

Despite Recent Recommendations, Helicopter Ambulance Safety Remains an Elusive Enigma

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When safety has been shortchanged, shout the alarm louder and to more agencies. That seems to be the strategy of the National Transportation Safety Board (NTSB), which issued a battery of 19 recommendations concerning helicopter ambulances on 1 September, adding to four recommendations previously issued to the Federal Aviation Administration (FAA), where promises for action have been slow-rolled into oblivion.

That makes 23 recommendations in all for helicopter emergency medical service (HEMS) operations, implementation of which is anywhere from two to five or more years distant. Those recommendations should be seen as the NTSB's perception of gaps in the safety system for HEMS operations, which resulted in 12 accidents and 29 fatalities in 2008, the worst toll on record for these particular operations. So far in 2009, there have been three HEMS accidents.

To put the 23 HEMS recommendations in perspective, the NTSB issued a total of 20 recommendations in the wake of the TWA Flight 800 fuel tank explosion, a July 1996 accident that destroyed the B747 and killed all 230 persons aboard. It has taken repeated NTSB reminders of this accident to spur safety changes, which will not be fully implemented until 2018, some 22 years after TWA Flight 800 exploded.

Clearly, the NTSB does not want a repeat of that terribly slow, apathetic and dilatory corrective process for helicopter ambulance operations, whose accident record is some 35 times higher than commercial airliners. So, instead of pleading for action solely to the FAA, the NTSB has targeted its recommendations to the Federal Interagency Committee on Emergency Medical Services, to the Department of Health and Human Services' (HHS) Centers for Medicare and Medicaid Services, and to HEMS operators directly.

NTSB Chairman Deborah Hersman explained why her agency is taking such comprehensive action:

“The pressure on HEMS operators to conduct their flights quickly in all sorts of environments makes these types of operations inherently more risky than other types of commercial flight operations. Operators need every available safety tool to conduct these flights and to determine when the risk of flying is too great.”

Among other things, the NTSB wants HEMS operators to install autopilots to reduce pilot workload, to conduct periodic simulator training for pilots, and to implement safety management systems including “sound risk management practices.”

Of interest, the NTSB did not recommend two pilots in the cockpit. Helicopter ambulances are authorized by the FAA to be flown by one pilot, although the helicopters are designed for two-pilot operations. Military medical evacuation helicopters are flown

by two pilots. In Canada, which has not suffered a single fatal HEMS accident, two-pilot operation is required.

In the U.S., HEMS flights are routinely conducted by one pilot, often with a medical technician in the right (co-pilot's) seat to relieve the pilot's workload by operating the radios, maintaining an external watch for obstacles, and so forth.

No commercial airline flight would be undertaken by a single pilot. The airplanes and air traffic control procedures are based on two pilots sharing the workload. And these flights are conducted from one airport to another, under radar coverage from the ground while en route overland and in the vast majority of terminal areas, with safety systems installed such as TCAS (Traffic Alert Collision Avoidance System) and TAWS (Terrain Alert Warning System).

By contrast, HEMS flights are conducted to remote landing zones that may be a school parking lot or highway, at low altitude in precipitation, fog, hilly terrain and/or man-made obstacles (e.g., transmission towers and their guy wires); flights are often at night, without benefit of continuous air traffic control or onboard TCAS/TAWS, under the extreme time pressure mentioned by Hersman to retrieve the patient. How these operations were authorized to be flown by one pilot is a mystery.

The FAA says these helicopters, although designed for two pilot operation, have been cleared for handling by just one pilot. The agency has declined to divulge information justifying this decision (such as reports of test flights, the risk matrices used, the problems attendant to one-pilot operation and how they are supposed to be handled). But if one were to ask why the FAA is so circumspect about single pilot operation – and willing to authorize same – the very practical impasse of cost-benefit ratios would lurk darkly in the spectral background. Having to train and keep current two pilots, and pay their salaries, would probably render many of the proliferating operations non-viable, and many marginally profitable services would cease to exist. It's presently an evident trade-off intended to allow cut-price operators to remain in business. At issue is whether or not the accident rate is attributable to single pilot operation – and if it is, whether the death-rate is an acceptable price to pay for having this large and growing number of “life saving” HEMS operations.

All we know of officially is that these operations are approved for single pilot conduct, medical technicians are frequently taking up the en route flying workload in the right seat, and that neither the military nor other countries operate these “angels of mercy” flights with just one pilot.

