

*Duke RAC Trauma Transport
Guideline*

*Disaster Drills: You Play the Game
the Way You Practice*

*Duke Life Flight: 20 Years
of Caring For The Community*

Lightning Strikes

Duke RAC Trauma Transport Guideline

Duke LifeNet

Shock is a physiologic state characterized by a significant reduction in perfusion. This results in decreased tissue oxygen delivery. The effects of this are initially reversible; however, prolonged oxygen deprivation leads to generalized cellular

hypoxia. (1) The eventual physiologic results are:

- cell membrane ion pump dysfunction
- intracellular edema
- inadequate regulation of intracellular pH
- cell death

As health-care providers, we see these abnormalities clinically manifested by:

- End-organ damage
- Failure of multiple organ systems
- Death (2)

These clinical signs may not be exhibited by patients in the initial phase of acute treatment of trauma patients. They are commonly seen in the intensive care units as

sequelae of the “low-flow” perfusion states which occur in many traumatically injured patients. As emergency care providers, our ultimate goal is to halt the damaging effects of the “shock state” in order to prevent these complications.

Many injured patients will exhibit varying degrees of shock, from “mild” to “severe” depending upon lab values and vitals signs. The Trauma Transport Guideline was formulated by our Trauma Team here at Duke for referring hospitals to use as a tool in managing these patients prior to transport. The guideline is helpful in prompting the clinician to obtain key data in order to determine the most logical plan for the disposition of these patients as well as in prioritizing their care management. Several lab values, along with vital signs, give the clinician a strong indication of how critically ill the patient is and help to predict the potential level of definitive care they may need.

The goal of initial resuscitation is to restore circulating blood volume and to support tissue oxy-

*Duke Trauma Center
Duke Life Flight
Duke Emergency Department
Duke Transfer Center
Duke Disaster Planning
Duke University Hospital
Durham, North Carolina*

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We are currently keeping Dr. Vaslef so busy that I am acting as “From the Editor – Substitute”. I have missed the opportunity to share my thoughts since Ginger has taken over (very well I might say) the Outreach Corner. Now, again I have space so here goes.

For those that attended the 15th Annual Trauma Conference on March 3rd. I hope you had a good time and gained much new knowledge. We are now planning for our fall workshop so if there are any specifics you would like hear about now is the time to let me know. Fresh ideas are always welcome, as well as speakers.

You may hear a few new voices on the phone when you call the Trauma Center. We have a couple of physicians intermittently helping by taking some trauma call. Thank you to Dr. Ricardo Bonner and Dr. Kumash Patel. Another new voice will be that of Dr. Jeff Hoehner, who has joined us in pediatric surgery. Dr. Hoehner comes to Duke from John Hopkins Hospital in Baltimore, Maryland. Welcome!

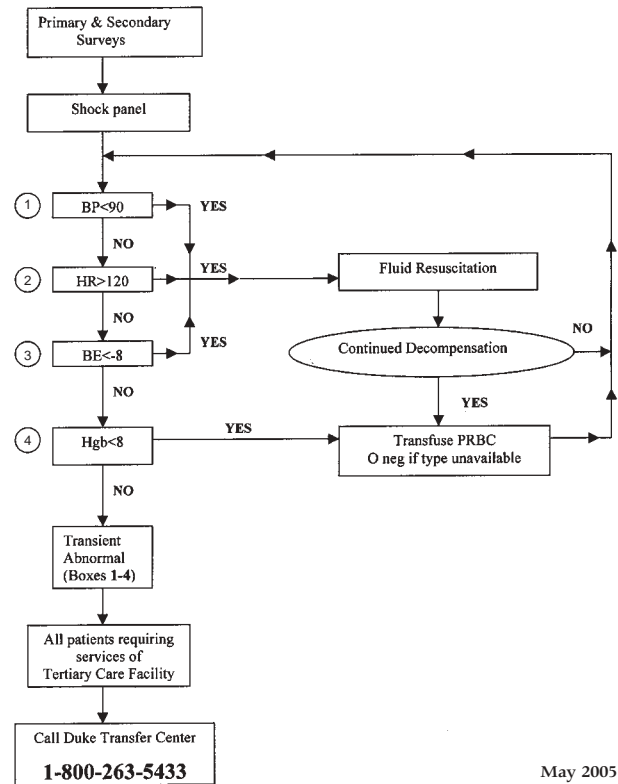
Over the next couple of months you will see some changes on the Duke Trauma website. We will be moving to a new location, reformatting the pages, and adding new information. Please hang on and there are better things coming.

