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DEPARTMENT OF SURGERY
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THE ANNUAL DETROIT TRAUMA SYMPOSIUM - DAY ONE - 2024

The Annual Detroit Trauma Symposium (DTS) took place on Thursday and Friday, November 7-8, 2024, at the Detroit MGM Grand Casino and Hotel. The program began at 6 a.m. with a Continental breakfast for those who were staying at the MGM Grand, after which Dr. Larry Diebel (WSU/GS 1980/86), who leads the DTS each year, welcomed the visiting speakers and the attendees. This was the 72nd Annual DTS which makes it the oldest trauma symposium in America.


Dr. Paul Gladden

The first presentation from 7:15-7:45 a.m. was made by Dr. Paul Gladden from the Tulane School of Medicine in New Orleans, Louisiana. The title was "Ballistics and Blasts." Dr. Gladden spoke about some of the historical aspects of firearms and emphasized that at one time, guns within an urban area would be primarily pistols but that now rifles are available everywhere. Many families have loaded weapons in their homes without appropriate protection and without appropriate education of some of the younger family members. Citizens living in the United States are about 25 times more likely to be injured by a bullet compared to the rest of the world, and the USA is also more likely to have a mass casualty related to firearms. Suicide is also a high risk for gun owners in that some believe it is a simple and easy way to end one's life when things are not going well. Velocity has a very important aspect in terms of wounding. The muzzle velocity of a handgun might be 200 feet per second, whereas a high-velocity rifle would have a muzzle velocity of over 2,000 feet per second. The Einstein equation states that energy is a function of both mass and velocity, which is represented by $E = \frac{1}{2} MV^2$. The injury brought about by a missile is related to the change in energy from the time that the missile hits a patient until it leaves the patient. For example, a high-velocity rifle bullet at 100 feet that goes through a patient without coming in contact with bone would cause many times less injury than that same bullet would cause at 100 yards when the yaw (ratio of missile spin) would be much greater and the missile would tumble upon impact even when not encountering a bone. Consequently, when the bullet is rotating or has a high degree of spin, there will be tumbling and much greater injury at the time of impact. He noted the importance of trying to pass laws which eliminate access to high velocity military rifles to citizens, and there should be background checks to decrease the likelihood that citizens who would inappropriately

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use firearms are less likely to be able to buy a firearm, particularly a high-velocity rifle.


Dr. Joseph Cuschieri

The next presentation, from 7:45-8:15 a.m., was provided by Dr. Joseph Cuschieri and was entitled, "The Recognition of Shock." Dr. Cuschieri is one of our former medical students who completed his surgical residency at the Henry Ford Hospital and is now in charge of the trauma program at the University of California in San Francisco. He emphasized the importance of restoring the blood pressure to a mean level of 65 torr. There is a role for vasopressin as a substitute for large volumes of crystalloid replacement, and there is a randomized controlled trial in patients who had received a minimum of 6 units of blood and then were randomized for additional crystalloid vs. vasopressin in order to keep the mean arterial pressure at 60 torr. This regimen was successful in decreasing the number of blood products and was associated with an increase in urine output. There did not appear to be any organ injury with this regimen.


Dr. Martin Schreiber

Dr. Martin Schreiber, who is the chief of Acute Care Service at the University of Health Sciences in Portland, Oregon, provided the next presentation from 8:15-8:45 a.m. which was entitled, "Whole Blood in Trauma Resuscitation." Dr. Schreiber highlighted that after many decades of using packed red cells plus components, there has been a shift back to the use of whole blood. This results in far less component therapy since the coagulation factors are present within the whole blood. They used shelf blood up to 14 days of age after which there was a marked decrease in the component therapy. He also recommended calcium supplementation in the form of calcium gluconate because of the citrate which is administered within the whole blood. The results of the whole blood resuscitation are monitored with TEG, which is done every 30 minutes in order to determine if additional cryoprecipitate or FFP is needed. One of the findings in their study was that those who were randomized for whole blood replacement had a lower incidence of requiring hemostasis with operative intervention, suggesting that possibly the improved coagulation associated with the whole blood replacement was providing better control of bleeding from the organ injuries.


Dr. Matthew Martin

The next presentation was provided by Dr. Matthew Martin from 8:45-9:15 a.m. and was entitled, "Just Say No to Angio! Angioembolization for Solid Organ Injuries." Dr. Martin is from the Acute Care Surgical Service at the University of Southern California in Los Angeles. He emphasized that the scientific evaluation of angioembolization (AE) for solid organ injuries is somewhat lacking because there are really no prospective randomized studies. He highlighted the many complications associated with splenic embolization, including infarction, abscess, and need for difficult subsequent splenectomies. He also described similar problems of necrosis associated with AE of liver injuries. The

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concept that the presence of a blush should lead to a consultation with interventional radiography for embolization should no longer be followed. Decision making should be based upon the patient's status rather than image studies. A review of the data from the National Trauma Bank shows no difference in results with or without AE.

Following a brief break for refreshments and visiting the exhibits, there was a question-and-answer session from 9:45-10:00 a.m. when Dr. Diebel questioned the above speakers about many topics, including the role of TXA and the use of leukoreduction when transfusing red blood cells.


(Lt to rt) Dr. Matthew Martin, Dr. Joseph Cuschieri, Dr. Martin Schreiber, Dr. Larry Diebel, and Dr. Paul Gladden

Following the Panel Session, the next presentation was made at 10:00-10:45 a.m. by Dr. Terri deRoon Cassini from the Medical College of Wisconsin trauma program. The title of her presentation was "Screening and Treating for PTSD Following Injury." Dr. Cassini emphasized that the high incidence of PTSD is now being more and more recognized so that the Verification Review Committee of the American College of Surgeons (ACS) lists evaluation and treatment of PTSD as one of the criteria for verification. Dr. Cassini pointed out that PTSD is present as often as 20-40% and is associated with depression. One of the features is that the patient will have flashbacks of the injury which results in the patient's avoiding being in similar locations as he/she was at when the injury occurred. For example, one patient was shot near her garage, and subsequent to her injury, had been afraid to park in parking structures because they remind her of her garage shooting. The extend of this fear is such that she has received many parking tickets due to parking in the street near her place of employment in order to avoid the fear of being in a parking garage. She described other similar situations where patients are fearful of being in a situation similar to where they received their injury. The extent of PTSD extends to suicidal ideation and clearly interferes with total patient recovery after severe injuries. It is, therefore, important to educate medical students and surgical residents about this horrible entity which can be devastating.


Dr. Terri deRoon Cassini

The next presentation from 10:45-11:15 a.m. was presented by Dr. Joseph Cuschieri and was entitled, "Sustained Improvement: Implementing Evidence Based Quality and Practice." Dr. Cuschieri highlighted the contributions that were made by Dr. Codman about 100 years ago when he emphasized that physicians need to be looking at their own complications and reporting on these complications in order to guide improvement in patient care. This recommendation by Dr. Ernest A. Codman was met with great resistance, but over time, the ACS introduced quality assessment in 1926, followed by the JCAHO who introduced this type of program in order to obtain hospital accreditation in the early 1950s. In the latter part of the 20th century, the Institute of

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Medicine identified that there were many thousands of deaths following surgery due to preventable errors. Many changes have occurred because of these efforts, including the importance of avoiding hypothermia and correcting problems with acidosis. The classic work by Dr. Donald Trunkey describes how a delay in implementing treatment for severe injury is associated with increased mortality and that rapid transport to a Level 1 Trauma Center circumvents that delay. There are also problems with mortality that occur following discharge, particularly in patients who end up in nursing homes or rehabilitation institutes.

The next presentation from 11:15-11:45 a.m. was made by Dr. Cassini and was entitled, "Addressing Health Disparities in Injured Populations: Is It the Responsibility of Trauma Centers?" Dr. Cassini pointed out how there are many disparities following MVC's as it relates to where a patient is taken to be treated. There is increased morbidity and mortality related to race, and it is important to talk with the families of victims of gunshot wounds in order to try to prevent retaliation. People in the Emergency Department at her trauma center overheard family members who were going to "get even" with the assailant who had shot their loved one in the head. This led to the trauma team's assigning one of their members to talk with the family. The person who discussed the intended revenge was a former prisoner who now worked with the trauma team. He described the horrors of being a prisoner and having the loss of one's self-determination. After some time, he was able to convince the family that it is better to let the law enforcement agencies punish the assailant and avoid ending up in prison in order to get revenge. She described a number of other areas where the trauma center team needs to take responsibility in addressing all of the needs of the injured patients and their families.


Dr. Deborah Stein

The next presentation, from 11:45a.m.-12:15 p.m. was made by Dr. Deborah Stein, who is part of the trauma team at the University of Maryland in Baltimore. Her talk was entitled, "Trauma in the Older Adult." Dr. Stein described how many countries in the world have a higher average age which is associated with significant increases in co-morbidities and that increased age is often associated with falls, particularly at home, related to items which are inappropriately located on the floor or to small rugs over which a patient trips. These soft falls are associated with a high incidence of traumatic brain injury and hip fractures which, in the elderly, often ends up being lethal events. Burns that occur in the kitchen area also lead to significant morbidity resulting in subsequent death. She emphasized the importance of frailty in the aged and how frailty, associated with what should be minor falls, results in rib fractures which complicate breathing and can lead to a lethal pneumonia. There are also problems with anticoagulation in elderly patients for various types of cardiac problems, and they are also more likely to develop post-traumatic stress disorder.

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The afternoon session on November 7th was moderated by Dr. Al Baylor (WSUGS 2005), who is the Chief of Surgery at Detroit Receiving Hospital.


