MedEvac Foundation International
Grant Outcomes

The MedEvac Foundation International invests in vital research and education to help the medical transport community become more effective in the delivery of safe, quality critical care transport to critically ill or injured patients.
The goals of the MedEvac Foundation Grant Program are to:

1. Promote research and education within the specialty of critical care transport.
3. Advance safety in critical care transport.
4. Advance the overall cost-benefit ratio of all aspects of critical care transport systems, whether by air or ground.
5. Facilitate the academic growth and development of future researchers and educators in critical care transport program.

The MedEvac Foundation releases a request for proposals (RFP) with the above-mentioned funding goals as well as a list of funding priorities for the funding cycle. However, the foundation welcomes all proposed studies or projects.
**PROMOTING RESEARCH & EDUCATION IN CRITICAL CARE TRANSPORT**

**Accelerating Improvement with the Ground and Air Medical qUality in Transport (GAMUT) Database (2015)**

*Michael Bigham, MD, FAAP*

This grant is currently in process. Transport medicine has matured into a specialized discipline. Although equipment, patient assessment methods, therapeutic interventions, protocols, aircraft/vehicle technology, and professional training have advanced significantly, related initiatives in medical transport quality care research has lagged behind. In 2011, six pediatric-neonatal critical care transport programs in Ohio addressed this need by forming the “Ohio Neonatal/Pediatric Transport Quality Collaborative.” This collaborative effort was the genesis of an ambitious project: defining quality metrics in transport and forming a collaborative to create transport-related quality improvement measures. Further development led to creation of the Ground and Air Medical qUality in Transport (GAMUT) Quality Improvement Collaboration and quality metric database. The GAMUT quality metrics project and its database now include more than one hundred participating medical transport programs and more than 150,000 patient contacts across all age groups. Its rapid acceptance by the transport community attests to the project’s benefits. The MedEvac Foundation grant funding is meant to further develop and implement a GAMUT database graphical dashboard user interface.

**Flight and Ground Transport Nursing and Paramedic Core Curriculum (2011)**

*Jill Johnson, RN*

An outline of knowledge, transport consideration, patient care interventions, and expected patient outcomes will be developed and submitted to ASTNA and IAFCCP for consideration and acceptance. From there chapters will be developed following the outline to integrate safety and transport considerations into the planning, preparing, and treatment of patients during transport. Chapters will be peer reviewed and compared to current evidence-based literature to ensure best practices in patient care and safety. The Core will serve as the body of knowledge for transport nurses and paramedics. This resource will be utilized to set the standards for orientation, continuing education, and training of transport nurses and paramedics.
A Concept Mapping Approach to Prioritize the National Research Agenda for CCT (2008). The Future of Research in Critical Care Transport is Identified
*Cathy Jaynes, PhD, RN*

The purpose for a blueprint for critical care transport research is to identify and categorize areas of needed research to direct future funding toward priority research projects. A group of medical transport leaders and stakeholders went through three phases of the study: brainstorming, categorization and prioritization. The results yielded one hundred and one research questions in the following key areas: clinical care, crew education and training, finance, human factors, patient outcomes, safety, team configuration, and utilization. The research questions were plotted on a cluster map based on urgency and feasibility. *Published in the Air Medical Journal 2013.*

A Proposal to Initiate an Annual Research Academy as a Pre-conference Activity at the Air Medical Transport Conference (AMTC) (2008). Research Academy Preconference
*Mark Alain Dery, DO, MPH*

The purpose of this project was to educate the air and ground medical transport community in research methodology that will inspire individuals to perform high quality investigational studies that will advance the air and ground transport scientific knowledge. The way in which this project did so was to develop an Air Medical Research Academy that will be held at the Air Medical Transport Conference (AMTC). The program was taught over the course of one day using the “pre-conference” model of continuing education. Research leaders in the air medical community also provided one-on-one research mentoring during the AMTC. Together, the mentorship program with the AMRA will provide individuals with interest in research and an excellent opportunity to be trained in the skills necessary to perform distinctive and high quality research.