In the meantime have a great spring and be safe.

Claudia McCormick, RN, MSN
Duke Trauma Program Director

DUKE RAC TRAUMA TRANSPORT GUIDELINE *continued*

Duke RAC Transfer Data Guideline



May 2005

generation. (3) All measures are directed towards these goals when treating the trauma patient. Trauma resuscitation follows a systematic and comprehensive order by performing a primary and a secondary survey as outlined in the Advanced Trauma Life Support Manual™ (ATLS). As noted at the top of the Trauma Transport algorithm, these surveys should begin immediately upon assuming care of the trauma patient and measures to correct and stabilize any issues with airway, breathing, and circulation undertaken as necessary. After the “ABC’s” are taken care of, the Shock Panel should be obtained. A shock panel consists of, at minimum, an **arterial** blood gas and a hemoglobin level. *Each Emergency Department should decide which additional lab values to also include in their own Shock Panel.* The Duke Shock Panel components include: pH, pCO₂, pO₂, Base Excess (BE), Bicarb, Hemoglobin, MetHemoglobin, Lactate, Glucose, and Ionized Calcium. Serum lactate levels are helpful as they are a measure of end-organ perfusion; this lab is not always easily obtainable in a timely manner in the community hospital setting. The remainder of the algorithm flows according to the data obtained from these labs along with the patient’s vital signs. ABG results will yield very helpful data regarding not only the obvious, airway status and oxygenation, but also reveal acid-base (pH, base deficit) status. All results must be compared with the clinical presentation of the patient.

Duke LifeNet

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www.dukehealth.org/emergency_services/trauma

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Duke Emergency Services

Key data points that should trigger the clinician to begin consideration of timely transfer of the adult trauma patient to a higher level of care are:

- Systolic blood pressure < 90
- Tachycardia (heart rate > 120)
- Hgb < 8
- Base deficit > - 8 or more.

Patients exhibiting these parameters should begin receiving the standard fluid resuscitation of 2 liters normal saline or Ringer's lactate solution. A hemoglobin level of less than 8.0 indicates consideration of transfusion of packed red blood cells (O negative if type unavailable.) Transient events of hypotension or other abnormal values should be considered for appropriate intervention as indicated in the guideline.

Early calls to the Level I Trauma Center with this pertinent information in hand and ready for discussion with the trauma surgeon on call will improve communication, prioritize the care and transfer of the patient, and ensure consistency in care across our region. Recognition, intervention, and timeliness of patient stabilization and transfer are the goals of our State Trauma System. The referring physician and the accepting physician will collaboratively determine patient transfer necessity at the time of the call to the Trauma Center with the assistance of these standardized data collected from the patient. It is imperative to recognize that many trauma patients may appear stable, with adequate blood pressure and absence of (or perhaps only transient) tachycardia, yet have sufficient compensatory mechanisms that can mask a significant metabolic acidosis or low hemoglobin level. By obtaining the Shock Panel, the true level of perfusion can be evaluated and intervention can occur in a timely way.

With the current challenges in bed availability across our state, we must be cognizant of the necessity of transferring patients that truly require tertiary care. We emphasize that this includes those injured patients that may not be in shock and may not have life-threatening injuries but whose injuries require specialized services such as Plastic Surgery, Ophthalmology, and Reimplantation that are not always available at each hospital. The goal of our guideline is to offer patient care standardization across our RAC for stabilizing patients prior to transfer to a Level I Trauma Center. By transferring the appropriate patients at the appropriate times, the complications of shock can be avoided or minimized for best patient outcomes.