Dr. Stephanie Savage

The next presentation from 12:30-1:15 p.m. was provided by Dr. Stephanie Savage from the University of Wisconsin Trauma Program in Madison, Wisconsin. Her presentation was entitled, "Alexander Walt Lecture on Innovation and Trauma Education: The Surgical Phoenix: Evolution and Acute Care Surgery." Dr. Savage talked about the many changes that have occurred with the merger of acute care surgery and care of injured patients. Most injuries have traditionally grown out of wars and civil disturbances, such as riots. Changes occurred in the blood banking industry during World War II, and technical advances have also occurred, such as the development of high quality CT scanning. She described the history of the development of acute care surgery and the integration with surgical critical care so that the acute care surgery typically involves critical care, trauma, and non-trauma surgical emergencies. The wide variety of challenges allows for different individuals to select their own area of special interest within acute care surgery and the evolution of acute care surgery programs which provide multi-specialty exposure, although minimal exposure with orthopaedic surgery or neurosurgery. These opportunities provide greater potential for satisfaction and predicts that there will be Acute Care Surgical Boards in the future.

The next presentation, from 1:15-1:45 p.m. was provided by Dr. Deborah Stein and was entitled, "Update in Neurocritical Care: Coma-Prognostication and Communication." Dr. Stein highlighted how this problem affects up to 1.8 million patients per year with visits to the Emergency Department. Over 60% of these visits are in patients who have a history of traumatic brain injury. She described the differences between coma, which means someone is really "out of it," as opposed to brain death where the inner brain is no longer functioning. The evolution of the "Death Act" was described, which defined patients with no hope being evident by the fact that there is no cerebral blood flow. The combination of a Glasgo Coma Scale of 3 and absence of cerebral blood flow confirms brain death, which is an important part of the various transplant programs around the country. In contrast, the "vegetative state" means there is minimal evidence of brain function, and this is rarely, but sometimes, associated with recovery.


Dr. Lena Napolitano

The next presentation from 1:45-2:15 p.m. was provided by Dr. Lena Napolitano who is in charge of the Critical Care program at the University of Michigan. Her presentation was entitled, "Trauma Brain Injury: BIG SIBCC and DC (Decompressive Craniotomy)." Dr. Napolitano described how one of the frequent causes of traumatic brain injury is a gunshot wound to the head as

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part of a suicidal effort. Very high on the etiology list is falls, particularly in the elderly. There is no magic bullet that is going to identify for certain how a patient is going to do. She compared the value of a CT scan vs. MRI and described the severities of brain injury with a GCS <8 being severe, 9-12 moderate, and 13-15 mild. There are also five different categories for the Abbreviated Injury Score as it relates to the head and brain. The BIG classification of mild, moderate, and severe injury was described, and the trauma surgeon can provide definitive care for the BIG I and BIG II, whereas the BIG III requires definitive neurosurgical consultation. Two interventions may provide help in the non-craniotomy treatment of bad injuries; these include manipulation of oxygenation in order to enhance brain oxygen concentration and intervention as it relates to intracranial pressure. Both of these techniques may be helpful in improving the patient's status without decompressive craniotomy. There are no magic medicines that will treat the injured brain, and when treatment by improved brain oxygenation or reduction in high brain pressures does not work, he next step would be decompressive craniotomy.

The next presentation from 2:15-2:45 p.m. was presented by Dr. Martin Schreiber and was entitled, "Too Much is Too Bad." He presented an interesting philosophical topic identifying how the definition of quality keeps changing. First, he described the ABC's that we all learned regarding resuscitation, but now, circulation takes priority, followed by airway and breathing because of the problems with cardiac arrest associated with giving medicines for intubation in patients who are hypovolemic. At one time, everyone had to have an enema, but this is no longer considered important. Multiple changes have occurred in the treatment of ongoing bleeding following injury. A high tidal volume was once considered the treatment of ARDS, but now it is recognized that a high tidal volume is bad. Patients who are brought in as a scoop and run by the police do better than those who are brought in by EMS when the run time to the hospital is short; the procedures performed at the scene by EMS only delays what has to be done, namely getting blood started. The emphasis on two liters of crystalloid solution is leading to problems with fluid overload in severely injured patients (this reviewer is reminded of the times when the residents would go out to have some drinks after a long night, none of the residents got short of breath from fluid overload, but there were frequent trips to the restrooms). Vitamin C was the rage for acute injury, and activated coagulation factor VIIa was important to bring about coagulation. This is no longer true. He also noted the love affair that many people had with the use of steroids for both hemorrhagic shock and septic shock. What we may be teaching today as quality may be shown tomorrow as harmful.

The next presentation from 2:45-3:15 p.m. by Dr. Matthew Martin was entitled, "From Baghdad to Boston: Top 10 MASCAL Lessons Learned." Dr. Martin emphasized the importance of being prepared for a mass casualty. This means that the hospital must anticipate the different factors that will be encountered when a

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mass casualty occurs. Because of the different factors that will be encountered when a mass casualty occurs and a large number of patients arrive in a short period of time, the triage must be performed number of patients who will arrive in a short period of time, the triage must be performed outside of the Emergency Department. Likewise, there needs to be the capability to communicate from the scene of the mass casualty to the Emergency Department, typically done by cell phone. There will also need to be a mechanism to deal with the media since they will be wanting to get into your Emergency Department. There has to be an activation plan, and at the end of everything, there has to be a plan to review all of the activities that took place. Well patients need to be discharged from the hospital in order to empty beds for the new arrivals. There has to be a plan to deal with the natural bottleneck areas, such as Radiology. The radiologist needs to be instructed that he/she is to take no x-rays on patients with long bone fractures since the x-ray is not going to help with immediate treatment, and other patients with higher priorities will be in large numbers, and all of them will be needing chest x-rays. He also emphasized the importance of having a Command Center where all communications go and to have a secure mechanism for keeping records since the Electronic Medical Record is too slow. Often procedures done on patients are written on the tape on dressings or sometimes even on the skin of the patient with a deep colored marker. He concluded by emphasizing that everything needs to be evaluated after the mass casualty has ended in order to see where there are areas that might be improved upon.


Dr. Jason Smith

The next presentation, following a brief break, occurred from 3:30-4:00 p.m. and was delivered by Dr. Jason Smith who is the trauma director from the University of Louisville. His talk was entitled, "Disaster Preparedness in a Hospital Resource-Restrained Environment." Dr. Smith talked about the challenge which is faced by the hospital when dealing with a disaster environment. He talked about the importance of access to all aspects of treatment and the prioritization of treatment with the acute treatment provided to patients with bad injuries who have the ability to survive. Typically, hospitals like to purchase their equipment in a "just in time" environment, which means that if this policy is followed, there will be inadequate supplies for disaster preparedness. He emphasized that there needs to be expansion of regional trauma systems in order that we have a national trauma system which gives greater flexibility when individual hospitals are faced with a huge challenge. He described even sending injured patients to another state in order to open up space for the arrival of huge numbers of severely injured patients. He emphasized how it is important for all members of the disaster program to be supportive of the program and that this leads to so-called "happy warriors." This relates primarily to the support and cooperation provided to the workers by the hospital leaders and often has nothing to do with the pay scale. Disaster preparedness is really about planning and involves all of the hospital team members.

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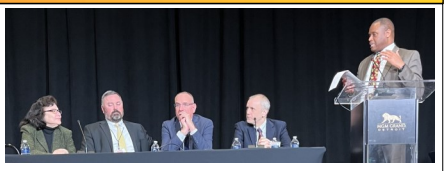
Dr. Baylor then moderated a question-and-answer session from 4:00-4:15 p.m. where many of the teaching points regarding these presentations were emphasized.


(Lt to rt) Dr. Lena Napolitano, Dr. Jason Smith, Dr. Martin Schreiber, Dr. Matthew Martin, and Dr. Alfred Baylor


(Lt to rt) Dr. Jason Smith, Dr. Martin Schreiber, Dr. Matthew Martin, Dr. Anna Ledgerwood, Dr. Joseph Cuschieri, and Dr. Lena Napolitano

The scientific part of day one of the DTS finished when Dr. Anna Ledgerwood moderated the panel with all of the above speakers. She presented them with multiple challenging problems, reflecting patient challenges that had been treated in the past year. This was an exciting, educational, and entertaining session.

Following the scientific program, there was a "networking" reception where the attendees had the opportunity to socialize with many of the attendees being former resident physicians who had not seen each other in some time.

THE ANNUAL DETROIT TRAUMA SYMPOSIUM - DAY TWO - 2024


Ms. Chelsea Meixner

The second day of the Detroit Trauma Symposium (DTS) began with a Continental breakfast at 7 a.m., at the end of which Ms. Chelsea Meixner, a nurse who is part of the Pediatric Readiness Improvement Project outlined the data for pediatric trauma centers with a presentation entitled, "Pediatric Preparedness for Adult Trauma Centers." Ms. Meixner emphasized how there has to be a readiness for injured children and that injured children who are cared for at pediatric trauma centers have a decrease in mortality. However, there are not many verified pediatric trauma centers, with the result that most injured children go to adult centers. Consequently, in order to maintain a decreased mortality, the adult centers have to be prepared with personnel and equipment in order to efficiently care for the injured child. The appointment of a pediatric nurse "champion" will help the adult trauma center be properly prepared for the care of injured children. Children are not little adults but require special care. This requires that the adult trauma center put into place various policies which will protect the injured child. One of these policies is to be concerned about radiation dose since a large amount of radiation going into a small child is a lot different from the same amount of radiation going into a large adult. Children have different vital signs so one has to recognize when hypovolemic shock is present in the injured child and to provide

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treatment which is appropriate for the vascular volume of a child in contrast to an adult. Many children who are brought into an adult trauma center with serious injury may need to be transferred to a pediatric trauma center which has a higher level of care that can be provided to the injured child. The Emergency Nursing Association has identified specific guidelines which should be implemented not only in pediatric trauma centers but in adult trauma centers that are providing care for injured children.