Aviation for the Medical Director (an educational product / presentation) (2007). Aviation Education for Medical Directors Aides Appropriate Utilization of Air Medical Transport
*Mike Jasumback, MD*

This educational presentation, designed for medical directors and appropriate for air medical clinical teams as well, was developed to provide a foundation for non-pilots to be able to address aviation issues that directly affect the provision of air medical transport services. In sessions at the Air Medical Transport Conference (AMTC) and AMPA Core Curriculum medical directors and air medical crew were educated to better understand aviation issues that affect their ability to transport patients safely and efficiently. By educating the directors and crews the goal is that they may further educate their customers in the appropriate and safe utilization of air medical services.
Comparison of Portable Blood Warming Devices at Different Flow Rates for Prehospital Use (2015) Andrew Weatherall

This grant is currently in process. Previous studies show infusion of cold crystalloid fluids can cause a drop in core body temperature of approximately 1.3 degrees Celsius. This is potentially harmful as trauma patients are at risk of hypothermia, with studies showing 50% of major trauma patients presenting to the emergency department have a core temperature of less than 36 degrees Celsius. Post-traumatic hypothermia is an independent predictor of mortality in retrospective and prospective studies. Commercial warming devices are already in use in the market, but formal assessment of these devices in real world conditions is lacking. By replicating prehospital flow rates and assessing how these devices provide warmed blood product, clinicians will be better able to judge device performance and the ability to prevent resuscitation-related hypothermia. The study will also assess device safety, including red cell hemolysis, to ensure such a device does not compromise patient safety as it performs its role in warming infused blood products.

Analysis of Temperature Variability in Medication Storage Compartments in EMS Transport Vehicles (2013) Margaret O’Donnell

This study outlines a program to monitor medication storage in emergency transport vehicles for UNC Carolina Air Care. Sensitech will provide a TempTale®4 temperature monitor for two medication storage locations in each of two helicopters. Sensitech will provide training and documentation to UNC Carolina Air Care personnel on project procedures. The project includes an expected 14-day monitoring period for each of the four storage locations. UNC Carolina Air Care personnel will start and place each monitor in the correct location. At the conclusion of the data collection period, monitors will be retrieved and returned to Sensitech for data storage and analysis. This procedure will be followed twice, once in the summer season and again in the winter of 2015. The data captured in this study will aid air medical transport programs in making medication storage decisions to comply with internal and regulatory requirements. Published in the Air Medical Journal 2016.
Assessment of patient’s exposure to transport (2011). Design and Evaluation of a Multi-Sensor Unit for Measuring Physiological Stressors of Medical Transport
Andrew Reimer, PhD, RN

Air and ground medical transport play a critical role in transferring patients from smaller referring hospitals to large academic medical centers. However, patients who are transferred from one hospital to another hospital experience increased mortality. The purpose of this pilot study was to design, build, and demonstrate feasibility of a sensor that measures the environmental stressors of medical transport. Results from this pilot study demonstrate the feasibility of building a new multi-sensor unit that reliably measures the environmental stressors of medical transport, moving beyond commercially available individual sensors. Further calibration of the electret microphone is necessary. The prototype sensor recordings are reliable and consistent with other reported findings.

Pre-hospital Stroke Diagnosis Using Ultrasound and Wireless Technology (2011)
Thilo Hoelscher, MD

The results of this pilot study imply that transcranial Ultrasound studies can be performed in the prehospital environment, the middle cerebral artery can be assessed bilaterally using ultrasound either at the site of the emergency or during patient transport to the hospital, the non-invasive assessment of brain vessels does not interfere with the emergency workflow at the site or during transport, the image data can be sent wirelessly in real-time from the emergency vehicle to a dedicated server in the hospital, and transcranial ultrasound studies can be performed by paramedics or EMT’s. The rather encouraging results of this pilot study support the aim to continue the project by implementation of acquisition of additional ultrasound devices, installation of paramedic/EMT TCD training program, inclusion of additional study sites, special focus on ‘911 Stroke Code’ patients, and the use of ultrasound microbubbles for improved diagnostics.

Pulmonary Vascular Responses to Air Transport (2011)
Thomas Smith, MD

This study has demonstrated that pulmonary artery pressure increases during simulated air travel in healthy people, consistent with previous in-flight observations. This study also provides evidence indicating that the pulmonary artery pressure response to simulated air travel is greater in older people than in younger people. Advancing age may increase in-flight susceptibility to adverse pulmonary vascular responses in aeromedical patients. Until further evidence is forthcoming, it may be prudent to consider using supplementary oxygen routinely in elderly patients undergoing specialist air ambulance transportation, regardless of medical condition or status, at least for long distance transfers.

