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NATIONAL TRANSPOPRTATION SAFETY BOARD

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Statement from
The Association of Air Medical Services
Helicopter Association International and
Air Medical Operators Association
To the National Transportation Safety Board

(27 pages)

Air Medical Service Safety Position Paper

Association of Air Medical Services

Air Medical Operators Association (AMOA)

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The Association of Air Medical Services (AAMS), Helicopter Association International (HAI), and the Air Medical Operator's Association (AMOA) offer this position paper to the National Transportation Safety Board (NTSB) for use in the scheduled hearings on the air medical industry and aviation safety.

AAMS is the association representing providers of air and critical care ground medical transport systems worldwide. HAI is the international helicopter operators association representing its 2,800 members in over 70 nations. AMOA is a trade association representing the Part 135 air carriers that are responsible for the safety and operations of approximately ninety percent of the nation's helicopter emergency medical transports. The three associations will collectively be called "The Associations" for the purposes of this position paper.

The document entitled "Air Medicine: Accessing the Future of Health Care,"[1] published by the Foundation for Air-Medical Research and Education (FARE) describes the importance of the air medical industry:

> The use of air medical services (AMS) has become an essential component of the health care system. Appropriately used air medical critical care transport saves lives and reduces the cost of health care. It does so by minimizing the time the critically injured and ill spend out of a hospital, by bringing more medical capabilities to the patient than are normally provided by ground emergency medical services, and by quickly getting the patient to the right specialty care. Dedicated medical helicopters and fixed wing aircraft are mobile flying emergency intensive care units deployed at a moment's notice to patients whose lives depend on rapid care and transport. While AMS may appear to be expensive on a single-case basis compared with ground ambulance service, examining the benefits behind the cost on an individual and a system-wide basis shows that it is cost-effective. The picture of a helicopter at the scene of a car crash evokes visions not only of the life-saving power of air medical services, but also of the risks of the environment into which they fly. Yet, air medical patient care and transportation actually promises less risk to the patient than does a patient's hospital stay.
>
> "Time is human tissue" is a saying that means death and disability from severe injuries, heart attacks, strokes, medical and surgical complications, and other time-dependent conditions often can be avoided if the right care is provided quickly enough. AMS is a means to bridge geography and time. As technology provides new, time-sensitive care, the need for AMS will increase. As the costs of the health care system continue to rise, and the availability of even routine health care in rural communities is put at risk, AMS will play an increasingly important role in the delivery of health care.
>
> In these days of increased concern about homeland security and emergency preparedness, air medical services provide a valuable medical resource that can transport patients and medical staff long distances, as well as carry medical equipment and medical supplies to the affected area(s). AMS is an integral component of

[1] "Air Medicine: Accessing the Future of Health Care," McGinnis, Kevin and Judge, Thomas. FARE, 2006.

> disaster planning and management. The recent experience of hurricanes Ivan, Katrina, and Rita illustrate the essential role of AMS in evacuating critically ill and injured infants and adults from hospitals and nursing facilities as well as providing direct scene support to disaster management teams. Without a prompt and massive AMS response of both dedicated air medical helicopters and fixed wing aircraft to the Gulf Coast, thousands of additional lives would have been placed at risk or even lost.
>
> Integrated air medical resources are an essential component of contemporary EMS systems. Today, financial pressures, insurance issues, changing federal regulations, and competition all are forcing changes, consolidation, and in many cases reduced services or closure of emergency departments, trauma centers, hospitals and specialty physicians. These factors have contributed to the increased use of AMS to move patients to specialty centers, particularly from outlying areas. As with EMS in general, there has been a general lack of overall system planning and design to guide the development and implementation of needed AMS. Mechanisms that might provide such guidance, such as state EMS or health regulations, certificate of need (CON) processes, and federal aviation and healthcare regulations sometimes conflict with one another, providing a jumble of uncoordinated hurdles to AMS providers.[2]

These services are provided in the United States through a multitude of relationships involving Part 135 air carriers, government (public) entities, hospitals and Emergency Medical Services (EMS) providers, including both for-profit and not-for-profit organizations.

It is currently estimated by AAMS that helicopters transport 400,000 patients annually in the United States—highlighting the primary role air medical transport plays in the patient care process in the US. By comparison, the major operators in Canada transport less than 24,400 patients annually (just over 6 percent of the United States' total annual air medical transports).

The Associations maintain a position of zero tolerance for accidents in the air medical industry.[3] Different individuals within the industry might postulate that one service model is safer than another; however, a review of accidents in the last two years shows that no service model, category of operator (for-profit, not-for-profit, civilian or government) or geographical area is immune to accidents.

We must establish effective safety solutions that allow for the continuance of this necessary service—a service that has become an integral part of the healthcare system. Limiting the use of air medical services is not a safety solution; simply flying less may lead to fewer accidents, but that solution would not increase aviation safety in air medical services. Unless the number of accidents per patients transported is reduced, the industry has failed to increase safety levels.

Only through the combined efforts of the service providers—and with the support of enlightened federal policy and regulation—can the air medical industry continue its commitment to safety

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[2] "Air Medicine: Accessing the Future of Health Care," McGinnis, Kevin and Judge, Thomas. FARE, 2006.
[3] http://www.visionzero.aams.org

while providing this essential service as part of the United State's healthcare and emergency response systems.

The Associations believe the focus and efforts of the NTSB hearings should be to promote safety initiatives that will lead to a rapid decrease of air medical accidents. The Associations recommend the following initiatives:

1. AAMS, HAI and AMOA should assist the NTSB to review and amend the 2006 recommendations and develop subsequent NTSB recommendations. These should be practical recommendations for daytime, nighttime and IFR operations that enhance or replace previous recommendations that are no longer practical or applicable.