Dr. Mark Hemmila

Following the presentation by Ms. Meixner, Dr. Michael White (WSU/GS 1990/97) became the Moderator for this part of the morning session and introduced Dr. Mark Hemmila from the University of Michigan, Dr. Bryant Oliphant from WSU and the University of Michigan, and Dr. Wayne VanderKolk, who is the trauma director at the Trinity Health - St. Mary's Hospital in Grand Rapids, Michigan. They discussed, "Life After Trauma Center Discharge." Dr. Hemmila discussed some of the recovery and financial aspects of severe injury following definitive care during hospitalization. Many patients with long bone fractures have a prolonged healing time which causes concern for the patient and the patient employer about the timing for return to work. He gave a number of examples of this problem; the most dramatic example was that of a professional defensive end who sustained injuries to the tibia and fibula. The injuries were internally repaired that same day with good approximation, but then the patient was sent for rehabilitation because of the long time that it takes for bones to heal and the surrounding muscles to regain their former strength in preparation for being a professional football player. There are a number of problems that can occur, including maintaining alignment, chronic pain, and inability to attain the same degree of muscle strength to protect the bones from a future fracture. This is important for the employer to know when this person will be able to return to the previous skill level and important for the patient and his family. Dr. Hemmila then introduced Dr. Bryant Oliphant who talked about tracking the future after discharge. He discussed when people can return to work or when children can return to their regular activities after injury. The current trauma registries are not complete as it relates to long-term follow-up, and this will hopefully be corrected in the near future. The registries provide good data regarding the incident, EMS care, and hospital care, but not for post-discharge care. The MTQIP is attempting to fill that gap in our knowledge following injury. He provided an example of this work as it elates to thromboembolism (VTE), and he described their five-year prospective study ending in 2023. This is all being done as part of a subunit called the Michigan Value Coalition. They have demonstrated that VTE may occur months after discharge and are more likely to occur after specific injuries, such as spinal cord injury. Still unknown in this prospective study is the medication taken during this postoperative period and the significant impediments that the VTE produced. He emphasized the importance


Dr. Bryant Oliphant

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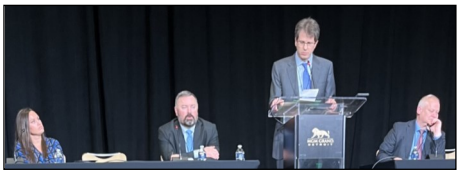
for treatment of infections, which are associated with a higher incidence following long-bone trauma and how the problems with associated infection are very expensive. One of the worst problems is infection leading to a non-union which is very debilitating to the patient and expensive for treatment. Often these infections are diagnosed in the post-discharge period. He re-emphasized the importance of initiating antibiotics within one hour of injury in patients with open fractures. It is also important to be able to track patients after discharge, and further work is needed at all levels. Dr. Hemmila then introduced Dr. VanderKolk who talked about the challenges for caregivers following a discharge from the trauma center after severe injury. He reminisced about his prior experiences at WSU and his prior attendance at the Detroit Trauma Symposium during his residency years. It is important to work closely with the caregivers who have multiple challenges. Following his presentation, there was an active question-and-answer session.


Dr. Wayne VanderKolk

The next portion of the program was moderated by Dr. Michael White. The first presentation from 8:45-9:15 a.m. was given by Dr. Jason Smith who is the trauma director at the University of Louisville; his presentation was entitled, "Direct Peritoneal Resuscitation." Dr. Smith began his talk by pointing out that venous access in not always easy, and there needs to be a means for resuscitating patients in unfriendly environments. In damage control laparotomy, control of bleeding was obtained and then packs were placed in order that the patient could be resuscitated in preparation for re-operation on day one, two, or three. He noted the importance of blood replacement when readily available and the importance of restoring circulation in a difficult situation. During the massive resuscitation for severely injured patients, they often take up large volumes of fluids which prevents closure of the abdomen. This swelling of the viscera has often been attributed to the administration of crystalloid solution. The small arterial and capillary changes that occur in a hemorrhagic shock model were described, as was the microvascular flow in association with crystalloid resuscitation and how fluid now leaves the capillaries and enters into the interstitial fluid space. This may be related to the endothelium not working as both water and sodium go into the interstitial space and cause clinical swelling. His team postulated that possibly intraperitoneal resuscitation might circumvent some of this extravascular fluid sequestration associated with resuscitation from shock. Peritoneal resuscitation with regular crystalloid solution, hypertonic glucose solution, and hypertonic saline solution was observed. The idea was that the intraperitoneal resuscitation might pull the fluid out of the interstices and decrease the problems with post-injury fluid sequestration. He showed how the shock insult and resuscitation leads to problems with liver function and other organ function. In their controlled studies regarding intraperitoneal resuscitation,


(Lt to rt) Dr. Brandi Miller, Dr. Jason Smith, Dr. Michael White, and Dr. Martin Schreiber

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they suggested that the mobilization of sequestered fluid was better than with standard crystalloid resuscitation per vein. They then looked at the damage control resuscitation with the different types of FFP/PRVC ratios. Even though they tried to decrease crystalloid resuscitation with the increased component therapy, they still found that at the end of 24 hours, the severely injured patients had retained multiple liters of crystalloid solution. They did, however, believe that they had a better probability of getting the abdomen closed using this resuscitation regimen as opposed to a higher crystalloid regimen. They thought that this led to a decrease in the ICU stay but not in the overall hospital length-of-stay. They also thought that the mortality was improved with this balanced resuscitation. When you look at the peritoneal resuscitation group compared to the standard group, it seemed like everything was a little bit better with the peritoneal resuscitation group although these differences were not significant. When this regimen is used for septic patients, this represented a different insult, but they thought it was improving the care of septic patients resulting in sooner closure of the abdomen. In those patients who had fatal injuries, this therapy resulted in a higher incidence of organ donation in comparison to the standard resuscitation regimen. They did a prospective study on the use of peritoneal resuscitation in patients who are going to have liver transplantation. In a very small study, the postoperative complications following liver transplantation was lower in the peritoneal resuscitation group compared to the control group. This needs to be further studied in the future.


Dr. Jeffrey Johnson

The next presentation from 9:15-9:45 a.m. was presented by Dr. Jeffrey Johnson from Henry Ford Hospital and was entitled, "Non-Flail Rib Fracture: What is the Role for Operative Fixation?" Dr. Johnson pointed out that rib fractures are common and are more treacherous in the elderly. This relates to the fact that there are more problems with co-morbidities and associated COPD. The use of operative fixation has been shown in controlled studies to decrease mortality in patients with multiple rib fractures, causing a flail chest. In the absence of flail chest, many authors have recommended non-operative therapy and, therefore, this is an area that needed to be studied. Data are now available that in patients with more than three rib fractures in the absence of flail chest, there appears to be beneficial results although most patients will do well with non-fixation with the use of appropriate pain medications, rib blocks, and paravertebral blocks. In general, it appears that the results of operative fixation are better when the fixation is done within the first 2-3 days before the patient gets into serious trouble with impaired ventilation and pneumonia.

Following this presentation, there was a break and then an active question-and-answer session moderated by Dr. White.

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Dr. Brandi Miller

The next presentation following the question-and-answer session was from 10:30-10:50 a.m. and was provided by Dr. Brandi Miller who is the Chief of Urology at the Detroit Receiving Hospital. Her presentation was entitled, "Urologic Trauma: Updates on Current Guidelines." Dr. Miller highlighted the Abbreviated Injury Score for renal injury, showing that Types I to III are more minor, and the IV-V injuries often require some type of intervention. Blood in the urine is one of the indications to institute a work-up for urologic injury, but the absence of blood provides no assurance that there are no injuries. She also described the different types of ureteral injuries due to penetrating wounds where the injuries are in proximity to the bullet track and due to blunt injury where the injuries tend to be in the pelvis. Preferred imaging studies would include the contrast CT scan which can identify injuries to both the kidneys and the ureters. The role of angioembolization was discussed in patients who have a renal blush which co-exists with some degree of active bleeding or instability. These patients are candidates for angioembolization.


Dr. Joseph Buck

The next presentation from 10:50-11:10 a.m. was presented by Dr. Joseph Buck (WSUGS 1987), the trauma director at Henry Ford - St. John Hospital and was entitled, "Preventing VAP in the ICU with a Toothbrush." This was a very interesting presentation that emphasized the importance of oral hygiene as one of the preventive tools regarding ventilator pneumonia. The use of nasopharyngeal suction of secretions is a well-known preventive technique, but the brushing of teeth has not been properly studied. When Dr. Buck and his team received the report from TQIP, their hospital was located in the higher percentile of trauma centers that have problems with VAP. There were a number of techniques that were recommended to try to reduce this complication, such as elevating the head of the bed. The cheapest technique appeared to be the utilization of frequent teeth brushing to improve oral hygiene. They initiated a prospective study whereby all of the nurses were instructed and directed to do teeth brushing twice a day, which led to a marked decrease in the incidence of VAP so that their hospital is now in the lower percentile on the TQIP evaluation of this complication. He demonstrated the technique and pointed out that the kit which is used for brushing the teeth twice a day in critically ill patients is very inexpensive.


Dr. Wazim Mohamed

The next presentation occurred from 11:10-11:30 a.m. and was presented by Dr. Wazim Mohamed from the WSU Department of Neurology. It was entitled, "High Stakes: Treating the TBI Patient on Blood Thinners." Dr. Mohamed noted that many more patients are now on Direct Oral Anticoagulants (DOAC), particularly factor Xa. There are many patients on Warfarin. Reversing the patients on Warfarin with vitamin K is a slow process as is the use of FFP for this purpose. When urgent reversal is needed, he recommended the pro-thrombin complex 3, or in unusual cases,

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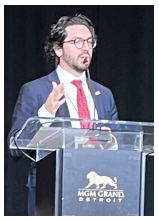
PTC4 because of its quicker efficacy over vitamin C and FFP. The use of TEG can help identify which parts of the coagulation scheme are deficient in order to guide the physician as to which treatment should be provided based upon what is the deficiency in the coagulation cascade. He also emphasized the reversal agents used for the different DOAC agents.


