LIFE STAR LINES

A Hartford Hospital publication addressing articles of interest to emergency and critical care personnel

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HARTFORD HOSPITAL

Night Operations

By Dennis McAffee, Pilot

Nighttime flight operations require strict adherence to the proper use of white lighting. Excessive or improper landing zone lighting can cause a serious safety risk by impairing a pilot's vision. This article is intended to raise the awareness level of proper use of lights when operating in and around any helicopter.

Vision is the most important sense we use in flight. The need for good depth perception, visual acuity, color vision, and night vision techniques are important for the overall safety of personnel in the vicinity of any landing area.

Differences Between Day and Night Vision

Color vision: Light and dark colors are distinguishable at night only in terms of the intensity of reflected light. If the brightness or intensity of a color is above the threshold for cone vision, color can be perceived. For this reason, signal flares and landing zone markers can be properly identified at night.

Perception: Perception of fine detail is impossible at night. At 0.1 foot-candle (level of full moonlight), visual acuity is one-seventh as good as it is in average daylight. Therefore, objects must be rather large or nearby to be seen at night. Identification at night must depend on the perception of generalized contours and outlines, and not on small distinguishing features.

Blind Spot: During low-level illumination, central vision becomes less effective and a relative blind spot (5 to 10 degrees wide) develops. If an object is viewed directly, it may not be detected due to this blind spot, and as distance increases, larger and larger objects will be missed. Use of off-center vision and scanning techniques are recommended to eliminate blind spots in the visual field.

Dark Adaptation

Going suddenly from bright light into darkness is a common occurrence. For example, you experience this when you enter a movie theater during the day or leave a brightly lit room at night. In both cases the sensations are the same. At first you see very little, if anything. After several minutes you can see dim forms and large outlines. As time goes by more details of the environment become apparent. The lower the starting level of illumination, the more rapidly you complete dark adaptation. For example, it would require less time to completely dark-adapt after being exposed to a darkened theater after being exposed to the brightness level of an office.

Maximum dark adaptation is reached in about 30 to 45 minutes under minimal lighting conditions. If the dark-adapted eye is exposed to a bright light, the sensitivity of that eye is temporarily impaired. The amount of impairment depends on the intensity and duration of the exposure. Brief flashes from a white strobe light commonly found on aircraft have minimal effect upon night vision because the pulses of energy are of such short duration. On the other hand, exposure to a road flare, vehicle headlights, or alternate high intensity lighting will seriously and dangerously impair night vision. The recovery of a previous maximum level of dark adaptation could then take from 5 to 45 minutes in continued darkness.

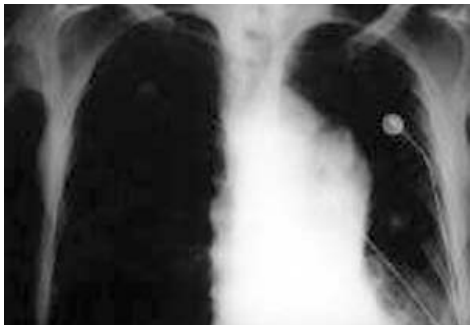
Safety Tips For the Nighttime LZ

- All available lighting should be turned on to assist the LIFE STAR crew in locating a specific landing area.
- Once the landing area has been identified, turn off all white lights shining toward the nose of the aircraft.
- After the aircraft has landed, lights can be used again, however, please do not shine any lighting directly at any crewmember.
- Prior to LIFE STAR departure, turn lighting back off.
- Landing zone hazards are more difficult to see at night. Please take a little extra time to double check the LZ for wires and other obstructions.

Case Study: ACUTE TRAUMATIC AORTIC DISSECTION/RUPTURE

By Steve O'Donnell, RN, CEN, EMT-P

LIFE STAR was requested for an interfacility transport for a 49 year old patient who sustained blunt chest and abdominal injuries in a high speed motor vehicle crash. At the sending facility, he was found to have a left side hemothorax, a flail chest, and a grossly positive diagnostic peritoneal lavage (DPL). The patient was intubated, chest tubes were placed (300cc blood drained from the left chest tube), and aggressive fluid resuscitation was initiated for signs of shock. The positive DPL and hemodynamic instability prompted emergent exploratory abdominal surgery. After a splenectomy and multiple transfusions, hypotension resolved. Postoperatively, a chest CT scan was completed which revealed a traumatic aortic dissection at the ligamentum arteriosum. LIFE STAR was called to transport this patient to Rhode Island Hospital, a center with cardiothoracic surgical capabilities.