   The Associations believe in order to effectively increase Helicopter Emergency Medical Services (HEMS) safety, the NTSB should consider the following recommendations:

   a. All air medical night operations should either utilize night vision goggles or enhanced vision systems, or be conducted under instrument flight rules (IFR) in a timeline established by the FAA and in coordination with those conducting air medical operations.

   b. Congress should authorize and appropriate Airport Improvement Program funds for helipads at hospitals and airports used for air medical transport for the purchase of Automated Weather Observation Systems (AWOS), instrument and global positioning system (GPS) approaches, helipad development, and other aviation specific improvements.

   c. Congress should authorize and appropriate funds, no later than FY 2010, to study, establish, augment, and maintain a dedicated low altitude helicopter IFR infrastructure to include associated approach and departure procedures which facilitate a seamless transition from visual flight rules (VFR) to IFR operations.

   d. The FAA should prioritize and accelerate the implementation of Automatic Dependent Surveillance-Broadcast (ADS-B) infrastructure to HEMS operating environments and implementation of associated weather reporting and communications enhancements.

   e. The same federal aviation safety standards and oversight for air medical operations should apply to commercial and government (public or public use) operators of these services.

   f. Those conducting air medical services should eliminate launch or response time requirements or guarantees in helicopter air medical service operations.

   g. The FAA, in coordination with the Associations and those conducting air medical services, should establish and monitor requirements, procedures and standards for air medical services in the implementation of formalized enhanced operational

control systems in order to increase management oversight and observation of crew performance.

h. The FAA, in coordination with Associations and those conducting air medical services, should establish requirements, procedures and standards for devices, technology, and procedures used to support air medical aircraft for the enhancement of Flight Operations Quality Assurance (FOQA) programs and subsequent accident investigations.

i. The FAA, in coordination with the Associations and those conducting air medical services, should produce materials for community emergency response services and medical facilities within the operating area of an air medical service in order to address issues of "helicopter shopping".

j. The FAA should conduct a study of flight crew fatigue factors.

2. The NTSB should work with the Associations and the International Helicopter Safety Team (IHST) to enhance the methodology of the NTSB in investigating air medical accidents to establish a focus on the role of human factors in accident causation.

3. The Agencies, the Associations, and those conducting air medical services should focus future efforts on establishing best practices and ensuring the root causes of air medical accidents have been identified, via such data driven initiatives as the IHST program. Identified safety interventions and recommendations should focus on relevant issues that address those root causes.

4. The Agencies, the Associations, and those conducting air medical operations should make every effort to ensure the continued safety of air medical patients and crews while reaffirming the commitment to the public trust.

The Associations offer the information in this position paper to the NTSB to provide as much applicable content as possible; this information will cover not only the current state of air medical services but also the safety procedures, training, equipment, management and oversight that air medical services are committed to introducing or are continuing to implement in their respective operations.

It is the intent of this paper to support the recommendations above which the Associations believe will mitigate risks in air medical operations, and provide areas in which the federal government can assist in these implementations.

Flight Operations and Training

Despite community, regional and state differences in emergency medical services' protocols and procedures in the United States, air medical services operate nationally under similar processes. This section will provide a detailed explanation in regards to flight operations practices in the air medical industry and training—with a focus on pilot training.

When air medical transport is utilized, there are common steps by which the air medical transport is completed. In addition, there are circumstances each air medical service will face throughout the transport and training process.

Requests for air medical transport can be made by one of several groups of people. Generally, flight requestors are designated and restricted by local, regional, or state policy. Common individuals authorized to request a helicopter are physicians, nurses, law enforcement personnel, fire service personnel and other certified emergency medical personnel.

Generally, a qualified medical professional makes the request by contacting the communications center of an air medical service. Many healthcare agencies (hospitals, EMS) have protocols indicating when to request a helicopter and which services to contact in which order. These protocols are based on patient condition, local resources to care for the patient, and the proximity of air-medical services.

The requesting agency that has determined the patient requires air medical transport initiates the patient transport process. The first step of this process is to contact the air medical service provider; this is generally a direct call to a communications center operated by the air medical service provider or state agency.

The communications center then contacts the Pilot-in-Command (PIC) to notify the base of a transport request from the requesting agency to a designated location. The PIC has established processes and steps to go through prior to accepting the transport request. Air medical services prohibit, as much as possible, patient information from being communicated to the pilot; this is a precaution to prevent the nature of the patient—including age and condition—from influencing the pilot's decision about whether or not to accept a particular flight.

The PIC checks the weather, personnel and aircraft readiness to determine whether the flight request can be safely accepted. The pilot has access to real-time weather information, including forecast and reported conditions, radar, satellite images, ceiling and visibility, weather and trends. This information is often available via computer at the pilot's workstation. Weather checks consist of "procedures that include up-to-date weather information and assistance in flight risk assessment decisions (A-06-14)"[4] as recommended by the NTSB. The majority of air medical services have an Enhanced Operational Control (EOC) procedure in which the PIC is required to perform a preflight risk assessment prior to accepting a flight request. This process is based on the NTSB recommendation that states the following: "Require all emergency medical services (EMS) operators to develop and implement flight risk evaluation programs that include training all employees involved in the operation, procedures that support the sys-

[4] Special Investigation Report on Emergency Medical Services Operations. Page 16

tematic evaluation of flight risks, and consultation with others trained in EMS flight operations if the risks reach a predefined level (A-06-13)."[5]

The PIC communicates to the communications personnel if they are or are not able to accept the flight request. The communications personnel then relay this information to the requesting party. If the flight is accepted, the communication specialist gathers additional information while the pilot and crew prepare for the flight.

Requests for air medical transport are driven primarily by medical necessity, but can also be justified by other circumstances and system necessities.

Any patient with a time-sensitive life, limb or critical life-function condition should be considered a candidate for air medical transport. Current Commission on Accreditation of Medical Transport Systems (CAMTS) standards require that services staff aircraft with clinicians capable of providing a higher level of care than advanced life support services (ALS) ambulances.

Drug therapies and other clinical interventions needed by the patient that cannot be initiated by ground personnel may be available from the air medical crew. Air medical transport minimizes the "out of hospital" time for the patient; it also minimizes the amount of time the patient is not under the direct care of a licensed physician.

Air medical transport is often requested due to a reasonable suspicion of a life-threatening condition, rather than objective evidence at the scene indicating such a condition. Termed defensive medical practices, an example would be a car accident victim who hits the steering wheel with his chest; the EMS personnel may have a reasonable suspicion of time-sensitive internal injuries, but those injuries may not be symptomatic in the immediate aftermath of the crash. In order to rule out internal injuries the patient may need to be rapidly transported to an appropriate health-care facility.

Defensive medical practices are designed to rule out conditions that might reasonably be assumed to be possible with a patient in order to provide optimal patient care and reduce potential future legal liability for the initial provider of care.

Air medical transport is often justified due to local traffic conditions that preclude rapid transport by ground to an appropriate level of care facility potentially due to traffic back-ups, accidents or road conditions.

Air medical transport is sometimes justified due to the inability of a ground ambulance service to transport the patient safely and in a timely manner.

Local EMS systems are sized to assure a state of readiness for most emergencies that may arise in their area, according to the resources available. Mass casualty incidents can quickly overwhelm local EMS systems, requiring the rapid infusion of additional resources, possibly including air medical transport services.

[5] Special Investigation Report on Emergency Medical Services Operations. Page 16

What is considered a mass casualty event in one area might not be considered difficult for available resources in a larger municipality. For example, a five-victim motor-vehicle accident might be easily handled in a large urban environment, but quickly overwhelm the capabilities of a rural response team. Air medical services are well equipped to rapidly deploy additional resources to areas of need.