Dr. Alex Marinica

The next presentation was given from 11:30-11:50 a.m. by Dr. Alex Marinica who is a trauma surgeon from the Sinai-Grace Hospital in Detroit. It was entitled, "Hypocalcemia in Trauma." Dr. Marinica described how some of the early understanding of the hemorrhagic shock insult was provided many years ago by Dr. Alan Thal, the former Chairman at WSU, and Dr. Robert Wilson (WSUGS 1963), the nationally recognized trauma/critical care surgeon from WSU. Hemorrhagic shock leading to death is associated with hypocalcemia and that calcium, which is primarily in bone (99%), decreases for various reasons, including the relocation of serum calcium into different cells within the body. He described how hypocalcemia might be added to the lethal triad of acidosis hypothermia and coagulopathy. This is the lethal diamond. There are many physiologic aspects of hypocalcemia and calcium is important in the coagulation cascade. These presentation were followed by an active question-and-answer session moderated by Dr. White.


Dr. Larry Diebel

Following the question-and-answer session, Dr. Larry Diebel presented on "TXA: When to Drop the ACID," from 11:50 a.m.-12:10 p.m. Dr. Diebel pointed out that TXA is an important part in preventing ongoing bleeding in patients with severe injury causing hemorrhagic shock. The data indicates that it should be given within the first hour of injury, and it should not be given prophylactically as has been suggested for soldiers who are on the front line but have not yet been injured. There have been reports of increased thrombosis following the administration of TXA, but these are probably not of concern if the appropriate guidelines are followed. The TEG can provide guidance as to when TXA therapy will be beneficial. He made his presentation somewhat humorous by equating the TXA with LSD, which is the type of acid which has been strongly recommended in the past by Timothy O'Leary. The audience appreciated the humor.

Dr. Diebel concluded the program by thanking all of the attendees and speakers and invited them to the 73rd edition of the DTS in November of 2025.

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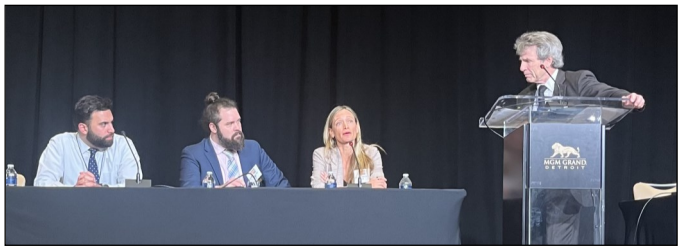
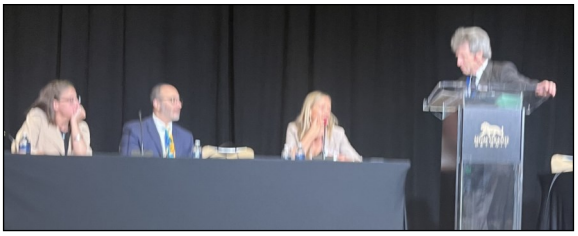
DECEMBER 2024



(Lt to rt) Dr. Omar Soubani, Dr. David Moore, Dr. Terri deRoon Cassini, and Dr. Larry Diebel

(Lt to rt) Dr. Joseph Buck, Dr. Larry Diebel, Dr. Michael White, Dr. Alexander Marinica, and Dr. Wazim Mohamed

Participants helping out at the DTS (in no particular order): Ms. Alita Pitogo, Ms. Manisha Williams, Ms. Katherine Dhue, Dr. Larry Diebel, Ms. Haleigh Deroeck, Ms. Teresa Vicencio, Ms. Sharon McQueen, Ms. Kari-Lynn Malec, Ms. Dorothy Alexander, Ms. Theresa Grimes, and Ms. Janice Watkins



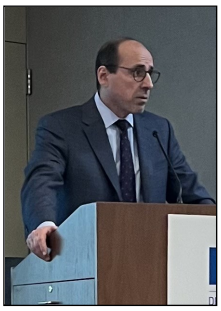
(Lt to rt) Dr. Deborah Stein, Dr. Joseph Cuschieri, Dr. Terri deRoon Cassini, and Dr. Larry Diebel

WAYNE STATE UNIVERSITY School of Medicine

2022 Annual WSSS Lectureship

wsss wayne state surgical society

The **Surgical Grand Rounds** for the WSU Department of Surgery on **Wednesday, 11/06/2024**, was presented by Dr. Joseph Cuschieri who is a Professor of Surgery at the University of California San Francisco. Dr. Cuschieri is our annual visiting **Wayne State Surgical Society Lecturer**, and he was introduced by Dr. Joseph Sferra, the current President of the Wayne State Surgical Society. The title of his presentation was "Sustained Inflammatory Dysfunction: The Impact on Recovery from Injury." Dr. Cuschieri began by discussing the classic paper by Dr. Donald Trunkey from 1983 where he discussed the differences between early deaths and late deaths. This paper pointed out that the very early deaths are due to non-survivable injuries; the deaths occurring shortly after admission were typically due to the effects of hemorrhagic shock on organ function; and the deaths that occur weeks and sometimes months later are due to the effects of sepsis. The number of deaths occurring at one year after severe injury is about 4%, and there are even some who die as long as two years following severe injury due to the complications of sepsis and organ dysfunction.



Dr. Joseph Sferra introducing the WSSS speaker, Dr. Joseph Cuschieri

The "Genomic Storm" which occurs after injury was also discussed. Many changes are occurring in the genome, including changes on glucocytes which often last more than one month and are a part of the inflammatory response to acute injury and sepsis. He sited the classic book by Dr. Walter C. Cannon, "The Wisdom of the Body," which highlighted many of the physiologic responses to shock and emphasized the immune response by the body. This immune response consists of both the Innate and Adaptic, which may go on for many months.

Dr. Joseph Cuschieri

Dr. Cuschieri pointed out that there is an endotheliopathy and that this is mediated by cytokines reflecting the cellular responses to acute injury. These are associated with early dysfunction and later recovery, but the early failure must be treated in order to allow for the recovery phase to occur. He also noted that the FFP/PRVC ratio is possibly beneficial for coagulation.

The triad of severe injury, including hypothermia, acidosis, and coagulopathy was also discussed. As part of this example, he gave a case report about someone who had a very bad injury with multiple organ injuries requiring multiple unis of crystalloid solution, packed red blood cells, and fresh frozen plasma. The patient underwent splenectomy and distal pancreatectomy and repair of the retrohepatic inferior vena cava. Following

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WAYNE STATE UNIVERSITY School of Medicine

2024 Annual WSSS Lectureship

wayne state surgical society

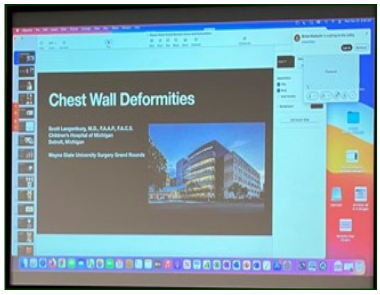
injury, the Acute Physiology Score and the Chronic Health Score were very bad as she developed multiple complications. Nosocomial infections lead to the increased morbidity and the subsequent development of chronic critical illness. The genome is changing in response to all of these factors, including the changes that occur in response to the chronic critical illness.

Dr. Cuschieri concluded his lecture by discussing how the long COVID leads to multiple organ dysfunction, and there appears to be changes in monocyte function which is associated with the chronic critical illness, which likewise is associated with an increased mortality. Phagocytosis is decreased with chronic critical illness, and this may be an important factor in the increased mortality. There was an active question-and-answer session!

SURGICAL GRAND ROUNDS

The **Surgical Grand Rounds** on **Wednesday, 11/20/2024**, was presented by Dr. Scott Langenburg, the Director of the Pediatric Surgical Residency program at the Children's Hospital of Michigan, and was entitled, "Chest Wall Deformities." Dr. Langenburg talked about the different types of chest wall abnormalities. The most frequent type, which occurs in about 88% of patients so affected, is pectus excavatum, whereby a large portion of the sternum, always including the lower half, points in toward the heart so that there appears to be a cavity extending from the ribs under the left nipple to the ribs under the right nipple, with the sternum being at the bottom of the cavity. This entity occurs more commonly in males (80%) and results in multiple admissions for symptoms. The embryology is such that the ribs develop in the chest wall by day 30 intrauterine and fuse to the sternum by day 48. The reason for this abnormal fusion is not known. There may be overgrowth of cartilage which somehow alters the angle that the ribs form with the depressed sternum. These patients have a higher incidence of scoliosis. The symptoms of pectus excavatum include shortness of breath, particularly with exercise, and, of course, the psychological aspect of looking different than your colleagues. The severity of symptoms is represented by the Haller Index, which is represented by the ratio of the transverse diameter of the chest from the right lateral ribs to the left lateral ribs divided by the anterior posterior diameter determined by the distance of the vertebral

Dr. David Edelman introduces Dr. Scott Langenburg at the Grand Rounds on 11/20/2024



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SURGICAL GRAND ROUNDS

column to the sunken sternum. A higher ratio is associated with more symptoms.


Dr. Scott Langenburg

Dr. Langenburg described the Ravitch procedure which was described many years ago by Dr. Mark Ravitch and consists of breaking the lateral margins and raising the sternum with the medial portions of the affected ribs higher for reattachment to the sternum and the sections of ribs which are normally located.