Diagnostic Accuracy of Stroke During Patient Transport with a Portable Ultrasound is Just the Beginning

Thilo Hölscher, MD

This study examined the accuracy of portable ultrasounds to identify acute stroke in patients during transport in Bavaria, Germany. In the study, a stroke neurologist with expertise in ultrasonography was dispatched to the scene of all suspected stroke patients. After a brief neurological assessment, stroke patients underwent transcranial color–coded sonography (TCCS). TCCS is a non-invasive ultrasound application that combines both imaging of functional structures of the brain, as well as measurement of blood flow in the brain. Ultrasound was performed either at the scene of in the ambulance during transport. The study results were promising. The sensitivity of a field diagnosis of stroke using the ultrasound equipment (meaning the percentage of patients having a stroke was correctly identified) was 90%. The specificity (meaning the percentage of patients not having stroke was correctly identified) was 98%. The MedEvac Foundation will continue to fund the next stage of this study, namely starting stroke treatment, during patient transport, using ultrasound and microbubbles.


Time Savings by Rapid EMS Antibiotic Therapy for Fractures: CCT CORE Treat Fx Study (2009).

EMS Can Save Time by Providing Rapid Antibiotic Therapy for Fractures

Stephen Thomas, MD, MPH

Research indicates that patients with an open fracture should receive antibiotic treatment as soon as possible for the best results. This study demonstrates that HEMS crews are able to make a diagnosis of an open fracture wound in the field with a high level of accuracy, and can administer antibiotics 30 minutes faster than at the hospital. The results on time saving of administered antibiotics while in transport are not statistically significant when evaluating whether a patient developed an infection or the bone did not heal correctly. However, the estimate for risk reduction was low and the effect magnitude was promising. The results also suggest that a randomized controlled trial for prehospital versus hospital administration of antibiotics to patients with suspected open fractures is warranted.
Does transport Induced Biophysical Impulse Cause Respiratory Deterioration by Inactive of Surfactant Proteins? (2008)
Shetal Shah, MD

Forces transmitted to the neonate as a consequence of accelerations during transport have been associated with adverse neonatal outcomes including broncho-pulmonary dysplasia. In this study, it was sought to determine the relationship between the duration of transport and respiratory performance in the rat model. The study results found increased transport time resulted in a significant step-wise increase in airway resistance at all levels of PEEP. Static compliance decreased significantly after 60 min at PEEPs of 3 and 6 cm H(2)O. Eta significantly decreased with greater transport time at a PEEP of 6 cm H(2)O. Tissue damping increased with duration of transport time across all PEEP levels, but only exhibited statistical significance at a PEEP of 0 cm H(2)O. No differences were seen in hysteresivity or inertance. Compared with controls, transport was associated with significant reductions in total phospholipid content and mRNA levels of surfactant proteins B and C. Rat pups experienced significant deterioration of respiratory function with increasing duration of simulated transport. Published in the Journal of Perinatal Medicine 2010.

HEMS Provider Use King LTS-D Airway in RSI patients (2008)
R.J. Frascone, MD, FACEP

This case series evaluated provider use of the King LTS-D as a primary airway in patients requiring rapid-sequence intubation (RSI). Twenty-seven paramedics completed a one-hour training session on the use of the device. All patients meeting the service's standard criteria for medication-assisted airway management were included in the study. Following each insertion, paramedics contacted a research hotline to complete data collection. Analysis between pre- and postinsertion variables was completed using the Wilcoxon signed-rank test. A total of 11 patients met the enrollment criteria and were treated with the device by nine of the 27 paramedics enrolled in the study. All 11 insertions (100%) were successful, with 10 of the 11 (91%) successes achieved on the first insertion attempt. No significant difference existed between pre- and post-insertion pulse rate or blood pressure measures. In this case series, paramedics were able to successfully place and use the King LTS-D in patients meeting our emergency medical services (EMS) system indications for RSI. Published in the Air Medical Journal 2013, Resuscitation 2012, Resuscitation 2011, Prehospital Emergency Care 2009.
Establishment of the Critical Care Transport Collaborative Outcomes Research Effort (The CCT CORE Airway Project) (2007)

Stephen Thomas, MD

The first study using the CCT CORE data proved that critical care transport (CCT) has a 98 to 99% success range of pre-hospital endotracheal intubation (ETI) or airway management. CCT crews, who receive greater training and use more sophisticated equipment and medications than ground EMS crews, offer a higher level of care in these life-saving situations. The results also challenge previous reports that have suggested pre-hospital ETI is associated with greater negative patient outcomes. Published in Prehospital Emergency Care 2010.