References available upon request

Ginger Wilkins, RN, BSN
Duke RAC Coordinator

Disaster Drills: You Play the Game the Way You Practice

How was your last disaster drill? Was it a positive learning experience that tested not only the preparedness of the staff, but the workability of your Disaster Plan? Were the “lessons learned” used to drive additional training or plan revision? Was the scenario realistic and tailored to the agency, area and current situation? Was HEICS or ICS used appropriately throughout the drill? Was the drill conducted during the day or at night? Were there real casualties, adult and pediatric or where the casualties “simulated” by slips of paper? Did you actually open the disaster lockers, closets and carts? If you conducted Decon operations did you flow water and decon both ambulatory and non-ambulatory victims? How about PPE? Were the responders dressed-out in the proper level for the known or suspected agent? Did you clean, check and secure your equipment when the drill was over? Was there a “Hot Wash” or debriefing conducted immediately after the drill that included all the players, including the victims?

Take a few minutes to answer the above questions, the list is not all-inclusive, but it will give you a starting point for making your next drill a positive experience.

Conducting a quality disaster drill is no different than conducting any other type of training as long as you keep one very simple premise in mind.....“You Play the Game the Way you Practice.” I wish I could take credit for this very simple philosophy, but the credit goes to Lieutenant General Don Starry, one of the Army’s greatest trainers and the developer of the current Air-Land Battle doctrine. General Starry was a hard task-master, but he turned-out soldiers who knew their mission and were confident with their equipment. How do we apply this philosophy to the disaster drill, it’s really quite straightforward:

- Begin drill preparations well in advance of the exercise and involve the key players, both internal and external, from the start.
- Determine your end-points, what do you want to test or accomplish from conducting this exercise? It is generally best to limit yourself to 4 or 5 end-points at most.
- Determine who will evaluate your drill, internal or external. External evaluation is generally the best method. Have enough Evaluators to cover all aspects of the exercise adequately. The RAC can provide you with appropriate evaluators from a variety of agencies.

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DISASTER DRILLS: YOU PLAY THE GAME THE WAY YOU PRACTICE *continued*

- Write a realistic scenario that fits your agency, your community and your capabilities. If you are having trouble developing a scenario there are many excellent sources of “canned” scenarios that can be easily adapted to your situation.
- Remember, you have to walk before you can run.....decide early-on whether a table-top, functional or full field exercise is best for your level of training. An inappropriate level of exercise only serves to frustrate the players and accomplishes very little in the end.
- Announce that there will be a drill on a particular day, but keep the details to a minimum. Don't allow managers or supervisors to alter staffing just because there is going to be a drill.....*You Play the Game the Way you Practice*.....very few disasters have been accommodating enough to give us advance notice. We need to work with what we have when the crisis happens. AND, we need to do it on the evening and night shifts too!
- Use live victims, they moan, they groan and most importantly....they provide feedback. Prepare script cards for your victims for a more realistic presentation. A little moulage works wonders and doesn't require an expensive kit of toys to be effective. You can likely find some amateur moulage artists right in your community.
- Integrate HEICS/ICS into all aspects of the drill these elements need to train also. You can have the best trained responders in the world, but without a strong and functional Command and Control element their efforts will be for not.
- Keep “simulation” to a minimum. Use the equipment and supplies that you have. Open the disasters carts, lockers and cabinets. Put on the PPE and use the PAPR's. If you are doing a Decon operation establish hot and cold zones, flow water and actually decon the victim.....yes, make them take their clothes off (bathing suits please), and go through the decon process to insure that your staff knows how to properly supervise an ambulatory decon line. *You Play the Game the Way You Practice*. If you have never dressed-out in PPE, worn a PAPR, etc. in training it is unlikely that you will be able to do it properly in a real emergency.
- Accountability, accountability, accountability.....I can't stress it enough! Know how many patients you have, what triage level they are and what their disposition is.
- End the exercise when you have accomplished your end-points or when your allotted time has elapsed.
- Conduct the “Hot Wash” immediately after the exercise to capture the best feedback. Involve all the players including the victims, their perspective is frequently the most accurate.....and this is all about patient care. Have someone take notes to insure that key points and recommendations are not lost. Discuss what went well and what didn't. The Exercise Director should serve as the facilitator for the discussion. This isn't the time for finger-pointing, just an open discussion of the events of the exercise.
- From the Hot Wash notes and Evaluators comments, make the appropriate changes to your SOPs and Disaster Plans.
- Start planning for the next drill using the lessons learned.
- ***YOU PLAY THE GAME THE WAY YOU PRACTICE!***