The Ravitch procedure was the definitive procedure for many years but has since been replaced by the Nuss procedure which consists of placing a bar under the ribs, extending from both lateral borders and then lifting the bar so that the sternum "pops" anteriorly into a more normal position. This is an elective procedure which is performed in the early teen years at about 14 years of age. The dissection behind the sternum has to be carefully done in order to not injure the heart which is actually pushing on the sternum. Once the dissection is complete, the bar is put in place and then lifted. The bar is left in place for two to three years after which it is removed by excising one side of the bar and then using the other side of the bar to pull it out. During this period of time, the bar is fixed laterally with a metal apparatus. When the procedure is performed at an older age, the boney structures are harder, and it is more difficult to get a satisfactory result. Rarely he has taken out the bar at one year when the patient is symptomatic while doing exercises or some other type of movement.

Other types of chest deformities were described, including pectus carinatum or "pigeon chest" where the sternum is anterior to its normal location. This also occurs in a 4/1 male/female ratio and is treated by braces which apply pressure to the sternum until it eventually goes back in to the normal position.

The Polard abnormality was also described where there is an absence of the pectoralis major muscle. This is thought to occur because of some intrauterine injury during the period of muscle development. Correction is made by rotating the latissimus dorsi or a pectoralis muscle flap in order to fill the gap.

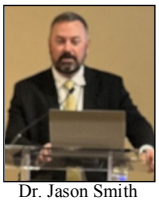
A third chest wall deformity is the Jeune syndrome which consists of a narrow chest cavity with decreased capacity for the lungs to expand. He did not have any recommended operation to correct this abnormality, and procedures that have been tried have not been beneficial.

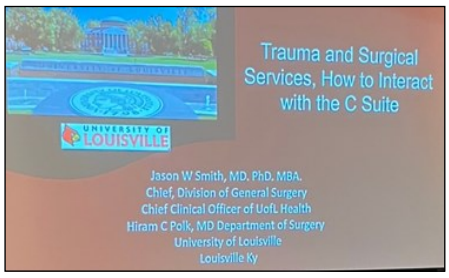
There was an active question-and-answer session for this very interesting and instructive presentation.

Academy of Surgery of Detroit

Following the completion of the first day of the Detroit Trauma Symposium (DTS), the Academy of Surgery of Detroit had their monthly meeting. Dr. Al Baylor (WSUGS 2005) introduced the visiting speaker, Dr. Jason Smith, from the University of Louisville. Dr. Smith presented a very interesting paper in which he described the limited resources that is facing the medical profession and particularly surgeons. He pointed out that all of the projections demonstrate that there will be a shortage of surgeons within the next ten years. This will involve all of the surgical specialties. There is also a limitation of financial resources. Consequently, the surgical services in hospitals will have to find a way to provide the same service with more expensive equipment, such as laparoscopes and robots, for a decreasing reimbursement. This will be a major challenge for the profession. Consequently, surgeons will have to learn to choose a mode of treatment which demands less resources from both the hospital and the surgical practice plans. There was an active question-and-answer session following his excellent presentation.


Dr. Al Baylor


Dr. Jason Smith



Title slide for Dr. Jason Smith's lecture at the Academy of Surgery of Detroit meeting on 11/7/2024

PRODUCTIVITY

Dr. Awni Shahait (WSUGS 2021) forwarded a paper that was published in the American Journal of Surgery in October 2024. His co-authors are Joshua Kong, Tanya Odisho, Abdul Rahman Alhajahjeh, Hannon Maqsood, Bayan Al-Share, Mohammed Shahait, Ali Abubaker (WSUGS 2015), Steve Kim and the paper is entitled, "Long-Term Survival Following Adrenalectomy for Secondary Adrenal Tumors: A Systematic Review and Meta-Analysis."


Dr. Awni Shahait

These authors analyzed secondary adrenal tumors. They pointed out that these are very unusual lesions that have not been well described in the literature. They performed a systematic literature search from 1990-2022. The inclusion criteria included a known primary tumor with confirmed adrenal metastases in patients who then underwent adrenalectomy.

They looked at a total of 26 studies which included 2,279 patients with an average age of 61 years. The most common primary tumor was the lung, and the time from primary tumor diagnosis until the identification of the adrenal metastasis was 19 months. The median overall survival after adrenalectomy was 35 months. The 1, 3, and 5-year survival was 79%, 49%, and 38%. They concluded that the long-term survival after adrenalectomy for secondary adrenal tumors is reasonable. They recommended that there be further study into the risk factors that are responsible for longer survivors in this category of patients.

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PRODUCTIVITY


Dr. Andrew Isaacson

Dr. Andrew Isaacson (WSUGS 2017) reported that he and his co-authors have been productive and forwarded two abstracts that were recently presented at the Extracorporeal Life Support Organization (ELSO) 35th Annual National Conference that was held right here in Detroit. Both abstracts were also published in the American Society for Artificial Internal Organs (ASAIO) Journal Supplement, October 2024. These abstracts are as follows:

Analgesia and Sedation with the "PGB" Protocol: A single-center retrospective review describing the protocolized use of phenobarbital, guanfacine, and buprenorphine for adult ECMO patients

David Carroll1, Kenton Zehr1, Yusuke Terasaki1, Ryan Gumbleton1, **Andrew Isaacson1**,2, Brandtly Yakey1, Bram Dolcourt1,2, Andrew King1,2*;* 1*Detroit Medical Center, Detroit, USA.* 2*Wayne State University, Detroit, USA*

Abstract

Background: Patients on extracorporeal membrane oxygenation (ECMO) often require infusions of opioids and/or sedative-hypnotics (e.g. benzodiazepines) for analgesia and sedation which causes iatrogenic dependence and delirium. This study describes our experience using an interdisciplinary collaboration implementing the protocolized use of phenobarbital, guanfacine and buprenorphine to reduce sedation/analgesia requirements and optimize sedation.

Methods: We performed a single-center retrospective process improvement chart review of ECMO patients before and after the implementation of our protocol. All patients post-intervention received phenobarbital loading and maintenance, underwent a buprenorphine micro-induction, and received scheduled guanfacine. Data elicited for comparison included RASS score ranges, daily benzodiazepine and opioid use (non-buprenorphine, in morphine milligram equivalents [MME]), and duration of analgesic/sedative infusions.

Results: 10 patients were included, 5 in the pre-intervention group and 5 in the post-intervention group. Time at targeted RASS (0 to -1) was significantly higher post-intervention (68.65% vs 25.21%, p=0.005). MME (19.56mg vs 81.27mg, p=0.036) and midazolam (16.7mg vs 69.93mg, p=0.06) use per day were lower in the post-intervention group, as was the percentage of time on opioid (11.8% vs 61.2%, p=0.019), sedative hypnotic (17.6% vs 43.6%, p=0.047), and dexmedetomidine (17.7% vs 60.5%, p=0.1) infusions.

Conclusion: Use of the PGB protocol reduced total use of benzodiazepines, dexmedetomidine, and opioids and increased time spent within target RASS.

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PRODUCTIVITY

The Use of Neuromuscular Blockade post Venovenous ECMO Cannulation

Jude Jaraki1, **Andrew Isaacson1**, Ryan Gumbleton2, Yusuke Terasaki2; 1*Wayne State University, Detroit, USA*. 2*Detroit Medical Center, Detroit, USA*

Abstract

Background: Salvage therapy for acute respiratory distress syndrome (ARDS) has increasingly and more frequently included venovenous extracorporeal membrane oxygenation (VV ECMO) as a step to potential lung recovery. Prior to consideration and cannulation for VV ECMO, there is usually a step up approach, if feasible, which include different advanced modes of ventilation, nitric oxide, proning, and paralyzing the patient. Neuromuscular blockade (NMB) aids with reducing patient-ventilator dyssynchrony and work of breathing in an attempt to improve oxygenation. However, if these measures fail, patients can be cannulated for VV ECMO, which can provide full lung support. Theoretically, if a patient is being fully supported by ECMO, their lungs are able to rest while the circuit and their native heart function provides oxygenated blood throughout their body, circumventing their need for advanced respiratory adjuncts such as NMB. This project aimed to understand why in certain clinical scenarios, NMB was restarted for patients while already receiving full VV ECMO support despite initial improvement, ensuring there were no other mechanical reasons to explain the deoxygenation. This is a process improvement study regarding patients who were on VV ECMO for ARDS, with initial improvement after cannulation, however necessitated NMB due to worsening oxygenation status and requiring increasing doses. A secondary aim of this study was to determine if the pharmacokinetics of cisatracurium is altered by the circuit necessitating the use of other neu-

MICHAEL & MARIAN ILTCH
DEPARTMENT OF SURGERY
WAYNE STATE
DECEMBER 2024

BALANCED RESUSCITATION REGIMEN

Often during the teaching sessions, the techniques used for resuscitating patients with hemorrhagic shock focuses on blood and blood products. The following article was published in the September issue of the Journal of Trauma and helps outline how Wayne State University / Detroit Receiving Hospital were the first to use a balanced resuscitation regimen.

INDEPENDENT SUBMISSION

Resuscitation for injured patients requiring massive transfusion: A personal perspective

Charles E. Lucas, MD, *Detroit, Michigan*

ABSTRACT: The past century has seen many advances in the field of resuscitation. This is particularly true in the subset of patients who sustain major injuries causing hemorrhagic shock (HS) and require massive transfusion of more than 10 U of blood within the first 24 hours. Controversies on how best to resuscitate these patients include the role of fresh whole blood, stored whole blood, fresh frozen plasma, platelets, colloid solutions, balanced electrolytes solution, vasopressors, and diuretics. This review summarizes the often-contradictory recommendations observed and studied by a single trauma surgeon working in a busy urban acute care center for 65 years. (*J Trauma Acute Care Surg.* 2024;97: e28–e31. Copyright © 2024 Wolters Kluwer Health, Inc. All rights reserved.)

LEVEL OF EVIDENCE: Level I.
KEY WORDS: Whole blood; blood components; hemorrhagic shock; resuscitation; Bayesian.

