

Fall 2016

# An Arm and a Leg: Paying for Helicopter Air Ambulances

Henry H. Perritt, Jr.

# AN ARM AND A LEG:<sup>1</sup> PAYING FOR HELICOPTER AIR AMBULANCES

Henry H. Perritt, Jr.<sup>†</sup>

## Abstract

*An increase in Medicare reimbursement rates in 2002 caused the number of helicopter air ambulances in the United States to increase threefold. The vast majority of air ambulance flights are ultimately paid for through Medicare or private insurance reimbursement, although the patient often remains legally responsible for the cost of a flight. Average costs for helicopter air ambulance (HEMS) operators have increased much more rapidly than the reimbursement rate, mostly due to low utilization of the helicopters. New safety requirements imposed by the FAA, after a ten-year*

---

1. Compare *Mum Owes Leg to Rescue Chopper*, AUCKLAND RESCUE HELICOPTER TRUST (Feb. 5, 2014, 5:00 AM), <http://rescuehelicopter.org.nz/news/mum-owes-leg-to-rescue-chopper>, and *Elk Hunter Uses His SPOT Device to Assist Fellow Hunter in Northern New Mexico*, SPOT, [http://www.findmespot.com/en/spotemergency/index.php?article\\_id=1060](http://www.findmespot.com/en/spotemergency/index.php?article_id=1060) (last visited Sept. 28, 2016) (describing the rescue of a hunter with broken leg), with franky, *Cost of Yosemite Helicopter Rescue*, SUPERTOPO (Nov. 10, 2015, 9:42 PM), <http://www.supertopo.com/climbers-forum/2715105/cost-of-yosemite-helicopter-rescue> (“[T]here is a very good chance that you’ll end up on a private . . . helicopter that will charge an arm and a leg.”).

<sup>†</sup> Professor of Law and Former Dean, Chicago-Kent College of Law, the Law School of Illinois Institute of Technology. Commercial helicopter and private airplane pilot with instrument rating. Member of the bar: Virginia (inactive), Pennsylvania (inactive), District of Columbia, Maryland, Illinois, and the Supreme Court of the United States.

Mr. Perritt has written twenty books and nearly a hundred law review articles on public policy and law and technology. In *Sharing Public Safety Helicopters*, 79 J. AIR L. & COM. 501 (2014), written with Eliot O. Sprague and Christopher L. Cue, he evaluated organizational structures for expanding helicopter support for law enforcement.

He is familiar with health care policy issues, having written a number of law review articles on the application of ERISA to health care plans and a book on the Clinton Administration’s health care reform proposal. He served as Vice-Chairman of the “Coal Commission,” a commission appointed by U.S. Secretary of Labor Elizabeth Dole to solve a crisis in retired coal miner health care.

He appreciates idea incubation on this subject from his friend, Eliot O. Sprague, who taught Mr. Perritt how to fly helicopters. He also appreciates valuable input from Ira Blumen, MD, Professor of Medicine, University of Chicago, and air ambulance safety expert; Randy Mains, international air ambulance helicopter pilot, pilot instructor, and safety expert; Clayton Beckmann, an Air Methods HEMS pilot, flying for Guardian Air in Winslow, Ariz.; Yasser Abdullah, a CPA and first-year law student at Chicago-Kent College of Law; Joel Brumlick, Chief of the Winthrop Harbor, Ill., Police Department; Lt. Greg Whalen, of the Glencoe, Ill., Public Safety Department; Michael I. Bitton, Commander, of the Winthrop Harbor, Ill., Police Department; Andrew Gust, a first-year law student at Chicago-Kent College of Law; Dave Klein, CFII; Jonathan S. Davis, CEO of Sentara Martha Jefferson Hospital in Charlottesville, Va.; Rod Kilduff, former line pilot with Air Evac; Austen Clark, a pilot with Air Methods, Jeff Fair, line pilot with Air Methods, flying for Life Star in Joliet, Ill; and Dan Harper, former flight nurse and flight paramedic, Air Methods. He also appreciates information provided by several HEMS personnel on the condition that they remain anonymous. Air Methods did not respond to several e-mail and telephone inquiries requesting an interview with senior finance and operations personnel.

*period of much higher accident rates for helicopter air ambulances than for the rest of helicopter aviation, have only partially brought HEMS accident rates to an acceptable level. To assess arguments for adjusting reimbursement rates and FAA safety rules, one must understand the different types of missions that helicopter air ambulances fly, the kinds of helicopters available, labor markets for the necessary personnel, the economics of helicopter ambulance operation, and the data on fixed and variable costs.*

*Several policy options exist for resolving the funding controversy. The best is to keep the existing Medicare reimbursement formula, expecting private insurance to continue to model their policies on Medicare. This will encourage further consolidation and shrinkage of the fleet to a more sustainable level. State and local governments can support noncompensatory HEMS operations in areas where population density is insufficient to support breakeven flight frequencies. The FAA should complete the task of promoting safety by requiring autopilots on all HEMS aircraft, collecting complete safety data, and abandoning the position that air ambulance operators are “airlines,” which interferes with state health care regulation.*

#### TABLE OF CONTENTS

I.	A Story .....	319
II.	Introduction .....	323
III.	Missions .....	326
	A. Medevac .....	327
	B. Hospital-to-Hospital Transport.....	328
	C. Dispatching Air Ambulances.....	331
IV.	Industry Structure.....	333
	A. Legal Forms.....	333
	B. Economies of Scale and Concentration .....	334
	C. Two Models.....	335
	1. Hospital-Based (“Contract”) .....	335
	2. Community-Based.....	336
	3. Hybrid Models.....	336
	4. Public Agency .....	338
V.	Risks and Safety Technologies .....	339
	A. Weather: Instrument Meteorological Conditions (IMC) .....	342
	1. Single- Versus Multi-Engine.....	344
	2. Single- Versus Two-Pilot .....	346
	3. Autopilots .....	347
	B. Collisions with Obstacles .....	348
	1. Night Vision Goggles (NVGs) .....	349
	2. Radio Altimeters.....	350
	3. Terrain Avoidance Warning Systems (TAWS).....	351
	4. Navigation Systems and IFR Operations.....	351
	C. Flight Simulators .....	353
VI.	Human Resources .....	354
	A. Pilots.....	355

1.	Recruitment and Qualifications .....	355
2.	Training and Safety Culture .....	357
B.	Flight Nurses .....	362
C.	Paramedics.....	363
D.	Dispatchers .....	364
VII.	Regulation .....	364
A.	Safety Regulation .....	364
B.	Federal Preemption of State Economic Regulation .....	370
VIII.	Economics of HEMS Operations .....	371
A.	Fixed and Variable Costs.....	371
B.	Utilization Is Critical .....	375
C.	Competition .....	377
D.	Reimbursement.....	380
E.	Health Care Reform.....	384
IX.	The Reimbursement Crisis .....	387
A.	The Perceived Problem.....	387
1.	Proposed Legislation .....	390
2.	Texas and Ohio Litigation Against Private Insurers.....	390
B.	The Facts .....	393
X.	The Solution.....	397
A.	Economics .....	397
1.	Adjusting Medicare Reimbursement .....	398
2.	Allowing State Regulation .....	399
3.	Allowing the Market to Work .....	400
4.	Private Insurance .....	401
5.	Subsidies for Low Population Density Areas.....	401
6.	Centralizing Dispatch.....	404
B.	Safety.....	404

## I. A STORY

Webster Tockingham gripped the cyclic stick so hard with his right hand that the big muscle between the base of his thumb and the rest of his hand ached.

“Hey, man. Relax!” he mumbled to himself.

“What?” said the flight nurse from the backseat over the intercom.

“Nothing,” Webster said, feeling his face flush. He relaxed his hand and now used a light caress with his fingers and thumb to manipulate the cyclic control, positioned between his knees. The cyclic stick controlled the direction the helicopter flew. He did not have to supply any real force—just to indicate the direction.

It would be fine. He knew it would. He had flown into plenty of confined areas over the last three years, although it had been six weeks since he had flown an actual accident-victim extraction. It would be fine. He knew how to do it.

“Hey cutie!” the fortysomething flight nurse had said as she checked her equipment. “Glad you’re flying for us tonight. You’re the best.”

Webster did not mind the compliment, but he hated when she called him “cutie.” Anyone would.

This was exactly what he had dreamed of doing—flying helicopters and getting paid for it. Sometimes he had to cut through the alternating tension and boredom to remember the dream. He was not flying nearly as much as he had hoped—twenty-five to thirty hours a month. He had actually flown more during his company training and check rides. Most of it now involved transporting patients from one hospital helipad to another and picking up an occasional transplant organ from an airport or helipad. Kidneys, livers, and—once—a heart. That was the coolest: the heart.

He reviewed the steps in his head, although he did not really need to. He looked at the moving-map aeronautical chart on the iPad strapped to his left thigh. About eight minutes to go.

He hoped they got there in time. The callout said it was a badly injured elderly woman and a child—they did not give their ages. He moved the cyclic forward imperceptibly and pulled up on the collective, glancing at the torque indicator to keep it just below the redline.

The career journey had been a bit tougher than he expected, but he had lucked out. Flight training and academic work toward an associate degree at Embry Riddle University in Prescott, Arizona, went well, although he was impatient to start flying for real. Before he finished, he often questioned his decision to stick around for an associate’s degree, and on the other hand, not to stick around longer for a bachelor’s degree. Embry Riddle offered flight training and ratings without degrees or with them.

But he was now an Associate of Science in Aeronautics, a commercial, instrument-rated, helicopter pilot, and a certificated flight instructor. At age twenty-three. Not too bad.

He worked as a flight instructor for only six months, much less than the usual dues-paying flight-instruction period that was the first stepping-stone for most professional pilots. He did not mind instruction; it kept him on his toes to anticipate and react appropriately to student surprises, so he could keep both of them from getting killed. He also met some very interesting people—experienced executives, doctors, lawyers, and a few public officials who had amassed the resources to pay for helicopter lessons as part of a very expensive hobby. But the pay was awful. He barely could afford the \$250-a-month rent for the privilege of sleeping in a very small bunkroom of an emergency response helicopter coalition in a hanger on the north side of the airport. Webster enjoyed interacting with the police pilots and TFOs, but it was a primitive lifestyle, and the “opportunity” to interact was a bit stifling at times.

Then opportunity beckoned—big time. An aggressive young entrepreneur was building a new “helicopter rides” operation aimed at Chicago’s large flow of domestic and foreign tourists. He had just bought an EC130 turbine helicopter to supplement his piston fleet. The young businessman was a private helicopter pilot himself, but his age—twenty-eight

years old—caused many in the industry to scoff at his ambitions, and he was having difficulty recruiting pilots. Webster had given him an FAA-required annual flight review and the two had come to know and like each other.

The entrepreneur offered Webster a job, and Webster had jumped from instructing in piston-engine helicopters to flying turbine helicopters. The entrepreneur sent him to Airbus flight school at Grand Prairie Municipal Airport, near Fort Worth, for “transition training.” He spent an intense eight days becoming thoroughly familiar with the EC130 systems and earned some fifteen flight hours gaining proficiency in flying it. The EC130 is essentially a widened-cabin model of the AS350 he was now flying.

After he got back, he flew his tail off, building coveted turbine time in the EC130.

The entrepreneur knew Webster would not be with him for long, but they were friends, and the entrepreneur encouraged Webster to take the next step, to move to EMS, Oil & Gas, or Utility external lift.

So, it was not an act of betrayal for Webster to begin applying, almost immediately, to EMS operators. Time after time, he received no response, occasionally punctuated with a kind word advising him to get more turbine time.

Then, bingo! He was flying medevac helicopters. For a small operator, in Birmingham, Alabama, to be sure—only five light helicopters, AS350s—but he was an air ambulance pilot, before he turned twenty-five!

Two minutes, now. He could see the flashing red and blue lights of the police cars and the fire trucks, one hundred yards off to the side of the secondary road, next to some kind of concrete structure.

He pushed the button on the cyclic with his right thumb, which flipped from the aviation frequency to 154.92 MHz, the frequency for Troop G of the Alabama Highway Patrol.

“Air Rescue 92 Sierra, you ready for us?”

“Medevac Helicopter, this is Trooper 467, Corporal Pitt. We’ve got to get the kid out of here! We’re losing him.”

“Okay, 467, have you secured the area? What can you tell me about the surface and about wires and poles?” Webster set up a right turn to inspect the landing zone.

“It’s fine. Just land beside the fire truck, on the south side.”

“Uh,” Webster said. When he approached the scene he was supposed to get detailed landing zone (LZ) instructions from the first responders who had called for a helicopter: where he should land, the surface he would land on, and information on any obstacles in the area.

But then he released the mic button. He had a job to do. No time for argument with the cops. But, still: the guy’s lack of discipline could kill them before they got to the patient.

When he arrived, he would fly a “high recon”—he was already doing it—looking for obstacles, personnel, surface type and slope, wind, approach and departure paths, and escape routes. This was especially challenging at night

using only a large spotlight. He wondered if night vision goggles would help, but his employer did not use them, and he had heard that they created more risks than they reduced.

Webster looked over the area and noticed power line poles (he knew that the wires themselves are always nearly invisible) on the north side of the fire truck. He searched but did not see any poles on the south side. He decided to set up his approach from the south.

Everything went like every other confined area approach in his experience; but then, when he was about fifty feet above the ground—

“Abort! Abort! Abort!” the flight nurse and paramedic both screamed over the intercom. A single power line appeared directly in the landing light.

Webster pulled power with his left hand on the collective, increasing the rotor-blade pitch and therefore the lift on the rotor and simultaneously increasing fuel flow to the engine. The wire disappeared under the belly. He flinched, waiting for the tail rotor to hit it. That would disable the tail rotor and send the helicopter spinning.

He braced himself. “Hold on tight,” he told the intercom, through clenched teeth.

No impact. Apparently, he had missed the wire. He climbed and set up another recon orbit.

“Hey kid!” Corporal Pitt shouted. “What’s the matter? You’ve got to land to get him out.”

*Screw you*, Webster thought, his heart thumping. *If you had been doing your job, we would have been on the ground already.* He figured out another approach path that avoided the wires and landed. His flight nurse and paramedic jumped out.

Webster took a deep breath and commanded his hands to stop shaking. He pulled them from the controls and balled them into fists in his lap. He probably had over-torqued the engine and transmission when he pulled up to avoid the wire. *And how did the highway patrolman know his age, anyway?*

Maybe he did not need to say anything—*what was the matter with him? Of course, he had to say something.* If he did not, the mechanic would not inspect for damage and it might kill the next guy—or him—on a later flight.

He looked through the gloom for the wire. No sign of it; but now he could see two steel poles, mostly hidden in the trees that supported it.

His crew had got the kid, loaded the stretcher, and signaled that everything was secure for lifting off. Webster began to pull up on the collective.

“Wait!” the paramedic said. Webster lowered the collective. The paramedic jumped out, ran a few yards, picked something up, and returned to the helicopter, once again saying, “Go!”