Sound Levels in Critical Care Transport Vehicles and the Neonatal Response During Transport (2006)

Greg Pippert, MD, FACEP

Neonatal patients often require air critical care transport to hospitals that can appropriately meet their medical needs. Current standards for sound levels in neonatal intensive care units (hourly maximum of 45 dB with an impulse maximum not to exceed 75 dB) and an international guideline for sound levels during transport (60 dB maximum) exist, but few studies have examined adherence to these standards. This study concluded that interior isolette noise is much higher than the NICU or international standards cited in the literature. Higher noise levels have been linked to possible hearing loss. The use of sound attenuating foam or neonatal earmuffs should be explored to determine the impact they have on decreasing sound level exposure.


Eric Swanson, MD

This study evaluates the use of the Intubating Laryngeal Mask Airway (ILMA) in an air medical transport service utilizing rapid-sequence intubation. The study concluded that the I-LMA was used effectively as both a primary and a rescue airway device by the test air medical transport service. The I-LMA was easy to use and successfully ventilated patients in all encounters, including those patients in which laryngoscopy had initially failed.
Sleep-Wake Patterns and Real-Time Fatigue Reduction in EMS Clinicians: Phase II (2015)
P. Daniel Patterson, PhD, NRP, Frank Guyette, MD, Eileen Frazer, Doug Swanson, MD, Charity Moore, PhD

This grant is currently in process. Phase II of this study will provide a novel mechanism for fatigue risk management through improved real-time surveillance and targeted, individualized, and tailored interventions. Phase I and II will have a significant impact on the medical transport community. The future of fatigue risk management is in the use of real-time monitoring. Knowledge of fatigued clinical providers will allow for improved strategies, such as prompting the provider to use caffeine or to take a nap. Data from the Phase II study may demonstrate how agencies can integrate this type of technology and protocol as part of a larger fatigue risk management system that includes brief rest periods or other strategies. This research may also lead to the technology being used to proactively identify HEMS clinicians with poor sleep health and offer them resources to mitigate fatigue related risk and improve their quality of life.

Sleep-Wake Patterns and Real-Time Fatigue Reduction in EMS Clinicians (Phase I) (2014)
P. Daniel Patterson, PhD, NRP, Frank Guyette, MD, Eileen Frazer, Doug Swanson, MD, Charity Moore, PhD

A key component of this study was data collection using novel tools and techniques. Funds were used to support web-based data collection of survey data, sleep diary data, actigraph data, and psychomotor vigilance data. Funds were used to facilitate an upgrade to the SleepTrackTXT data collection tool for use in Phase 2 – the intervention study. The SleepTrackTXT tool was used in a recent randomized trial of EMS clinicians to determine the performance and impact of a novel fatigue assessment and intervention protocol. The tool performed exceptionally well and collected more than 36,000 EMS clinician reports of fatigue, sleepiness, concentration, sleep hours, and safety outcomes from 100 EMS clinicians distributed across the United States. Results from that trial were recently published in the American Journal of Industrial Medicine. The team successfully submitted an abstract with preliminary findings on August 3rd, 2015 to the annual National Association of EMS Physicians (NAEMSP) meeting. The submission was accepted for a poster presentation and was presented on Friday, January 15th 2016 in San Diego, CA by Principal Investigator (Dr. Patterson).
Survivor Perceptions of Recovery Following an Air Medical Transport Accident (2012)

*Survivor's Network and The Center for Medical Transport Research.*

There have been numerous accidents since the inception of the industry. National Transportation Safety board investigations report 354 air medical crash fatalities between 1972 and 2010. It is estimated that there are over 600 crash survivors. This study utilized a descriptive qualitative research design with a single focus group used to collect data about survivor experiences. Major themes were the extent of physical injuries, psychological reactions to trauma, social and financial impact, support and advocacy, how programs were involved in the survivor's recovery and the transparency of post-crash discovery. *Published in Prehospital Emergency Care 2014*