The NTSB's silence on the matter of two pilot operation stems, in part, from the fact that none of its accident investigations has cited the absence of two pilots as a deficiency.

The accident reports have served to justify the NTSB's recommendation for TAWS and night-vision goggles, but these technologies are best employed with two pilots. TAWS alerts require one pilot to be looking out the windscreen while the other pilot tracks the dangerous terrain on the cockpit display. As far as night-vision goggles, which have a

restricted field of view and depth perception problems, the military has found that it's best to operate with one pilot wearing goggles while the other pilot does not and maintains situational awareness with his natural field of view.

As intimated above, requiring two-pilot operation would probably put many HEMS operators out of business. The cost of the second pilot would price the operations well beyond that of single pilot oriented mission plan. In the competition for business, the two-pilot operation, although inherently safer, would lose out to a helicopter operated by a single, stressed out pilot.

In its latest batch of recommendations, the NTSB urges the use of an autopilot "if a second pilot is not available." The phrasing is inexplicably expressed as if a co-pilot was normally on-board most flights, which patently is not the case.

The HEMS industry has experienced explosive growth since 2002, when Medicare boosted its reimbursement rate for HEMS flight. The spigot of new money expanded the market for private operators, who compete ferociously for business.

A typical HEMS flight can generate a payment of \$20,000 or more. To garner these payments, operators have an implicitly built-in incentive to fly — despite such proven deadly factors as marginal weather at night. One HEMS pilot described every patient as a golden trout. "We need to go get these trout," he said, because of the generous Medicare reimbursement.

The reimbursement rate is independent of the level of safety factors built into the operation. One can operate a 20-year old helicopter without the latest safety equipment, with one pilot, and the Medicare payment is the same as for a patient transported in a state-of-the-art new helicopter flown by two pilots. The NTSB mildly suggests to the HHS that it evaluate "if reimbursement rates should differ according to the level of HEMS transport safety provided."

A tiered reimbursement schedule, based on safety programs, would be useful. The NTSB recommendation did not indicate how soon such a reimbursement schedule should be implemented. Obfuscation and delays are probably inevitable.

It is obvious that the more generous reimbursement since 2002 has spawned a competitive growth in the industry. There are presently over 750 helicopter ambulances in this country, and they transport an estimated 400,000 patients and transplant organs each year. The HEMS industry is now about a \$2.5 billion activity. There is a growing belief that not all "golden trout" ought to be transported by helicopter. Ground transport would be adequate for many patients not suffering life-threatening time-sensitive illnesses or injuries.

The Canadian experience is instructive. The Canadian HEMS industry totals 20 helicopters covering the entire country. Contracts are awarded to the four companies providing the flights based on a request for proposal (RFP) process, and managed through Provincial Health departments.

Helicopters fly to prepared landing zones; patients are transported on the ground from the scene of the accident to the landing zone. Even with night vision goggles, a minimum of 5 miles visibility is required in mountainous regions. The list of requirements goes on. Suffice to say, there is no mad competition for “golden trout” in Canada. The entire populated area of the country is covered by the four companies operating a grand total of 20 helicopters.

By contrast, the state of Missouri has some 33 helicopter ambulances serving the state. The number is up from 9 helicopters in 1985, largely as a result of the economic incentive provided by the Medicare reimbursement formula. In other words, one state has more helicopter ambulances than the entire country of Canada. Similar growth in helicopter ambulances has occurred throughout the U.S. During the last 10 years, the helicopter ambulance fleet has expanded by about 88%. As the NTSB’s Robert Dodd indicated during the deliberations over the latest 19 recommendations, “Payment occurs only when the patient is transported.”

The payment scheme may contribute to a phenomenon known as “press on” regardless, in which the evacuation flight is launched and continued under marginal conditions in order to realize payment. Not to put too fine a point on it, but this is a scheme where the decision to fly is market driven. Medical necessity is frequently a second-order (or lower) consideration.

The unparalleled growth in the HEMS industry has diluted safety. Rather than looking for ways to increase the safety of America’s excessively large fleet of competing helicopter companies, the Canadian model should be examined and emulated. This course would probably drive some companies out of the business of transporting patients by air. The counter argument is that if standards were codified to the level really needed to operate these flights safely, many companies would not be able to support the costs and would be driven out of the business anyway.

This is not the future envisioned by the Air Medical Operators Association. The association’s managing director argued recently that “greater numbers of aircraft have improved response times, resulting in faster recovery and reductions in mortality.”