Webster concentrated on the locations of the poles and wires, not sure he could see them all, but made a successful lift off. He redlined the airspeed all the way back to the heliport of the nearest trauma center.

No one worried too much about Medicare guidelines for reimbursement

or getting a written certification from a physician that the helicopter extraction was necessary.

The flight back to the hospital was uneventful, by comparison. The stretcher on which the boy lay, inert, extended into the cockpit on the left side. Webster easily could have touched his leg.

According to the flight nurse and paramedic, who punctuated their clinical discourse over the intercom with other information, a mother had been driving her thirteen-year-old son to a tennis tournament scheduled for the next morning in Oak Grove. She hit a deer bounding across the road and lost control of the car. The boy had apparently had his window down and his right arm outside the car when it hit a tree. Ordinarily, the medical crew isolated their intercom conversations from the pilot, but they apparently had forgotten to press the isolation switch.

He suffered a traumatic amputation of his right hand. The flight paramedic had retrieved the hand, and Webster presumed it was somewhere behind him, packed in ice.

The boy survived, and Webster hoped they had been able to reattach the hand. Webster's boss congratulated Webster. Webster told him about the possibility of an overtorque, but the owner seemed quite casual about it, and merely commented that he would have the mechanic check it out. He seemed preoccupied.

Then he told Webster he was selling his company to Air Methods, assuring Webster that he had told Air Methods that Webster was a superb pilot. That is what the Air Methods HR person told Webster in their first meeting, as well.

"You are just the kind of young talent we want," she said. "Someone who wears the helicopter like a glove."

But then she explained that Air Methods was retrenching, downsizing its fleet, cancelling its advertisements for new pilots, generally cutting budgets, and, regrettably, would have to lay Webster off.

"There are too many operators chasing too little business," she said.

## II. INTRODUCTION

Increases in average costs for air ambulance missions have outgrown sources of revenue to cover them.<sup>2</sup> This phenomenon presents a significant public policy question for health care and aviation: should the air ambulance fleet be allowed to shrink, or should new sources of revenue—probably public—subsidize air ambulance operations?

When a medevac helicopter—or Helicopter Emergency Medical Service (HEMS)<sup>3</sup>—is called out to an accident scene, it almost always leads the

---

2. Peter Eavis, *Air Ambulances Offer a Lifeline and Then a Sky-High Bill*, N.Y. TIMES (May 5, 2015), <http://www.nytimes.com/2015/05/06/business/rescued-by-an-air-ambulance-but-stunned-at-the-sky-high-bill.html>.

3. Terminology is in flux. "Medevac" is a popular usage. The helicopter industry uses "HEMS" (Helicopter Emergency Medical Service). "Helicopter air ambulance" is becoming more common. The FAA



evening news and symbolizes the seriousness of the accident and the readiness of first responders to do everything possible to save victims.<sup>4</sup> More than one thousand helicopter air ambulances are on standby throughout the United States to fulfill this expectation.<sup>5</sup> Keeping them available in so many different places, however, costs a lot of money.<sup>6</sup>

A 434% increase in Medicare reimbursement rates in 2002 caused new providers to enter the market.<sup>7</sup> Before the increase, most HEMS operations were hospital-based; after the increase, they became predominately community-based.<sup>8</sup>

Controversy is growing on whether so many helicopter air ambulances are needed and whether already strained budgets for health care can afford rapidly escalating fees. One interpretation of the data suggests that there is simply an oversupply of HEMS operators,<sup>9</sup> and that the best policy is to keep reimbursement rates where they are to starve the weakest operators out of the market.<sup>10</sup> One emergency room physician asked rhetorically why a 300% increase in the number of EMS helicopters occurred in just over eight years.<sup>11</sup> “There are several reasons. Medical necessity is not one of them,” was the answer.<sup>12</sup> “This uncontrolled, unregulated growth has largely been industry-driven with little scientific support for the practice.”<sup>13</sup>

---

has declared that:

The term Emergency Medical Service/Helicopter (EMS/H or HEMS) is obsolete. It is being replaced by HAA [Helicopter Air Ambulance] because, though a critical life and death medical emergency may exist, air ambulance flights are not operated as an emergency. Pilots and operator management personnel should not make flight decisions based on the condition of the patient, but rather upon the safety of the flight.

FED. AVIATION ADMIN., AC No. 135-14B, ADVISORY CIRCULAR: HELICOPTER AIR AMBULANCE OPERATIONS § 1-1(b)(1) (Mar. 26, 2015) [hereinafter HEMS ADVISORY CIRCULAR], [http://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC\\_135-14B.pdf](http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_135-14B.pdf).

4. See, e.g., Allison Brophy Champion, *Six Medical Helicopters Provide Transport from Culpeper Car Accident*, DAILY PROGRESS (May 20, 2016), [http://www.dailyprogress.com/news/state/six-medical-helicopters-provide-transport-from-culpeper-car-accident/article\\_34549902-1ecb-11e6-bf6d-8f0979e74af3.html](http://www.dailyprogress.com/news/state/six-medical-helicopters-provide-transport-from-culpeper-car-accident/article_34549902-1ecb-11e6-bf6d-8f0979e74af3.html) (covering a breaking story where a “half-dozen medical evacuation helicopters responded to the scene of a single-vehicle accident”).

5. ASS’N OF AIR MED. SERVS. & CUBRC PUB. SAFETY & TRANSP. GRP., ATLAS & DATABASE OF AIR MEDICAL SERVICES (ADAMS) 16 (Sept. 2016) [hereinafter ADAMS 2016], [http://www.adamsairmed.org/pubs/atlas\\_2016.pdf](http://www.adamsairmed.org/pubs/atlas_2016.pdf).

6. Monte Burke, *Rescue Helicopters Elevate Profits*, FORBES (Oct. 15, 2009, 9:20 PM), <http://www.forbes.com/forbes/2009/1102/small-companies-09-air-methods-rescue-helicopters-elevate-profits.html>.

7. Michael K. Abernethy, *Helicopter Emergency Services: A Disparity Between Aviation and Medical Proficiency*, KEVINMD.COM (Oct. 25, 2014), <http://www.kevinmd.com/blog/2014/10/helicopter-emergency-services-disparity-aviation-medical-proficiency.html> (reporting that a 434% increase in reimbursement for helicopter transport in 2000 triggered “uncontrolled growth” in the number of medical helicopters, from 377 in 2000 to more than 900 in 2014).

8. *Id.*

9. Eavis, *supra* note 2 (“[E]xplosive growth in the number of air ambulances creat[ed] an inefficient system in which too many helicopters are chasing too few patients . . . . One side effect may be that smaller, nonprofit air ambulance operators, which make up a significa[nt] portion of the industry and may charge less than their large commercial rivals, are finding it harder to survive.”).

10. *Id.*

11. Bryan Bledsoe et al., *Can EPs Fix the Helicopter EMS System?*, EMERGENCY PHYSICIANS MONTHLY, <http://epmonthly.com/article/can-eps-fix-the-helicopter-ems-system/> (last visited Sept. 28, 2016).

12. *Id.*

13. *Id.*

Critics also criticize the safety record.<sup>14</sup> “HEMS transport is the only medical procedure that holds a much higher morbidity and mortality for the providers than it does for the patient.”<sup>15</sup>

A deeper analysis, however, taking into account changes in the structure of hospital care, suggests an increasing need for HEMS in low-population density areas and for interfacility transport.<sup>16</sup> If that is the case, reimbursement needs to be adjusted to cover the higher average cost associated with lower frequency HEMS operations, resulting in lower aircraft utilization.<sup>17</sup> When fewer flights are available to each operator, fixed costs drive up their average per-flight hour and per-mission costs.<sup>18</sup>

This Article jumps in the middle of the controversy as HEMS operators seek a quadrupling of Medicare reimbursement rates and sue insurance carriers to force them to pay more.<sup>19</sup> It begins with a simple profile of the most common missions flown by HEMS helicopters, and then provides an overview of the industry structure. It describes the specific risks that have led to an accident rate that was the worst in helicopter industry for many years,<sup>20</sup> and explains the technologies that can reduce the risks, conceding that human factors are as important as technology. It analyzes the economics of a HEMS operation, and explains the current reimbursement scheme in which Medicare plays a leadership role in determining the formulas for reimbursement. It then evaluates opposing factual data used to support arguments in favor of higher levels of reimbursement, and conversely, arguments that the HEMS industry is out of control, advocating public-policy or market-oriented initiatives to shrink the size of the fleet and the number of missions and personnel.

It also evaluates policy options for dealing with the reimbursement controversy and concludes that maintaining current reimbursement formulas and levels is the best general policy. Communities that want HEMS service in circumstances that do not support breakeven flight frequencies can enter into agreements with HEMS operators that make up the shortfall in revenue, while tailoring the nature of the service to meet local needs.<sup>21</sup> The data and a number of interviews suggest that the problems are intensifying and that the situation is deteriorating.<sup>22</sup> Sharp declines in flight volumes increase pressure on HEMS operator marketing.<sup>23</sup> In some cases, financial weakness and the need for additional missions cause pilots and medical crews to press the odds on weather.<sup>24</sup> Also, distrust in management and a perception that it will terminate

---

14. *Id.*

15. *Id.*

16. *See infra* Section X.A.5.

17. STEPHEN H. THOMAS ET AL., OU DEP’T OF EMERGENCY MED., HELICOPTER EMERGENCY MEDICAL SERVICES IN OKLAHOMA: AN OVERVIEW OF CURRENT STATUS AND FUTURE DIRECTIONS (Apr. 22, 2012), <https://www.ok.gov/health2/documents/HEMS%20OK%20Report%20Final.pdf>.

18. Burke, *supra* note 6.

19. Eavis, *supra* note 2.

20. *Id.*

21. *Id.*

22. *Id.*

23. THOMAS ET AL., *supra* note 17.

24. *See generally* Eavis, *supra* note 2; THOMAS ET AL., *supra* note 17.

anyone who breaks the rules tempts pilots to disregard their training and to engage in unsafe practices that they think will obscure mistakes they have made.

### III. MISSIONS

Helicopters first proved themselves in World War II, Korea, and Vietnam as air ambulances.<sup>25</sup> Although their mission profiles have proliferated considerably since then, medevac remains a staple of helicopter operations.<sup>26</sup>

Helicopter operations comprise 75% of the air ambulance industry and devote about half of their flights to hospital-to-hospital transport, a little over a third to accident-scene extraction, and the remainder to organ, medical supply, and medical personnel transport.<sup>27</sup>

HEMS operators establish standards for their flight crews, including the maximum time between a call for HEMS services and the helicopter being in the air, typically about five minutes.<sup>28</sup> Required preflight and dispatch procedures<sup>29</sup> have already been completed when a call comes. The pilot and medical staff typically preflight the helicopter and systems at the beginning of their shifts, and the helicopter is secure in a hanger from any tampering after that.<sup>30</sup> Usually, the pilot and dispatcher can assess the weather pretty accurately a couple of hours before the flight, so most of the risk analysis required has already been done by the Pilot-in-Command (PIC)<sup>31</sup> and a dispatcher before a callout. A quick update on the weather conditions at the destination need take only a minute or so as the helicopter is started and made ready for flight.<sup>32</sup>

Most HEMS helicopters have maximum cruising speeds in the one hundred to one hundred and fifty knot range.<sup>33</sup> If the operator's standard calls

---

25. JAMES R. CHILES, *THE GOD MACHINE* 149 (2007) (reporting early use of rescue helicopters in World War II); THOMAS ET AL., *supra* note 17 ("Lessons learned in Korea and Vietnam were translated to the civilian setting and HEMS became an integral part of many trauma systems.").

26. CHILES, *supra* note 25; see also Charlotte Adams, *Top 10 HEMS Providers*, ROTOR & WING INT'L (Oct. 1, 2010), [http://www.aviationtoday.com/rw/commercial/ems/Top-10-HEMS-Providers\\_70996.html](http://www.aviationtoday.com/rw/commercial/ems/Top-10-HEMS-Providers_70996.html) (reporting HEMS as a \$2.5 billion industry).

27. Bernard F. Diederich, *Air Ambulance: Rescuer or Rescue?*, 62 FED. LAW. 66, 69 (2015) (summarizing types of operations).

28. Author's conversations with HEMS pilots; see also AAMS, *EARLY ACTIVATION OF AN AIR MEDICAL HELICOPTER AND AUTO LAUNCH RECOMMENDATIONS 1* (June 2006), <http://aams.org/wp-content/uploads/2014/01/EarlyActivationFINAL.pdf.pdf> (stating time from activation to lift can range from five to fifteen minutes).

29. 14 C.F.R. § 91.103(a) (2016) (requiring preflight preparation regarding "all available information concerning the flight"); *id.* § 91.9(a) (prohibiting operation without complying with the approved aircraft flight manual). Section 4.1 of the AS350 Flight Manual prescribes eleven pages of preflight inspection steps that must be completed during the day of flights. See EUROCOPTER, *FLIGHT MANUAL AS 350 B3*, at 70–81 (Mar. 25, 1998), <http://www.avialogs.com/en/aircraft/france/aerospatiale/as350ecureuil/flight-manual-as-350-b3-ecureuil.html#download>.

30. Author's conversations with HEMS pilots.

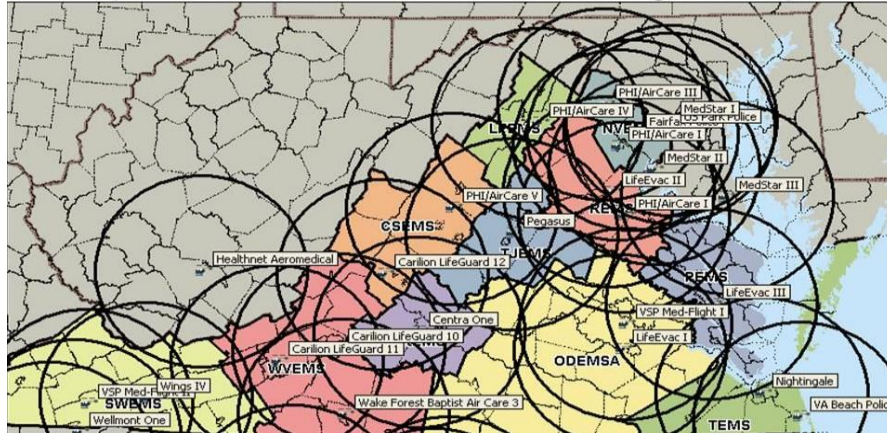
31. A PIC is an FAA-rated pilot responsible for a flight. See 14 C.F.R. § 91.3 (titled, "Responsibility and authority of the pilot in command").