Have we covered it all? No, actually we have just hit the high-points of conducting a meaningful disaster drill.....we could go on for several more pages! There are many excellent sources of further information available to you including free on-line courses from FEMA and classroom instruction from the NC Office of Emergency Management. Hospital Incident Command System (HEICS) training, Decon training and assistance with exercise development and evaluation are available from the Duke Trauma Regional Advisory Committee, a phone call or an email will get you the resources you need.

Remember, *YOU PLAY THE GAME THE WAY YOU PRACTICE*, and when game time comes we should be able to provide the highest level of patient care because we have practiced well and often.

Next edition: Disaster Triage, New tools and Techniques.

*Larry S. Tucker, RN, MICN, EMT-B
Regional Disaster Preparedness Coordinator*

Duke Life Flight: 20 Years of Caring For The Community

On March 1st 1985, Duke Life Flight was called to Lynchburg, Virginia to airlift a patient to Duke Hospital that was suffering from Gas Gangrene. This was Duke Life Flight's inaugural flight. For the last 20 years the transport team has successfully brought a high level of critical care to communities all over the state of North Carolina, as well as some parts of Virginia, South Carolina and Tennessee. Today the program operates two rotor wing aircraft and 4 critical care ground transport units. The longevity of the program is credited to its visionary initial and current team members, directors and aviation personnel.

The program was initiated after many discussions with local and state authorities on the need for expeditious transport of critically ill patients to Duke for tertiary services. Duke Life Flight initially operated one rotor wing aircraft, a Bell 222 UT model. This was North Carolina's first aeromedical operation. The expectation at first was to complete 1-2 patient flights/day. The first month of operation, March 1985, the team completed 56 patient flights. By December of that year, the team was flying approximately 80 patient flights/month. A second rotor wing, an Aerospatiale Twin-Star F2 model was acquired to assist with the flight load. Over the years, Duke Life Flight has operated the Twin-Star model and in the Fall of 1987, acquired another Aerospatiale rotor wing, the N1 Dauphine. These were the Duke Life Flight flagships for many years to follow and fit the Duke Life Flight mission well. In December of 2000, the Dauphine was transferred to Texas for another program and Duke utilized the Twin-Star and a back up rotor wing for service. During December of 2002 through January of

2003, the Duke Life Flight team accepted delivery of the current flagships, two brand new Italian Agusta 109 Power rotor wing aircraft, Life Flight 1 and Life Flight 3. Life Flight 2, Duke's original Twin-Star call name was retired after it tragically crashed in October of 2000, taking the life of the pilot, John "Bear" Holland. It was a time of great sadness that the team had to overcome and work together to get back in the air. The speed and economical advantages of the new Agusta aircraft fit the program mission more now than ever. The aircraft are operated by CJ Systems Aviation Group out of Pittsburgh, Pennsylvania. CJ Systems provides the rotor wing pilots and aviation mechanics. It is an understatement to say that the knowledge and skill of the pilots and mechanics at Duke directly reflects on the survivability of the patients flown to Duke. The need for rapid critical care transport was now recognized and addressed, but not completely.

