

Carolinas Medical Center F.H. Sammy Ross Jr Trauma Center Foundation Update 2020

Overview

For the F.H. Sammy Ross Jr Trauma Center at Atrium Health's Carolinas Medical Center (CMC) and the Division of Acute Care Surgery, 2020 was the year of COVID. While the Ross Trauma Center and CMC provided life-saving care for large numbers of acutely and critically injured patients, CMC and the Division of Acute Care Surgery expended tremendous energies ensuring safe, timely, and effective care for both COVID and non-COVID patients, ensuring adequate bed and resource capacity for patients across the metro region, while maintaining safety for care providers.

The F.H. Sammy Ross Jr Trauma Center at Atrium Health's Carolinas Medical Center remains as the only Level I Trauma Center in the Charlotte – Metrolina region and is certified by the American College of Surgeons (ACS) Committee on Trauma. One of the 10 busiest ACS Trauma Centers in the nation, it serves as a quaternary referral center for acutely ill and injured surgical patients from the region and beyond. The 17 faculty of the Division of Acute Care Surgery provide care for a large volume of acutely injured patients from the Metrolina region in addition to providing care for urgent and emergent general surgery conditions and intensive care support of critically ill surgical patients at Atrium Health's Carolinas Medical Center. These three groups of patients (trauma, emergency general surgery, and surgical critical care) all share the attributes of having acute, time-sensitive, complex conditions at high risk of adverse outcome.



To provide the highest valued care for acutely and critically injured and ill surgical patients, the Ross Trauma Center and Atrium Health's Carolinas Medical Center maintains 24/7 in-house acute care surgeon availability in addition to continuous availability of CT scanners, trauma-accredited nursing staff, trauma designated operating rooms, surgical critical care support, blood bank operations and immediately available subspecialists like neurosurgeons and orthopedic trauma surgeons.

Atrium Health's Carolinas Medical Center is the hub of a network of 9 Atrium Health facilities that provide urgent care surgical management of greater than 50,000 patients annually with emergency general surgery, trauma, or surgical critical care conditions. Two of these 9 facilities are also Level-III trauma centers, Atrium Health Cabarrus and Atrium Health Cleveland. These 9 facilities comprise the integrated Acute Care Surgery

Network, formed to limit disparities in outcome across the region, provide high quality emergency general surgery and trauma care close to home, and enhance the regions ability to ensure the "right patient, right place, right time".

The F.H. Sammy Ross Jr Trauma Center leads the regional efforts for trauma system development, has very active trauma prevention programs, quality outcomes programs, trauma educational outreach programs, research programs, and Trauma Survivors Network program. Programs are highlighted below.



As one might expect, much of the previous year's activities within the Ross Trauma Center and the Division of ACS were

done in the context of the COVID-19 pandemic. Ensuring access to highest level of care for critically ill and injured surgical patients in addition to and in the setting of surging COVID patient numbers presented significant and unique challenges in 2020 and early 2021.

The Year of COVID

Preparations for the surge in COVID patients and efforts to maintain highly reliable, safe, and effective care for the acutely ill and injured patients through the pandemic were exhaustive. While elective surgery was significantly curtailed during the COVID surge, the contributions to the care of critically ill COVID patients by the Division of Acute Care Surgery were in addition to the management of trauma victims, emergency general surgery patients, and critically ill surgical patients, whose volumes remained relatively unchanged. Although the reduction in travel and commuting led to a decline in highway injuries, a significant increase in handgun violence as the pandemic went on substantially offset that decline. As a result, the Ross Trauma Center had the three busiest months in its history this past July through September 2020.

The Division of Acute Care Surgery worked collaboratively with our medical intensivist at CMC and across the region to ensure the ability to provide safe interventions and patient care. Some CMC COVID Numbers:

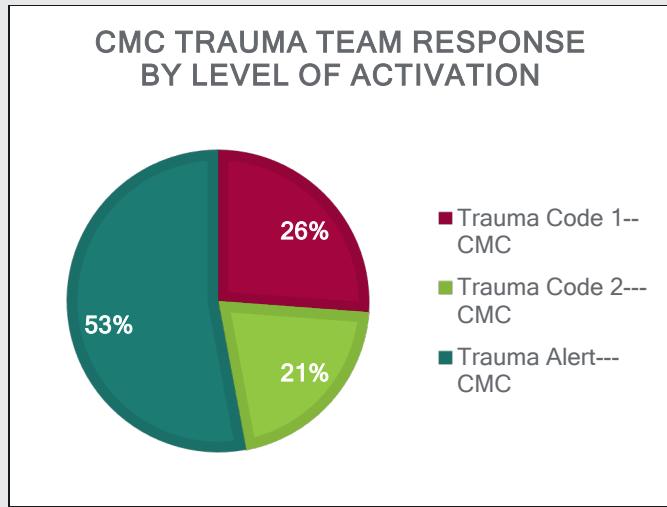
- > 1000 critically ill COVID patients managed at CMC, roughly half are now back at home
- Developed process to expand ventilator capacity in case of shortages
- Tracheostomies in COVID patients: Introduced and standardized process for the performance of tracheostomy in mechanically ventilated COVID patients across the Metro system
- Safely performed more than 75 tracheostomies in COVID patients to advance their care and facilitate transition off the ventilator
- Supported medical critical care colleagues through the management of COVID patients and providing critical care services at Atrium Health Cabarrus
- Busiest 3-month period for the trauma service (July – September) in the history of the program

Leading During COVID-19

As the SARS-CoV2 virus and the COVID-19 pandemic surge approached, the Division of Acute Care Surgery (ACS) at CMC employed its mass casualty management skills, developing a Department of Surgery wide pandemic response plan to mobilize and organize surgeons for the influx of COVID patients within the center. This framework was adopted broadly by other Departments and published in the *Journal of the American College of Surgeons* (visual abstract below) with Dr. Sam Ross as first author, leading to international recognition. The ACS Division also participated in international collaborative research initiatives, “COVIDSurg” and “GOBALSurg”, investigating the influence of COVID on outcome in surgical patients. To date, through this collaboration our Division faculty have coauthored two peer-reviewed publications, one in the journal *Anesthesia* and the other in the *British Journal of Surgery*.

CMC Trauma Center Snapshot 2020-2021

- ◊ CMC F.H. Sammy Ross Jr Trauma Center treated 7,198 injured adult patients. Of those patients, 4,731 required admission to the Trauma Center.
- ◊ Injury Types: 77% Blunt force injuries; 21% Penetrating injuries; 2% Burns
- ◊ Top Mechanisms of Injury: 1) Motor Vehicle Crashes; 2) Gunshot Wounds/Stabbings/Assaults; 3) Falls
- ◊ 2,067 (30%) injured patients were transferred in from other hospitals to CMC.
- ◊ 5,397 injured patients met triage criteria for full trauma team activation, with both the trauma team and emergency medicine present to evaluate and stabilize the patient.
- ◊ 1,183 patients required critical care support in the ICU after trauma team activation. 25% of patients have an injury severity score (ISS) greater than 15, indicating high risk of adverse outcome and death.
- ◊ 23% of injured patients treated at CMC are uninsured.



12,240 injured patients treated at Atrium Healthcare's four trauma centers

Regional Care: Serving Patients in Metrolina Region and Beyond

Diaphragm Pacing Program:

After several years of research and planning, the Division of Acute Care Surgery established a Diaphragm Pacing Program for patients with spinal cord injuries at the F.H. "Sammy" Ross Jr. Trauma Center in the spring of 2020.

The goal of this program is to liberate spinal cord injury patients that are dependent on a breathing machine 24 hours a day, 7 days a week from mechanical ventilation by providing electronic stimulation of their diaphragm, the major muscle involved in breathing. Following the surgical implantation of pacing wires into the diaphragm, electronic stimuli can stimulate and strengthen breathing, allowing some patients to live without the breathing machine entirely.

The programs first patient had pacing wires implanted in September 2020 and 2 additional patients since. Two of the three patients were able to be freed entirely from the breathing machines within 10 days of implantation. The third patient, who has been on a breathing machine since the time of his injury over a year ago, is now able to spend 8 to 12 hours per day off the breathing machine. We believe this technology will truly be life-changing for patients with spinal cord injuries at Atrium Health, in our region, and in the southeastern United States.

Logan Miller – ventilator dependent for more than a year, now spends 8-12 hours off the ventilator



Educational Outreach

The F.H. "Sammy" Ross, Jr. Trauma Center plays a large role in educating and maintaining skills for providers in the management of acutely injured patients from across the region. Despite the challenges imposed by COVID -19, our Simulation Education Outreach Program was able to provide ongoing courses while following COVID safe practices. A snapshot of activities is provided.