Safe Emergency Transport of Neonatal Patients (2012)

*Nadine Levick MD, MPH*

The objective of this study is to scientifically address the safe medical transport of neonatal patients from a technical biomechanical, biofidelic, occupant protection, and clinical operational perspective using a comprehensive interdisciplinary team approach, bridging occupant protection engineering and clinical practice needs in neonatal transport. This Phase I project involves the assembling of an interdisciplinary team, linking expertise in automotive safety engineering/pediatric occupant protection and neonatal transport expertise with clinical transport systems safety and operational evaluation. The Phase II project has a goal to develop and test optimal neonatal transport safety systems, practices and devices and develop comprehensive guidelines and recommendations.

Deviation and Validation of a Taxonomy to Categorize adverse Events and Near-misses in Transport Medicin (2008)

*Russell MacDonald, MD*

This is the first study to systematically collect and categorize near miss and adverse events in an air medical transport setting. The results allow potential root causes for adverse events to be categorized. The study concluded that air medical transport is associated with a low incidence of adverse events and patient harm. Determining event causes is necessary to direct future efforts to improve safety in air medicine. As a follow up study, Dr. MacDonald is conducting another MedEvac Foundation funded research study to create standardized terminology for error reporting and analysis when categorizing adverse events and near-misses in transport medicine. This will allow comparison amongst transport services, and between transport services and other health care and aviation settings, and will permit benchmarking. Ultimately these efforts can help better monitor outcomes of change efforts and mitigate risk to patient and transporting crew. *Published in Academic Emergency Medicine 2008.*
Webinar on Ambulance – Ground Transfer Safety (2009)

Nicole Alexander, MPP

MedEvac Foundation funded a webinar outlining ways that transport teams can safely and effectively transfer neonatal and pediatric patients by ground ambulance. After a detailed presentation by five safety experts in the transport medicine field, the presenters offered participants an opportunity to ask questions, share comments, and exchange ideas. In addition to discussing what teams can do to ensure that patients are transferred safely and efficiently by ambulance, the webinar also addresses ways to improve the regulatory environment that governs ground transfers. “Ambulance Safety in the 21st Century” had 355 registered participants from over 132 sites. As a result 71% of the survey respondents noted that they intended to change their current practices – including teaching team members about the importance of restraints for patients as well as healthcare professionals.

Assessment of Cognitive Fatigue in Air Medical Providers (2009)

Francis Guyette, MD

The research project used a battery of previously validated surveys and neuropsychiatric tests to compare changes in fatigue and cognitive abilities of air medial crews after 12 and 24-hour shifts. The results concluded that one third of EMS providers in the survey identified themselves as severely fatigued and half get poor sleep. However, in this sample of air medical providers, shift length was not associated with changes in fatigue or cognitive function. Actually, fewer providers identified themselves as severely fatigued post shift vs. pre shift. There were no changes in performance on cognitive tests following a shift in either group. Published in Prehospital Emergency Care 2013.

The Role of Digital Stories in Air Medical Transport Safety: Develop digital narratives and learn how to use them to influence behavior (2009)

Cathy Jaynes, PhD, RN and Howard Werman, MD

Quality assurance processes to improve safety are typically void of emotional content, although emotional content can also be helpful to individuals by identifying the importance of the issues presented. Digital storytelling is a creative variant of reporting information that can be used to augment a dry and impersonal a safety review process by presenting narratives or “lived experiences.” MedEvac Foundation funded a digital storytelling workshop in which seven individuals presented their personal stories concerning safety issues in the medial transport community. Each clip told the story of how that person survived or avoided a crash, the things they did or did not do, lessons learned, and what their experience can teach the greater transport community. These personal narratives may be as beneficial as adjuncts to educational topics, used to influence policy when shared with decision makers, or for research
and evaluation in an academic context. The videos are available online at www.tcmtr.org. Transport programs are encouraged to use them in safety meetings, safety education and whenever a program wants to focus on a particular safety topic.