Three years later, Duke Hospital recognized another need which entailed transporting not only adult patients but Pediatric and Neonatal patients to Duke, but by ground critical care. So in March of 1988, Duke Life Flight initiated the state's first ground critical care unit. The ground ambulance operated out of Duke Hospital and served the entire state to bring patients to Duke that required tertiary services that did not need air transport. The ground units were initially staffed with one critical care nurse and two EMT's. This took strain off of surrounding EMS systems so that their



units did not have to travel out of their service area to bring the patients to Duke. In February of 1994, Life Flight added another critical care ground unit based in Lumberton. South Eastern Regional Medical Center in Lumberton became Duke Hospital's number one referral center for cardiac and trauma patients. With the addition of the Lumberton base, other referral centers in Burlington, NC (Alamance Regional Medical Center) and Smithfield, NC (Johnston Memorial Hospital) took suit sending high volumes of patients to Duke. Therefore, ground units opened in these arenas. With the rotor wing success and now ground critical care units covering the state, Duke Life Flight became a staple for critical care transport for the communities of North Carolina.

Duke Life Flight's most outstanding attribute over the years has been its ability to adapt to the environment and community needs, as said best by Dr. Gregory Georgiade, one of its founders. With survival rates of premature babies improving and technology in caring for these patients as well as pediatric patients, the Life Flight team added nurses that were cross-trained in a neonatal/pediatric subspecialty. The nurses were taught to go out into the community to transport newborns that needed tertiary ventilator and cardiac therapies. In the last five years, the neonatal nurses have been trained in administering Nitric Oxide,

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DUKE LIFE FLIGHT: 20 YEARS OF CARING FOR THE COMMUNITY *continued*

Surfactant and Prostaglandins in a transport environment. This has greatly improved survival rates for the neonatal population. Technology also played a major part in improving critical therapies for adult patients needing Intra-Aortic Balloon Pump therapy, complex ventilator modes and Left Ventricular Assist Devices. Both the air and ground units today are staffed with two critical care nurses and either a pilot in the air or an EMT on the ground. This enabled the transport program to obtain CAMTS (Commission on Accreditation of Medical Transport Systems) accreditation, an industry standard. The patients coming to Duke were now becoming more critical and with the volume increasing, there was a need to manage the admissions more effectively.

In March of 2002, Duke Emergency Services began operating the Emergency Services Transfer Center. The transfer center is staffed with experienced registered nurses to take the initial call from the referring facility or physician to streamline the process. The transfer center works in direct relation with the Duke Life Flight Communications Center. The communications center is the nerve center of the program. The Life Flight communication specialists staffing the center are trained to flight follow multiple aircraft, track the progress of multiple ground units, take calls for scene missions, assist with bed control flow and work with the pilots for weather checks.

On March 12th, 2005 the Duke Life Flight team celebrated its 20th Anniversary with an open house for

the community at Durham Regional Hospital. Local EMS and Fire Departments attended with emergency vehicles and fun was had by all. At the present time, the Duke Life Flight team transports thousands of critically ill and injured patients to Duke and other tertiary centers each year. Its success is its people and the safe operation of the program on a day to day basis. Duke Life Flight has been a model transport program for 20 years and is always looking to the future. Everyday, the Life Flight team comes to work to meet the challenging needs of the community with new ideas, state of the art equipment and a team approach in caring for its patients and families.

The above article was adapted from The Official Duke Life Flight 20 Year History Book written by Edd Shope, RN, CCRN, EMT-P in February 2005.

Lightning Strikes

It is a sunny, warm August afternoon and as you are teeing off on the 17th hole you hear thunder. Seeing that it is sunny and not raining, you and your buddy decide to finish your golf game. A few minutes later your friend is struck by lightning as he stands holding the flag while you putt; and you are knocked to the ground. You realize that your friend is not breathing, however you can neither move your legs, nor feel them. You and your buddy have just become lightning statistics!