32. THOMAS ET AL., *supra* note 17.

33. See, e.g., Air Methods Corp., *Annual Report (Form 10-K) 16* (Feb. 29, 2016) [hereinafter *Air Methods 2015 Annual Report*]. The AS350 is one of the most common HEMS helicopters, and Air Methods

for them to be at a scene no longer than thirty minutes after a call, that means a sixty to seventy-five mile radius of service.<sup>34</sup> That corresponds to a map the Commonwealth of Virginia prepared of HEMS operators in Virginia showing overlapping circles for their operating radii.<sup>35</sup>

### Virginia Medevac Service Map (50 Mile Radius – 20-25 minute flight time)



36

#### A. Medevac

The image of what EMS operators do is romantic and exciting. A child is seriously injured in an accident occurring in a remote area. First responders despair of saving her. Then a helicopter swoops down out of the sky, lands in the middle of a road in the dark, surrounded by trees and utility poles, and a flight nurse and paramedic rush to disembark from the helicopter. They stabilize the patient and the helicopter takes off again, whisking her to an emergency room where she receives further treatment and recovers.

The need for air ambulance transportation, however, is much more complex than that. Not only do accident victims require the fastest possible transportation to emergency health care, so do victims of heart attacks, strokes, and diabetic incidents.<sup>37</sup> In addition, accidents occur not only from motor vehicle collisions, but also from entanglement in farm machinery and logging

is the largest HEMS operator. *Id.* It has eighty-eight of its own AS350s. *Id.* The AS350 has a cruise speed of 133 knots. *H125 (formerly known as AS350) Specifications*, AIRBUS HELICOPTERS, <http://airbushelicoptersinc.com/products/H125-specifications.asp> (last visited Sept. 28, 2016).

34. One hundred and twenty knots times one-half hour equals sixty nautical miles.

35. *Physician's Guide to Helicopter EMS Use in Virginia*, VA. DEP'T HEALTH, <https://www.vdh.virginia.gov/OEMS/Medevac/PhysiciansGuidetoHEMS.pdf> (last visited Sept. 28, 2016).

36. *Id.*

37. THOMAS ET AL., *supra* note 17.

equipment, falls from utility towers, and hunting mishaps.<sup>38</sup> All may require emergency transportation by air.

Many of these missions require helicopters to operate from unprepared, off-airport locations that present a variety of hazards.<sup>39</sup> Others involve well-designed, well-lighted, hospital heliports protected from obstacles.<sup>40</sup>

Health care policy appropriately invests a substantial portion of its resources in emergency care,<sup>41</sup> and emergency helicopter extraction is a part of that infrastructure.<sup>42</sup> Not only is HEMS transport faster than ground transport, HEMS medical crews and equipment are more sophisticated than those available on most ground ambulances, permitting advanced treatment to begin while enroute.<sup>43</sup> Data analysis shows that HEMS transport of trauma patients improves survival rates by about 15% over ground transport.<sup>44</sup>

### B. Hospital-to-Hospital Transport

The largest area of growth has been, not in trauma extraction from accident sites, but in interfacility transport, where the need is less obvious.<sup>45</sup> HEMS interfacility transport has increased, in part, because of the regionalization of care for non-trauma, but life-threatening, conditions such as cardiac and stroke emergencies.<sup>46</sup> Many community hospitals are not staffed or equipped to deal with these conditions, necessitating transport to a specialized hospital in the region.<sup>47</sup> As described by a University of Oklahoma study assessing HEMS in that state, “In essence, HEMS can extend the reach of regionalized systems for trauma, cardiac, stroke, neonatal, obstetric, pediatric, and other patient populations.”<sup>48</sup>

Substantial changes in the industry structure for acute care hospitals, considered in more detail in Section IX.B, increase the need for interfacility

---

38. See, e.g., Eavis, *supra* note 2 (describing an accident requiring emergency air transport where a rancher was moving bales on top of a haystack and fell eight feet, hitting his head on the corner of a truck).

39. Diederich, *supra* note 27.

40. *Id.*

41. *Costs of Emergency Care Fact Sheet*, AM. C. EMERGENCY PHYSICIANS, [http://newsroom.acep.org/fact\\_sheets?item=29928](http://newsroom.acep.org/fact_sheets?item=29928) (last visited Oct. 2, 2016) (reporting emergency care costs of 2% of \$2.4 trillion total health care expenditures, covering 136 million people).

42. Jon Mark Hirshon et al., *Maryland's Helicopter Emergency Medical Services Experience from 2001 to 2011: System Improvements and Patients' Outcomes*, 67 ANNALS EMERGENCY MED. 332, 332 (2016) (“Helicopter emergency medical services (EMS) has become a well-established component of modern trauma systems.”).

43. THOMAS ET AL., *supra* note 17, at 3 (noting trauma surgeons believe that resuscitation time-frame clock stops when HEMS arrives because HEMS crews are capable of hospital ED-level advanced intervention).

44. See Press Release, Univ. of Md. Med. Ctr., *Helicopter Transport Improves Trauma Patient Survival Compared to Ground Transport* (Apr. 17, 2012), <http://umm.edu/news-and-events/news-releases/2012/helicopter-transport-improves-trauma-patient-survival-compared-to-ground-transport> (summarizing study of 223,475 adult trauma patients finding 15%–16% survival advantage from HEMS, compared to ground ambulance transport); Samuel M. Galvagno Jr. et al., *Association Between Helicopter vs Ground Emergency Medical Services and Survival for Adults with Major Trauma*, 307 JAMA 1602, 1602–10 (2012).

45. THOMAS ET AL., *supra* note 17, at 14.

46. *Id.* at 3 (“[F]or many HEMS programs trauma patients now comprise a minority of flights.”).

47. *Id.*

48. *Id.* at 4.

transport by HEMS. Sixty percent of acute care hospitals in the United States are now part of hospital systems, in which community hospitals are clustered around a high-tech tertiary care center, often University affiliated.<sup>49</sup> More often than in the past, a patient headed to a nearby community hospital must be transported to an affiliated tertiary care facility after an initial diagnostic workup and stabilization.<sup>50</sup> Constructing a system with a tertiary care hospital at its hub to which the other members of the system feed patients is only one strategy. It is far from dominating the vision of the future of health care.<sup>51</sup>

A fundamentally different strategy recognizes that tertiary and quaternary<sup>52</sup> care capability costs a lot of money. Tertiary and quaternary care hospitals must meet standards that greatly increase their costs.<sup>53</sup> They typically have four levels of physician: hospitalists, residents, attendings, and specialists in multiple areas who get involved with each patient.<sup>54</sup> Community hospitals have only two: hospitalists and specialists.<sup>55</sup> Community hospitals also offer something subtler that gives them an advantage over large, advanced care hospitals. Their smaller size provides a more intimate atmosphere for patients; the simpler structure for their medical staff keeps the patient from being bounced around from one specialty area to another, with no one physician really knowing the whole patient.<sup>56</sup> Also, community hospitals often are located in suburban areas that generally are more pleasant aesthetically than a large advanced care hospital in the middle of a city.<sup>57</sup> Little things like parking lots and garages right next to the hospital make a difference to patients and their families.

Decision-makers for some community hospital systems, like Sentara Healthcare in Virginia, capitalize on these advantages.<sup>58</sup> They do not want tertiary care capability, because it would increase their overall cost structure, and getting the right cost structure is the key to success.<sup>59</sup> The key is to think strategically and then have the discipline to follow that strategy. Those systems that go into a state and just buy up all the hospitals, vaguely intending

---

49. According to a 2013 study published in the *Journal of the American Medical Association* by a member of the Harvard economics faculty and a member of the Yale School of Management faculty, 60% of American hospitals are part of hospital systems. David M. Cutler & Fiona Scott Morton, *Hospitals, Market Share, and Consolidation*, 310 JAMA 1964, 1965 tbl.1 (2013), [http://scholar.harvard.edu/files/cutler/files/jsc130008\\_hospitals\\_market\\_share\\_and\\_consolidation.pdf](http://scholar.harvard.edu/files/cutler/files/jsc130008_hospitals_market_share_and_consolidation.pdf). The average hospital system comprises 3.2 hospitals. *Id.*

50. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., GUIDE FOR INTERFACILITY PATIENT TRANSFER 1 (Apr. 2006), <http://www.nhtsa.gov/people/injury/ems/Interfacility/images/Interfacility.pdf> (noting that interfacility transport has "increased as a result of regionalization, specialization, and facility designation by payers").

51. Telephone Interview with Jonathan S. Davis, CEO, Sentara Martha Jefferson Hosp. in Charlottesville, Va. (Mar. 29, 2016) [hereinafter Davis Interview].

52. Because the dividing line between tertiary and quaternary care hospitals is vague, this Article uses the term *tertiary* to refer to advanced care hospitals even if they classify themselves as quaternary.

53. Davis Interview, *supra* note 51.

54. *Id.*

55. *Id.*

56. *Id.*

57. *Id.*

58. *Id.*

59. *Id.*

to become the big gorilla, have been a colossal failure.<sup>60</sup> Everyone in the system claims to be able to treat everything, but none of them are capable of doing it well.

Community hospitals are happy to send their most critical patients to a university-based tertiary care hospital and let them pay the cost of all the high-end equipment and multiple high-end specialist positions they are required to have to be a tertiary care center.<sup>61</sup> Community hospitals keep the patients they know they can make money on.<sup>62</sup>

In some cases, they upgrade the level of care a particular hospital can provide, but that is not the same as becoming a tertiary care hospital, where it is necessary to upgrade technology and personnel on every conceivable type of treatment.<sup>63</sup> Community hospitals can be selective.

The “need” for tertiary care is very broadly defined. Someone who falls off a stool and breaks his ankle is rushed to a tertiary care facility, where a herd of hospitalists, residents, attendings, and multiple specialists bounce him from one specialty to another; it ends up costing a fortune.<sup>64</sup>

This strategy, which leaves trauma care to other systems, will increase the need for interfacility transport further because it makes it less likely that trauma care will be available within the same regional hospital system.<sup>65</sup>

For the highest acuity patients, there is going to be more and more concentration. Teaching hospitals must have trauma patients to give experience to their medical students and residents.<sup>66</sup> For a teaching hospital, maintaining a flow of trauma patients is essential.<sup>67</sup> Other systems are happy to occasionally let university hospitals receive people who are flown in from automobile or factory machine accidents.

Depending on how tight the cluster is, i.e., how close the admitting hospital is to the advanced care facility, HEMS transport may be desirable either to shorten the time before advanced care can begin or to provide more advanced support en route than is likely to be available in a ground ambulance. This concentration and specialization in the hospital infrastructure increases the need for HEMS transport in two ways. First, hospitals near the locations of accidents or acute medical emergencies are less likely to have advanced treatment capabilities, making it more likely that victims should be transported directly to a higher-level hospital.<sup>68</sup> Second, even if a nearby hospital can provide the level of care immediately necessary, a subsequent transfer to a higher-level hospital might be prudent, which involves interfacility air

---

60. *Id.*

61. *Id.*

62. *Id.*

63. *Id.*

64. *Id.*

65. *Id.*

66. *Id.*

67. *Id.*

68. Bruce H. Ziran et al., *United States Level 1 Trauma Centers Are Not Created Equal—A Concern for Patient Safety?*, PATIENT SAFETY IN SURGERY (July 21, 2008), <http://pssjournal.biomedcentral.com/articles/10.1186/1754-9493-2-18>.

transport.<sup>69</sup>

To the extent that significant numbers of hospital systems embrace this alternative strategy, the demand for interfacility transport will increase even more because there will be fewer tertiary care hospitals.

Despite these plausible arguments for increased interfacility transport, controversy exists. A British Columbia empirical study found little benefit from interfacility helicopter transport,<sup>70</sup> while the American College of Emergency Physicians (ACEP) published a policy statement articulating justifications for interfacility helicopter transport.<sup>71</sup>

Demand is growing, though, not only for interfacility transport of patients, but also for organ-transplant transportation.<sup>72</sup> Technology for organ transplantation is advancing rapidly, including better techniques for *ex vivo* preservation of the organ while it is being transported from the place of harvesting to the place of transplantation.<sup>73</sup>

While the operating environment for interfacility transfer is more benign than that for emergency extraction, usually involving a heliport at both ends, the onboard medical equipment and medical staff capability required is high.<sup>74</sup>

The increase in interfacility transport, however, will not necessarily translate into more HEMS flights. Ground ambulances are improving their capability to provide critical care at the level available inside a helicopter air ambulance.<sup>75</sup> Hospitals increasingly are relying on critical-care ground ambulances instead of air ambulances.<sup>76</sup>

### C. Dispatching Air Ambulances

HEMS operations control centers must work with first responders, who make the decision to call for an air ambulance.<sup>77</sup> Typically, the paramedic on the scene decides whether air ambulance transportation is necessary under protocols developed by his employer or the state.<sup>78</sup> In some communities, the paramedic's decision is unilateral; in others, it is subject to only light review by his chain of command; in other cases, more searching review occurs through the paramedic's chain of command or by physicians at an affiliated

---

69. *Id.*

70. Bledsoe et al., *supra* note 11.

71. *Policy Statement: Appropriate Utilization of Air Medical Transport in the Out-of-Hospital Setting*, AM. C. EMERGENCY PHYSICIANS, <https://www.acep.org/Clinical---Practice-Management/Appropriate-Utilization-of-Air-Medical-Transport-in-the-Out-of-Hospital-Setting/> (last updated Apr. 2008).

72. C.J.E. Watson & J.H. Dark, *Organ Transplantation: Historical Perspective and Current Practice*, BRIT. J. ANAESTHESIA (2012), [http://bj.a.oxfordjournals.org/content/108/suppl\\_1/i29.full](http://bj.a.oxfordjournals.org/content/108/suppl_1/i29.full).

73. *Id.* (reviewing advances in organ harvesting and *ex vivo* preservation).

74. Divya Sethi & Shalini Subramanian, *When Place and Time Matter: How to Conduct Safe Inter-Hospital Transfer of Patients*, 8 SAUDI J. ANAESTHESIA 104 (2014).

75. Telephone Interview with Ira Blumen, MD, Univ. of Chi. Med. Ctr. (Mar. 25, 2016) [hereinafter Blumen Interview]; Davis Interview, *supra* note 51.

76. *Id.*

77. Scott M. Sasser et al., *Guidelines for Field Triage of Injured Patients Recommendations of the National Expert Panel on Field Triage*, CTR. FOR DISEASE CONTROL (Jan. 23, 2009), <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5801a1.htm>.

78. *Id.*



hospital.<sup>79</sup> Once the decision is made to call for an air ambulance, the dispatcher for the paramedic makes a phone call to one or more HEMS operations centers.<sup>80</sup> Flight for Life has an online app that permits the on-scene paramedic to use his own phone to call for the helicopter, without the delays occasioned by his dispatcher getting involved.<sup>81</sup> Many jurisdictions have regular operators that they always call; others, apparently in Oklahoma, selectively shop among multiple operators.<sup>82</sup> In northern Illinois and southern Wisconsin, the regular provider, Flight for Life, takes the responsibility for finding another operator if its helicopters are unavailable.<sup>83</sup>

Here is how one first responder described the decisionmaking:

Always the question is how quickly can we get the patient to the right hospital. For trauma, the kinds of things that would cause us to call a helicopter are multiple long bone injuries, femur and humerus fractures, traumatic amputations, or the need to start IVs or to intubate the patient. If it's going to take us thirty minutes to cut the victim out of a car or an industrial machine, that covers the inbound flight time for the air ambulance, and then it's only ten minutes to a treatment center. If we need to start an IV or to intubate, that involves five to ten minutes of work, which also covers part of the inbound flight time.