These debatable arguments aside, if the U.S. adopted the same ratio of helicopter ambulances to population as the Canadians, the U.S. fleet would number about 350 helicopters, far less than the 750 machines now in this service.

In its reauthorization bill for the FAA (H.R. 915) the Congress has addressed the safety of HEMS operations by ordering the FAA to conduct a “rulemaking proceeding to improve the safety of flight crewmembers, medical personnel, and passengers onboard helicopters providing air ambulance services.” However, the Congressional mandate is shot through with loopholes. Here are three:

1. Matters to be addressed include “devices that perform the function of flight data recorders and cockpit voice recorders, to the extent feasible ...” The words “to the extent feasible” relegates flight data and cockpit voice recorders – which the

NTSB deems essential – to the “too hard, too expensive” pile of unrequited safety recommendations.

2. A flight risk evaluation program should be conducted for every Part 135 helicopter ambulance flight. This assessment excludes positioning flights under Part 91, so the Part 135 is less of an imposition than it ostensibly appears.
3. Similarly, flight and duty time restrictions, and weather minima, are to be considered only when “medical personnel are onboard the aircraft” and the helicopter is making a Part 135 flight. Again, Part 91 flights are excluded.

With minor tweaks, Congress is abetting the current situation. The situation is reminiscent of a proliferation of tow-truck drivers haunting known accident scenes and actively touting for business, or taxi drivers vying for slots in queues outside airport terminals.

What needs to be addressed, and changed, is the current payment formula, the excessive number of helicopter ambulances, allowing flights with only one pilot, and establishing a central operations center at least at the state level.

The Canadian model of dedicated HEMS operations has been in place since 1977, without one fatal accident. The NTSB and Congress should have called for the U.S. to emulate the Canadian example. To do that, the current swarm of helicopter ambulances needs to be thinned out. What better way to do that than to price out of contention all those hand-to-mouth operators without the technological and manpower resources to operate safely?

The 19 recommendations recently issued by the NTSB (note the lack of a deadline for either response or implementation, thus undercutting any sense of urgency):

To the FAA

1. Develop criteria for scenario-based HEMS pilot training.
2. Require HEMS pilots to undergo simulator training based on these scenarios. (Annual training, semi-annual, or bi-annual training? The NTSB does not say.)
3. Require operators to introduce a safety management system.
4. Require operators to implement a flight operations quality assurance (FOQA) program.
5. Annually report total hours flown, patient transports completed, etc.
6. Permit use of the Aviation Digital Data Services Weather Tool.
7. Evaluate requirements for a low-altitude airspace infrastructure in support of HEMS operations.

8. Once the evaluation is completed, develop the infrastructure. (The requirement does not say the infrastructure should be deployed – a major omission.)
9. Require HEMS operator to train and equip pilots in the use of night vision goggles.
10. Require HEMS operators to install autopilots “if a second pilot is not available.” (The recommendation subtly equates autopilots as boosting safety equivalent to adding a second pilot. Requiring two pilots and an autopilot is the norm for airliners.)

To HEMS operators

11. Conduct simulator training on inadvertent flight into instrument conditions often enough to ensure proficiency.
12. Implement a safety management system.
13. Establish a FOQA program “to identify deviations from established norms and procedures.”
14. Require pilots to use night vision goggles for visual conditions.
15. Equip helicopters with autopilots.

To the Federal Interagency Committee on Emergency Medical Services

16. Develop national guidelines for the use of HEMS transport.
17. Develop national guidelines for the selection of emergency transportation modes.

To the Department of Health & Human Services’ Centers for Medicare & Medicaid Services

18. Evaluate the existing HEMS reimbursement rate to see if payments should be based on the level of safety provided.
19. If the findings point in this direction, establish a new reimbursement rate structure.

Status of 4 previously issued NTSB recommendations (in 2006) to the FAA (not one of which has yet been fully implemented to the NTSB’s satisfaction):

20. Require EMS operators to comply with Part 135 operations specification at all times, as they are more rigorous than Part 91 specifications.
21. Require HEMS operators to implement a flight risk evaluation program, said paper form to be completed before the flight to assess whether the risk profile (e.g., from possible/probable poor visibility) outweighs the benefit of aerial transport.

22. Require HEMS operators to use formalized dispatch and flight-following procedures.

23. Require HEMS operators to install TAWS on their helicopters for terrain avoidance.

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