The United States is hit by an estimated 25,000,000 lightning strikes annually. The exact number of individuals struck by lightning yearly is not known, however an estimated 100 people die annually from lightning strikes and another 300 are injured, making lightning the second leading cause of death due to weather related phenomena. Seventy-five percent of those hit by lightning will suffer long-term sequelae.

Lightning strikes can occur anywhere, but are more frequent in the South, the Rocky Mountains, the Atlantic Coast, the Hudson and Mississippi River valleys; and usually happen in the summer months during the afternoon or evening. Most victims of lightning strikes are involved in some type of outdoor activity when they are hit.

A lightning strike may only last 1/1000th of a second; however it can have voltage of over 100 million volts and produce temperatures five times hotter than the sun. Five mechanisms of injury can occur from lightning: Direct strike, contact injury, side flash (splash), ground current (step voltage), and blunt trauma.

Lightning strikes produce a DC current, thus cardiac arrest at the time of strike is most often due to asystole. Individuals who receive a direct strike to the head are also at a very high risk for death or severe brain injury. Interestingly, fixed and dilated pupils are not a reliable indication of brain death since there may be direct eye involvement or autonomic dysfunction after a lightning strike.

Due to the short duration of "electricity", most of the energy flows over the person and they may incur superficial burns. Feathering burns, called the Lichtenberg figure, produce a fern-like pattern on the skin and are considered pathognomic of lightning. Linear burns, punctuate burns, and thermal burns may also occur. Deep thermal skin burns occur in only 5% of lightning strike victims.

A brief loss of consciousness is seen in up to 75% of victims. Keraunoparalysis, another clinical state specific to lightning strikes, causes temporary paralysis and loss of sensation in the lower extremities. In addition, the legs become cold, mottled, and pulseless. This condition usually resolves within a few hours. Serious neurologic injuries including post hypoxic-ischemic encephalopathy, intracranial hemorrhages, cerebral infarction and cerebellar syndromes are also associated with lightning strikes. Intracranial hemorrhages are most often seen in the basal ganglia and/or the brainstem. Long-term behavioral and neuropsychological problems may occur and survivors resemble victims afflicted with post-traumatic stress disorder or traumatic brain injury.

By far, the most common injury related to a lightning strike is a ruptured tympanic membrane caused either by the shock wave or a basilar skull fracture.

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Outreach Corner

by Ginger G. Wilkins, RN, BSN

I have several updates for RAC members in this newsletter. As of April, 2005, our membership changed due to the formation of the Capital RAC headed by WakeMed. Franklin Regional Medical Center in Louisburg and Central Carolina Hospital in Sanford elected to join the CapRAC. We wish them luck with their new partnership.

We held our first annual RAC Dinner May 4 at the Angus Barn in Raleigh. We hope to make this an annual event. Duke Trauma Center hosted the evening of networking with the Medical Directors and Nurse Managers of our RAC hospitals. Dr. Mark Sebastian, our new Vice-Chair, presented our newest initiative, the Trauma Transport Data Guidelines. Discussion and suggestions followed. Please see the related article in this newsletter for more details. You will all be hearing from me about this new initiative in the coming weeks and months.

Dr. Steve Vaslef, who serves on the statewide PI Committee on Trauma, also updated us on another PI effort.

The State Committee on Trauma is making an effort to collect data on the number of intubations occurring in the prehospital setting across our state. I will be asking each of our RAC hospitals and EMS facilities to assist me in collecting this data.

Many thanks go to those of you that have attended our quarterly RAC meetings. We have a number of exciting projects going on and your efforts have made them possible.

As a gentle reminder for everyone, please anticipate that your attendance at RAC meetings will be tracked by the NCOEMS to show compliance with benchmarks for future HRSA grant funding for your hospital. We understand that sometimes unexpected things may take priority, please send a representative for your hospital in your place when this occurs.

Upcoming RAC meetings for the remainder of 2005:

July 22, 2005 • October 28, 2005

All meetings are in the Main Auditorium, Durham Regional Hospital

*Have a safe summer,
Ginger*

Join Duke Life Flight!