We would avoid calling a helicopter and use ground transport to the nearest facility if we cannot stop the bleeding from a traumatic amputation—that doesn't happen very often—or, more often, if we can't control the airway. That would force us away from a helicopter toward transport to the nearest medical facility where a surgeon or other physician is available. Once the patient is stabilized, he can be transported to a specialized facility.

Medical emergencies are more complicated. For a stroke or heart attack victim, the question is how far away the nearest hospital is, where the patient can be stabilized, even if she is transferred somewhere else later. Lots of hospitals can stabilize a medical emergency.<sup>84</sup>

---

79. *Id.*

80. See THOMAS ET AL., *supra* note 17, at 9 (describing multiple lines of dispatchers to different HEMS services).

81. *Flight for Life Central App*, FLIGHT FOR LIFE, <http://www.flightforlife.org/ffl-central-app/> (last visited Sept. 28, 2016) (describing Flight for Life's central app).

82. See THOMAS ET AL., *supra* note 17, at 9, 101 (describing dispatch scenarios that “can border on the absurd” and the nature of HEMS dispatch as “often byzantine”).

83. Telephone Interview with Michael Bitton, Commander, Winthrop Harbor Police Dept. (Mar. 24, 2016) (describing dispatch as “work[ing] like clockwork”); Interview with Greg Whalen, Lt., Glencoe Pub. Safety Dep't (Mar. 23, 2016); Telephone Interview with Michael Wienke, Paramedic (Mar. 28, 2016) [hereinafter Wienke Interview].

84. Wienke Interview, *supra* note 83.

#### IV. INDUSTRY STRUCTURE

Currently, 1,045 HEMS helicopters operate in the United States.<sup>85</sup> In 2009, when the FAA last released data on the number of certificate holders operating in the United States, there were seventy-four that were permitted to conduct helicopter air ambulance operations, including:

- Thirty-eight certificate holders with five or fewer helicopters;
- Fourteen certificate holders with six to ten helicopters;
- Six certificate holders with eleven to fifteen helicopters; and
- Sixteen certificate holders with more than sixteen helicopters.<sup>86</sup>

2016 data reports 261 air ambulance helicopter “services,”<sup>87</sup> a much larger number than the earlier FAA report, which covered only Part 135 certificate holders. Publicly traded Air Methods Corporation is the largest provider of HEMS in the United States.<sup>88</sup>

HEMS providers fall into one of three basic types: governmental, nonprofit (mainly hospital provided), and for-profit (mainly community carriers).<sup>89</sup> The market is competitive, with neither the federal nor state governments restricting entry.<sup>90</sup> States may restrict market entry by ground ambulances but not by air ambulance providers.<sup>91</sup> Advocates exist for changing the preemption provisions to allow states to regulate air ambulance services as an integral part of largely state-regulated health care infrastructure.<sup>92</sup>

##### A. Legal Forms

The business organization structures for HEMS operators vary. The 2002 Medicare fee increases stimulated a shift away from a hospital-based nonprofit model to a for-profit model.<sup>93</sup> Beyond that, organizational diversity proliferates. Among the top ten, only Air Methods and PHI are publicly traded corporations.<sup>94</sup>

Many of the others are privately held for-profit corporations, standalone nonprofits, or more complex hybrids of profit and nonprofit. OSF Aviation, Inc., for example is an Illinois for-profit corporation, but it is solely owned by OSF, LLC, the corporate face of a small hospital chain run by the Order of the

---

85. ADAMS 2016, *supra* note 5.

86. Air Ambulance and Commercial Helicopter Operations, Part 91 Helicopter Operations, Part 135 Aircraft Operations; Safety Initiatives and Miscellaneous Amendments, 75 Fed. Reg. 62640, 62642 (proposed Oct. 12, 2010) (to be codified at 14 C.F.R. pts. 91, 120, 135).

87. ADAMS 2016, *supra* note 5, at 13 tbl.2.

88. Air Methods 2015 Annual Report, *supra* note 33, at 1. *See also generally* Burke, *supra* note 6.

89. Diederich, *supra* note 27, at 69 (identifying three basic types of operators).

90. *Id.* at 68, 71–72 (describing efforts to limit entry to the non-limited market).

91. *Id.* at 72 (reviewing efforts by and motivations for state grant of exclusive operating authority).

92. *Id.* at 71–72.

93. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-10-907, AIR AMBULANCE: EFFECTS OF INDUSTRY CHANGES ON SERVICES ARE UNCLEAR (Sept. 2010) [hereinafter 2010 GAO REPORT], <http://www.gao.gov/assets/320/310527.pdf>.

94. Adams, *supra* note 26 (mentioning hospital outsourcing).

Sisters of St. Francis of the Roman Catholic Church.<sup>95</sup> Care Flight is a Texas nonprofit, jointly owned by a half-dozen nonprofit hospitals in the Dallas area.<sup>96</sup>

The formal business legal structure is less important than it appears. Shareholders and boards of directors of for-profit hospitals scrutinize profits, losses, and capital expenditures, but so do the CEOs of nonprofit hospitals.<sup>97</sup> Investors will not make additional capital available to for-profit hospitals if financial performance deteriorates. Neither will nonprofit hospital CEOs, who may consider replacing an internal nonprofit HEMS operation with a contract arrangement with a large for-profit corporation like Air Methods or PHI.<sup>98</sup>

### B. Economies of Scale and Concentration

While economic and legal barriers to entry are low, significant economies of scale encourage consolidation and concentration. The proliferation of small, independent HEMS providers caused by the 2002 Medicare fee increases is gradually being reduced as Air Methods and PHI buy them up.<sup>99</sup>

At first, the new entrants had an advantage. Unlike incumbent operators, they had no sunk capital<sup>100</sup> in large, twin-engine helicopters, which historically had been the norm. They could buy the latest technology in a single-engine helicopter from Airbus or Bell for a couple of million dollars, which was not difficult to finance, hire some Vietnam-era veteran helicopter pilots, make a deal with a local hospital, get a Part 135<sup>101</sup> operating certificate from the FAA without too much difficulty, and start operating.

But then the HEMS safety crisis considered in Part V and Section VII.A put pressure—and eventually legal mandates—on them to upgrade their equipment, impose stricter pilot hiring criteria, and centralize control of flight decisions.<sup>102</sup> Many are not flying enough to cover their fixed costs.<sup>103</sup>

New technologies are likely to increase economies of scale and lead to further consolidation. For example, high-speed digital connectivity, including wireless links spanning the globe, make it possible to centralize the HEMS dispatch function.<sup>104</sup> United Airlines, for example, has one control center with

95. KPMG, OSF HEALTHCARE SYSTEM AND SUBSIDIARIES 7 (Feb. 14, 2013), <http://emma.msrb.org/EP739959-EP574415-EP975831.pdf> (characterizing SFI as “sole corporate member” of OSF Aviation, Inc.).

96. *About Us*, CAREFLITE, <http://www.careflight.org/AboutUs.aspx> (last visited Sept. 28, 2016).

97. Molly Gamble, *The Dying Rivalry: How For-Profit and Non-Profit CEOs Are Becoming More Compatible*, BECKER'S HOSP. REV. (Oct. 1, 2012), <http://www.beckershospitalreview.com/hospital-management-administration/the-dying-rivalry-how-for-profit-and-non-profit-ceos-are-becoming-more-compatible.html> (noting the closing gap in similarities between for-profit CEOs and nonprofit CEOs, including looking at numbers).

98. Adams, *supra* note 26 (mentioning hospital outsourcing).

99. Abernethy, *supra* note 7 (describing the expansion of the sector after the 2002 Medicare fee increases).

100. Sunk capital is capital invested in resources that cannot be redirected to other uses.

101. 14 C.F.R. pt. 135 (2016) (regulating commercial operators other than air carriers).

102. *See id.*

103. Burke, *supra* note 6 (stating that Air Methods, the largest HEMS provider, needs at least thirty flights per base per month, and they average thirty-five per base per month).

104. *See* THOMAS ET AL., *supra* note 17, at 9 (stating that centralized dispatch is already occurring in Oklahoma, from sites that are out of state).

flight dispatchers that are in real-time communication with all of its 5,300 daily flights anywhere in the world.<sup>105</sup> Any HEMS operator meeting the 24/7 and full staffing requirements of Subpart L has a substantial amount of overhead for dispatch centers. Considerable efficiencies are available from having only one center for a large HEMS operation rather than several, one for each base.<sup>106</sup> The small operator exemption under Subpart L offers relief from this aspect of economies of scale, but not others.<sup>107</sup>

Economies of scale also exist with respect to safety; put differently, larger operators may be able to enforce a safety culture more effectively than a smaller, less formally organized enterprise that has fewer rules.<sup>108</sup>

### C. Two Models

Early HEMS services were provided by hospitals themselves, either with hospital-owned helicopters and hospital-employed crews or under contract with a private provider.<sup>109</sup> The last fifteen years has seen a dramatic trend away from this contract model to a community-based model.<sup>110</sup> Provision of HEMS services by state and local governmental agencies is less common.<sup>111</sup>

#### 1. Hospital-Based (“Contract”)

Under the traditional hospital-based model, HEMS service is associated with a particular hospital or group of hospitals. The hospital determines when to dispatch the helicopter and what its mission is.<sup>112</sup>

The hospital may own the helicopter and hire the flight personnel as well as the onboard medical personnel, or they may contract with an outside operator.<sup>113</sup>

HEMS operators provide hospital-based services under contract, which typically include 80% fixed monthly fees and 20% hourly flight fees.<sup>114</sup> Operators generally compete for air medical service (AMS) contracts “on the basis of price, safety record, accident prevention and training, and the medical capability of the aircraft.”<sup>115</sup> “The ready availability of new and used aircraft has contributed to increased price competition on contract renewals. Price is a

105. Chris Sloan, *An Inside Look: United Airlines’ Mission Control Center*, FORBES (Nov. 25, 2013, 9:02 AM), <http://www.forbes.com/sites/airchive/2013/11/25/inside-united-airlines-network-operations-control/#21b862fd4fb8> (describing United’s Network Operations Center).

106. See THOMAS ET AL., *supra* note 17, at 106 (noting examples of efficiencies in centralized dispatching as being better resource tracking and multiple helicopters not responding to the same emergency).

107. 14 C.F.R. pt. 135 (2016).

108. See THOMAS ET AL., *supra* note 17, at 106 (citing flight safety and public safety needing to improve with communication between several entities as a problem).

109. Diederich, *supra* note 27, at 69–70.

110. See Air Methods 2015 Annual Report, *supra* note 33, at 1 (stating it had 209 community-based locations and 84 hospital contract locations in 2015, compared with 189/97 in 2014, 179/109 in 2013, 169/141 in 2012, and 165/136 in 2011).

111. Diederich, *supra* note 27, at 70.

112. *Id.* at 69–70.

113. *Id.*

114. Air Methods 2015 Annual Report, *supra* note 33, at 1.

115. *Id.* at 9.

significant element of competition because of the continued pressure on many health care organizations to contain costs passed on to their consumers.”<sup>116</sup>

PHI reported that hospital contracts provided 35% of its air medical segment revenues in 2015, down from 39% in each of 2014 and 2013.<sup>117</sup>

## 2. *Community-Based*

In the community-based model, the HEMS operator is an independent entrepreneur and earns revenue only when it provides helicopter transport.<sup>118</sup> The operator decides where to place bases, what kinds of helicopters to fly, what its crew needs are in terms of qualifications and numbers, and where to put helicopters and crews.<sup>119</sup>

Usually, the operator flies only when called out by a hospital or public safety agency, but the operator is also free to monitor public safety radio traffic and unilaterally respond to an accident scene.<sup>120</sup>

The typical Air Methods community-based facility has about thirteen full-time employees, including pilots, dispatchers, and paramedics at each base.<sup>121</sup>

Community-based revenue comes from flight fees billed directly to patients, their insurers, or to governmental entities. “Liftoff charges range widely from \$12,000 to \$30,000 with an additional per loaded mile fee of \$110 to \$190.”<sup>122</sup>

A significant number of patients are uninsured and unable to pay, and the operators book a reserve for “uncompensated care.”<sup>123</sup> Medicare and Medicaid pay only discounted rates, and the operators book a reserve to cover those discounts.<sup>124</sup>

Some lawsuits by HEMS carriers against individual patients have been publicized.<sup>125</sup>

## 3. *Hybrid Models*

Many HEMS operations are neither purely hospital-based along traditional lines nor completely community-based.<sup>126</sup> Instead, they involve hybrid arrangements in which a HEMS enterprise, like Air Methods or Metro Aviation, enters into a contractual arrangement with a hospital (or groups of hospitals) or with a public safety agency to provide helicopters, pilots, and mechanics while other participants in the arrangement provide some of the

---

116. *Id.* at 2.

117. PHI, Inc., Annual Report (Form10-K) 31 (Feb. 29, 2016) [hereinafter PHI 2015 Annual Report].

118. Adams, *supra* note 26.

119. *Id.*

120. Burke, *supra* note 6.

121. *Id.*

122. Abernethy, *supra* note 7.

123. Air Methods 2015 Annual Report, *supra* note 33, at 1 (reporting on revenue sources).

124. *Id.*

125. See Eavis, *supra* note 2 (reporting lawsuit by Air Methods against patient for \$47,182 air ambulance bill).

126. See Burke, *supra* note 6.

dispatch functions, physical infrastructure, and some or all of the medical personnel.<sup>127</sup> Such arrangements often are branded under a local name.<sup>128</sup> Typically, such agreements shift the loss of patient non-payment away from the HEMS operator.<sup>129</sup> This is a major financial advantage to operators.

In a growing number of cases, hospitals are deciding to get out of the HEMS business, even under the traditional hospital-based contract model, where an independent HEMS operator actually provides the aircraft, pilots, and mechanics.<sup>130</sup> Hospitals involved in the traditional hospital model, such as the University of Chicago, want to get out of the air ambulance business.<sup>131</sup> Hospitals lose money on the flat fee payments to their HEMS operator partners, and are not very good at billing.<sup>132</sup> Most importantly, most hospitals now have managed-care agreements with insurers that limit how much reimbursement they can get for air ambulance service, which prohibit balance billing the patient.<sup>133</sup>

In new hybrid arrangements, the HEMS operator does all the billing, and bills the patient directly.<sup>134</sup> It has no managed-care agreements with insurers, so it can balance-bill the patient.<sup>135</sup> These agreements usually put the hospital in the position of providing medical services, including flight nurses and flight paramedics, while the HEMS operator provides the aircraft, pilots, mechanics, and billing and collections personnel.<sup>136</sup>

The two partners share the financial risk, rather than the hospital bearing all or most of it—as under the traditional hospital-based model—or the HEMS operator bearing it all—as under the traditional community-based model.<sup>137</sup>

Instead of the hospital paying a monthly fee to the HEMS operator, the operator pays a fee to the hospital for providing the medical services.<sup>138</sup>

127. *Id.*

128. For example, some of these include Nightingale, Sentara Healthcare, operated by Metro Aviation; Flight for Life, McHenry County, Illinois, operated by Air Methods; Superior Air Ambulance, DeKalb, Illinois, operated by Air Methods; and Northern Arizona Healthcare, operated by Air Methods.