ATLS (Advanced Trauma Life Support) Courses

- 3 full courses in 2020, 1 in 2021
- Certified 130 providers
- Held 1 refresher course
- Able to stay within CDC and Atrium guidelines for COVID by using hybrid course, virtual lectures, small group skills stations and simulated patients

ATLS Instructor Courses

- 2 Instructor Courses
- Certified 12 providers as Instructor Candidates
- Improves sustainability for our busy ATLS program by training more instructors and supporting courses locally, regionally and nationally

ASSET (Advanced Surgical Skills for Exposure in Trauma) Course

- 2 ASSET Courses
- 17 students
- Perfused cadaver model to enhance training and provide a realistic model for simulation

Intern/Junior Resident Procedure Bootcamp

- 2 procedure courses
- 24 students
- Improves technical skills for emergency procedures such as chest tubes, cricothyroidotomy, IO placement

Metrolina Trauma Advisory Committee

The Metrolina Trauma Advisory Committee (MTAC) is one of eight North Carolina Regional Advisory Councils, dedicated to working with its regional emergency and trauma care providers, hospitals, and agencies in efforts of constructing and maintaining a coordinative, evidence-based process for the delivery of consistent, quality trauma care. As the region's only level-I trauma center, the F.H. Sammy Ross Trauma Center bears the responsibility for directing and managing MTAC. Activities of MTAC for 2020 include:

- Continue social media outreach. Goal is to expand visibility of the MTAC to increase its utility as regional resource for education and information regarding trauma care as well as promoting public awareness in the region. Over the 2020 calendar year our social media traffic increased over 50%, mostly due to the herculean efforts of Scott D. Wilson. In addition to promoting educational efforts, we look to be more aggressive with Injury Prevention Awareness.
- Increasing visibility and circulation of the MTAC Newsletter. The 2020 Newsletters highlighted Joe Lord of Cleveland County, Britt Christmas, and Brenda Medline. Currently a quarterly publication, our goal would be to get to a monthly circulation by early 2022.
- Ongoing Performance Improvement and Patient Safety (PIPS). We are currently reviewing 2019 and 2020 (incomplete) data regarding the case reviews to examine for data trends which may help with guiding further 2021 educational initiatives and awareness in the region. During 2020 we reviewed 86 PI cases. Loop closure remains challenging with the rural entities. Limited face time due to COVID restrictions had an impact and as restrictions lessen so will our ability to have face time.

- Educational initiatives were difficult for 2020. We have continued our monthly multi-disciplinary conferences/lectures more virtual than in the past. More recently we have been successful in the collaboration of the ASSET and ATOM courses, expanding to surgeons within the region, not just our own. I believe this is a significant step forward. Tremendous credit needs to go to Cynthia Lauer, MD for coordinating with Level III trauma center medical directors to offer this training to their junior surgeons. Other stakeholders include emergency medicine and EMS throughout the region. Scott is currently working on an EMS handoff project. What may be our biggest obstacle as we try to add CME/CEU credits are the requirements and costs.
- Pediatric Trauma Transfer Guidelines have rolled out. Again, COVID has restricted our abilities for face-to-face interactions which has slowed our outreach. Megan Waddell, RN has been instrumental in developing communication materials for this rollout. With the involvement of Drs. Christmas and Teich we will be sending out posters for display in the emergency departments throughout the region. Again, our adult poster has positively impacted our delays in transfers. The pediatric rollout will not only include transfer criteria but include NAT screening as well as “packaging” the pediatric patient for transfer.
- The Stanly County EMS POCUS Initiative is progressing rapidly due to the collaboration between Stanly EMS and MTAC, specifically The Ross Trauma Center. See separate brief on the Stanly County EMS POCUS Initiative.
- Finally, on-site visits remain on hold pending the COVID situation.

Division of Acute Care Surgery Research Program

Supporting advances in care through research:

Although the SARS CoV-2 virus and the COVID-119 pandemic had a direct impact on our research operations in 2020, our ACS research team overcame many new challenges to maintain research productivity. When on-site study enrollment was limited, focus was shifted to projects that analyzed large patient datasets such as our >1,800 patients with multiple rib fractures in the last 5 years. Analysis of this data, published in *The American Journal of Surgery*, demonstrated that our dedicated rib fracture consultation service provides earlier operation and improved clinical outcomes for our trauma patients.