A ground transport provider may have all its units tied up with other transports or may not be able to staff appropriately for the patient condition. Some ground services limit the transport distance they allow their units to travel in order to maximize their ability to cover their designated service area.

Many states and municipalities have transport protocols in place that govern when air medical transport is appropriate. State trauma system protocols include guidelines for air medical transport. Air medical transport may be justified due to the inability of ground resources to get to the patient in a timely or safe manner. Examples include hiking, hunting or camping emergencies occurring in remote areas.

In any case, the appropriate use of air medical services is determined by physicians, medical facilities, and state and local medical authorities. The Associations recommend the national guidelines developed jointly by the American College of Emergency Physicians (ACEP), the National Association of EMS Physicians (NAEMSP), and the Air Medical Physicians Association (AMPA) and further recommend that the groups listed above maintain a level of discourse on the appropriate use of an air medical service.

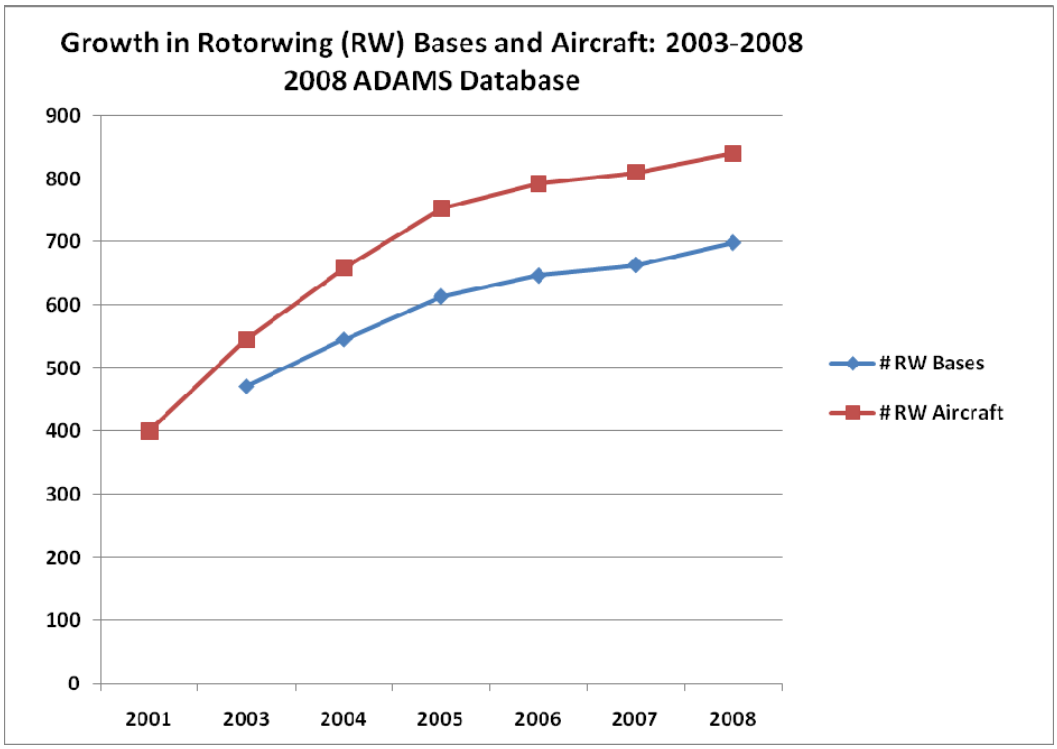
A few of the known or suspected consequences that may occur as a result of increased competition include helicopter shopping (where a requestor calls a second air medical service after the first turns down the flight due to weather), and over utilization of air medical service. The Associations do not support these practices.

The Associations also support the cooperative efforts of air medical services sharing weather turn-down information. Weatherturndown.com is an example of current efforts to better share weather turn down information and prevent “helicopter shopping” by requesting agencies. In order to combat these practices where they may exist, the Associations recommend that the NTSB provide a formal recommendation that the FAA, working with air medical operators, should produce materials for community emergency response services, medical facilities, and other air medical services within the operating area of an air medical operator to address issues of “helicopter shopping.”

As the medical benefits of rapid transport by air medical service have become more recognized by the medical community, air medical services growth and expansion has been steadily upward since its inception in the 1970’s in numbers of air medical services providing transport, the numbers of bases they provide those services from and in the numbers of rotorwing (RW) aircraft dedicated to those transports.

Figure 1 below shows the recent growth in AMT rotorwing bases and aircraft since 2003. This data comes from the Atlas & Database of Air Medical Services (ADAMS), the most accurate

repository for this type of information since 2003.[6] NOTE: While this graph does indicate growth, participation in ADAMS is voluntary and the exact numbers may indicate increase reporting, not increased growth.



One of the key mitigations to the risks and causal factors of accidents is increased training, both for aviation and medical personnel. It is for this reason that the Associations recommend that the NTSB should work with the Associations and the International Helicopter Safety Team (IHST) to enhance the methodology of the NTSB in investigating air medical accidents to establish a focus on the role of human factors in accident causation. By providing more information of this type, post-accident investigations can better inform future training requirements, and other regulatory and air medical service policy changes.

This section will focus on pilot and crew training and provide the NTSB and other participants in these hearings with an overview of industry efforts to date. Many of the methods of instruction (MOI) employed by Part 135 air carriers were influenced by the experiences that key training personnel brought from the military. The training focused on handling in-flight emergencies and the pilot's flying proficiency in performing his duties as pilot in command. From the inception of the air medical industry, the pilot in command has been the final authority responsible for accepting and conducting a flight.

[6] Data from the 2008 ADAMS database, except 2001 rotorwing aircraft from Air Medical Physicians Association (AMPA) White Paper, November 2002

In the late 80s and the early 90s, many Part 135 air carriers added Crew Resource Management (CRM) training to their curriculum. They then embraced an additional philosophy focused on Aviation Decision Making (ADM) that has evolved to an industry specific combination of these philosophies—now called Air Medical Resource Management (AMRM). Unlike previous efforts, this MOI embraced all parties involved in the air medical transport to include pilots, clinicians, maintenance, communications and management personnel.

The proliferation of available flight training devices (FTD) and flight simulators have been incorporated into many pilot training programs in recent years. All Part 135 carriers are utilizing Federal Administration Aviation (FAA) approved training programs which meet or exceed existing regulatory training requirements. More dollars are invested into training personnel involved in the air medical transport sector today than in any previous period of the industry's history.