129. Adams, *supra* note 26.

130. See James T. McKenna, *Emergency Medical Service: Justifying the Helicopter*, EMS WORLD (Sept. 20, 2007), <http://www.emsworld.com/news/10408641/emergency-medical-service-justifying-the-helicopter> (“The trend is heavily toward independent operators setting up community-based programs that work ad hoc with area hospitals or migrate over time to closer and more formal working relationships with them.”).

131. See HOWARD WERMAN ET AL., OHIO DEP’T OF PUB. SAFETY, EVALUATION OF TRAUMA TRIAGE CRITERIA FOR MEDICAL TRANSPORT OF ADULTS AND CHILDREN 13–14 (2012), [http://www.publicsafety.ohio.gov/links/ems\\_grant\\_Priority%204%20OSU%20Trauma%20Triage1012.pdf](http://www.publicsafety.ohio.gov/links/ems_grant_Priority%204%20OSU%20Trauma%20Triage1012.pdf) (concluding that empirical data show overuse of helicopter air ambulance transport and that criteria for use should be revised in light of costs and risks); Blumen Interview, *supra* note 75.

132. McKenna, *supra* note 130 (“‘Why are we sponsoring this program when we’re losing \$1–2 million to do it?’ was a common question, said Ed Eroo, president of the Assn. of Air Medical Services, which this month convenes its annual Air Medical Transport Conference in Tampa, Fla.”).

133. See Troy Carter et al., *Despite Saving Lives, Air Ambulance Companies Under Fire*, FLATHEAD BEACON (Nov. 29, 2015), <http://flatheadbeacon.com/2015/11/29/despite-saving-lives-air-ambulance-companies-under-fire/>.

134. *Id.*

135. *Id.*

136. *Id.*

137. See James Careless, *Helicopter EMS: Part 1: A Brief History*, EMS WORLD (Oct. 14, 2010), <http://www.emsworld.com/article/10319182/helicopter-ems>.

138. *Id.*

An important part of these new hybrid arrangements is that the patient has a legal relationship with the HEMS operator, not the hospital.<sup>139</sup> This permits the HEMS operator to charge the patient directly.<sup>140</sup> Even when the patient is covered by private insurance, if the insurance does not cover an adequate portion of the air ambulance bill, the patient is liable for the balance.<sup>141</sup> That is not typically the case when the patient has a direct relationship to the hospital, because hospitals increasingly have broad managed-care arrangements with health care insurers so that they can be “in network”; such arrangements typically prohibit balance billing.<sup>142</sup> Most HEMS providers are out of network with most insurers.<sup>143</sup>

#### 4. *Public Agency*

Publicly operated HEMS services are the exception rather than the rule. Unlike law enforcement, where helicopter support is usually provided by aviation wings of municipal police, sheriffs’ departments, or state police organizations,<sup>144</sup> and where contract-based police helicopter support is unusual, the reverse is the case with HEMS. The Maryland State Police is an outlier in this regard. It has eleven helicopters, twenty pilots, and flies as many HEMS missions as it does law-enforcement missions.<sup>145</sup>

The most important difference between a governmental HEMS operator and a civilian operator is that there is more extensive FAA regulation of the private-sector operators.<sup>146</sup> Governmentally operated helicopters are “public use” aircraft, which are subject to a much lighter regulatory hand. Public use aircraft must follow the same operating rules that apply to civilian aircraft, but they are not subject to Parts 119,<sup>147</sup> 135,<sup>148</sup> and 121.<sup>149</sup> Thus, they do not need to get operating certificates under these regulations, and they may be flown by persons without civilian pilot ratings—usually by pilots holding military ratings.<sup>150</sup>

---

139. See Adams, *supra* note 26.

140. *Id.*

141. *Id.*

142. See Carter et al., *supra* note 133.

143. *Id.*

144. Or in a few instances by nonprofits or public agencies formed by mutual aid pacts of law enforcement agencies; AIR-ONE Emergency Response Coalition in northern Illinois and southern Wisconsin is an example. See AIR-ONE EMERGENCY RESPONSE COALITION, <http://www.airsupport.org> (last visited Sept. 28, 2016); Henry H. Peritt, Jr., Eliot O. Sprague & Christopher L. Cue, *Sharing Public Safety Helicopters*, 79 J. AIR L. & COM. 501 (2014) (arguing that AIR-ONE is a good model for the rest of the country).

145. See Bob Vaccaro, *Maryland State Police Aviation Command Continues Perfecting HEMS Fleet*, JEMS (Jan. 26, 2015), <http://www.jems.com/articles/print/volume-40/issue-2/vehicle-ops/maryland-state-police-aviation-command-c.html> (reporting that 2,300 of a total of 7,500 missions flown in 2014 were HEMS missions); see also *Maryland State Police Unveils New Medevac Helicopter, More Coming*, WBAL-TV (Oct. 5, 2012, 9:44 PM), <http://www.wbalv.com/news/maryland/Maryland-State-Police-unveils-new-Medevac-helicopter-more-coming/16869264> [hereinafter *Maryland Medevac Helicopter*] (reporting on purchase of AW139 twin-engine HEMS helicopter with room for four patients as the first of ten to upgrade its fleet).

146. See generally 14 C.F.R. pts. 91, 119, 135, 121 (2016).

147. *Id.* pt. 119 (regulating commercial operators).

148. *Id.* pt. 135 (regulating commercial operators other than air carriers).

149. *Id.* pt. 121 (regulating air carriers).

150. *Id.* pts. 119, 135, 121.

Nevertheless, most non-military operators of public-use aircraft voluntarily comply with Part 135 or something close to it, and rarely use pilots who do not have civilian pilot ratings.<sup>151</sup>

## V. RISKS AND SAFETY TECHNOLOGIES

Helicopter flying is a risky business, and HEMS flying especially so.<sup>152</sup> In 2014, HEMS operations had the second worst accident rate in the helicopter industry, after agricultural spraying.<sup>153</sup>

Helicopter air ambulance accidents reached historic levels during the years from 2003 through 2008. . . .

Helicopter air ambulances operate under unique conditions. Their flights are often time sensitive, which puts pressure on the pilots. Helicopter air ambulances fly at low altitudes and under varied weather conditions. They must often land at unfamiliar, remote, or unimproved sites with hazards like trees, buildings, towers, wires, and uneven terrain.

. . . [F]rom 1991 to 2010, there were 49 accidents that occurred while the helicopter was operating under basic VFR weather minimums and those accidents caused 63 fatalities. The FAA has determined that these accidents may have been prevented if pilots and helicopters were better equipped for IIMC,<sup>154</sup> flat-light, whiteout, and brownout conditions, and for flights over water.<sup>155</sup>

In 2011, National Transportation Safety Board (NTSB) Member Robert Sumwalt gave a presentation declaring that the level of HEMS safety was unacceptable.<sup>156</sup> This was following a surge of accidents in the first decade after 2000 resulting from the wide variation in safety practices of HEMS operators.<sup>157</sup> His presentation concluded with a slide showing accident fatality statistics, on which HEMS flying ranked as the most dangerous occupation in

151. Stephen P. Prentice, *Staying Legal: Public Aircraft*, AVIATIONPROS (Oct. 4, 2011), <http://www.aviationpros.com/article/10253354/staying-legal-public-aircraft> (noting that, technically, pilots of public-use aircraft do not even need pilot's licenses, but that most public-use operators voluntarily comply with the FARs).

152. See Ira Blumen, *An Analysis of HEMS Accidents and Accident Rates*, NAT'L TRANSP. SAFETY BD. (Feb. 2009), <http://www.nts.gov/news/events/Documents/NTSB-2009-8a-Blumen-revised-final-version.pdf> (PowerPoint slides) (reporting HEMS accident rates nearly double that of other Part 135 operations).

153. OFFICE OF INSPECTOR GEN., DEP'T OF TRANSP., AV-2015-039, DELAYS IN MEETING STATUTORY REQUIREMENTS AND OVERSIGHT CHALLENGES REDUCE FAA'S OPPORTUNITIES TO ENHANCE HEMS SAFETY 7 fig.2 (Apr. 8, 2015) [hereinafter 2014 OIG HEMS REPORT], <https://www.oig.dot.gov/sites/default/files/FAA%20HEMS%20Progress%20and%20Oversight%20Final%20Report%5E4-8-15.pdf>.

154. Section V.A *infra* explains instrument meteorological conditions (IMC), inadvertent flight into IMC (IIMC), visual flight rules (VFR), and instrument flight rules (IFR), the operating rules for flight in IMC.

155. Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations; Final Rule, 79 Fed. Reg. 9932, 9935 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135).

156. Robert L. Sumwalt, *Current Issues with Air Medical Transportation: EMS Helicopter Safety*, NAT'L TRANSP. SAFETY BD. (May 4, 2011), [http://www.nts.gov/news/speeches/rsumwalt/Documents/Sumwalt\\_050411.pdf](http://www.nts.gov/news/speeches/rsumwalt/Documents/Sumwalt_050411.pdf) (PowerPoint slides).

157. See *id.* at slide 22 (illustrating three different models of HEMS helicopter: single-engine, single-pilot, costing \$800,000 to \$3 million; twin-engine, two-pilot, IFR capable, autopilot, costing \$4 to \$6 million; and twin-engine, two-pilot, IFR capable, with autopilot, longer range, and specialty transport capability, costing \$7 to \$12 million).



the United States, ahead of fishing, logging, structural iron and steel work, and coal mining.<sup>158</sup> He recommended that the FAA require HEMS helicopters to be equipped with terrain warning systems and an autopilot for single-pilot operation, and also require pilots to use night vision imaging systems.<sup>159</sup> He also recommended that hospitals impose these requirements in their HEMS contracts.<sup>160</sup>

In 2014, the FAA reiterated that “[h]elicopter air ambulance accidents reached historic levels during the years from 2003 through 2008.”<sup>161</sup> It identified four common factors: inadvertent flight into IMC, loss of control, controlled flight into terrain (which includes mountains, ground, water, and man-made obstacles), and night conditions.<sup>162</sup>

In February 2009, Matt Zuccaro, president of the Helicopter Association International (HAI),<sup>163</sup> gave a presentation to the NTSB.<sup>164</sup> He identified the following characteristics of HEMS operations that increase safety risks:

- Off airport operations
- Low altitude environment
- Remote locations
- Operations outside the normal aviation infrastructure
- Challenging operating environments
- No previous operations at site locations
- Minimal notice of flight requirement
- Daily / 24 hour; Day / Night; VFR / IFR.<sup>165</sup>

The top causes were pilot judgment and actions, data issues, safety culture, ground duties, and pilot situational awareness.<sup>166</sup> Maintenance, equipment failures, and system failures did not appear until positions six and seven on the list.<sup>167</sup> Nevertheless, failures in pilot judgment or situational awareness as accident contributors often originate with critical, but not necessarily fatal, equipment malfunctions such as engine failures.<sup>168</sup>

The emergencies that helicopter pilots train for are not so prevalent in HEMS operations as other conditions that they train inadequately for. Every helicopter pilot practices autorotations over and over again; an autorotation is

---

158. *Id.* at slide 29.

159. *Id.* at slide 18.

160. *See id.* at slide 28 (recommending that HEMS contracts require pilots to “be trained and helicopters equipped per NTSB recommendations”).

161. Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations; Final Rule, 79 Fed. Reg. 9932, 9935 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135).

162. *Id.*

163. HAI is the dominant helicopter trade association. HELICOPTER ASS’N INT’L, <https://rotor.org> (last visited Sept. 28, 2016).

164. Matt Zuccaro, *Helicopter Association International Presentation on Industry Safety Initiatives*, NAT’L TRANSP. SAFETY BD. (Feb. 3, 2009), <http://www.nts.gov/news/events/Documents/Helicopter-Association-410753.pdf> (PowerPoint slides).

165. *Id.* at slide 24.

166. *Id.* at slide 16.

167. *Id.*

168. *See id.* (discussing different causes of helicopter accidents).

how one keeps the helicopter flying if the engine quits.<sup>169</sup> Obviously, this is a necessary skill, but it rarely is needed in HEMS operations.<sup>170</sup> Similarly, helicopter pilots train to avoid settling with power, also known as vortex ring state—a condition in which the helicopter descends into its own downwash resulting in a catastrophically increasing rate of descent.<sup>171</sup> Avoiding vortex ring state is crucial to operating from confined areas such as accident scenes.<sup>172</sup> But inadvertent entry into instrument meteorological conditions and collision with obstacles are the killers in the HEMS industry.<sup>173</sup>

To some extent, technology can mitigate the specific risks, and regulation has a clear role to play in mandating specific technologies and justifying the mandates by explaining their relationship to enhanced safety. But technology cannot eliminate risk. Ultimately, it is pilot attitude to risk and ability to manage it that determines outcomes. Section VI.A.2 addresses the human elements of the safety equation. The following subsections, though, address specific technologies that can reduce specific risks.

As might be expected, more capable HEMS helicopters cost more.<sup>174</sup> Understanding the capabilities of different types of helicopters informs an understanding of HEMS economics. In the helicopter industry generally, light single-engine helicopters<sup>175</sup> predominate, accounting for just under half of new

169. Autorotation is possible only when the blade pitch is flat, a configuration that does not exist in level flight. See, e.g., Daven Hiskey, *How Helicopters Are Designed to Land Safely When Their Engine Fails*, GIZMODO (June 1, 2015, 6:15 AM), <http://gizmodo.com/how-helicopters-are-designed-to-land-safely-when-their-1708128868>. In an autorotation, the air comes up through the rotor as the helicopter descends rather than being pulled down through the rotor from above when the rotor is powered. *Id.* The pilot, after detecting an engine failure, has only about two seconds in most helicopters to flatten the blade pitch or autorotation becomes impossible because the rotor speed has decayed too much by the time the blade pitch is flattened, if it ever is. *Id.* The glide ratio in an autorotation is much steeper than in an airplane, but properly managed, an autorotation is a perfectly safe maneuver to make a safe landing after a complete power failure. *Id.* Helicopters also need a certain amount of speed and/or altitude to set up an autorotation. *Id.* A helicopter hovering near the ground will hit the ground before an autorotation can be established if its engine quits. *Id.* That is why FAA certification requires helicopter designers to define the “height-velocity” envelope within which a test pilot has been able to set up an autorotation. FED. AVIATION ADMIN., AC No. 29-2C, ADVISORY CIRCULAR: CERTIFICATION OF TRANSPORT CATEGORY ROTORCRAFT (June 13, 2014). Typically, these height-velocity diagrams suggest avoiding heights less than five hundred feet above the ground at speeds of less than forty knots. *Id.*

170. *Full Touchdown Autorotation Training*, U.S. HELICOPTER SAFETY TEAM, <http://www.ihst.org/portals/54/airmanship/Airmanship%20Bulletin.pdf> (last visited Sept. 25, 2016).