Attention to detail: A dedicated rib fracture consultation service leads to earlier operation and improved clinical outcomes

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Contents lists available at [ScienceDirect](#)

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

- 41 peer-reviewed publications co-authored by members of the Division of Acute Care Surgery since the beginning of 2020

World's Top Enrolling Site:

The Atrium Health Acute Care Surgery Research team collaborated with interdisciplinary teams of specialists from Infectious Disease, Pediatric Critical Care, Pulmonary Critical Care at Atrium Health Cabarrus, and Atrium Health

Pineville to become the TOP ENROLLING site in an international study of a novel lysin called Exebacase, developed to treat *Staphylococcus aureus* and MRSA infections in patients with complicated bacteremia and right-sided infective endocarditis.

Additionally, the ACS Research team also enrolled the first two pediatric patients in the world in a clinical trial examining antibiotic lock therapy for patients who develop a catheter-associated bloodstream infection.

Continued dedication to this clinical trial has made our Atrium Health team the second-highest enrolling site in the world (for meaningful patient stories see *link below*).

Mino-Lok Patient Story - <https://atriumhealth.org/dailydose/2020/07/21/mino-lok-clinical-trial-saves-the-day--just-in-time-for-davids-dream-cruise>

With funding from these and other sponsored projects, we were able to add our seventh research coordinator, making our team one of the largest and most productive research divisions at Atrium Health.

Forging ahead in 2021 – new clinical trials:

- Acute spinal cord injury investigational drug study in collaboration with Carolinas Rehabilitation.
- Anticoagulant reversing drug for patients requiring urgent and emergent surgery
- randomized trial evaluating an investigational drug for treatment for Acute Respiratory Distress Syndrome (ARDS) in patients with COVID-19

Education: Growing Our Present and Future Medical Professionals

Medical Student Education

The Acute Care Surgery Faculty are committed to the education of medical students. Each year, approximately 30 University of North Carolina School of Medicine 3rd year medical students, choose to spend their entire 3rd year clinical rotation on the Charlotte campus. The surgical rotation for these students has a major component with Acute Care Surgery. Several 4th year medical students, who are interested in surgery as a career also travel to Charlotte for this surgical experience.

- ◊ The faculty were responsible for the surgical education of approximately 90 medical students.
- ◊ This included students from the University of North Carolina Chapel Hill and approximately 20 students from medical schools across the country.
- ◊ The faculty gave over 110 combined teaching sessions to medical students during the 2018 academic year.

The Charlotte campus for surgery is rated the best among all University of North Carolina Medical School campuses. Sixty-four percent (64.7%) of our students reported the Charlotte surgical clerkship as excellent compared to 47.4% nationally. Ninety-four percent (94%) of students rated our rotations as "Good" or "Excellent" compared to 82.1% nationally.

Ross Summer Student Research Fellowship

Despite the challenges of 2020 COVID pandemic, The Ross Student Research Internship worked through its 9-week long paid practicum designed to expose first-year medical students, undergraduate and post-graduate students to clinical surgery, trauma, and research. Unfortunately, the North Carolina Committee on Trauma Resident Paper Competition was held remotely, thus the students could not attend in-person. Much appreciation to Tyler Rape for diligence is getting the regulatory issues related to the COVID situation addressed for the students.

During the summer of 2020 the program welcomed two fellows:

- Ahsan R. Khan - Morehouse School of Medicine
- Paige DeBlieux-Andrews - University of South Florida School of Medicine



Surgical Critical Care and Acute Care Surgery Fellowship Impact

The Division of Acute Care Surgery supports the training of two different fellowship programs, the Surgical Critical Care Fellowship and the Acute Care Surgery Fellowship open to those completing general surgery residency programs. These fellowship programs aim to train future leaders in the field of Acute Care Surgery. To do so requires a significant commitment of our faculty to continuously engage in transformative and innovative care to ensure that Carolinas Medical Center and Atrium Health are at the forefront of training programs in the nation. The impact of these advanced training programs on our region is significant.

