances. Once completed, we found no unresolved problems that were not addressed during the project. We feel the completed project is a comprehensive example of the needed steps to take to successfully develop a new Scope of Practice model and an exercise in building the much needed relationships between parties with similar interest in better patient outcomes.

Project Originality/Innovation

As previously mentioned, there have been attempts to bring projects similar to this to the forefront, but they were not well received due to their uncoordinated approach and no previous project was approved for a clinical pilot. This project included partnerships with the South Carolina Nursing Board, Hospital leadership to include the Medical University of South Carolina, Trident Medical Center, Prisma Health Oconee and their respective Trauma Program Directors and Gastrointestinal Specialists, Air Medical and The Blood Connection community blood bank. This project not only looked at the benefits from the clinical research component, but also the feasibility and

sustainability in creating a new prehospital Scope of Practice model in South Carolina that relies heavily on the partnerships it was built upon.

There are no similar projects in South Carolina. It can safely be said that even though the idea may not be completely original, the approach and scope are. This is one of the primary reasons for the project's success. Quite simply, this problem has been realized before, but Colleton County is the first to execute the ideas to address it.

There were several aspects of the project that had to be innovated. Colleton County's Fire-Rescue Department had to create a logistically sound way to store and track whole blood outside of the traditional blood bank. This required the purchase of portable medically certified refrigerators and thermometers to control and accurately track the temperature of the stored blood as it was strategically deployed on Colleton County's Fire-Rescue Department ambulances. Colleton County's Fire-Rescue Department also took ideas from air medical providers when it came to storing extra blood in a central supply. A permanent medical storage refrigerator and tracking hardware were purchased and placed at Fire-Rescue Headquarters. A logistics technician was assigned the duties of receiving, tracking, storage and distribution to one of the four selected Colleton County Fire-Rescue ambulances. Temperature monitoring was conducted multiple times a day on each ambulance blood was stored and the results were digitally downloaded and saved. "No Power" alarms were installed on each ambulance where blood was stored to alert crews if there was a problem with the power supply when the apparatus was not running and being staged at the stations while not on a call.

Colleton County's Fire-Rescue Department had to develop a way to administer the blood products through a portable warming system. The blood is stored at three degrees Celsius but must be administered to the patient at thirty six to thirty nine degrees Celsius. The Department researched and found a fluid warming system that monitors flow rates and temperature hundreds of times per minute and adjusts to the proper warming temperature to achieve this.

Portable, safe, accurate and secure storage of the blood was something that had to be innovated. The Department found, after much research, portable medical refrigerators that could store the blood at the proper temperature with an accuracy of 0.1 of degree Celsius. This meets the needs of safe storage. The department researched and purchased secondary digital constant monitoring thermometers that measure to the one hundredth of a degree with storage and the ability to download data to a flash drive for record keeping and verification.

Colleton County's Fire-Rescue Department partnered with The Blood Connection, out of Greenville South Carolina, to assist in creating a logistically feasible supply chain for prehospital providers. This has never been accomplished in ground based prehospital medicine. The Blood Connection was instrumental in the success as it fully supported the initiative and believed in its goals. The Blood Connection operates a community based blood bank, in that the blood they collect through donations in your community stays in your community. This allowed a way for the citizens of Colleton County to assist in the project, but moreover helped in saving the lives of these critically ill or injured patients. A positive consequence of our partnership with The Blood Connection was they also expanded their business to the Charleston market. This created a supply

point closer to Colleton County. The Blood Connection is now supplying blood to several of the area hospitals.

The Program used the following guidelines to analyze the data.