171. *Helicopter Emergencies and Hazards*, in FED. AVIATION ADMIN., HELICOPTER FLYING HANDBOOK 11-9 (2013), [https://www.faa.gov/regulations\\_policies/handbooks\\_manuals/aviation/helicopter\\_flying\\_handbook/media/hfh\\_ch11.pdf](https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/helicopter_flying_handbook/media/hfh_ch11.pdf) [hereinafter *Emergencies and Hazards*].

172. A helicopter cannot escape from vortex ring state by applying more power and attempting to climb; the only way it can recover is to fly forward, sideways, or backwards out of the disturbed air. See, e.g., Tim Tucker, *Flying Through the Vortex*, ROTOR & WING INT’L (Sept. 1, 2015), [http://www.aviationtoday.com/rw/personal-corporate/personal-ac/Flying-Through-the-Vortex\\_85872.html](http://www.aviationtoday.com/rw/personal-corporate/personal-ac/Flying-Through-the-Vortex_85872.html) (describing mechanisms by which a rotor aircraft can escape from a vortex ring state). That may not be possible in a confined area. *Id.*

173. Patrick Veillette, *How to Develop Helicopter-Centric IFR*, AVIATION WK. (Jan. 29, 2016, 4:00 AM), <http://aviationweek.com/print/bca/how-develop-helicopter-centric-ifr>.

174. *Compare Maryland Medevac Helicopter*, *supra* note 145 (reporting on purchase of AW139 twin-engine HEMS helicopter with room for four patients and with advanced terrain-avoidance, NVG, and IFR systems that cost \$12.6 million), *with* CONTROLLER, <http://www.controller.com/listings/aircraft/for-sale/list/?manu=eurocopter&mdltx=as+350b-3> (listing used single-engine, single-pilot AS350s for sale at \$1 to \$2 million).

175. The Airbus EC130/AS350 series, Bell 407, Bell 505, and Robinson R66, were the most popular choices.

purchases. Light<sup>176</sup> and medium twin-engine helicopters<sup>177</sup> are next, with about 18% and 31% of the market, respectively.<sup>178</sup> Heavy multi-engine helicopters account for a much smaller fraction of the fleet (about 2%).<sup>179</sup>

Five basic variables influence suitability of a particular helicopter model for HEMS operations: whether it has one engine or two, whether it is designed to be flown by one pilot or by two, whether it is capable of flight in instrument meteorological conditions (IMC), whether it is equipped for night vision goggle (NVG) operation, and its interior volume.<sup>180</sup>

HAI president Matt Zuccaro identified the following mitigating technologies, most of which found their way into the new Subpart L of Part 135:<sup>181</sup>

- Helicopter terrain avoidance warning systems
- Enhanced ground proximity warning systems
- Health usage monitoring system (systems of monitoring the state of aircraft systems and components)
- Automatic Dependent System Broadcast (ADS-B)
- GPS / WAAS enhanced (subsystems for improving the precision of GPS-based navigation).<sup>182</sup>

#### A. *Weather: Instrument Meteorological Conditions (IMC)*

The single most common cause of fatal HEMS accidents is unplanned entry into IMC.<sup>183</sup> Weather accounts for almost 20% of HEMS accidents.<sup>184</sup> HEMS flights take place under two distinct regulatory regimes: under visual flight rules (VFR) and under instrument flight rules (IFR).<sup>185</sup> VFR relies on a pilot being able to see obstacles and other aircraft in time to take appropriate action to avoid them (“see and avoid”).<sup>186</sup> When rain, snow, or other meteorological conditions obscure visibility, implementation of that see and avoid philosophy is not possible.<sup>187</sup> When the cloud deck (the “ceiling”) is too close to the ground the same problem is likely because the pilot may have to enter the cloud to avoid obstacles. Accordingly, pilots can fly VFR only when prescribed cloud bases and visibility limits are satisfied, down to two statute miles and eight hundred feet above the ground for HEMS flights.<sup>188</sup>

---

176. EC135, Bell 429, and AW109.

177. AW139, AW169, Bell 412, EC145T2, and Sikorsky S-76.

178. Press Release, Honeywell, Honeywell Forecasts Steady Global Helicopter Demand for Next Five Years (Mar. 1, 2015) [hereinafter Honeywell 2015 Forecast], <https://aerospace.honeywell.com/en/press-release-listing/2015/march/honeywell-forecasts-steady-global-helicopter-demand-for-next-five-years>.

179. *Id.*

180. See HEMS ADVISORY CIRCULAR, *supra* note 3 (discussing requirements and elements of safe helicopter air ambulance and HEMS operation).

181. See *infra* Section VII.A (discussing 14 C.F.R. pt. 135).

182. Zuccaro, *supra* note 164, at slide 25.

183. Veillette, *supra* note 173, at 1.

184. Blumen, *supra* note 152, at 16 (reporting that weather accounted for 19% of all HEMS accidents).

185. HEMS ADVISORY CIRCULAR, *supra* note 3.

186. 14 C.F.R. § 135.615 (2016).

187. *Id.* § 91.155.

188. *Id.* (establishing basic VFR weather minimums); *id.* § 135.609 (establishing VFR minimums for

When VFR criteria are not met, in other words in instrument meteorological conditions (IMC), a pilot can fly in controlled airspace only when he has an IFR clearance from air traffic control (ATC).<sup>189</sup> An IFR clearance specifies exact times, altitudes, and routes of flight to maintain traffic separation, and typically involves radar contact between the aircraft and ATC.<sup>190</sup> To fly safely in IMC, the aircraft must be equipped with additional instrumentation that allows the pilot to maintain the altitude of the aircraft and to navigate by referring to the instruments, without any outside reference to know whether he is upside down, right side up, going north or east.

To be qualified legally to fly IFR, pilots must be instrument rated, and flying an aircraft model that is certificated to fly IFR.<sup>191</sup> Many HEMS pilots are instrument rated (often that is a hiring criterion), but most single-engine HEMS helicopters are not certificated for IFR flight, because most of them do not have autopilots or require two pilots.<sup>192</sup> Twin-engine helicopters are more likely to meet these requirements. “It isn’t two engines that bring me comfort, [rather] it’s the ability to fly IFR. Weather, not engine reliability, is the greater concern.”<sup>193</sup>

Every pilot knows that he should not fly into IMC in a helicopter that is not certificated for IFR. Accident statistics show, however, that inadvertent entry into IMC is altogether too common.<sup>194</sup> A sudden snow shower or rain shower can eclipse visibility. At night, a pilot may fly into a cloud without realizing it. When that happens, maintaining control of the aircraft is unlikely unless the pilot is instrument rated and proficient. Successful exit from IMC requires a high level of proficiency.<sup>195</sup> One test by the Los Angeles Police Department showed that 80% of its experienced helicopter pilots lost control of the helicopter within thirty seconds of entering simulated IMC.<sup>196</sup> Even when the helicopter is not certificated for IMC flight, an instrument rated pilot is more likely to handle an inadvertent flight into IMC (IIMC) safely.<sup>197</sup>

---

HEMS operations, including eight hundred-foot ceiling and two miles visibility for non-mountainous, local flying areas in the daytime, with higher minimums for mountainous and non-local areas and for night operations).

189. An ATC clearance is not required in Class G airspace. *Id.* § 91.173 (requiring ATC clearance for IFR flight in *controlled* airspace); *id.* § 91.179(b) (prescribing cruising altitudes for IFR flight in uncontrolled airspace); *id.* § 1.1 (“Controlled airspace is a generic term that covers Class A, Class B, Class C, Class D, and Class E airspace.”).

190. *IFR Clearance & Flight Log*, FED. AVIATION ADMIN., [https://www.faa.gov/files/gslac/courses/content/38/473/CRAFT\\_and\\_IFR\\_Flight\\_Log.pdf](https://www.faa.gov/files/gslac/courses/content/38/473/CRAFT_and_IFR_Flight_Log.pdf) (last visited Sept. 25, 2016).

191. 14 C.F.R. § 61.65.

192. Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations; Final Rule, 79 Fed. Reg. 9932, 9946 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135) (discussing autopilot or two-pilot requirements of 14 C.F.R. §§ 135.101 and 135.105).

193. Veillette, *supra* note 173, at 4 (quoting HEMS pilots).

194. *Id.* at 2 (analyzing NTSB voluntary incident reports, which involved loss of control from IIMC, with 75% at night).

195. *Id.* (discussing difficulties that pilots encounter in navigating IMC).

196. The author attended a training program for helicopter pilots of Air One Emergency Response Coalition on August 6, 2014. A sergeant of the Los Angeles Police Department reported that simulator sessions with the Department’s helicopter pilots showed that 80% lost control within thirty seconds of entering IIMC. *See also IMC Encounters*, AOPA HOVER POWER (Feb. 24, 2012), <https://blog.aopa.org/helicopter/?m=201202> (noting rapidity with which pilots lost control in IIMC).

197. Air Ambulance and Commercial Helicopter Operations, Part 91 Helicopter Operations, Part 135

Three technologies mitigate the risk of IIMC: multi-engine helicopters, two-pilot configurations, and autopilots.

### 1. *Single- Versus Multi-Engine*

As the number of HEMS operators increased, cost pressures caused HEMS operators to shift from twin-engine helicopters to single-engine helicopters.<sup>198</sup> In its 2015 annual report, Air Methods reported 268 single-engine helicopters and 169 twin-engine helicopters.<sup>199</sup> In 2007, 43% of the HEMS fleet in the United States was single-engine.<sup>200</sup> Some commentators argue that twin-engine helicopters should be the norm for HEMS operations because they are safer.<sup>201</sup> But others disagree.<sup>202</sup>

Intuitively, the appeal of twin-engine helicopters is the reduced risk associated with engine failure.<sup>203</sup> In a twin-engine helicopter, the loss of one engine does not necessitate an autorotation. Although the helicopter's performance on one engine may be much degraded—it may not be able to hover, climb, or maintain usual cruise speed—the pilot can make a safe landing at a much wider range of alternative landing sites than would be available in an autorotation.<sup>204</sup> Helicopter engines rarely fail, however, absent fuel mismanagement by the pilot.<sup>205</sup> The relevant advantage of twin-engine helicopters is that they are far more likely to be certificated for IFR.<sup>206</sup>

The ongoing debate about the relative safety of single-engine, compared to twin-engine helicopters, is illustrated by the shifting position of Mercy Air Service, a subsidiary of Air Methods, in obtaining, and then seeking to modify, a contract to provide HEMS service for Kern County, California.<sup>207</sup> When it

---

Aircraft Operations; Safety Initiatives and Miscellaneous Amendments, 75 Fed. Reg. 62,640, 62,642 (proposed Oct. 12, 2010) (to be codified at 14 C.F.R. pts. 91, 120, 135).

198. Veillette, *supra* note 173, at 4 (noting that entry by more operators means fewer flights for each to cover fixed costs, resulting in higher costs per flight hour, causing operators to prefer VFR single-engine helicopters over IFR twins).

199. Air Methods 2015 Annual Report, *supra* note 33, at 16.

200. See KERN REPORT, *infra* note 207, at 13 (quoting ADAMS report).

201. Abernethy, *supra* note 7 (arguing that most countries use mostly dual-engine helicopters for HEMS, but that single-engine helicopters prevail in U.S. HEMS fleet); see also 2010 GAO REPORT, *supra* note 93, at 16 (noting argument about ability of single-engine helicopter to provide adequate care when patient's lower body is adjacent to the pilot, beyond effective reach of medical team).

202. THOMAS ET AL., *supra* note 17, at 63–64 (finding no consensus on relative safety of single-engine, compared with twin-engine helicopters).

203. See, e.g., Adam Twidell, *Twin Engine vs. Single Engine Helicopters: Which Should You Choose?*, PRIVATEFLY (Dec. 3, 2014), <http://blog.privatefly.com/twin-engine-vs-single-engine-helicopters-which-should-you-choose/> (“It is generally believed that if there was engine trouble with one engine in a twin-engine helicopter, the second engine is there to ensure the flight continues to go smoothly.”).

204. *Singles and Twins: Choosing the Right Fit for the Job*, HELICOPTERS MAG. (June 30, 2009), <https://www.helicoptersmagazine.com/new-products/singles-and-twins-1718>.

205. Helen Krasner, *Helicopter Engine Failure in the Hover*, DECODED SCI. (Feb. 19, 2013), <http://www.decodedscience.org/helicopter-engine-failure-in-the-hover/25976>.

206. Elan Head, *Cultural Barriers*, VERTICAL (Oct. 23, 2015), <http://www.verticalmag.com/features/culturalbarriers/>.

207. See MERCY AIR SERV., COMPARISON AND ANALYSIS OF EXISTING AND PROPOSED PRIMARY AIR AMBULANCES USED BY MERCY AIR SERVICE IN KERN COUNTY: BELL HELICOPTER (BHT) 412 AND EUROCOPTER AS350B3 (discussion draft July 28, 2009) [hereinafter KERN REPORT], <http://docplayer.net/10697742-Draft-comparison-and-analysis-of-existing-and-proposed-primary-air-ambulances-used-by-mercy->

successfully bid on the contract, Mercy Air emphasized the advantages of the twin-engine Bell 412 it proposed to fly, arguing that it would be much safer and offer greater capacity to provide for patient needs.<sup>208</sup> Two years later, because of high maintenance costs for the Bell 412 (and the backup twin-engine Bell 222) and a general desire to reduce costs, Mercy Air proposed to substitute a single-engine helicopter—an AS350—for the twin-engine Bell 412.<sup>209</sup>

The staff of the county legislative body embraced the proposal and provided a variety of arguments supporting the proposition that single-engine helicopters are just as safe, presumably based on data supplied by air rescue: “No compelling evidence has been found to indicate that a twin-engine helicopter is safer than a single-engine helicopter. It would appear appropriate to dismiss this factor as being irrelevant to the decision regarding Mercy Air’s proposal.”<sup>210</sup>

The most relevant aspect of the single- versus twin-engine debate is IFR capability. Twin-engine helicopters are far more likely to be certificated for IFR and to require two pilots. Most air ambulances are single-engine helicopters.<sup>211</sup> No single-engine helicopters have been certificated for IFR since 1989.<sup>212</sup> In that year, the FAA changed the reliability requirements for single-engine helicopter autopilots to make them equivalent to those in large transport aircraft. The only way to meet the requirement was to provide triple redundancy, a cost the market was not willing to bear. The industry is pressing the FAA to ease the requirements for IFR certification of single-engine helicopters, and the agency has shown some interest in the industry’s proposed changes.<sup>213</sup>

More IFR-capable single-engine helicopters would mean that HEMS operators simply could fly IFR when the weather is marginal rather than taking the risk of IIMC. The infrastructure makes this possible because of the increasing availability of Point-in-Space (PinS) approaches and direct GPS routing. “It is . . . reasonable to speculate that as pilots choose to conduct operations IFR instead VFR, fatal IIMC, CFIT and certain accidents attributable to loss of control will be eliminated. Successful and safe completion of missions under IFR will have a snowball effect throughout the industry.”<sup>214</sup> IFR capability is not a silver-bullet, however, because published instrument approaches never will exist to every accident site.