Confidence in the industry increased in 2006 and most of 2007 that these dollars and adjustments to MOI were providing positive results because of a period of minimal accidents; the confidence has been compromised with recent experiences in 2008.

The air medical community responded after each of the accidents in that time period, studying causal factors and holding internal dialogues to find new strategies to mitigate risk and prevent accidents. In July 2008, the community came together at the AAMS Safety Summit to raise awareness and involve thought leaders in finding solutions. The formation of the Air Medical Operators Association (AMOA) was also a product of this period and is now focused on utilizing their combined experiences and assets to create an environment dedicated to improved safety.

Management and Regulatory Oversight

Management oversight for air medical transports occurs at many levels. All Part 135 air carriers are required to have a Director of Operations (DOO), a Chief Pilot (CP) and a Director of Maintenance (DOM). These individuals are tasked with reviewing aviation personnel hiring/firing, performance, training and decision making. All flight and maintenance records, risk assessments and other documents are reviewed on a regular basis for compliance with regulatory requirements and company policies and practices.

Clinical Management oversees the care given to patients through regular review of transports, care decisions and the medical crewmembers as they relate to standards of care and company protocols. Management reviews patient transports through a continuous quality improvement process. Additionally, the Medical Director(s) and Clinical Supervisor evaluate the appropriateness of the transports through a utilization review process.

Utilization Review (UR) is accomplished by having a set of specific events, or flags, that raise suspicion about the appropriateness of a particular flight request. Clinical leadership will review transports where UR flags have been triggered to review the appropriateness of the flight request. When a request is deemed to have been inappropriate, the general course of action is to review the transport with the requesting organization.

The Associations encourage air medical services to spend considerable amount of time and resources in regular training for area EMS, law enforcement and fire professionals in the appropriate selection and setting up of a safe landing zone. This training is considered a best practice in the industry with the intent of minimizing potential safety concerns in a crucial time of flight.

Air medical services operate under a tremendous amount of regulatory oversight. Part 135 rules are a complex set of requirements; beyond those regulations are additional rules that outline how a service must operate depending on what type of operation that service chooses to perform. Despite numerous inaccurate reports, statements and articles to the contrary, air medical services operate utilizing stringent restrictions—particularly in the area of weather minimums.

For Part 135 air medical operators, these rules are included in FAA issued Operations Specification A021. Recent efforts coordinated by HAI with the FAA and air medical operators to address safety issues led to significant changes to the A021 Operations Specification. This change represents the combined effort of the HEMS operator community to improve (and in some cases increase) existing requirements for HEMS operations.

The A021 revisions specify that if a flight, or sequence of flights, includes a Part 135 segment, then all visual flight rules (VFR) segments of the flight must be conducted within more stringent weather minimums and the minimum safe cruise altitude determined in pre-flight planning. These new weather minimums are significantly more restrictive than those prescribed in Part 135. They also are calculated to encourage deployment of night vision imaging systems. Further, A021 requires pilots to identify a minimum safe cruise altitude during pre-flight planning by identifying and documenting obstructions and terrain along the planned flight path. HEMS pilots must also determine the minimum required ceiling and visibility to conduct the flight using the revised weather minimums contained in A021.

Revised Operations Specification A021 also permits HEMS instrument flight rules (IFR) operations at landing areas without weather reporting if an approved weather reporting source is located within 15 nautical miles of the landing area or if an area forecast is available. This change corrects a long-standing issue with Part 135 operation and IFR flight. Previously, Exemption 6175 allowed for a similar permission, but only under Part 91. With this Operations Specification (OpSpec) change, air medical operators no longer need to use the exemption, and can operate IFR under Part 135 rules without the need to utilize any exemptions that exist under Part 91.

Revised Operations Specification A050 also changes weather minimums for helicopter night vision goggle operations conducted in Class G Airspace to be consistent with changes made to the Class G Airspace minimums in A021.

Part 135 air medical Operations Specifications now contain more restrictive weather minimums and enhanced preflight planning requirements than those contained in either Part 91 or 135 regulations generally applicable to other industry sectors. These changes address and exceed the intended safety enhancements of the 2006 NTSB recommendations related to Part 135 flight rules on all legs.

Any discussion of enhanced oversight would be incomplete without recognizing the significant activity by the FAA and the air medical industry in bringing attention to the concepts of operational control. While the FAA made relatively minor changes to OpSpec A008 (FAA Notice 8000.347), those changes were the culmination of a multi-year focus on enhanced operational control that stretched across all areas of the Part 135 community. For air medical operators that focus was on the clear delineation of the aviation management structure, increased attention to management over far flung operations, and the reaffirmation that it is Part 135 Certificated operators that oversee the aviation portion of an air medical service. This led to changes and enhancements in both regulatory and management oversight primarily in the areas of flight authorization and communications.

As part of the changes to A008, risk assessments were required for Part 135 flights as part of an enhanced operational control structure; further, it was reaffirmed that the certificate holder retains all responsibility for the operational control of aircraft operations, and thus the safety of each flight conducted under its Certificate and Operation Specifications, including the actions or inactions of all direct employees and agents of the certificate holder. The certificate holder cannot transfer that responsibility to any other entity for any reason. In air medical services, this includes hospitals, medical personnel, emergency or 911 dispatching services, or any other entity. In order to ensure this oversight control, operators were required to initiate some type of operational control system. For many operators that became Enhanced Operational Control Centers, a program that monitors and tracks flight requests, flight initiation decision making and risk management procedures, and the course of the flight itself. While air medical operators do this differently based on the size and displacement of their operations, the goal of maintaining oversight is essentially the same.

As part of this effort, the FAA released Advisory Circular 120-96, entitled Integration of Operations Control Centers into Helicopter Emergency Medical Services Operations. This Advisory

Circular "provides recommendations to assist helicopter emergency medical services (HEMS) operators with the development, implementation and integration of an Operations Control Center (OCC) and enhanced operational control procedures". (AC 120-96) It is also a product of a survey of best practices in the air medical industry and gives guidance to other air medical services as to the benefits of this type of operation.

Although operational control is explicit in terms of expectations, the FAA guidance does not define or require operational control centers to achieve operational control. There are diverse configurations within the HEMS industry designed to accomplish this requirement. Certain air carriers utilize a centralized communication center/dispatching methodology, which may apply to their entire multi-state operation. Others utilize a localized methodology specific to the hospital and/or service. Still others utilize a regional methodology. These varied configurations and methodologies help support the operational control function in terms of routing request for flights to the pilot on duty that accepts or declines the mission in accordance with regulatory and internal guidelines. This decision process is accomplished inclusive of the aforementioned requirements for establishing and maintaining operational control. If the flight is accepted the communications specialist will monitor the flight via radio communications and satellite tracking providing real-time knowledge of the aircraft's location and issues specific to that flight (a recent survey conducted by AAMS and AMOA found that the of over 700 aircraft surveyed over 85% of the aircraft are tracked by satellite, with plans to implement the remaining fleet by 2010).