Aortic dissection image

Discussion:

Postoperatively, the patient's heart rate was 120-140/min, and blood pressure ranged from 140-170 systolic. Additional studies showed no further abdominal hemorrhage or blood in the thoracic cavity. With intra-abdominal bleeding now controlled and hyperdynamic vital signs persisting, an Esmolol infusion was initiated by the flight team to minimize shearing forces against the area of aortic disruption. The treatment plan in flight also included pain control, sedation, urine output monitoring for signs of organ perfusion and neurological status monitoring. Over the course of the 40-minute transport to Rhode Island Hospital, blood pressure was reduced to 100-116 systolic and heart rate was lowered to about 100 with titration of the Esmolol infusion. After a brief evaluation in the trauma room at Rhode Island Hospital, his patient went for surgical aortic repair.

The challenge of managing patients with traumatic aortic dissection who also have other blunt trauma injuries can be difficult and merits further discussion.

Acute Traumatic Aortic Dissection/Rupture

Traumatic aortic injuries occur when there is blunt force trauma to chest wall as from a deceleration injury in a front-end collision motor vehicle accident. The injury is caused when the body is in motion and impacts a fixed object, for example, the chest against the steering column. Lateral impacts also have a high probability of causing aortic injures. These impacts cause a direct blunt injury to the chest wall while the internal organs of the thoracic cavity continue in motion. If organs or structures have points of fixation, as with the aorta at the ligamentum atreriosum, the force of the aorta moving against this point of fixation (shear force) can cause the dissection or rupture.

Aortic Dissection occurs when blunt trauma shearing forces create a separation between the layers of the aorta, specifically the inner layers of the aorta. This allows blood to enter between the layers, and because it is under great pressure, it begins to dissect the aortic lining like a bulging inner tube. Each contraction of the left ventricle can cause further separation of the layers causing the dissection to lengthen.

Aortic Rupture is a tear through all layers of the aorta causing massive hemorrhaging into the chest or abdominal cavity, depending on the location of the rupture. Traumatic rupture of the thoracic aorta causes sudden death in 75% to 90% of patients, with only 15% to 25% of the victims reaching a hospital in stable condition.

Of patients that sustain a blunt traumatic aortic injury, 85% die at the scene and of those who arrive at the hospital with unstable vital signs, 2% survive. Within the first 48 hours of injury there is a 1% per hour increase in death for untreated patients.

It is important that caregivers be very familiar with aortic injury management, since immediate repair may not always be possible in all patients. Temporarily ineligible candidates include patients unstable from intra-abdominal injuries who require laparotomy, patients with severe closed head injuries requiring craniotomy, or elderly patients with comorbidities that prohibit emergency thoracic surgery. Cardiothoracic surgical capabilities may also be limited at some institutions. Patients with aortic injuries must be managed medically until these other factors resolve. Pharmacological control of blood pressure and heart rate is extremely important when delayed or non-operative management is contemplated.

Evidence is accumulating that in stable patients, purposeful delay of surgery in combined with blood pressure control and careful monitoring of the mediastinal hematoma may be an acceptable course of action. This purposeful delay allows the surgeon time to assess the patient's total injury burden and select optimal timing for operative intervention. Thoracic stent grafts instead of operative interventions may also be considered to repair aortic injuries for patients with adequate vital signs. Immediate operative aortic repair is indicated for patients with unstable vital signs, penetrating aortic injury, large-volume hemorrhage from chest tubes or rapidly expanding mediastinal hematoma.

Until the aortic disruption is repaired, treatment focuses on reducing systolic blood pressure and the force of left ventricular ejection. Initially, a beta blocker is used to lower both blood pressure and slightly lessen the force of the heart's contractions, thus reducing stress on the aorta. Often, a second antihypertensive medication is added to help lower blood pressure as far as possible without compromising blood flow to the vital organs. The recommendations are to initially utilize a beta blocker to reduce systolic blood pressure to approximately 110 and heart rate to 70 while monitoring end organ perfusion and neurological status. Use of a short-acting beta blocker such as Esmolol is a good option if hemodynamic status is tentative. Labetalol, which has alpha and beta blocking effects, may also be used. If the beta blocker alone does not adequately control blood pressure, a vasodilator such as nipride should be added. If volume losses cannot be controlled or hypotension is present, resuscitation with crystalloid and/or blood products is appropriate and beta blocker administration should be avoided.