On the other hand, the greater complexity of two engines increases the

---

air-service-in-kern-county-draft.html (discussing the safety of single-engine helicopters compared to twin-engine helicopters).

208. *Id.* at 6–7.

209. *See id.* at 9–10 (explaining motivation for substitution).

210. *Id.* at 10.

211. *Id.* at 2.

212. HELICOPTER ASS’N INT’L ET AL., 14 CFR 27 SINGLE-ENGINE IFR CERTIFICATION PROPOSAL 2 (June 2015) [hereinafter IFR WHITE PAPER], [https://www.aea.net/pdf/Part\\_27\\_SE\\_IFR\\_White\\_Paper\\_6-19-15b.pdf](https://www.aea.net/pdf/Part_27_SE_IFR_White_Paper_6-19-15b.pdf).

213. Frank Lombardi & James T. McKenna, *Momentum Builds for US Single-Engine IFR Certification*, ROTOR & WING INT’L, Aug. 2016, at 25, <http://digitaledition.rotorandwing.com/august-2016/momentum-builds-for-us-single-engine-ifr-certification/>.

214. IFR WHITE PAPER, *supra* note 212, at 4.

probability of some kind of malfunction.<sup>215</sup> Moreover, having two engines does not insulate the aircraft from fuel mismanagement. In a 2013 fatal accident, both engines of a twin-engine helicopter flamed out due to fuel exhaustion.<sup>216</sup>

## 2. *Single- Versus Two-Pilot*

A single-pilot HEMS operation is challenging. The pilot must keep his right hand on the cyclic stick throughout the flight, unless the helicopter is equipped with an autopilot or some kind of stabilization system, and most light helicopters are not.<sup>217</sup> So, he has only his left hand for other tasks, and he must keep it on or close to the collective stick at all times in case an engine failure occurs. Working radios to manage multiple frequencies to communicate with air traffic control, ground units, and HEMS dispatch is an important activity, as are other activities associated with management of aircraft systems, as well as searching for an elusive accident scene or referring to aeronautical charts and other navigational aids. Watching outside the cockpit for other aircraft and obstacles is another essential task that cannot be omitted for more than a few seconds at a time, especially as the helicopter gets closer to the ground. A professional pilot should have enough mental and physical bandwidth to do all this, but he requires a high level of training and must maintain proficiency in cockpit resource management.

A second crewmember sitting in the left seat (helicopter pilots in most helicopters sit in the right seat) is helpful.<sup>218</sup> Even if that crewmember is not a rated helicopter pilot, she can help identify obstacles and help with navigation and manipulating the radios. If the second crewmember is a pilot, she obviously can be even more helpful. She can fly the helicopter part of the time and is more likely to have knowledge of aircraft systems and aerodynamics to help the pilot monitor flight parameters and deal with emergencies.

Some larger helicopters are certificated to require two pilots, but light helicopters usually require only one pilot.<sup>219</sup> Even in single-pilot helicopters, however, a second pilot can occupy the left seat, as long as the left seat exists and is accompanied by a second set of controls. The problem, however, is that the configuration of most light HEMS helicopters places the patient stretcher on the left side extending into the space where the left seat otherwise would be,

---

215. *Id.* at 7.

216. See AIR ACCIDENTS INVESTIGATION BRANCH, REPORT ON THE ACCIDENT TO EUROCOPTER (DEUTSCHLAND) EC135 T2+, G-SPAO GLASGOW CITY CENTRE, SCOTLAND ON 29 NOVEMBER 2013 77–80 (Mar. 2015), [https://assets.publishing.service.gov.uk/media/5628ea4ded915d101e000008/3-2015\\_G-SPAO.pdf](https://assets.publishing.service.gov.uk/media/5628ea4ded915d101e000008/3-2015_G-SPAO.pdf) (analyzing sequence and concluding that pilot did not attempt autorotation).

217. Paul Hoversten, *Why Do Helicopter Pilots Sit in the Right Seat?*, AIR & SPACE MAG. (Nov. 16, 2011), <http://www.airspacemag.com/need-to-know/why-do-helicopter-pilots-sit-in-the-right-seat-243212/?no-ist>.

218. *Why Do Helicopter Pilots Sit in the Right Seat*, ROTORNATION, <http://rotornation.com/helicopter-pilots-right-seat/> (last visited Sept. 28, 2016).

219. J. Mac McClellan, *Single Pilot Jets*, FLYING MAG. (Dec. 14, 2006), <http://www.flyingmag.com/single-pilot-jets>.

making it impossible to carry a second pilot.<sup>220</sup>

### 3. Autopilots

Autopilots are less common on helicopters than on airplanes, especially light helicopters.<sup>221</sup> When installed, they can greatly simplify basic flight tasks and navigation. Even the most basic helicopter autopilots relieve the pilot of having to keep his right hand on the cyclic stick all the time.<sup>222</sup> Most can automatically hold altitude and fly whatever heading the pilot specifies.<sup>223</sup> Many can do more than that, such as accepting an entire flight plan, including approach procedures, and flying the flight plan, including detecting arrival at waypoints, making appropriate turns and altitude changes, and even flying most of the approach without pilot intervention.<sup>224</sup> Most significantly for HEMS operations, autopilots facilitate IFR flight and reduce the risks of recovery from IIMC.<sup>225</sup>

The NTSB recommended that the FAA require HEMS helicopters to be equipped with autopilots for single-pilot operation.<sup>226</sup> The FAA rejected the NTSB recommendation, however, in the preamble to its new Subpart L: “Autopilot units may be cost prohibitive and not widely available, and may pose space and weight issues for helicopters not equipped to handle the units.”<sup>227</sup>

This observation is questionable. New technologies are lighter and more capable, enabling even the smallest single-engine helicopters to be equipped

---

220. HUDSON VALLEY-WESTCHESTER REGIONAL HEMS, AIR MEDICAL SERVICES (AMS) GUIDELINES 13 (Dec. 2014), <http://hvremSCO.org/wp-content/uploads/2015/06/HVREMSCO-WREMSCO-AMS-Guidelines-FINAL-2015.pdf>.

221. See Ron Bower, *No Hands*, ROTOR & WING INT’L (Apr. 1, 2004), [http://www.aviationtoday.com/rw/training/ratings/No-Hands\\_1458.html](http://www.aviationtoday.com/rw/training/ratings/No-Hands_1458.html) (noting that autopilots are more common in single-engine airplanes than in helicopters).

222. *Id.*

223. See Philip Greenspun, *Learning to Fly Helicopters*, PHILIP.GREENSPUN.COM (Mar. 2009), <http://philip.greenspun.com/flying/helicopters> (explaining helicopter safety and use of autopilot control).

224. See FLIGHT SAFETY FOUND. ET AL., CONTROLLED FLIGHT INTO TERRAIN EDUCATION AND TRAINING AID (1999), <http://www.skybrary.aero/bookshelf/books/2507.pdf> (“Proper use of modern autoflight systems reduces workloads and significantly improves flight safety. These systems keep track of altitude, heading, airspeed, and flight paths with unflagging accuracy.”).

225. Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations; Final Rule, 79 Fed. Reg. 9932, 9953 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135) (“Several members of ACCT [Association of Critical Care Transport] also stated that autopilots are more effective than HTAWS [helicopter terrain awareness and warning systems]. They claimed that HTAWS only provides a warning to a pilot of an impending collision or altitude loss, but the pilot’s corrective actions with the flight controls prevent controlled flight into terrain. They stated that an autopilot would decrease the risk of controlled flight into terrain and accidents from IIMC by holding the aircraft flight path steady and reducing a pilot’s susceptibility to spatial disorientation during IIMC recovery maneuvers.”). Autopilots have limits, however. They typically do not work below a certain speed, because of the tendency of thrust requirements to increase at lower speeds (the “back side” of the power curve) and erroneous airspeed indications from the pitot tube at very slow airspeeds. *Understanding Your Autopilot PT.3*, VERTICAL (Nov. 7, 2011), <http://www.verticalmag.com/news/understanding-your-autopilot-pt-3.html/>.

226. See NTSB SAFETY RECOMMENDATION 4402G, NAT’L TRANSP. SAFETY BD. 15–18 (Sept. 24, 2009), [http://www.ntsb.gov/safety/safety-recs/recletters/A09\\_87\\_96.pdf](http://www.ntsb.gov/safety/safety-recs/recletters/A09_87_96.pdf) (recommending that FAA require HTAWS, use of NVG, and autopilot if second pilot is not available).

227. Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations; Final Rule, 79 Fed. Reg. at 9958.



with autopilots.<sup>228</sup> Autopilots are now on the market for light helicopters, which provide a considerable measure of safety enhancement.<sup>229</sup> They weigh only twelve pounds and are designed to remain activated throughout flight.<sup>230</sup> Recovery from IIMC is one of their advertised capabilities: “In the event that a pilot loses visual reference due to limited visibility, releasing the cyclic causes the helicopter to automatically recover to a near-level attitude.”<sup>231</sup> The option costs \$60,200 for a \$500,000 helicopter.<sup>232</sup> Equipping single-engine helicopters with autopilots is distinct from seeking IFR certification, which, as the Industry White Paper explains, would cost a lot more and take much longer.<sup>233</sup>

### B. Collisions with Obstacles

A significant number of helicopter accidents involve colliding with obstacles fixed to the ground, what the FAA calls “controlled flight into terrain” (CFIT).<sup>234</sup> Some of these involve flying into the terrain itself, such as hitting a mountain, or into obstacles connected to the terrain: a radio tower, or a wind turbine.<sup>235</sup> CFIT also involves misjudging the length of the rotor blades of the length of the tail boom and hitting a building or other obstruction with the rotor tip or tail rotor.<sup>236</sup>

Most involve colliding with wires, especially electric transmission wires.<sup>237</sup> Wires are largely invisible from the air unless the sunlight happens to hit them just right. Pilots must avoid them by looking for the towers that support them and making sure that they fly at a height higher than the top of

---

228. See Press Release, Genesys Aerosystems, Genesys Aerosystems Earns FAA STC to Retrofit HeliSAS in R66 (Mar. 29, 2016), <http://www.verticalmag.com/press-releases/genesys-aerosystems-earns-faa-stc-for-helisas-stability-augmentation-and-autopilot-system/> (reporting on FAA certification of \$71,509, fifteen-pound stability augmentation system with two-axis autopilot for Robinson R66 and other light helicopters).

229. See *HeliSAS for R44: Autopilot and Stability Augmentation System for Robinson R44 Helicopters*, GENESYS AEROSYSTEMS (2014), [http://genesys-aerosystems.com/sites/default/files/files/GenesysAerosystems\\_HeliSASforR44\\_DataSheet.pdf](http://genesys-aerosystems.com/sites/default/files/files/GenesysAerosystems_HeliSASforR44_DataSheet.pdf) [Hereinafter *HeliSAS for R44*] (reporting that Genesys Aerosystems HeliSAS Helicopter Stability Augmentation System and Autopilot is available for ordering for retrofit installation in Robinson R44 series helicopters).

230. *Genesys Aerosystems Autopilot & Avionics Systems*, GENESYS AEROSYSTEMS, <http://genesys-aerosystems.com> (last visited Sept. 25, 2016).

231. *HeliSAS for R44*, *supra* note 229.

232. Press Release, Robinson Helicopter Co., Robinson Introduces New R44 & R66 Autopilot and Aspen Primary Flight Display Package (Aug. 28, 2015), [http://www.robinsonheli.com/media/pressrelease/r44\\_autopilot\\_aspen\\_press%20release.pdf](http://www.robinsonheli.com/media/pressrelease/r44_autopilot_aspen_press%20release.pdf); see also *R44 Raven II & R44 Clipper II—2016 Price List*, ROBINSON HELICOPTER CO. (Jan. 15, 2016), [http://www.robinsonheli.com/price\\_lists\\_eocs/r44\\_2\\_pricelist.pdf](http://www.robinsonheli.com/price_lists_eocs/r44_2_pricelist.pdf) (quoting 2016 prices for various helicopter models and equipment). The R44 is too small to be a HEMS helicopter, but the system illustrates what is available for single-engine HEMS helicopters.

233. IFR WHITE PAPER, *supra* note 212, at 21.

234. *Id.* at 1.

235. FED. AVIATION ADMIN., AC NO. 61-134, ADVISORY CIRCULAR: GENERAL AVIATION CONTROLLED FLIGHT INTO TERRAIN AWARENESS 7 (Apr. 1, 2003), [http://www.faa.gov/documentLibrary/media/Advisory\\_Circular/ac61-134.pdf](http://www.faa.gov/documentLibrary/media/Advisory_Circular/ac61-134.pdf).

236. Clarence E. Rash, *Walking into Trouble*, AVIATION SAFETY WORLD (Aug. 2006), [http://www.flightsafety.org/asw/aug06/asw\\_aug06\\_p28-34.pdf?dl=1](http://www.flightsafety.org/asw/aug06/asw_aug06_p28-34.pdf?dl=1).

237. See John Croft, *Getting Helicopter TAWS Right*, AVIATION WK. (May 1, 2013), <http://aviationweek.com/awin/getting-helicopter-taws-right> (discussing how power lines are a CFIT threat to helicopters).

the tower.

HEMS flights are especially vulnerable to wires because for accident victim extraction, the pilot flies the helicopter into a confined area not normally intended for helicopter landings. Such areas often are surrounded by utility poles and associated local electric distribution wires and telephone wires. Appropriate safety protocols require first responders on the ground and all personnel in the helicopter to assist the pilot in looking for wires so he can avoid them, as in the story that begins this Article.

Collision with the ground also can result from settling with power. Settling with power, or more formally “vortex ring state,” is a condition in which a helicopter in a hover or in very low speed flight begins to settle into its own rotor downwash, reducing the effectiveness of the rotor.<sup>238</sup> The faster it settles, the worse the problem becomes. Once vortex ring state is fully developed, the pilot cannot fly out of it simply by raising the collective. That only intensifies the problem. He must quickly, while he still has full lateral control, lower the collective and fly out of the downwash forward or sideways. When fully developed, vortex ring state produces descents of several thousand feet per minute and reduces lateral control.<sup>239</sup> This can be disastrous for a helicopter only a few hundred feet off the ground. Moreover, a helicopter entering a confined accident site may not have room to fly forward or sideways to get out of the condition.<sup>240</sup> Good pilot training and situational awareness is more important than technology in mitigating this risk, although enhanced awareness of ground proximity can aid in detecting the onset of the phenomenon.