THE EARLY YEARS

The resuscitation regimen for severely injured patients requiring massive transfusion (MT) has evolved throughout the author's career. Following his leadership contributions to the national military effort during World War II, Dr. Charles Johnston, the first editor of the *Journal of Trauma*, returned as chief of surgery at the Detroit Receiving Hospital (DRH). He formed a close relationship with the Wayne State University Chairman of Physiology, Dr. Walter Siegers who was a nationally recognized expert in coagulation. Based upon this relationship, a resuscitation regimen for injured patients evolved.[1,2]

During the 1960s, the residents on the emergency surgical service (ESS) at DRH gave patients requiring MT of 1 U of fresh whole blood (WB) per 3 U stored WB and 1 U of fresh frozen plasma (FFP) to restore the labile factors V and VIII and calcium.[1] Family members or walking donors provided WB if necessary.[1] Platelet packets (5 U) were given for "medical bleeding" or thrombocytopenia (<50,000/μL). Normal saline was used to supplement blood products. During the late 1960s, the author led the ESS and became an associate member of the Coagulation Division of Physiology; the resuscitation regimen remained similar except that normal saline was replaced with lactated Ringers, a balanced electrolyte solution (BES).[1,2] Also, a clinical research unit was established to examine multiple factors, including coagulation in patients requiring MT. Criteria for study mandated that the patient has a systolic blood pressure of <80 mm Hg on admission and required a minimum of eight blood transfusions prior to completion of an emergent operation to control bleeding. The clinical research unit consisted of a full-time research technician, a visiting trauma fellow, a full-time midlevel surgical resident, and a half-time coagulation physiologist. All data accumulated as part of this project were prospectively stored in a huge trauma registry.

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DOI: 10.1097/TA.0000000000004393

A BAD PROPOSAL

In the late 1960s, several studies on the pathophysiology of disseminated intravascular coagulation, characterized by "medical" oozing following MT associated with thrombocytopenia, hypofibrinogenemia, and prolonged prothrombin time and partial thromboplastin time, recommended heparinization to break the cycle of fibrin deposition.[3–5] The combination of MT and heparin on the ESS was often fatal, and heparinization was quickly and thankfully abandoned.[6] It was clear from this experience that fibrin deposition was not the root cause of disseminated intravascular coagulation in trauma patients. This experience stimulated additional study of platelets, including adhesiveness, aggregation, and platelet-specific proteins, β-thromboglobulin, and plasma platelet factor 4 on the ESS research unit.

A CRISIS

During the 1970s, there was a major shift in transfusion medicine as the American Blood Banking Association moved from WB transfusion to component therapy. Thus, the routine transfusions of red blood cells were delivered by processed packed red blood cells (PRBCs) devoid of procoagulants. As we all recognize today, this was a huge change, and it is not for the better, in our patients requiring MT. The ESS MT policy was modified to include 2 to 3 U of FFP and 2 ampules $CaCl_2$ per 5 U of PRBC. Platelets were given for "medical oozing" or thrombocytopenia (<50,000/μL). Heimbach[7] proposed modified whole blood prepared by separating only platelets and cryoprecipitate from fresh WB, thereby preserving the coagulation factors. The author was unable to persuade the DRH Blood Bank to use modified whole blood. At the close of this decade, severely injured patients requiring MT were often deficient in coagulation factors and platelets.

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BALANCED RESUSCITATION REGIMEN

THE COLLOID CONTROVERSY

During the middle 1970s, the use of colloid supplementation for the treatment of hemorrhagic shock (HS) in patients requiring MT was advocated by some to reduce the volume of fluid relocation in the interstices.[8–13] The resultant controversy of colloid versus crystalloid stimulated a prospective randomized study of 94 patients at DRH.[14] The patients were well matched and received and average of 15 U of PRBC and had a systolic blood pressure of <80 mm Hg for 35 minutes during the first 8 hours. The group who received human serum albumin (HSA) in addition to the standard regimen demonstrated several negative factors, including the oncotically driven movement of all proteins, including the procoagulants, into the interstitial space. This resulted in ongoing coagulopathy and a need for additional PRBCs during the first 3 postoperative days.[14]

These adverse clinical findings led to several canine HS studies comparing noncolloid resuscitation with Hespan, Fluosol-DA 20%, or human serum albumin–supplemented resuscitation. All studies demonstrated that colloid drove all proteins, including procoagulants, out of the capillaries into the interstices and the lymphatics.[14–19] Colloid-supplemented resuscitation was abandoned in 1978. Packed red blood cell, FFP, and BES in addition to blood and blood product replacement remained the standard for the treatment of patients requiring MT.

Single-Donor Blood Products: FFP

During the early 1980s, the author was invited to participate on the planning committee for a National Institutes of Health Consensus Development Conference dealing with FFP derived from single donors.[20] Not surprisingly, since the routine replacement of WB with PRBC, FFP utilization had risen more than 500 times. This resulted in national shortages in FFP and led the National Institutes of Health to determine the cause. The conference concluded that the use of FFP during the resuscitation of severely injured patients requiring MT was not recommended unless there was coagulopathy as evidenced by abnormal clotting times or oozing.

THE FLAWED CANINE SHOCK MODEL

The conclusions of this conference led this author to undertake canine studies with the goal to demonstrate the necessity of FFP administration.[21] One group of animals was resuscitated with PRBCs and FFF plus BES, while the other received PRBCs and BES alone. Coagulation factors I, II, V, VIII, and VII and antithrombin III fell equally during HS. Factor II and antithrombin III fell less in the FFP group, but the other factors were comparable and no factor decreased to coagulopathic levels. These studies refuted our hypothesis, and the addition of FFP did not restore coagulation better than no FFP; the prophylactic use of FFP was abandoned.[21] The conclusions from this study led to a modification in the resuscitation of severely injured patients who were only administered FFP when there was evidence of prolonged coagulation times. Within a short period, several patients developed severe coagulopathy requiring aggressive correction, and at least two deaths were judged preventable.[22]

The clinical outcomes resulted in the reinstitution of prophylactic FFP administered. The authors undertook a second canine study, which was designed to more accurately reflect the clinical scenario.[22] In this study, a postresuscitation phase of both bleeding and transfusion was added to more accurately reflect the operating room setting when the surgeon is striving to get hemostasis while bleeding is being controlled. The animals had continued blood loss and blood replacement at the same rate while maintaining vital signs. The animals without FFP developed severe coagulopathy on both day 1 and day 2. The second study showed experimentally that prophylactic FFP is needed.[22] These studies are a cautionary tale on too quickly embracing animal studies and translating them to the clinical arena, even if these conclusions are in concert with national guidelines.

THE RECOMBINANT FACTOR VIIA DETOUR

Despite early administration of coagulation factors, some patients with MT still develop coagulopathic bleeding leading to organ failure and death. The development of recombinant factor VIIa was thought to be a potential solution. Boffard et al.[23] described reduced coagulopathy and improved survival in severely injured patients after blunt trauma but not after penetrating wounds, when they received recombinant factor VIIa. The doses of FVIIa used were quite large since very small amounts of FVII are needed to induce activation to FVIIa. The normal concentration of FVIIa is about 5 pmol/L and remains constant after cleavage of the ARG152-ILE153 bond without reducing the total factor V.[24] This use of recombinant factor VIIa seemed at odds with our prior canine studies, which showed that FVII was the only factor that was not significantly lower in the animals that received only BES solution.[21,22] The beneficial effect noted in the original trial could not be replicated in later trials, which showed that FVIIa supplementation to resuscitation provided no benefit.[25]

BALANCED RESUSCITATION: THE 1:1:1 STORY

Historically, military conflicts uniformly enhanced the treatment of injured patients. This occurred during and subsequent to the conflicts in Iraq and Afghanistan. Injured soldiers who died with coagulopathy were identified as having lower FFP/PRBC ratios than those who survived. This led to a recommendation for a more balanced resuscitation ratio of 1:1 of FFP/PRBCs; later publications also identified the importance of platelets.[26,27] These recommendations spread like wildfire, were rapidly adopted by civilian trauma surgeons, and became a "standard of care."[27]

These reported benefits of the 1:1 FFP/PRBC ratio lacked any measurements of procoagulants.[26] Consequently, a retrospective review of our MT research database was performed to assess the FFP/RBC ratio on this group of patients. There were 31 patients in the study group.[28,29] Coagulation measurements included factor I (a stable factor), and both factors V and VIII (labile factors), prothrombin time, partial thromboplastin time, thrombin time, and fibrin degradation products.[28]

Five patients died in surgery; four of whom had no recordable blood pressure or pulse on admission and did not respond to resuscitation.