The Effect of Sleep Inertia on EMS Pilot Performance (2009)

Frank Thomas, MD

EMS pilots often must wake from sleep to make quick decisions on mission safety. This study evaluated 20 pilots before falling asleep, after 30 minutes of non-REM sleep and after 10 minutes of REM sleep. The results demonstrate that performance recovery depends on the level of sleep (non-REM vs. REM) and the skills tested. Psychomotor (physical dexterity, coordinating and movement) skills recovered the fastest at less than 10 minutes. Pilots who never made it to REM sleep recovered even faster than 10 minutes. Visual attention and vigilance recovery required less than 15 minutes. Finally, self-assessed fatigue necessitated about 30 minutes or more for a pilot to not feel tired. Understanding the effects of sleep inertia on EMS pilots will pave the way for improved safety mitigation strategies.


H.B. Martz

The purpose of this project was to greatly improve the chances of survival through effective water safety education, exposure, familiarization, preparation and technique. As well as to develop and maintain an educational component by which air medical crewmembers will be able to overcome disorientation, react, egress, survive and successfully effect a water rescue in the event of a life threatening water related emergency. The following courses of instruction and exercises were taught and/or demonstrated by each participant in lecture format and through dynamic in-water practical scenarios: role and responsibility of the leader, overwater emergency strategy, underwater escape procedures, search and rescue procedures and clothing inflation techniques. This grant developed an educational component for presentation at the 2008 Air Medical Transport Conference (AMTC). The Water Egress Training course has been offered at each AMTC since.


Paul Davenport, RN, CMTE

By utilizing web-enabled software, the incidence of helicopter shopping can be identified and quantified. This Virginia-based study found that hospitals represented 63% of the total agencies that demonstrated helicopter shopping. Of the agencies/hospitals that demonstrated helicopter shopping behavior, 58% did so more than once during the review period. While broad based education and awareness programs are important to address helicopter shopping. The system monitoring allows for focused discussions with agencies/hospitals that exhibit
helicopter shopping behavior. The range of helicopter notifications ranged from 1 minute to 45 minutes. Typically helicopter shopping has been defined as calling, in succession (quickly), air medical providers and the requestor not informing the providers of the previous turndown. However this study calls into question the definition and timeframes should be broadened to include longer times between same location requests.

*Ira Blumen, MD, FACEP*

*This grant is currently in process.* A research team comprised of over 30 aviation and air medical professionals has been established to undertake this HEMS safety research project. A comprehensive root cause analysis will be conducted on each of the HEMS accidents since 1998. Problems that influenced or contributed to each accident will be identified and scored. Interventions will then be identified that could have prevented or reduced the effort of the accident. Through this evidence-based research and analysis, concrete recommendations will be made to compare the potential benefits, cost, effectiveness and feasibility of various factors that can prevent HEMS accidents or reduce the impact of accidents that do occur. We have a responsibility to make HEMS safer. Safer for our crews, for our patients, for our community and for our families. This safety research will accomplish that goal.

**Reporting and Analysis of Medical Transport Incidents and Accidents (2007)**
*Eileen Frazer, RN, CMTE, CLNC*

*This grant is currently in process.* This project aims to combine two community databases with sanitized information to sort incidents from accidents and develop tools for tracking, trending and analyzing data. Then use this information to publish a semi-annual report that would be available as a Vision Zero initiative. Also, enhance the CONCERN network to become a more user friendly process and develop formal privacy policies.

**Assessment of EMS and Fire Department Knowledge of Landing zone Safety Before and after Viewing a Web-based Streaming Safety Video with Analysis of Knowledge Retention over Six Months (2007)**
*Marc A. Bellazzini, MD*

Firefighters and EMS personnel are responsible for coordinating a safe landing zone for air medical transport crews at scene responses. Their knowledge of landing zone safety is critical to prevent disaster. This study assesses the use of on-line video to teach landing zone safety to firefighters and EMS personnel. Firefighters and EMS personnel participating in our study had a moderate degree of baseline knowledge of landing zone safety. Knowledge of landing zone safety significantly increased after watching the safety video. Web-based media is an effective
and easily accessible method of teaching landing zone safety to firefighters and EMS personnel. Knowledge of landing zone safety did not decline significantly over 6 months. *Published in the Air Medical Journal 2011.*