Duke Life Flight is a comprehensive air/ground critical care transport program with bases in Lumberton, Smithfield, Burlington, and Durham North Carolina. The program is currently seeking RN's and EMT's to join our team! **RN Requirements include:** 3 years of current ICU/ED experience and the ability to work in a diverse autonomous environment, satisfactory completion of physical fitness standards, ACLS, PALS, and PHTLS/TNCC preferred, maximum weight 257lbs, and a 2-year minimum commitment to the program. Rotating 12-hour shifts available. **EMT Requirements include:** 2 years of EMT experience, current North Carolina EMT certification, 25 Years of age, satisfactory completion of physical fitness standards, and a 2-year minimum commitment to the program.

If you are interested and would like to learn more about Duke Life Flight, contact one of the Clinical Operations Director nearest you!

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Outreach Calendar

July

- 22 Duke RAC Meeting –
Durham Regional Hospital

August

- 1-2 TNCC Provider Course –
Duke Medical Center

September

- 22 Orthopedic Trauma Course –
Duke Medical Center
- 23 Fall Trauma Workshop –
Duke Medical Center
- 28 Trauma Stabilization Course –
Duke Medical Center

October

- 7 Trauma Resuscitation Course
– Duke Medical Center
- 25 State Trauma Meetings –
High Point
- 28 Duke RAC Meeting – Durham
Regional Hospital

November

- 4-5 TNCC Provider Course –
Duke Medical Center
- 7-8 TNCC Provider Course –
Duke Medical Center
- 9 Outdoor Trauma Course –
Duke Medical Center
- 30 & December 1
TNCC Provider Course –
Duke Medical Center

December

- 2 Medical Forensics Course –
Durham Regional Hospital

LIGHTNING STRIKES *continued*

A victim of a lightning strike should be treated as a trauma patient; airway, breathing and circulation being the priority. Provide oxygen, attach to a cardiac monitor, and place intravenous catheters. Since lightning strikes rarely cause deep tissue or massive tissue necrosis and the injuries are usually intracranial and cardiac, fluid resuscitation should be judicious. Topical burns are frequent sequelae and should be treated as thermal cutaneous burns. A person struck by lightning is not “charged”, thus the rescuer is not at risk for an electrical shock from the patient.

If several people are victims of a lightning strike and one is in a mass casualty situation, the usual treatment algorithm is reversed. That is, treat the patients who appear “dead” first. Individuals who are alive at the scene, will normally survive, thus, those who are “dead” are treated first. In addition to cardiac arrest, individuals may have respiratory arrest due to temporary paralysis of respiratory muscles. Therefore, rapid treatment by providing the ABCs may prevent further injuries.

Prevention is the best protection against being struck by lightning. If you can see lightning or hear thunder you are already at risk. Lightning can occur 10 miles ahead of or behind a storm, so clear skies are no assurance against being hit.

The Lightning Safety Group set recommendations for thunderstorm safety in 1998. This group came up with the “30-30 Rule”: If less than 30 seconds occurs between lightning and thunder, one should seek safe shelter immediately and stay there until 30 minutes after the last lightning is seen. Shelters considered **SAFE** include: large structures with plumbing and electrical wiring (houses, schools); fully enclosed metal vehicles such as cars or school buses (roll up the windows and avoid contact with metal). Places to **AVOID** include: tall structures (isolated trees, towers, and light poles), open fields (golf courses, playgrounds), open structures (gazebo) or vehicles (golf carts); being near or in water (indoor or outdoor pools, beaches) or being in contact with conductive materials (bleachers, computers).

Fortunately for you, complete movement and feeling return to your legs over the next hour and you are discharged home, sore but otherwise fine. Your buddy however was not so lucky. Although CPR was initiated by bystanders, neurological injuries were severe and your buddy did not survive. You now have a new respect for Mother Nature and her power.

*Carrie Pinkham-Reidy,
RN, MS, CCRN, CFRN*

References available upon request

Duke Emergency Services

Duke LifeNet

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