The remaining 26 patients received an average of 5 U of FFP and 14 U of PRBC (1:3) along with 12 L of BES and had

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BALANCED RESUSCITATION REGIMEN

a systolic blood pressure of <80 mm Hg for 35 minutes. All procoagulants were within the effective range of clotting, averaging 161 mg/dL for FI, 52% for FV, and 75% for FVIII. Following operation, clotting times and factors improved by 8.4 hours after operation and throughout the next 3 days.[29] We concluded that the FFP/PRBC resuscitation ratio does not have to be greater than 2:5. More recently, Mesar and coworkers[28] reported that, in the vast majority of MT that occur in patients with bleeding of nontraumatic origin, there is no difference in outcome when a high FFP/PRBC/platelet ratio was used as compared with lower ratio. Their three subgroups included patients who received a 1:0.9 ratio, 1:1.4 ratio, and 1:3.0 FFP/PRBC ratio.[30]

CRYSTALLOID VS. COLLOID AND THE FFP/RBC RATIO

Another purported benefit of the high (1:1) FFP/PRBC resuscitation ratio is the reduction in BES needs because of an enhanced FFP-induced intravascular oncotic pressure.[29,30] This concept was analyzed in 316 patients requiring MT for severe HS by assessing the duration of the postoperative fluid uptake phase, BES needs, weight gain, and hypoproteinemia.[29] These patients were given an average of 14 U of PRBC, 5 U of FFP, and 12 L of BES during a 7-hour emergency department and operating room resuscitation; they had a 29-hour postoperative fluid sequestration phase. The duration of fluid uptake phase, total BES needs, weight gain, and hypoproteinemia correlated significantly with shock time, PRBC, FFP, and BES infusion during operation. There was no significant correlation between FFP/PRBC, BES/RBC, or BES/FFP to either the degree of hypoproteinemia or postoperative weight gain.[29] The higher FFP/PRBC during operation correlated directly ($p = 0.001$) with postoperative fluid uptake duration and BES needs ($p < 0.01$). In contrast, the lower BES/PRBC ratio correlated inversely and significantly ($p = <0.001$) with postoperative fluid uptake duration and crystalloid needs.[29] These data demonstrated that the degree of hypoproteinemia and fluid sequestration is most accurately predicted by the number of minutes that a patient is in shock and the number of PRBC units, FFP units, and BES given during operation. When a higher FFP/PRBC ratio is used during operation, the duration and the volume of BES needs during the postoperative fluid uptake phase are greater than that seen with a lower FFP/PRBC ratio. These groups were not randomized but challenge the concept that a high FFP/RBC will lead to less fluid needs.[29]

ANTIFIBRINOLYTIC THERAPY CONTROVERSY

Groth and coworkers,[31] in 1963, recognized hyperfibrinolysis in patients undergoing liver transplantation, a procedure where bleeding and coagulopathy are common, and reported that therapy with epsilon-aminocaproic acid (EACA), a weaker precursor of tranexamic acid (TXA), would reduce fibrinolysis and the number of transfusions during transplantation. Subsequently, in 1969, they reported that the EACA caused multiple thrombotic events in both arteries and veins and increased mortality; the use of EACA was discontinued.[31] Roberts and coworkers,[32] in 2011, reported that the early administration of TXA would reduce the number of transfusions and death from hemorrhage. Morrison et al.,[33] in the subsequent Military Application of Tranexamic Acid in Trauma Emergency Resuscitation study, reported that the benefit of TXA was present only if given within 3 hours of HS, whereas Valle and coworkers[34] reported that TXA given after 3 hours was associated with increased death from bleeding; the reason for increased bleeding was not stated. Over the past 5 years, the author has had the opportunity to be involved with three patients with severe injuries requiring MT. All three were successfully treated during operation and received TXA upon arrival in the emergency department. Postoperatively, all three developed multiple arterial thromboses to an extent not previously seen by this author involving the renal, mesenteric, and cerebral arteries and were associated with hepatic necrosis, small bowel necrosis, renal shutdown, and strokes. There are hundreds of papers and case reports describing arterial thrombotic complications involving all organs after TXA.[35,36] The author looks forward to seeing what later controlled studies on TXA will demonstrate and believes that the exuberant use of TXA will also prove to be another bad detour.

THE FUTURE

The surgeons, both civilian and military, need to continue to perform controlled prospective randomized studies to define the ideal resuscitation regimen.[37] Based upon these accumulated experiences and going full circle, the author predicts this ideal regimen will return to fresh WB, stored WB, and FFP to replace labile factor, calcium, and platelets. Dr. Starzl's observations about the thrombogenic effects of antifibrinolytic therapy will be verified and the indiscriminate use of TXA will be abandoned. Lastly, the benefits of the 1:1 FFP/PRBC ratio over the 0.5:1 ratio will not be demonstrated.

AUTHORSHIP

C.E.L. supervised all the studies reported herein.

DISCLOSURE

Conflicts of Interest: Author Disclosure forms have been supplied and are provided as Supplemental Digital Content (http://links.lww.com/TA/D799).

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BALANCED RESUSCITATION REGIMEN

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MICHAEL & MARIAN ILITCH DEPARTMENT OF SURGERY

WAYNE STATE

EXCERPTS FROM THE LOG BOOK DOWN MEMORY LANE

Dr. Anna Ledgerwood

5/22/72 - Staff: Dr. A. Weaver; Chief Resident: Dr. S. Sankaran

1. LW: 26yo male with stab left chest, had left thoracotomy and suture of bleeding lung.
2. RW: 41yo with acute abdomen, had laparotomy and drainage of diverticular abscess and right transverse loop colostomy.
3. DP: 31yo with acute abdominal pain, laparotomy showed acute severe hemorrhagic pancreatitis and also cirrhosis of the liver. Patient had drainage of pancreas (had cardiac arrest in E.R. and acute renal failure).
4. JH: 26yo with GSW small bowel, had laparotomy with small bowel x1 repaired and urinary bladder x2 repaired.
5. OH: 66yo male with hypertension and heart failure, had perforated duodenal ulcer treated with omental patch and repair of umbilical hernia.
6. MB: 15yo with acute appendicitis, treated with appendectomy.

5/23/72 - Staff: Dr. S. Woods

1. RK: 2yo with bowel obstruction, had laparotomy and removal of congenital band from second portion of duodenum to ascending colon across the jejunum; cecum was in left upper quadrant, and this was a malrotation.
2. JD: Young male with GSW neck had thru-and-thru injury of right common carotid artery, treated with resection and anastomosis, and injury to right chest, treated with chest tube.
3. IH: 18yo with GSW to abdomen, had wounds to small bowel x2, treated with repair left colon x2, treated with anastomosis and exteriorization (Dr. Kirkpatrick study), and GSW aorta below the renals and above the inferior mesenteric artery treated with repair.
4. GF: 23yo S/P GSW colon and small bowel and lumbar plexus, treated with I&D of left flank retroperitoneal abscess.
5. RT: Re-insertion of right chest tube for pneumothorax.

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WAYNE STATE

"EXCERPTS FROM LOG BOOK" - DOWN MEMORY LANE, cont...

5/24/72 - Staff: Dr. N. Thoms

1. LM: Ischial rectal abscess, treated with I&D.
2. RH: 22yo with GSW chest and abdomen, treated with right thoracotomy and repair of right upper and lower lobes and laparotomy with repair of liver and jejunum.
3. JD241: 24yo with GSW abdomen, laparotomy showed thru-and-thru liver x2 and gallbladder x2, treated with cholecystostomy; there was a tangential wound to the right kidney.
4. WD: 22yo 20 days postop GSW chest and abdomen with abscess in region of the bullet, treated with incision and drainage.
5. UP: 27yo with GSW buttock, laparotomy revealed serosal tear of cecum.

5/25/72 - Staff: Dr. Hartzell

(When called, he did not know he was on call; he did come to the hospital.)

1. ST: 20yo with GSW right chest with right hemothorax, fracture of right scapular and right shoulder, treated with debridement and right chest tube.
2. JD: 52yo pedestrian struck by a car with fracture both pubic rami bilaterally and left ilium and acetabulum and fracture left humerus, treated with exploratory laparotomy which was negative and a tracheostomy.
3. JB: 22yo male with stab left chest x2 and left back x1 with left hemothorax, treated with chest tube, laparotomy with repair left diaphragm, spleen injury treated with splenectomy, and perforation stomach x1 treated with repair.
4. CW: 20yo with small bowel obstruction involving the terminal ileum, secondary to internal herniation through greater omentum, treated with laparotomy, reduction of hernia, and decompression of small bowel.

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MICHAEL & MARIAN ILITCH DEPARTMENT OF SURGERY

WAYNE STATE

"EXCERPTS FROM LOG BOOK" - DOWN MEMORY LANE, cont...

5/26/72 - Staff: Dr. A. Arbulu

1. IH (see case of 5/23): 18yo who had previous GSW of abdomen with hole in aorta was extubated and had pain in his left foot. X-ray showed bullet in left popliteal artery; taken to O.R. with removal of embolized bullet left popliteal artery.
2. MP: Right pneumothorax post chest tube removal, treated with re-insertion of chest tube.
3. JW: 16 days postop septic, treated with right retroperitoneal and supraphrenic space exploration which was negative.
4. KD: 40yo with GSW left arm with thru-and-thru injury left brachial artery, treated with resection and anastomosis.

5/27/72 - Staff: Dr. T. Grifka

1. AT: 29yo with laceration both wrists, repair of extensor tendons both wrists.
2. JD250: 12yo with GSW abdomen with injury to left internal iliac artery, treated with ligation; injury to sigmoid colon, treated with colostomy and mucous fistula; injury to small bowel, treated with resection and anastomosis. Patient had cardiac arrest on table, treated with left thoracotomy and cardiac massage, and then a tracheostomy was done.

5/28/72 - Staff: Dr. A. Arbulu

1. CW: SGW left buttock, treated with debridement.
2. MW: 22yo with GSW neck, treated with esophagoscopy, exploration left neck, repair of two holes in esophagus, and bronchoscopy.
3. JH: GSW right shoulder and right chest, treated with right chest tube and exploratory laparotomy with repair of holes left and right diaphragm, stomach x2, colon x2 with exteriorization as a loop colostomy and suture of liver bleeding from thru-and-thru wound.
4. CA: Beer bottle laceration right forearm and muscle, treated with debridement and closure and application of splint.

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WAYNE STATE

WSU MONTLY CONFERENCES 2024

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Every Wednesday from 7-8

Didactic Lectures — 8 am
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Wednesday, December 4
Death & Complications Conference
ABSITE Quest Exam
David Edelman, MD
Program Director, DMC/WSU Surgical Residency

Wednesday, December 11
Death & Complications Conference
Nashat B. Imran, MD, FASN, FACP
Associate Professor (Clinician-Educator), Interim Division Chief
Nephrology and Hypertension/WSU School of Medicine

Wednesday, December 18
Death & Complications Conference
Abubaker Ali, MD
Assistant Professor of Surgery
DMC/WSU School of Medicine Department of Surgery

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The Wayne State University School of Medicine is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. The Wayne State University School of Medicine designates this live activity for a maximum of 2 hours ***AMA PRA Category 1 Credit(s)***™. Physicians should claim only the credit commensurate with the extent of their participation in the activity."