**EMS Safety Attitudes Questionnaire (2007)**  
Daniel Patterson, MD and Henry Wang, MD

Air-medical emergency medical services (EMS) agencies scored highest nearly across the board in perceived workplace safety culture when compared to other agency types. Safety culture is the collective belief about safety conditions and practices in the workplace. This research project studied safety culture in 61 EMS agencies across the United States, surveying emergency medical technicians, EMS physicians, prehospital nurses and first responders. Using the EMS Safety Attitudes Questionnaire the researchers studied the following domains: safety climate, teamwork, stress recognition, perceptions of management, job satisfaction, and working conditions. Air-medical-only agencies scored the highest in all but one category, with the highest scores in perception of safety climate and teamwork climate. Combined air-ground agencies ranked second highest. This information and the survey tool, published in Prehospital Emergency Care in October 2010, provides an opportunity for any critical care transport program to assess their safety culture objectively and to benchmark their results against a diverse sample of other provider agencies. *Published in Prehospital Emergency Care 2010.*

Eileen Frazer, RN, CMTE

This free video provides a comprehensive overview of the limitations of helicopters during hazardous weather conditions. Designed as a curriculum for requesting agencies (i.e. dispatch centers, emergency rooms, etc.) to better understand the pressures and pitfalls facing air medical crews that can occur when accepting or declining a flight. The purpose is to raise awareness and to eliminate “helicopters shopping” – when a requesting agency calls several air medical programs asking them to transport a patient after other programs have declined the flight due to weather conditions. This video is free and may be reproduced to distribute to requesting agencies through the community.

**Assessing Air Medical Crew Real-time Cognitive Readiness to Perform Critical Tasks (2006)**  
Darren Braude, MD

Air medical flight crew must be able to focus on critical safety tasks despite multiple distractions. Cognitive readiness may be impacted by multiple factors including fatigue, stress, workload, medications and intoxicants. This study used a battery of simple computer-based psychological tests, tests to assess cognitive readiness within a few minutes. Scores obtained by
flight crew on tests correlate well with self-reported professional performance and rest, and were significantly worse at the end of the shift compared with the beginning. This process may allow flight crew to objectively determine, quickly and objectively, their cognitive readiness to perform critical safety tasks at various points in a shift, to assure on-going ability to concentrate safely. Published in Prehospital Emergency Care 2011.


*Mark Alain Dery, DO*

The largest study to date surveying HEMS pilots on their attitudes toward safety provided clear recommendations. Prior to this survey study, pilots were not regularly queried. The results of this study validated three prevailing opinions within the community: 1) crew resource management (CRM) and air medical resource management (AMRM) are effective determinants of safety within an HEMS program and are suggested to improve pilot decision making 2) night vision goggles (NVG) are seen by HEMS pilots as major component of a program committed to safety and 3) HEMS pilots believe that the quality and frequency of training, such as more time in simulators, will make them safer pilots. Published in the Air Medical Journal 2007.


*Cathy Jaynes, PhD, RN*

The purpose of this study was to identify the critical elements that contribute to a culture of safety in air medical transport. A survey was conducted with HEMS pilots to collect their attitudes toward safety. The results yielded 11 domains of safety identified by the pilots; 1) Risk management, 2) Regulatory issues, 3) Pilot training, 4) Logistics, 5) Avionics, 6) Dispatch, 7) Maintenance, 8) EMS business culture, 9) Human factors, 10) Team standards, and 11) Management. There were 37 narrative responses in the survey describing safety factors that the pilots felt were highly important as well as highly feasible. These identified areas for safety improvements present the need for further research and actions necessary to improve operational safety in air medical transport.

**The Effects of Acute Stress on Paramedic Performance (2006)**

*Vicki LeBlanc, PhD*

This study researched the association between symptoms of posttraumatic stress, coping styles, and subjective and biological responses in advanced-care paramedics when encountering a high stress simulated event. The results concluded that after the stressful event paramedics are more likely to commit commission errors, or reporting information that did not take place in the scenario. The study also found that that coping styles in stressful situations play a role in the paramedics’ response to stress. Individuals with task-oriented coping styles showed a decrease anxiety response compared to those with emotional or avoidant coping
styles. This study highlights the importance of training for crew members in high stress situation on the best coping strategies while dealing with anxiety on the job. Published in Prehospital Disaster Medicine 2012.