Dependent Variables:

Systolic Blood Pressure before and after administration (Quantitative)
Diastolic Blood Pressure before and after administration (Quantitative)
Pulse before and after administration (Quantitative)
Pulse Pressure (Quantitative)
Shock Index (Quantitative)
Length of Stay in hours *ICU and Total Hospital* (Quantitative)
Mortality (Quantitative)

Control Variables:

Age (grouped) 5-10, 11-15, 16-25, 26-40, 41-55, 56-65, over 65 (Quantitative)
Gender (Quantitative)
Mechanism of Injury / Nature of Illness (Qualitative)
Patient Contact Time from Time of Call (Quantitative)
Transport Time (Quantitative)
Transport Method (Quantitative)
Fluid Administration amount (Quantitative)

Independent Variable:

Blood Administration (Quantitative)

For the control group we utilized trauma patients transported by Colleton County Fire-Rescue who did not receive blood, but would have screened for transfusion, but blood was not available to compare dependent variables based on the control variables utilizing regression analysis to document findings.

Our goal was to determine if transfusion of whole blood in the pre-hospital environment improves patient outcomes, shortens length of stay, and reduces morbidity and mortality in the hemorrhagic patient. This goal was accomplished.

Colleton County's Fire-Rescue Department Chief Barry McRoy initially imagined ground ambulances carrying blood. His innovative idea occurred as a direct result of our partnership with MedTrans and the air medical industry's ability to carry blood because of their staffing model, which includes a Registered Nurse. Chief McRoy saw no reason that the same level of care patients receive in a helicopter could not be extended to ground ambulances. He approached the Departments Chief Medical Officer and asked if it could be done. This began the lengthy process of approval. Once approved, it took nearly six months to get the pieces in place before the pilot project could begin. Ultimately, the project culminated successfully into one of the largest, if not the largest, change in the Scope of Practice in prehospital medicine for Paramedics South Carolina.

In March of 2022, during the South Carolina EMS Symposium, Colleton County Fire-Rescue was recognized as the South Carolina Large EMS System of the Year for 2021 for the work success of the blood administration project and its impact on pre-hospital care in South Carolina. This award

is given to services which exemplify outstanding professionalism and service to its community through exceptional programs and training, EMS awareness, innovation, and citizen safety.

Closing

In closing this project set out to increase the level of prehospital care that could be given by paramedics in Colleton County by providing whole blood on ambulances. This innovative program proved that providing whole blood at the early stage of treatment greatly improves chances of recovery and survival. The program although unique and currently one of a kind in the state it can now be easily replicated at a fairly low cost by other agencies now that an approved protocol has been established through SCDHEC for its implementation. This project has identified a new way of greatly increasing prehospital care by paramedics to improve and save lives of those traumatized by accidents and illness. This is not only provided greater emergency response care for the citizens of Colleton County, but can now be implemented to improve this care for all citizens across all 46 counties.

Other Agency Information

Colleton County's Fire-Rescue Department has thirty-one employees at the EMT level, one employee at the Advanced EMT Level and seventy-two employees at the Paramedic level. We stress paramedic training as evident by the number of paramedics we employ. All prospective paramedic candidates undergo a rigorous selection process and are selected based on many criteria that measure how successful they would be in obtaining certification and their ability to practice at the paramedic level. Our DHEC approved Continuing Education program exceeds all national and South Carolina requirements. Our paramedic level providers also maintain certifications in Advanced Cardiac Life Support, Pediatric Advanced Life Support, Prehospital Trauma Life Support, Advanced Medical Life Support, Advanced Burn Life Support and Advanced Stroke Life Support. Field Skill evaluations are performed annually to ensure personnel maintain competencies in the required skills for each certification level.

Colleton County Fire-Rescue's Departmental goals are:

- Fostering team-based management of patients
- Giving providers the skills necessary to think and act based on solid assessment skills and sound clinical judgment
- Providing the best possible clinical outcomes based on the principles of evidence-based medicine.

All training is centered on evidence based practice and Colleton County Fire-Rescue boasts some of the most progressive protocols within the state. Training is focused on supporting our goal and is carefully scrutinized and updated often to meet the needs of an ever changing pre-hospital environment.

Colleton County's Fire-Rescue Department currently operates nine twenty-four hour a day staffed Advanced Life Support ambulances located strategically throughout the county, as well as an additional seasonal 24-hour a day ambulance at Edisto Beach. We also house four non-staffed fully equipped backup ambulances staged in the center of our response area. We respond to

approximately 6,000 emergency medical calls for service per year. Our average response time for 2021 is 7.89 minutes with an average transport time to a hospital of 13.65 minutes. Scene times for 2013 average 17.30 minutes.