Communications center personnel are trained on the certificate holder's internal methodology for performing required functions to include emergency response in accordance with the approved General Operators Manual (GOM). Base locations and communications centers have the ability to access weather, may utilize the HEMS Weather Tool and other mapping tools, and certain certificate holders may also include an aviation subject matter expert to provide input regarding the conduct of flights as necessary or requested. The function of a communications center in terms of flight following and augmenting the operational control/accountability piece is absolutely necessary; however, it is arguable whether centralized communications center is the optimum solution. In fact, one could argue that a regional center provides greater individual oversight with less workload and intimate familiarity with localized weather and challenges within their respective territories.

The requirement of having an aviation subject matter expert such as a pilot on duty at every communications center may have certain utility in terms of being able to field questions and offer requested information or advice; however, there are also certain limitations/considerations such as attempting to insert a "virtual pilot" into the cockpit of an aircraft while in flight, adding layers to operational control, and situational awareness challenges not only in terms of the cockpit environment, but with the area of operations especially on a national scale. A competent communications specialist is capable of fielding the majority of these requirements if trained; however, standardized training and turnover of personnel is certainly a variable.

The requirement for ensuring that flights are dispatched in the appropriate manner, that operational control is maintained, that tracking and communications with aircraft is being accomplished, and that provisions are in place to respond in a timely manner to the pilot's needs/requests cannot be overstated. Therefore, the dispatching processes and procedures must be clearly outlined in an organization's GOM and approved training manual and the training

conducted and documented to include emergency response (Post Accident Incident Plan). From a general standpoint, the process entails receiving flight requests, forwarding those flight requests to the air carrier (PIC) who makes the decision to accept the flight following prescribed procedures outlined in the GOM. If accepted, the communications specialist continues to serve as an information/support system in addition to monitoring the aircraft via radio communications and a GPS system throughout the conduct of the entire flight while maintaining a standardized log consisting of flight inception to completion data and whatever internally developed demographical, or organizational data for trending that is required to be collected.

While there can be improvements to regulatory oversight, as the Associations have indicated in their recommendations to the NTSB, we believe that these improvements must be made with a thorough understanding of the regulatory environment and the changes that have been made to that environment. We also believe that only by continuing the cooperative efforts of the Associations, the FAA, and the NTSB can we achieve further advancements in regulatory and managerial oversight.

The Associations support the NTSB recommendation to require all air medical services operators to develop and implement flight risk evaluation programs that include training all employees involved in the operation, procedures that support the systematic evaluation of flight risks, and consultation with others trained in air medical flight operations if the risks reach a predefined level.[7]

Risk Management is developing targeted and practical control measures that reduce the risk and make the flight safer. Managing the inherent risk to the lowest possible level should be our primary goal. Consideration must be given and due diligence applied to performing the Risk Management Process in its entirety to make the flight safer. We must always ask ourselves what control measures can we implement or what risk decisions can we make to enhance the overall safety of flight. Decision-making has been an enduring challenge and has contributed to many HEMS accidents. Understanding and implementing the Risk Management process will enhance the pilot's ability to control risk and make better and more informed risk decisions while in flight.

Notwithstanding having accomplished all of the previously mentioned requirements for initiating a flight, we must continue to emphasize and enhance our ability to make informed risk decisions during the conduct of that flight. As previously mentioned, human error is a contributing factor in the preponderance of the HEMS accidents. Proper planning, dispatching, operational control, and risk management are essential. The challenge is recognizing the "critical risk decision point" and acting proactively to stop the "chain-of-events" that result in a human error accident. The air carrier's culture and internal procedures must play a central role in terms of advocating "three to go, one to say no" policies and CRM/AMRM training programs that educate and reward adherence to these principles. Medical crew member involvement based on defined expectation during the preparation and conduct of a flight from a risk management standpoint is invaluable for early detection of a hazard and provides additional impetus for immediate and decisive action.

[7] *Special Investigation Report on Emergency Medical Services Operations.* [NTSB/SIR-06/01]

The Associations support the development and implementation of *Safety Management Systems (SMS)* by all air medical services operators to systematically integrate flight risk evaluation programs, safety policy, risk management, safety assurance, safety promotion, and proactive accident/incident prevention methodologies throughout the full range of air medical operations to include flight operations, dispatch/flight following, maintenance and inspection, aircraft safety, ground handling and servicing, medical services, and training.

References and Recommendation

The Associations recommend that air medical operators develop and implement ***Safety Management Systems (SMS)*** that incorporates a ***Flight Risk Evaluation Programs*** consistent with the recommendations and standards outlined in, but not limited to, the following references:

1. NTSB Special Investigation Report on Emergency Medical Services Operations, NTSB/SIR-06/01
2. Section 5 *Operational Risk Assessment Programs for Helicopter Emergency Medical Services*, 8900.1 CHG 22, VOLUME 4 AIRCRAFT EQUIPMENT AND OPERATIONAL AUTHORIZATIONS, CHAPTER 5 AIR AMBULANCE OPERATIONS
3. Introduction to Safety Management Systems for Air Operators, AC 120-92
4. Aviation Safety Analysis Programs (ASAP), AC 120-79
5. Flight Operational Quality Assurance, AC 120-82
6. Developing and Implementing a Continuing Analysis and Surveillance System, AC 120-66B
7. Commission on Accreditation of Medical Transport Services (CAMTS) standards
8. Air Carrier Internal Evaluation Programs, AC 120-59A
9. Flight Risk Assessment Tool, InFO 07015
10. International Civil Aviation Organization (ICAO) Safety Management Manual, (Doc 9859-AN/460)
11. Background and Fundamentals of the Safety Management System (SMS) for Aviation Operations, IHST

Safety Management Systems Toolkit, IHST SMSToolkit

Aircraft Safety Equipment

Since the January 2006 NTSB Special Investigation Report on Air Medical Safety, air medical operators and their hospital partners have made great strides in making improvements to the air medical fleet. While there are hurdles to the implementation of this equipment, the rates at which air medical operators have initiated these changes, and continue to meet these commitments is unprecedented in the history of air medical transport.

Aircraft continue to undergo numerous changes as a result of new technologies specifically designed for helicopters. In addition to this important new equipment are new training programs and enhanced procedures to address the complicated tasks of operating this equipment while flying the aircraft and managing the pilot's workload. The Associations continues to stress that the implementation of any new technology must be completed carefully and with the proper training; without proper implementation new technology can decrease the level of safety, contrary to the intent of any new technology or procedure.