New Crew Members

Flight Nurse Jeremy Kriner, RN, CEN, EMT-P, joined the LIFE STAR team in May 2005. Jeremy has experience in emergency and critical care from UPMC Presbyterian, New Britain General Hospital and Hartford Hospital. He received his BSN from the University of Pittsburgh.

Flight Nurse Sara Sonstroem, RN, CEN, EMT-P, joined the LIFE STAR team in June 2005. Sara has prior flight experience from Native Air in Arizona. She has experience in critical care and emergency care.

Flight Nurse Stephen O'Donnell, RN, CEN, EMT-P joined the LIFE STAR team in May 2005. Stephen comes to the program with extensive experience in emergency and critical care settings. He is a retired police Sergeant from the Hartford Police Department where he received his training in Tactical Emergency Medicine.

LIFE STAR Myths Dispelled

By Michael Frakes, APRN, CCNS, CFRN, CCRN, EMTP and Jonathan Barbagallo, EMT-I Training Specialist

"LIFE STAR can't fly in the rain or snow."

"When LIFE STAR is cancelled by a fire department while en route to an accident scene, a bill is sent to the patient regardless of transport."

"LIFE STAR only brings patients to Hartford Hospital."

These and many other myths have been stated as fact by many for almost as long as Hartford Hospital's helicopter program has been in existence. This article will explain the truths behind a few of the myths and rumors that have been around for years.

Myth: LIFE STAR can't/won't fly in bad weather.

Truth: Just because it is raining or snowing does not automatically mean the helicopter cannot be requested. As part of our commitment to operational safety, LIFE STAR does have strict weather minimums, but that does not preclude the helicopter from flying in rain, snow, or windy conditions. Prior to accepting a flight, the pilot will check the ceiling (height from the ground to the clouds), visibility (how far ahead you can see) and wind speed. If the weather conditions meet the minimums set by our program, the helicopters are more than able to fly safely.

Myth: LIFE STAR always brings the patients back to Hartford Hospital (or only Level 1 trauma centers).

Truth: LIFE STAR is obligated to follow the State of Connecticut trauma regulations that require transport to the closest appropriate designated trauma center from the scene. If the injury includes burns or certain amputations, LIFE STAR may transport directly to the most appropriate burn center or re-implantation center. Similarly, if there are a number of patients going to the closest trauma center, LIFE STAR may fly over that center to allow those resources to be used for the other patients already en-route. The ability to get the patient to an optimal destination quickly is one of the many advantages of helicopter transport. Other factors including weather conditions and fuel status help to decide which hospital the patient will be transported.

For inter-facility flights, LIFE STAR will take the patient to the destination chosen by the physicians at the sending hospital. Although Hartford Hospital is centrally located within Connecticut and does receive patients, many other hospitals, including Level 2 trauma centers, are frequent destinations.

Myth: LIFE STAR sends a bill to the requesting hospital, fire department, or ambulance service even if they are cancelled.

Truth: If a requesting agency does not need LIFE STAR's services and cancels LIFE STAR before or even after we arrive, there is NO charge.

Myth: You shouldn't send a patient with a closed head injury in a helicopter because the high altitude during the flight will cause more injury.

Truth: Except in extremely rare cases, any altitude change does not affect patients with closed head injuries. Well-done medical research has shown that patients with closed head injuries are among the groups of patients whose outcomes are actually much better when transported to the hospital by helicopter transport teams than by any other means. With regard to altitude, it is quite uncommon for the minimal altitude change that happens in a LIFE STAR flight to have an important effect on the patient. The Flight Team is extremely well-versed in the physical laws that describe the effects of altitude change. They can identify the rare cases where altitude change is important and will implement strategies to manage those patients.

Myth: The helicopter can't land unless a fire truck is on scene and a hose line is charged.