ADVANCING THE OVERALL COST-BENEFIT OF CRITICAL CARE TRANSPORT SYSTEMS

HEMS Effectiveness Achieved by Rapid Transport of STEMIs: The CCT CORE HEARTS Study (2012), Stephen Thomas, MD

The CCT CORE HEARTS project is an extension of a pilot project recently completed and accepted for publication. The pilot, funded by AMPA, established methodology of using highend geographic information software (GIS) to characterize logistics of ST-elevation myocardial infarction (STEMI) patients undergoing interfacility transport for primary percutaneous coronary intervention (PCI). The Oklahoma study clearly demonstrated substantial benefits associated with HEMS transport of STEMI patients for primary PCI. The approach of HEARTS is to use the methods of the preliminary study (which actually examined just one center in Oklahoma) to assess actual and estimated time performances of ground and air EMS interfacility transports of STEMI patients, for primary PCI. The study foundation is the robust evidence from the primary PCI cardiology literature that ties specific incremental time savings to specific mortality improvement.

How Does EMS Deliver Trauma Patients to Trauma Centers? (2010)
David Stuhlmiller, MD

This grant is currently in process. The goal of this project is to determine whether trauma patients are taken to the proper trauma center in accordance to EMS protocol. The study will also find the estimated time the patient to reach the trauma center (this may include either or both ground and air transport).

Defining the Current Distribution of Transport Times for Time-Sensitive Air Medical Transports and the Scope of the Procedural Practice for air Transport Providers (2008)
Scott T. Youngquist, MD

The key to surviving the most deadly type of heart attack is getting patients to a hospital that is best equipped to treat them in the least amount of time. A study funded in part by the MedEvac Foundation reveals that most air ambulance transfers from one healthcare facility to a more advanced hospital occurs in less than two hours. This timeframe is associated with the
best outcomes for acute heart attack patients whose chance of survival would be to have life-saving coronary angioplasty procedures. The study also revealed clinical decompensation of patients during air-medical transport, while uncommon, occurred most often in diabetes patients with transport delays – a finding that suggests efforts to reduce delays might reduce this risk. Published in Prehospital Emergency Care 2010.

Exploration of Gender Discrepancy in Outcomes and Utilization of Air Medical Transport (2008)
Jeffrey Singh, MD, FRCPC, MSc

This grant is currently in process. This study will generate novel data regarding the effect of transport on health outcomes and the independent effect of gender on these health outcomes. The data will be instrumental in understanding how gender influences healthcare delivery (including transport) and the effect of this on patient outcomes. The study will also assess whether there is a gender discrepancy in air medical transport utilization and referral in a heterogeneous population of acutely-ill patients registered to Emergency Departments in the province of Ontario. This information could have significant impact on care practices, transport processes, and health policy.

Christy Hopkins, MD

Correct utilization of Helicopter Emergency Medical Services (HEMS) crews for winter sport injuries would minimize the risk to crews flying in mountainous areas where weather conditions may change quickly and help identify the most cost-effective use of this resource. This study found that the use of a simple predication rule was superior to provider judgment in predicting the need for an emergent procedure in patients injured at winter resorts. Predictor variables consist of age, sex, mechanism of injury, mental status, respiratory rate, spinal cord injury, chest pains, shortness of breath or abdominal pains. If validated, this may be a resource to help out-of-hospital providers decide when to activate HEMS from these areas. Published in Prehospital Emergency Care 2011.

Characterization and Determination of Pre-Transit Predictors of Medical Intervention during Interfacility Patient Transport (2005)
Jeffrey Singh, MD

A medical study, the largest of its kind to date, finds that 5 percent of urgent-care patients experience a critical event such as a major resuscitation, rapid loss of blood pressure or respiratory arrest and even death during air-medical transport (although one in 20 transports involved critical events, fatalities were rare). The study confirms that with a highly organized, dedicated transport system, very sick patients can be transported and safely managed in-transit.
if they deteriorate. The data will be useful in refining transport and triage protocols to make in-transit events even less likely, and in training crews to effectively manage crises when they occur. The results are published in Canadian Medical Association Journal 2009. Published in the Canadian Medical Association Journal 2009.
The MedEvac Foundation would like to thank its Research and Grant Committee, especially, Russell MacDonald, MD, MPH, FCFP, FRCPC, Medical Director, Ornge, Cathy Jaynes, PhD, RN, Director of Research, The Center for Medical Transport Research, and David Olvera, AS, NRP, FP-C, CMTE, Clinical Education Manager, Air Methods.

If you have any questions, please contact the MedEvac Foundation at 703-836-8732.