The following information illustrates the ongoing commitment of these operations to increase the level of safety by implementing safety equipment that offers a clear and practical application to helicopter and air medical operations. Safety enhancements other than those discussed below also may be effective safety tools; however, operators have chosen safety enhancements based on the most appropriate and effective technology available that meets technical standards proscribed by the FAA and offer the most benefit to the operating environment.

The information does indicate that certain equipment upgrades have matured in their technical growth faster than others; other upgrades are based on the operator's expert knowledge of the operating area and the most appropriate safety enhancement for that area. This information demonstrates the numerous hurdles in implementing new technologies caused by deficiencies in the regulatory framework and possible interruptions in the supply line and implementation process.

From a survey of accidents in the recent past and based on the NTSB's 2006 report, operating at night clearly poses an increased risk to air medical transports of controlled flight into terrain. With the encouragement of the NTSB and FAA, air medical services have invested heavily in night vision and vision enhancement technology as an effective intervention to mitigate this risk. Other operations have chosen different mitigation strategies, some choosing to invest in the terrain alert and warning system technology specifically designed for helicopters (HTAWS), and still others choosing to operate under instrument flight rules at night and when possible under the current aviation infrastructure.

We must recognize that different technologies for avoiding terrain and obstacles are better suited to certain operating environments than others. For example, some operations may operate only in a large urban environment, where the ambient light from the ground makes night vision technology largely unnecessary. This does not relieve that operation from addressing terrain and obstacle avoidance; however it does inform the choices that the air medical operator will make in investing limited resources in safety equipment. There are also other technologies, such as Enhanced Vision Systems (EVS, usually referring to forward looking infrared technology) that can significantly increase the pilots ability to avoid obstacles in terrain both in low light or obscured vision situations. Operations may also choose, when the appropriate infrastructure is available, to

operate the majority of their flights under instrument flight rules IFR, a significant safety enhancement that may not be available to every operation due to their location or operating environment.

In a recent survey of air medical operators conducted by AMOA, eight Part 135 certificate holders reported that of the nearly 700 aircraft in their combined fleets- over 90% of the air helicopters currently conducting air medical services in the United States- over 35%of helicopters are currently operating with night vision goggles. This is a significant increase considering that at the time the NTSB encouraged the use of night vision goggles the prevalence of that technology in the fleet was estimated at less than 5%. That same survey indicated air medical operators are committed to having ninety percent of their combined fleets equipped with night vision goggles by 2011.

This comment illustrates the suggestion by some operators that NVG's and enhanced vision systems are a far more effective safety intervention than H-TAWS. Their argument is that unlike H-TAWS, NVG's and EVS are an active system, providing a real-time view of the environment; current H-TAWS technology is software based that is only as current as the last database update. By comparison, the use of NVG's and EVS permits the pilot to see actual obstacles in low light or no-light conditions. NVG's and EVS can identify obstacles in the low altitude environment, such as cell towers, power lines, and trees, that H-TAWS might not, depending on the height of the structure. Further, low altitude and low speed operations are common in helicopter operations, and current H-TAWS technology often offers limited effectiveness in these conditions. Despite the recent attention to H-TAWS, many air medical operators surveyed believe that NVG's would be a more effective tool to avoid terrain and obstacles at night. This is due to the fact that NVG's provide an "active" view of the environment, whereas H-TAWS are still based on database comparisons which must be updated frequently.

The implementation of H-TAWS is significant, however, with several air medical operators and hospitals including the devices on new aircraft. Some choose this device as a more effective implementation, or choose this device in addition to other safety enhancements. The Associations encourage the implementation of H-TAWS, especially after the NTSB's 2006 recommendation to that effect, and commend the FAA, the RTCA, and the numerous participants who volunteered their time to develop minimum standards for H-TAWS in 2007. This effort culminated in the release of a Technical Standard Order for H-TAWS released in December of 2008. While H-TAWS are a safety enhancement tool, the Associations believe that NVG's and EVS offer a more effective risk mitigation, especially in take-off and landing phases, than H-TAWS, which have a limited capacity at low altitudes, slow speeds, and against low obstacles.

Many air medical operators are investigating the implementation of devices that perform the function of flight data, voice recording, or video capture. These systems clearly offer significantly more information than is currently available to accident investigators; however the benefits of these devices are clear far beyond their accident applications. Flight operations quality assurance (FOQA) programs offer a significant safety management tool and allow aviation managers and pilots the ability to oversee, in a non-punitive manner, flight operations. They also provide pilots and managers the ability to recreate a flight; helping to determine what conditions existed that prevented an accident. Combined with a non-punitive reporting system can greatly enhance safety management and greatly increases the effectiveness of training programs.

While several new systems are currently on the market to provide video, voice, and other types of flight data recording (the popular ALERTS system measures inertia to provide software based flight-path recreation), the widespread use of these devices is still not developed. As previously indicated, however, FOQA programs and other management oversight programs are driving a significant interest in this technology.

Several operators surveyed indicated that they are equipping aircraft with cockpit information systems, such as the Garmin 396 and Garmin 430, 420, 300, or 250. These devices provide GPS technology, moving map, XM weather updates, airspace and navigation, and obstacle clearance. Operators are actively tracking aircraft using satellite tracking services, and have included this technology as part of enhanced operational control procedures. Finally, the survey indicated that all of the aircraft covered by the survey were equipped with both radar altimeters and global positioning systems.

While there are numerous benefits to the application of these technologies, there are hurdles to both implementation and operation, especially in the case of NVG's. A lack of appropriate resources, support, and commitment by senior FAA officials to address issues such as Night Vision Goggle (NVG) implementation and training, the advancement of new types of recording technologies, and the appropriate training of FAA inspectors for helicopter emergency medical services (HEMS) operations oversight, remains a significant roadblock to implementing new technologies. Especially in the case of NVG’s, much of the current regulatory structure restricts the use of night vision goggles in single pilot operations, despite the fact that there is no restriction on similar operations when they are not aided by night or enhanced vision.

While it is clear that safety technology has its place in mitigating risks that lead to accidents, air medical operators must be allowed some choice in how they approach the purchase of this equipment, as an operator may determine that different operating environments demand different risk mitigation strategies. With that in mind, however, operators must engage in the practical implementation of devices that provide some mitigation of the risks posed by obstacle and terrain at night and in low lighting conditions. The commitment of air medical operators in this risk mitigation effort is clear based on their plans to implement new technologies. Similarly, the benefits in equipping recording devices to provide post-accident information, enhanced safety management oversight and FOQA programs, and information vital to effective training, is essential to ensuring safety in future operations.