Figure 1.1

Map outlining Colleton County ambulance locations and blood storage locations, as well as the two primary Trauma Centers utilized by Colleton County Fire-Rescue to include mileage and transport times.

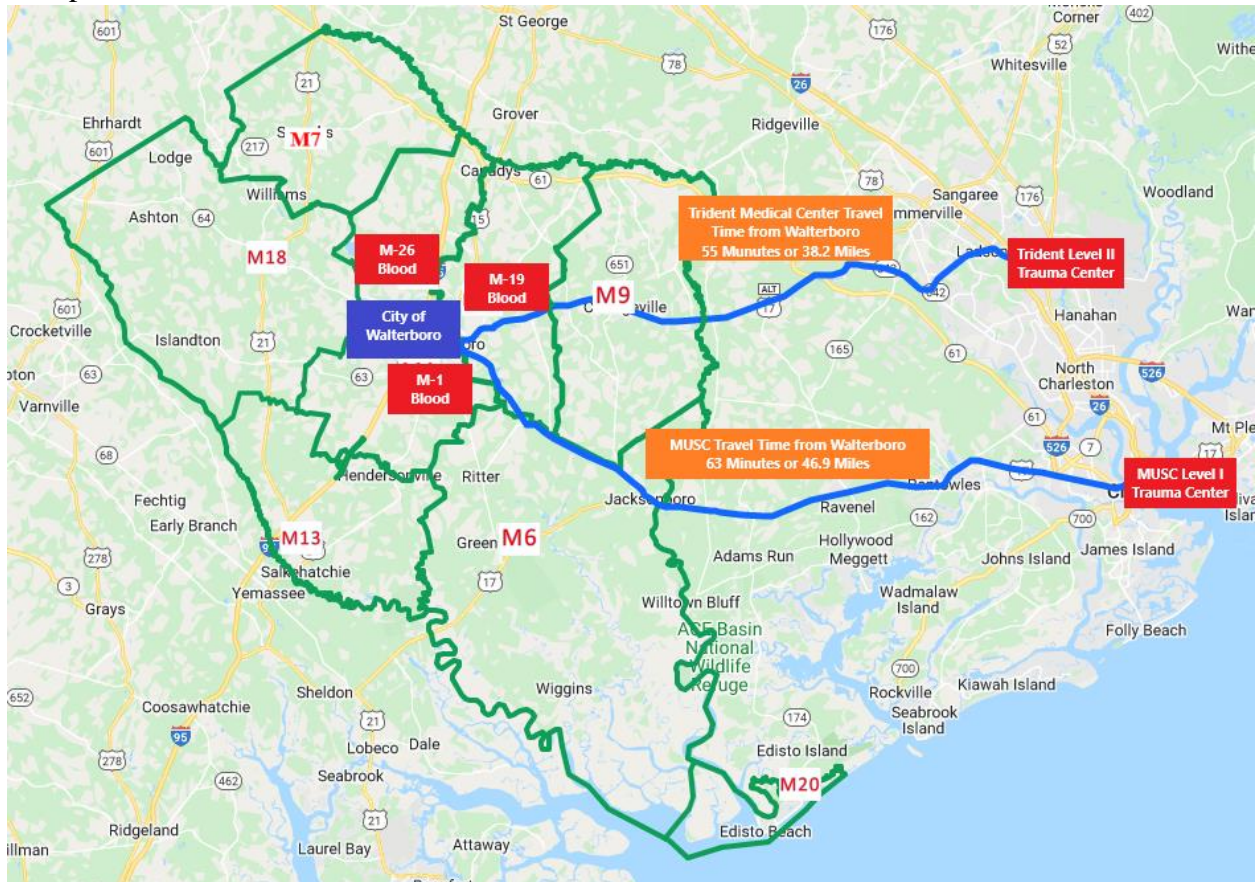
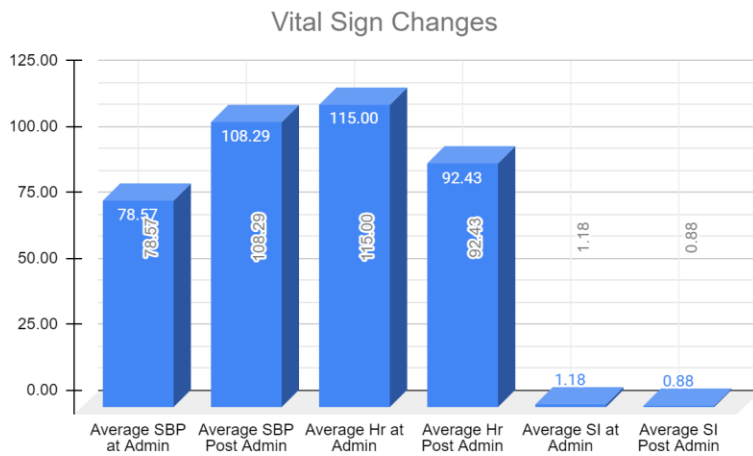
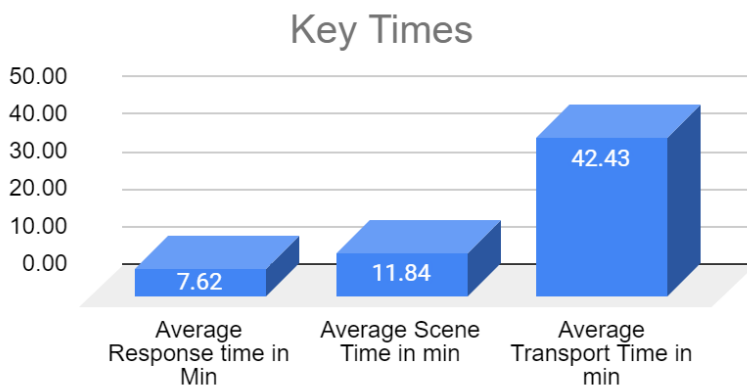
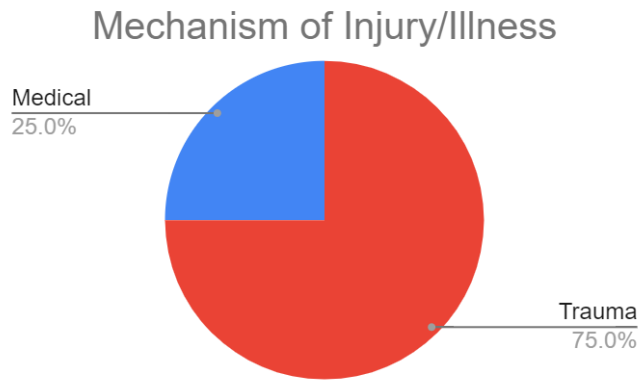


Figure 1.2 Data









May 5, 2022

South Carolina Association of Counties
1919 Thurmond Mall
Columbia, SC 29201

Re: J. Mitchell Graham Award Submissions 2021-2022
Colleton County - Pre-hospital Whole Blood Administration by Paramedics

To Whom It May Concern:

Colleton County would like to express its support of the application by the Colleton County Fire-Rescue department for the J. Mitchell Graham award in regards to paramedics providing Pre-Hospital Whole Blood transfusions.

Colleton County Fire-Rescue has made a great leap in the area of prehospital emergent care by developing this one-of-a-kind program within our state. Not only will this program be of benefit to the citizens of Colleton County in the future, but it will also provide a template to recreate the same level of care across the state.

Colleton County Fire Rescue Chief Barry McRoy and his outstanding staff have done all of our citizens a great service by both developing and implementing this new service. His vision for Colleton County Fire-Rescue continues to have an impressive impact on our County and State.

Please feel free to contact me if you have any questions.

Regards,



J. Kevin Griffin
County Administrator