The Division has committed to training our regional acute care surgeons in the field of Surgical Critical Care to achieve elevation in care for the acutely ill and injured surgical patient across the region, support system growth and support collaboration across the Atrium Health system. We provide our fellows with training to become ATLS Instructors, ATOM Instructors, and ASSET Instructors. This service allows our ACS Division to continuously offer education to regional providers on these specialized and essential programs. Additionally, we support our Acute Care Surgery fellows to attend the NC STAC meetings, TQIP meeting, and TCAA Trauma Medical Directors Course. These unique and highly relevant offerings allow our fellowships to stand out amongst others, attracting competitive applicants to attend our programs. They also provide our fellows with an exceptional learning opportunity, where they can grow professionally, develop critical relationships with regional and national ACS leaders, and gain advanced level knowledge in Trauma Systems development and improvement. Lastly, our fellows participate in various research projects throughout the year. These projects are related to analyzing and

improving clinical outcomes of our trauma patients and are ultimately presented at regional and national meetings. These presentations allow our fellows and supporting faculty to demonstrate the clinical and research work occurring at CMC, and this further establishes our program as an exceptional, innovative, and transformative training program within the field of Acute Care Surgery.

Violence Prevention

Hospital-Based Violence Intervention Program:

Through the efforts and leadership of Dr David Jacobs, a long-time faculty member of the Division, the Ross Trauma Center and Atrium Health's Carolinas Medical Center received funding from the City of Charlotte to establish a hospital-based violence intervention program at Atrium Health here in Charlotte.

For victims of violence treated at the F.H. Sammy Ross Trauma Center, 25% will become a repeat victim of violence at some point. In other words, if nothing is done to intercede, 1 in 4 will suffer violent injury again. Hospital-based violence intervention programs can substantially reduce those chances by taking advantage of the “teachable moment” following violent injury.

The “teachable moment” is based on the theory that violent injuries that are serious enough to require hospitalization provides the victim an opportunity to reflect on the events that led to the violent injury and acknowledge that perhaps it’s time to make some positive changes in their lives.

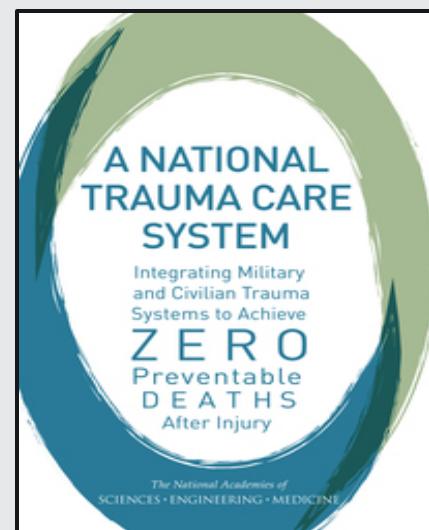
Hospital-based violence intervention programs offer that much-needed help to the often socio-economically challenged victims of violence by providing 24/7/365 intensive case-management services, initiated in the Emergency Department and continued frequently weeks and months after hospital discharge. Hospital-based violence intervention programs reduce violent re-engagement and future criminal involvement, they improve the self-esteem and self-sufficiency of violence victims, and have been demonstrated to save money through the reduction of future healthcare, law enforcement, and social service expenditures.

While many such programs exist throughout the country, 37 at last count, The F.H. “Sammy” Ross Jr. Trauma Center will be the first program established within North Carolina.

Military Partnership

In 2016, the National Academy of Science, Engineering and Medicine published a report entitled “A National Trauma Care System: Integrating Military and Civilian Trauma Systems to Achieve Zero Preventable Deaths After Injury” that articulated a strategy for improving both military and civilian trauma care through coordinated partnerships in training, education, clinical operations, and research.

A partnership between the United States Army Special Operations Command (USASOC) and Atrium Health to *integrate military trauma and emergency care teams into the clinical operations of Atrium Health's Carolinas Medical Center* (CMC) in support of the 2018 Mission Zero Act, the 2019 National Defense Authorization Act (Sec. 719) and the 2019 Pandemic All--- Hazard Preparedness Act (Sec. 204). This innovative program integrates four, multidisciplinary Forward Surgical Resuscitation Teams (FRST) into CMC’s clinical operations on a rotating basis.



The purpose of the program is to foster a learning trauma system and improve the delivery of care across the civilian and military trauma networks.



The program consists of 4 Army Resuscitative Surgical Teams containing a total of

- 4 Emergency Medicine Physicians
- 4 Surgeons
- 4 APP (Emergency Medicine and surgical)
- 4 CRNAs
- 8 RN (Emergency Medicine and ICU)
- 12 Medics
- 4 OR Technicians

These soldiers have been assigned at CMC for 15 months and are fully integrated into the Atrium Health in their respective areas of Trauma and Acute Care Surgery, ED, ICU, OR, and Anesthesia. They engage in team training within the hospital as well on field exercises. They are gaining valuable trauma experience at CMC, while also supporting our services clinically. In addition, they share an important perspective of the deployed austere healthcare provider managing complex war wounds with our faculty, fellows and residents.