The Associations, recognizing the need for these enhancements, take the position that the NTSB should recommend that the FAA require in the alternative NVG’s, EVS, or IFR operations for night flights, while also providing the appropriate regulatory framework to allow for single pilot night vision, or enhanced vision, operations. Similarly, it is the opinion of the Associations that the NTSB should recommend that all air medical helicopters be equipped with some type of recording device that takes into account the limited space and weight availability unique to helicopters. While we must recognize that putting this technology into place safely and effectively takes significant time, there must be a regulatory structure in place that recognizes the performance of this technology and the support of the FAA in its timely implementation.

Operational Structures and Models

The foundation of the air medical transport industry was built around a common theme and program framework. The Associations support the AAMS mission statement: "to assure that every person has access to quality air medical and critical care transport."[8]

The air medical industry has evolved into several service models—each reflective of regional, competitive, and financial influences. This section will review the evolution of the air medical industry and services.

The modern era of air medical transports in the United States rapidly expanded during the 1970s and 1980s throughout the country. These services were basically identical in structure; these services were hospital based and viewed as a service and competitive edge to the sponsoring hospitals.

The hospital based service has become known as the traditional model. In the 1990s, variations to these operations began proliferating, countering the competitive exclusiveness created by the traditional model. These air medical services began filling emergency medical service voids in United States' communities and responding to an increasing number of hospitals that determined air medical transport services were imperative to patient care delivery.

Over the past ten years, the air medical services have dramatically expanded services available to rural communities and increased the focus on placing aircraft and transport teams in rural areas. Hospital air medical services, recognizing need in the communities they serve, have expanded their fleets to meet increasing demand.

Community based services have become a resource for regions and hospitals in which the major hospital systems determined air medical services were not a part of their core services. In these cases, hospitals have outsourced those services to community based services. Recent examples include air medical services in the states of California, Arizona, New Mexico, Texas, Mississippi, Alabama, Virginia, Florida, Tennessee, Kentucky, South Carolina and Nebraska.

In some cases a hospital may terminate its involvement with the air medical service and may outsource their transport needs to a community based service.

The industry nomenclature for the three different air medical service models are referred to as the traditional service, community based service and government operated (public use) service. Each model has specific strengths that are appropriate in different circumstances and are able to influence specific needs. While it is convenient to refer to these three "models", in reality there are many different types of financial structures that support air medical services, many of which are a combination of these "models."

Traditional services are so named because they were the most common structure early in the history of air medical services. The traditional services model was developed around a contractual relationship between a medical institution and an operator providing aviation services.

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[8] http://www.aams.org/AM/Template.cfm?Section=About_AAMS

A hospital institution generally employs the flight nurses, flight paramedics and management in addition to providing medical direction. The Part 135 air carrier contracts to provide aviation services and personnel for the purposes of managing flight operations. The hospital compensates the air carrier for the aircraft in addition to the maintenance and aviation personnel necessary for air medical operations.

Typically, the hospital assumes naming rights for the services and operates it as a hospital department. Traditional services are operated in partnership with both for-profit and not-for-profit organizations. Traditional services may have aircraft based at the primary hospital, at an area airport, or a satellite base.

As the air medical industry has evolved, several variations on the traditional services have become common. Some traditional services have assumed varying degrees of financial risk—for example, leasing or purchasing the aircraft or assuming all maintenance costs. Some services have gone a step further and applied for their own Part 135 operating certificate so they can operate as their own aviation vendor.

In the current service environment, many historically traditional services have now evolved into organizations that resemble the community based services; key elements of this are multiple aircraft based at regional locations, operating as Part 135 air carrier, billing patients directly for revenue and often providing services to multiple requesting and receiving organizations.

Hospital consortiums of two or more hospitals have formed to provide air medical services in regions. Hospital consortiums may contract with an aviation vendor for traditional aviation services, or they may operate as their own part 135 vendor.

Community based services commonly consist of community based organizations locating an aircraft and a transport team at airports, clinics, hospitals or fire stations. In most of these operations, the medical transport teams—flight nurses, flight paramedics, flight respiratory therapists and communications specialists—are employed by the Part 135 air carrier. Aviation personnel—mechanics and pilots—are also employed by the Part 135 air carrier.

The introduction of the non-traditional model dramatically affected the air medical industry; this model extended opportunities for Part 135 air carriers to provide air medical services outside of the historical traditional relationship with hospitals. These services have become increasingly common with the growth of the air medical industry over the past decade. In many cases, this expansion allowed for increased air medical resources based in rural communities—these operations are commonly referred to as community based services.

Although there are a number of community based services operating in singular geographical areas, most services are part of large companies providing services in extended geographic areas—often nation-wide. A number of these companies have grown out of aviation companies that formerly were exclusively providers of aviation services to traditional air medical services.

Many of the companies continue to provide aviation services to traditional services while also operating community based services. Most of the growth in air medical transport services over the past decade has been in community based service models.

Government operated (public use) services are the least common of the three models for air medical transport, although they can be found in a number of locations throughout the country. Currently, the FAA does not require government operated air medical services to hold a Part 135 Certificate or otherwise to operate at standards set by Part 135, unless the government operator is receiving compensation for the service. FAA guidance confirms government operated aircraft utilized in typical air medical operations are considered under federal law to be civil, not public, aircraft operations and thereby are governed by the Federal Aviation Regulations applicable to civil aircraft. However, the FAA has been less than consistent in its surveillance and pronouncements on this subject.

Many government operated services have chosen to comply with the same regulations as commercial air medical services (under a Part 135 certificate). As an example, the FAA database of certificate holders indicates that in the State of Florida there are five governmental entities holding air carrier certificates with air medical operations specifications.

Government operators are characterized by being owned and operated by a government entity, usually a state or county government department. While most government operators operate as their own aviation vendor and own their aircraft, they can operate under contract for aviation services with an aviation vendor. They are generally not directly affiliated with local hospitals but integrated within the EMS community and have clinical training arrangements with one or both of these organizations

Some of these services are operated as part of law enforcement or fire department as an added responsibility to the services' other roles. These dual-purpose services are generally operated by government entities. Funding for these organizations, depending on their structure and certification may be through taxes, user fees, commercial billing or a combination of these. Financial risk within these governmental entities is generally shared with the residents of the community and supplemented with commercial insurance. All expense and risk rest with the government entity and the civilian tax base.

Government operated services are similar to community based programs providing the aircraft and aviation services, medical crews and medical licensing they are typically based at an airport or other municipal facility and may serve a limited geographic area defined by their governing authority. Some government operators focus exclusively on flights from the scene of an accident, leaving interhospital transfers to other air medical services.