Truth: Our program does not require the fire department to be present at a landing zone. It is up to the local municipality or hospital to decide if fire apparatus must be present during a helicopter landing. While having a fire department on scene is appreciated, our pilots will not land at any site unless they deem the landing zone to be safe. A hose line off the apparatus and charged is not recommended. Sometimes the pilot may decide that another landing zone is more appropriate. Charged hose lines can hinder swift relocation of fire apparatus to the new location. Also, should the aircraft have an emergency near the landing zone; ground crews should be able to move quickly to assist.

Myth: The helicopter is too small for the flight team to provide any care during the transport.

Truth: There is no intervention that cannot be provided in flight, including placing peripheral and central intravenous lines, intubation, and medication administration. The patient cabin is small, but this actually allows the Flight Team to reach the entire patient and all of the medical equipment, which includes a transport ventilator, a monitor for EKG, invasive and noninvasive blood pressure, pulse oximetry and capnography, two multi-channel infusion pumps, and the monitor/pacer/defibrillator. Scene times may be extended to complete essential BLS care such as spinal immobilization, or to intubate a patient whose respiratory or neurological status requires immediate intervention.

Myth: The helicopter takes too long to get to my location to use them.

Truth: The helicopter generally flies at about 150 miles per hour and our activation goal is seven minutes from the time of dispatch, so it generally does not take that long to reach any destination. However, we recognize that in a critical situation, every second counts. The often overlooked part of the LIFE STAR response time is the time between dispatch or arrival of the first responders and the time that the request for a helicopter is made. While each location has unique policies governing a helicopter request, LIFE STAR will accept a request from any fire, EMS, or police personnel responding to or at the scene of an incident. The earlier the call, the sooner the helicopter will arrive. Remember that there is not a charge to the patient, municipality, or agency if a helicopter is requested in good faith and then canceled en-route.

Additionally, you can reduce the activation time and gain dispatch priority by using our Standby Policy. A standby request will allow the pilot to confirm weather and the team to be on the helipad while you make your final launch decision. A helicopter will remain on standby, not accepting other requests, for 15 minutes. If you make a standby request from a location more than 20 miles from where the closest helicopter is located, it will launch to your location on a "Flying Standby" to make a greater reduction in our response time.

Hopefully this article clears up some LIFE STAR myths. For further questions, e-mail Nicole Wilson at NWilson@harthosp.org. Letters to the editor regarding questions or concerns about the LIFE STAR program are also welcome!

2005: Year in Review

By Steve Haemmerle, RRT, Chief Respiratory Therapist and Nicole Wilson, Communications Specialist

One word can sum up the year for the LIFE STAR program: Thankful. The year began with LIFE STAR being the beneficiary of Hartford Hospital's Black and Red Gala. The funds from this annual event allowed the program to purchase medical, safety, and communications equipment to continue maintaining LIFE STAR's commitment to superior critical care and safety.

- On June 17, 2005, exactly 20 years from the program's inauguration ceremony, LIFE STAR celebrated 20 years of service. A ceremony to highlight this accomplishment was held on the front green of Hartford Hospital.
- On October 22, 2005, New Milford Hospital hosted its annual "Honoring Our Hero's" Banquet. LIFE STAR, along with Roxbury Ambulance, were nominated and received this award for the collaborative care of a critically injured child.
- A fallen colleague was officially remembered on November 19, 2005. The rest area on Interstate 91 North, between exits 19 and 20 was dedicated to LIFE STAR Flight Nurse Jennifer Hodges. Jennifer Hodges became Connecticut's first EMS personnel to have a part of a state highway dedicated to her remembrance.
- Finally, LIFE STAR finished the year with another milestone in the program's history. On December 20, 2005 a critically injured patient was transported from Sharon Hospital to Hartford Hospital. This frequent and scenic route through Connecticut's northwest hills became a part of LIFE STAR history. The patient marked the 20,000th patient flown by the program.

As the LIFE STAR program heads into the next 20 years, we look forward to the positive changes in the industry, the continued success of the program, and continuing to improve on our services to our customers and the community.

News Briefs: FYI

Promotional Events

Are you interested in doing a drill or having a LIFE STAR safety presentation? Please call (860)545-4369 to schedule your event. Please give us three possible dates at least ONE MONTH in advance. Our crew needs ample time to accommodate your requests! Training is the key to safety.

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