EVALUATIONS
Surgical Death and Complications Rounds #2024321125, Jan-April 2024 CME Reflective Evaluation:
https://www.surveymonkey.com/r/MJMJNVV
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*I want to commit to becoming a charter life member with payment of $1000 per year for the next ten (10) years.

Send check made payable to ***Wayne State Surgical Society*** to:

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Detroit Receiving Hospital, Room 2V
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MARK YOUR CALENDARS

145th Annual Meeting of the American Surgical Association
April 24-26, 2025
Intercontinental San Diego
San Diego, CA

71st Meeting of the Michigan Chapter of the ACS
May 14-16, 2025
Shanty Creek Resort
Bellaire, MI

Please Update Your Information

The WSUSOM Department of Surgery wants to stay in touch. Please email Charles Lucas at clucas@med.wayne.edu to update your contact information.

MICHAEL & MARIAN ILITCH DEPARTMENT OF SURGERY

WAYNE STATE

Missing Emails

Over the years the WSU Department of Surgery has lost touch with many of its alumni. If you know the email, address, or phone number of the following WSU Department of Surgery Residency Program graduates please email us at clucas@med.wayne.edu with their information so that we can get them on the distribution list for the WSU Department of Surgery Alumni Monthly Email Report.

Mohammad Ali (1973)
David B. Allen (1992)
Tayful R. Ayalp (1979)
Juan C. Aletta (1982)
Kuan-Cheng Chen (1976)
Elizabeth Colaiuta (2001)
Fernando I. Colon (1991)
David Davis (1984)
Teoman Demir (1996)
Judy A. Emanuele (1997)
Lawrence J. Goldstein (1993)
Raghuram Gorti (2002)
Karin Haji (1973)
Morteza Hariri (1970)
Harrison, Vincent L. (2009)
Abdul A. Hassan (1971)
Rose L. Jumah (2006)
R. Kambhampati (2003)
Aftab Khan (1973)
Samuel D. Lyons (1988)
Dean R. Marson (1997)
Syed A. Mehmood (2007)
Toby Meltzer (1987)
Roberto Mendez (1997)
Mark D. Morasch (1998)
Daniel J. Olson (1993)
David Packer (1998)
Y. Park (1972)
Bhavik G. Patel (2004)
Ami Raafat (1998)
Kevin Radecki (2001)
Sudarshan R. Reddy (1984)
Renato G. Ruggiero (1994)
Parvid Sadjadi (1971)
Samson P. Samuel (1996)
Knavery D. Scaff (2003)
Steven C. Schueller (1974)
Anand G. Shah (2005)
Anil Shetty (2008)
Chanderdeep Singh (2002)
David G. Tse (1997)
Christopher N. Vashi (2007)
Larry A. Wolk (1984)
Peter Y. Wong (2002)
Shane Yamane (2005)
Chungie Yang (2005)
Hossein A. Yazdy (1970)
Lawrence S. Zachary (1985)

Wayne State Surgical Society

The Wayne State Surgical Society (WSSS) was established during the tenure of Dr. Alexander J. Walt as the Chairman of the Department of Surgery. WSSS was designed to create closer contact between the current faculty and residents with the former resident members in order to create a living family of all of the WSU Department of Surgery. The WSSS also supports department activities. Charter/Life Membership in the WSSS is attained by a donation of $1,000 per year for ten years or $10,000 prior to ten years. Annual membership is attained by a donation of $200 per year. WSSS supports a visiting lecturer each fall and co-sponsors the annual reception of the department at the annual meeting of the American College of Surgeons. Dr. Scott Davidson (WSU/GS 1990/96) passed the baton of presidency to Dr. Larry Narkiewicz (WSU/GS 2004/09) at the WSSS gathering during the American College of Surgeons meeting in October 2022. Members of the WSSS are listed on the next page. Dr. Narkiewicz continues in the hope that all former residents will become lifetime members of the WSSS and participate in the annual sponsored lectureship and the annual reunion at the American College of Surgeons meeting.

MICHAEL & MARIAN ILITCH DEPARTMENT OF SURGERY

WAYNE STATE

Members of the Wayne State Surgical Society
Charter Life Members

Ahn, Dean
Albaran, Renato G
Allaben, Robert D. (Deceased)
Ames, Elliot L.
Amirikia, Kathryn C.
Anslow, Richard D.
Antonioli, Anita L.
Auer, George
Babel, James B.
Bassett, Joseph (Deceased)
Baylor, Alfred
Bouwman, David
Bradley, Jennifer
Busuito, Christina
Cirocco, William C.
Clink, Douglas
Chmielewski, Gary W.
Colon, Fernando I.
Conway, William Charles
Davidson, Scott B.
Dente, Christopher
Dujon, Jay
Edelman, David A.
Engwall, Sandra
Francis, Wesley
Flynn, Lisa M.
Fromm, Stefan H.
Fromm, David G
Galpin, Peter A.
Gayer, Christopher P.
Gerrick Stanley
Grifka Thomas J. (Deceased 2022)
Gutowski, Tomasz D.
Herman, Mark A.
Hinshaw, Keith A.
Holmes, Robert J.
Huebl, Herbert C.
Johnson, Jeffrey R.
Johnson, Pamela D.
Kline, Gary
Kovalik, Simon G.
Lange, William (Deceased)
Lau, David
Ledgerwood, Anna M.
Lim, John J.
Lucas, Charles E.
Malian, Michael S.
Marquez, JoFrances
Martin, Donald J., Jr.
Maxwell, Nicholas
McGuire, Timothy
McIntosh, Bruce
Missavage, Anne
Montenegro, Carlos E.
Narkiewicz, Lawrence
Nicholas, Jeffrey M.
Novakovic, Rachel L.
Perrone, Erin
Porter, Donald
Prendergast, Michael
Ramnauth, Subhash
Rector, Frederick
Rose, Alexander
Rosenberg, Jerry C.
Sankaran, Surya
Sarin, Susan
Sferra, Joseph
Shapiro, Brian
Silbergleit, Allen (Deceased)
Smith, Daniel
Smith, Randall W.
Stassinopoulos, Jerry
Sullivan, Daniel M.
Sugawa, Choichi
Tuma, Martin
vonBerg, Vollrad J. (Deceased)
Washington, Bruce C.
Walt, Alexander (Deceased)
Weaver, Donald
Whittle, Thomas J.
Williams, Mallory
Wills, Hale
Wilson, Robert F.
Wood, Michael H.
Zahriya, Karim

Members of the Wayne State Surgical Society—2024-25 Dues

Alpendre, Cristiano V.
Bambach, Gregory A.
Carlin, Arthur
Chmielewski, Gary
Dawson, Konrad L.
Dolman, Heather
Dulchavsky, Scott A.
Fernandez-Gerena, Jose
Field, Erin
Goltz, Christopher J.
Gutowski, Tomasz
Hall, Jeffrey
Hollenbeck, Andrew
Joseph, Anthony
Klein, Michael D.
Kline, Gary
Kosir, Mary Ann
Lloyd, Larry
Marquez, Jofrances
Martin, Jonathon
McGee, Jessica D.
Mostafa, Gamal
Nevonen, Marvin G.
Paley, Daniel S.
Park, David
Porterfield, Lee
Shanti, Christina
Siegel, Thomas S.
Tarras, Samantha
Taylor, Michael G.
Tennenberg, Steven
Thoms, Norman W.
Vasquez, Julio
Ziegler, Daniel W.

Operation-A-Year
January 1—December 31, 2025

The WSU department of Surgery has instituted a new group of alumni who are remembering their training by donating the proceeds of one operation a year to the department. Those who join this new effort will be recognized herein as annual contributors. We hope that all of you will remember the department by donating one operation, regardless of difficulty or reimbursement, to the department to help train your replacements. Please send you donation to the Wayne State Surgical Society in care of Dr. Charles E. Lucas at Detroit Receiving Hospital, 4201 St. Antoine Street (Room 2V), Detroit, MI, 48201.

Albaran, Renato G.
Antoniolli, Anita L.
Bambach, Gregory A.
Bradley, Jennifer
Busuito, Christina
Chmielewski, Gary W.
Dente, Christopher
Dittinbir, Mark
Engwall, Sandra
Fernandez-Gerena, Jose
Gutowski, Tomasz
Gayer, Christopher P.
Herman, Mark A.
Hinshaw, Keith A.
Holmes, Robert J.
Johnson, Jeffrey R.
Johnson, Pamela D.
Joseph, Anthony
Lim, John J.
Malian, Michael
Marquez, Jofrances
McGuire, Timothy
McIntosh, Bruce
Porter, Donald
Prendergast, Michael
Siegel, Thomas S.
Smith, Daniel
Smith, Randall
Sullivan, Daniel M.
Wood, Michael H.
Ziegler, Daniel

WSU SOM ENDOWMENT

The Wayne State University School of Medicine provides an opportunity for alumni to create endowments in support of their institution and also support the WSSS. For example, if Dr. John Smith wished to create the "Dr. John Smith Endowment Fund", he could donate $25,000 to the WSU SOM and those funds would be left untouched but, by their present, help with attracting other donations. The interest at the rate of 4% per year ($1000) could be directed to the WSSS on an annual basis to help the WSSS continue its commitment to improving the education of surgical residents. Anyone who desires to have this type of named endowment established with the interest of that endowment supporting the WSSS should contact Ms. Lori Robitaille at the WSU SOM> She can be reached by email at *lrobitai@med.wayne.edu*.