The air medical industry's primary objective is to provide safe transport and quality clinical care to its patients. This objective is achieved through varied air medical service models with the two primary models being traditional and community based. Each air medical service design reflects regional, competitive and financial influences.

Each of these models has strengths and weaknesses associated with them and as demonstrated in the accidents in 2007 and 2008, none of the models have been immune from accidents (for profit

or non-profit, government or civilian, union or non-union personnel). The following data highlights the unfortunate involvement of all service models and geographical regions with accidents.

2008

DATE	LOCATION	Business Model
2/5/08	South Padre Island, TX	Traditional
5/10/08	LaCrosse, WI	Traditional
5/21/08	Hiram, GA	Community Based
5/29/08	Grand Rapids, MI	Traditional
5/30/08	Pottsville, PA	Traditional
6/8/08	Huntsville, TX	Community Based
6/27/08	Ash Fork,. AZ	Community Based
6/29/08	Flagstaff, AZ (2 Aircraft)	Traditional/Community
8/31/08	Greensburg, IN	Community Based
9/27/08	Forestville, MD	Government Operated
10/15/08	Aurora, IL	Community Based

2007

7/28/07	Marks, MS	Community Based
8/22/07	Mullinville, KS	Community Based
9/8/07	Greenville, SC	Traditional
12/3/07	Whittier, AK	Traditional
12/30/07	Cherokee, AL	Community Based

Costs and Reimbursement

Air medical services – regulated from both an aviation and healthcare standpoint - is both a high fixed cost and capital intensive endeavor. By the nature of being an emergency service, HEMS must provide coverage on a 24/7 basis every day of the year. This entails around the clock staffing of a pilot, registered critical care nurse and paramedic with significant pre-hospital experience, at each air medical service location. In addition, it requires 24/7 staffing of a communications center and typically an on-call airframe and power plant mechanic dedicated to that location. Hull and liability, medical malpractice and other insurance is also essentially fixed. Together, with other fixed infrastructure (safety management, aviation training, medical training, billing and collections, management, etc.) and miscellaneous expenses, total fixed costs typically represent 85% of a provider's cost structure.

Helicopter emergency medical services provide the same level of quality critical care to all patients transported regardless of their ability to pay for those services. There are no efforts made to secure payment prior to transport because of the emergent nature of helicopter emergency medical services.

The majority of air medical services rely on a fee for service model as their primary revenue source. Typically, this comes in the form of a payment from the patient or their insurance company after the patient is transported.

Most medical insurance pays for ambulance services (both air and ground), as do the government payers (Medicare, Medicaid, and Champus). The coverage for air medical services is most often limited to transport to the nearest appropriate facility, and the transport must be medically necessary.

It is important to note that helicopter air medical services provide emergency transport without knowing if a patient has any medical insurance at all, and a significant percentage of their patients have no medical insurance and no ability to pay for the service. As is the case with hospitals and other healthcare providers, air medical services must cost-shift by increasing charges to those with insurance to compensate for the government payers who in most cases pay less than the cost of providing the service. The cost shift to payers is also necessary because of those patients who have no insurance and are unable to pay for the services at all.

Air medical services providing emergency services do not self dispatch; the decision to transport by air medical service is made by a physician, nurse, paramedic, or appropriately trained first responder. In most cases there is a presumption that "medical necessity" is met when the decision is made based upon the facts known at the time of the transport.

While each air medical service determines their own charge structure (usually a base rate and a mileage rate) the services only collect a fraction of this billed amount. The government payers—which may represent as much as 50 percent of the market—establish their own payment limits. Services must accept these limits without the ability to bill the balance to the patients.

The socioeconomic make up of each service area determines the degree to which patients have medical insurance or the means to pay for the service themselves. In any given market, the reimbursement can range from as little as 40 percent to over 80 percent of billed charges, depending on the payer mix. Reimbursement for air medical service is generally the same regardless of the size or expense of the aircraft used.

Medicare, which is the single largest payer, has never paid community based services the full cost of providing this service. The national fee schedule established by the 1997 Balanced Budget Act (Public Law 105-33) was not based on cost, and has not been adequately adjusted for the inflated costs of providing the service.

Medicaid, which is a combined federal and state program for the poor, has traditionally paid less than half of the Medicare rate, and prohibits billing the patient anything. The practice of paying only a small fraction of the Medicare rate is changing slowly as states recognize the value of maintaining a strong air medical fleet. Some states have significantly increased the reimbursement rates in recent years; all states still fall short of the Medicare rates.

Private medical insurance continues to pay for air medical services in most cases, but an increasing number of Americans no longer have any form of health insurance.

Prior to the 1990s, the majority of air medical services were provided by organizations utilizing the traditional model. In most cases these services charged patients less than the cost of providing the service, and consequently lost money providing the service—often in excess of one million dollars per year. However, the inpatient revenue generated by diverting patients to the sponsoring hospital more than offset the loss of providing the helicopter service.

One of the events that greatly impacted the air medical industry when it comes to reimbursement is the change in methodology for the Medicare program (the government funded health insurance program for everyone over age 65) for both traditional hospital services and community based services.

Throughout the 1980s and 1990s, Medicare reimbursed hospital based services on the basis of cost. The higher their cost, the more they were paid. Community based services on the other hand, were paid based upon a fee schedule that varied widely across the country.

This all changed as a result of a congressional mandate in the 1997 Balanced Budget Act (Public Law 105-33). BBA 1997 required HCFA (now CMS) to eliminate cost-based reimbursement for hospital based ambulance services, and to establish a National Fee Schedule for all ambulance services, and required that it be developed through a Negotiated Rulemaking process in "consult with various national organizations representing individuals and entities that furnish and regulate ambulance services." Unfortunately, the catch was that the new National Fee Schedule was to be budget-neutral.

The ultimate outcome was that many hospitals had their reimbursement reduced, while all of the community based services experienced a payment increase of as much as 100 percent from the largest single source of reimbursement.

Conclusion

We believe that this paper, and the statements made to the NTSB, represents a noteworthy collaboration of the three trade associations representing air medical services in the United States. Through this combined effort, and with the cooperation of our federal partners and with the support of the United States Congress, we believe we must achieve a significant decline in the number of air medical accidents and fatalities. It is critical to the patients we serve, and the public trust we must ensure.

In final analysis we must remember that in our effort to improve safety, all technology comes with benefits but also new risks. The air medical community is committed to improving safety of medicine and aviation; keeping those goals in mind, we also must continue to care for critically ill and injured patients every day.

During the course of the nearly 4 day NTSB hearing, the associations estimate over 3,000 patients will reach needed care through the use of medical helicopters and aircraft. In our efforts to improve, we must not put more lives at risk by decreasing access to care.

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