Atrium Health ACS University City

Expanding and Elevating Care - Atrium Health University City

The Atrium Acute Care Surgery Division expanded to provide acute care surgery coverage to Atrium University City, continuing to elevate surgical care throughout the system.

Since the inaugural coverage began in July 2020, this service has outperformed in every predicted metric. The ACS service been recognized by Atrium University City administration, CHG, ED and OB/GYN for elevating the surgical care within the facility and changing the culture within the institution.

Performance metrics:

- >750 surgical consults since July; 83 consults/month, 2.8/ day
- 448 major operative cases; average of 64 cases/month
- 154% predicted operative volume based on initial ProForma estimate
- Elevation of care for our trauma system with more timely sequela operations for trauma patients
- One of only two service lines at University City whose case volume increased during COVID, with an increase of 20%
- Reduction in need to transfer patients within Atrium System due to elevation in surgical care, assistance with trauma patient management, and surgical critical care support, conservation of CMC and Cabarrus surgical beds
- Atrium Acute Care Surgery has become a local leader in quality, leading NSQIP efforts and participating as the surgical representative on Quality Assurance and Improvement Committee

Stanly County EMS POCUS Initiative

The Stanly County EMS POCUS Initiative clearly demonstrates the importance that the Metrolina Trauma Advisory Committee (MTAC) plays in the region. Ultrasound has many clinical roles but arguably none more important than its ability to rapidly diagnose free fluid within the abdomen, specifically in the trauma patient with internal bleeding. Being a small prehospital agency in rural North Carolina, they sought the partnership of Scott Wilson, MTAC Coordinator and Dr. Ronald Sing, MTAC Medical Director, who were able to bring the expertise and resources from the region's Level I trauma center to facilitate the training of over 70 paramedics and begin the process of implementing ultrasound into their operations. A curriculum was designed consisting of on-line videos and self-paced modules on POCUS with the paramedics then undergoing a hands-on training session. Over a two-week period, several trauma surgeons with the help of volunteers, delivered multiple POCUS training sessions at the Stanly County Government Center, just across the street from Atrium Health Stanly.

The Ross Trauma Foundation contributed an honorarium to the PD patients for their time. Additional training for five of the Stanly County EMS field training officers is underway, i.e., "train the trainers" who will be overseeing the POCUS initiative at the local level under the supervision of Dale Dorsey, current Medical Director Dr. Cris Hall, and their soon-to-be medical director, Dr. S. Tyler Constantine. Stanly EMS will begin performing POCUS on their ambulances beginning April 1st with the first 3 months serving as a feasibility trial. Dr. Sam Ross will be serving as Principal Investigator to study the reliability and effectiveness of Paramedics to capture appropriate and equivalent imaging to that obtained in Emergency Departments. This will be followed by a study on practical application of ultrasound use, potentially impacting trauma destination protocols by diverting patients with positive FAST exams to a Trauma Center when previously definitive care may have been delayed by transport to a community hospital.

Trauma Survivors Network (TSN) 2020 Year in Review

Due to COVID-19, in March 2020, the Trauma Survivors Network moved all services to a virtual platform. This included peer visitation and support groups.

Introduced TSN services to more than 700 adult trauma patients and their families

- Provided peer visitation to 166+ patients (Majority virtually)

Introduced services to more than 140 pediatric trauma patients and their families

- Provided peer visitation to 60+ patients (Majority virtually)
- Facilitated:
 - 14 Survivors Groups (2 in-person pre-Covid and 12 virtual)
 - 10 TSN Kids Groups (2 in-person pre-Covid and 8 virtual)
 - 8 Family and Friends Groups (2 in-person pre-Covid and 6 virtual)
 - We had a virtual TSN holiday party last night
 - Socially Distanced Volunteer Picnic- October



Training:

- Trained 5 new TSN volunteers using a virtual platform
- Facilitated a virtual volunteer in-service for current volunteers
- Trained 5 UNCC MSW Interns- virtually and in-person
- TSN Team and Volunteers hosted a session for the National TSN Coordinator Course 2x in 2020
- TSN Volunteer was invited to speak to the American Trauma Society BOD in December 2020