### 1. Night Vision Goggles (NVGs)

Night operations introduce additional risks because the pilot cannot see landing areas and potential obstacles as well. If the engine fails in a single-engine helicopter, he may not be able to see a safe landing area even if one is within the limited autorotation radius.<sup>241</sup> That is where night vision goggles (NVGs) come in. If the pilot is wearing NVGs and the helicopter is equipped for NVG operation when the engine failure occurs, he is in a much better position to identify safe autorotative landing possibilities.

The NTSB recommended that the FAA require HEMS helicopters to be equipped with NVG.<sup>242</sup> According to a 2009 Forbes article, Air Methods began, in 2006, retrofitting its entire fleet with NVGs and collision- and

---

238. J. Gordon Leishman et al., *The Vortex Ring State as a Spatially and Temporally Developing Wake Instability*, 49 J. AM. HELICOPTER SOC'Y 160, 160–65 (2004) (explaining aerodynamics of vortex ring state).

239. *Vortex Ring*, SKYBRARY (Apr. 12, 2016), [http://www.skybrary.aero/index.php/Vortex\\_Ring](http://www.skybrary.aero/index.php/Vortex_Ring).

240. This was exactly the problem that caused the crash of the lead helicopter on the Osama bin Laden raid, which resulted from vortex ring state in the confined area of bin Laden's compound. *Operation Neptune's Spear: Details Emerge*, AVIATIONINTEL.COM ¶ 4 (May 6, 2011), <http://aviationintel.com/operation-neptune-s-spear-details-emerge/> (concluding that vortex ring state in high-density altitude caused helicopter crash).

241. *Emergencies and Hazards*, *supra* note 171.

242. NTSB SAFETY RECOMMENDATION 4402G, *supra* note 226 (recommending that FAA require HTAWS, use of NVG, and autopilot if second pilot is not available).

obstacle-avoidance technology, at a cost of \$100,000 per aircraft.<sup>243</sup> In 2010, 195 of Air Methods' 306 helicopters were NVG equipped.<sup>244</sup> All of the helicopters of the industry's number two operator, Air Evac Lifeteam, were NVG equipped.<sup>245</sup> The helicopters of number four PHI, number five Metro Aviation, and number six Med Trans were all NVG capable, as well.<sup>246</sup>

HEMS pilots<sup>247</sup> and HEMS safety experts<sup>248</sup> say that NVGs materially enhance safety for night operations. Data collected in 2015 by Ira Blumen, MD, showed that 90% of all HEMS helicopters in the United States are NVG equipped.<sup>249</sup>

Nevertheless, Subpart L does not require NVGs. In a report to Congress, issued at about the same time as Subpart L, the FAA embraced the recommendation of an advisory committee, chaired by Air Methods, not to require NVGs.<sup>250</sup> Despite taking two years, under a committee mandate that considered twenty-three enumerated and specific issues, the eight-page report recommended against mandating NVGs, pending further FAA investigation.<sup>251</sup>

## 2. *Radio Altimeters*

Pilots usually control aircraft altitude by referring to a barometric altimeter, an analog device that calculates altitude above sea level by measuring the air pressure.<sup>252</sup> Air pressure decreases as altitude increases.<sup>253</sup> Such altimeters can be standalone display devices usually resembling a clock, with a short hand indicating thousands of feet and a long hand indicating hundreds of feet, but they also may involve sensors built into digital flight management displays, providing data for digital indications.<sup>254</sup> For an altimeter to be accurate, it must be reset periodically with changes in the sea level pressure as weather patterns and their associated pressure systems move across the earth.<sup>255</sup>

For flights close to the ground, radio altimeters are preferable, because they use the basic principles of radar, bouncing radio or sound signals off the ground and measuring the exact height by determining how long it takes the

---

243. Burke, *supra* note 6.

244. Adams, *supra* note 26.

245. *Id.*

246. *Id.*

247. Telephone Interview with Clayton Beckmann, HEMS Pilot, Air Methods (Mar. 23, 2016) ("NVG is amazing; it's almost essential.").

248. Blumen Interview, *supra* note 75 ("NVGs are huge; they are very important and long-overdue.").

249. *Id.*

250. FED. AVIATION ADMIN., REPORT TO CONGRESS: NIGHT VISION GOGGLES FOR HELICOPTER PILOTS 4 (Jan. 16, 2014) [hereinafter NVG REPORT], [https://www.faa.gov/about/office\\_org/headquarters\\_offices/agi/reports/media/FAA\\_Report\\_to\\_Congress\\_on\\_Night\\_Vision\\_Goggles\\_for\\_Helicopter\\_Pilots.pdf](https://www.faa.gov/about/office_org/headquarters_offices/agi/reports/media/FAA_Report_to_Congress_on_Night_Vision_Goggles_for_Helicopter_Pilots.pdf).

251. *Id.* at A2-1.

252. FED. AVIATION ADMIN., PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, FAA-H-8083-25B, at § 8-3 (2016), [http://www.faa.gov/regulations\\_policies/handbooks\\_manuals/aviation/phak/media/pilot\\_handbook.pdf](http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/pilot_handbook.pdf) (explaining how barometric altimeter works).

253. *Id.* at 12-5 (explaining that atmospheric pressure decreases with increasing altitude).

254. Craig Sanders, *Atmospheric Pressure and Altimeters*, FRONT, Sept.–Oct. 2002, at 5–6, <http://www.nws.noaa.gov/os/aviation/front/02oct-front.pdf>.

255. *Id.* at 6.

pulses to return.<sup>256</sup> The aviation community believes that they are significant enhancers of safety for low-level flights.<sup>257</sup>

### 3. *Terrain Avoidance Warning Systems (TAWS)*

Terrain avoidance warning systems (TAWS) reduce the risk of collision with terrain and obstacles by warning the pilot of unsafe proximity to either, and in some cases, automatically triggering aircraft maneuvers to avoid the risk.<sup>258</sup> They typically work by a combination of altitude information from barometric or radio altimeters, GPS-derived position indication, and databases of terrain and cultural features such as power lines and wind turbines.<sup>259</sup> They sometimes also use forward-looking radar.<sup>260</sup>

Helicopter TWAS, required by Subpart L, provides additional data to enhance situational awareness when a pilot in IMC is trying to land.<sup>261</sup> Of the types of equipment that can enhance HEMS safety, they are the second most expensive, after autopilots.<sup>262</sup> Radio altimeters, in contrast, have relatively modest costs.<sup>263</sup>

### 4. *Navigation Systems and IFR Operations*

While IFR capability depends on certification of the aircraft and the pilot, its efficacy also depends on the availability of IFR navigation infrastructure.<sup>264</sup> Technology has greatly simplified aerial navigation, although all pilots train to be able to navigate by combination of dead reckoning and ground references. Virtually every pilot flies with a navigation application<sup>265</sup> running on a tablet computer strapped to his thigh. Such applications present aeronautical charts in graphical form on the screen of the device and utilize GPS signals to depict the position, direction of flight, altitude, and groundspeed of the helicopter, and

256. Chris Woodford, *Altimeters*, EXPLAINTHATSTUFF!, <http://www.explainthatstuff.com/how-altimeters-work.html> (last updated Sept. 18, 2016).

257. *Id.*

258. FED. AVIATION ADMIN., AC No. 90-48D, ADVISORY CIRCULAR: PILOTS' ROLE IN COLLISION AVOIDANCE 6 (Apr. 19, 2016), [http://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC\\_90-48D.pdf](http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_90-48D.pdf).

259. *Terrain Avoidance and Warning System (TAWS)*, SKYBRARY, [http://www.skybrary.aero/index.php/Terrain\\_Avoidance\\_and\\_Warning\\_System\\_\(TAWS\)](http://www.skybrary.aero/index.php/Terrain_Avoidance_and_Warning_System_(TAWS)) (last updated Sept. 10, 2015, 12:22 PM).

260. See FED. AVIATION ADMIN., AC No. 25-23, ADVISORY CIRCULAR: AIRWORTHINESS CRITERIA FOR THE INSTALLATION APPROVAL OF A TERRAIN AWARENESS AND WARNING SYSTEM (TAWS) FOR PART 25 AIRPLANES (May 22, 2000), [http://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC25-23.pdf](http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC25-23.pdf) (describing technical features of acceptable TAWS).

261. 14 C.F.R. pt. 135 (2016).

262. GARY PICOU, AEA PILOT'S GUIDE, TAWS: FAA MANDATES A NEW PROXIMITY TO SAFETY! 56, 59 (2004), [http://www.aepilotsguide.net/pdf/04\\_Archive/PG04TAWS.pdf](http://www.aepilotsguide.net/pdf/04_Archive/PG04TAWS.pdf).

263. *Radar Altimeters*, PAC. COAST AVIONICS, <https://www.pacificcoastavionics.com/category/86-radar-altimeters.aspx> (last visited Sept. 28, 2016).

264. Veillette, *supra* note 173 ("[E]ase of getting into the IFR system enhances the probability of a pilot using the IFR system on a more frequent basis. And IFR protection matters . . . Miller-Tester's thesis found that with the IFR option available, the pilots' decision-making process is comparatively quick and simple.").

265. See, e.g., FOREFLIGHT, [www.foreflight.com](http://www.foreflight.com) (last visited Sept. 28, 2016) (one of the most popular examples).

many other navigation functions.<sup>266</sup> Increasingly, helicopters also have “glass panels”—large video displays installed in the panel that display essentially the same graphical information.<sup>267</sup> Destinations can be entered according to their latitude and longitude, easily obtainable from any GPS device, and the applications can chart a course to such points once entered and provide the pilot with compass headings to navigate to the point.<sup>268</sup> The only important challenges are to make sure the pilot is adequately trained to access the multiple layers of these computer applications, confidently and quickly, and to assure reliability, by system design or by providing backups. The precision of installed GPS navigation systems can also be enhanced by the Wide Area Augmentation System (WAAS).<sup>269</sup>

IFR capability is not a silver bullet, however. For IFR to be broadly useful in HEMS, the helicopter must operate from landing areas that have published IFR approach procedures. That is not generally the case with helipads, and it certainly is not the case with accident or acute-illness scenes. While some hospitals and other heliport operators may elect to work with the FAA to develop approach and departure procedures for helipads, the process requires significant investment.<sup>270</sup>

The Federal Aviation Regulations (FARs) permit landings and departures in IMC to be made only by use of published approach or departure procedures.<sup>271</sup> Establishing an approach or departure procedure is a demanding process requiring detailed engineering calculations of runway length, height above sea level, nearby obstacles, aircraft approach speeds, rates of descent, and rates of climb.<sup>272</sup> This is so even for newer GPS-based PinS procedures designed for helicopters.<sup>273</sup>

---

266. See, e.g., *id.* (showing one example of pilot navigation application).

267. See, e.g., *G1000*, GARMIN, <https://buy.garmin.com/en-US/US/prod6420.html> (last visited Sept. 28, 2016); GARMIN, *G1000: GUIDE FOR DESIGNATED PILOT EXAMINERS AND CERTIFIED FLIGHT INSTRUCTORS* (Nov. 2004), [https://www.faa.gov/training\\_testing/training/fits/guidance/media/G1000.pdf](https://www.faa.gov/training_testing/training/fits/guidance/media/G1000.pdf) (both discussing the Garmin 1000, a popular example of a glass panel display).

268. *Id.*

269. *What Is WAAS?*, GARMIN, <http://www.garmin.com/aboutGPS/waas.html> (last visited Sept. 28, 2016) (explaining that WAAS enhances accuracy of GPS from fifteen meters to less than three meters).

270. Larry Anglisano, *GPS—From VFR to IFR*, AVWEB (May 26, 2002), <http://www.avweb.com/news/avionics/181617-1.html>.

271. 14 C.F.R. § 135.225 (2016).

272. jrogers13, *Figuring Takeoff and Landing Distances?*, STUDENTPILOT.COM (May 10, 2007, 5:51 PM), <http://studentpilot.com/interact/forum/archive/index.php/t-30191.html>.

273. See, e.g., HICKOK & ASSOCS., INC., *HELICOPTER INSTRUMENT APPROACH AND DEPARTURE CHARTS* (May 21, 2015), <http://hickokgpsifr.com/wp-content/uploads/2016/01/Charting-Legend-Revision-21.pdf> (showing an example of Point-in-Space procedures, which it develops and publishes under FAA-approved guidance). As Hickok develops new procedures, it uploads them to an FAA database, from which the FAA reviews and approves them. See *Complete Helicopter Airspace Systems*, HICKOK & ASSOCS., INC., [http://hickokgpsifr.com/?page\\_id=28](http://hickokgpsifr.com/?page_id=28) (last visited Sept. 28, 2016) (“We build and coordinate helicopter airspace systems, sometimes covering entire states, to provide approach, departure, and enroute capabilities. Our enroute segments are always hundreds of feet lower than the traditional Minimum Instrument Altitude (MIA) or Minimum Vector Altitude (MVA) that ATC would otherwise have to use.”).

### C. Flight Simulators

Well-designed simulators allow pilots to experience all the flight regimes of which a particular model of helicopters is capable without leaving the ground. The simulator replicates all of the onboard electronics, provides visual information on a large screen similar to what the pilot would see from the cockpit, and replicates the feel of controls and the response to the aircraft to control inputs.<sup>274</sup> A simulator permits a pilot to practice basic flight skills at a lower cost than actual flight would require and also permits him to perform emergency maneuvers such as autorotations and recovery from vortex ring state close to the ground, without the hazards of actual flight.<sup>275</sup>

Importantly for purposes of enhancing HEMS safety, simulators also permit practicing inadvertent entry into IMC. An instructor “riding” with the pilot in the simulator can trigger the failure of various systems to give the pilot realistic experience with sudden emergencies.<sup>276</sup> Until recently, sophisticated simulators for helicopters that faithfully replicate the performance and feel of specific models of helicopter were not widely available. Now that has changed, although the acquisition cost remains high.<sup>277</sup>

“Generic” helicopter simulators are available for about \$120,000 and cost pilots slightly more than \$100 per hour for training time.<sup>278</sup> These simulators are capable of simulating IFR flight and have hundreds of published approach procedures in their databases.<sup>279</sup> They do not, however, replicate the dynamic behavior of specific models of helicopters. The FAA cautions that instrument proficiency depends upon intimate familiarity with the behavior of specific types of helicopter and the instrumentation and automation systems installed on them.<sup>280</sup> To get that level of simulator training, a pilot must use a class D simulator, which costs much more.<sup>281</sup> In a class D simulator, however, the FAA allows a pilot to earn flight time as if he were in the actual helicopter.<sup>282</sup>

Flight Safety Foundation has been an aggressive promoter of wider use of

---

274. *Professional Helicopter Simulator*, FLYIT SIMULATORS, <http://www.flyit.com/professional-helicopter-simulator.html> (last visited Sept. 28, 2016).

275. *Cost Justification*, FLYIT SIMULATORS, <http://www.flyit.com/helicopter-simulator-cost-justification.html> (last visited Sept. 28, 2016).

276. See, e.g., *News*, FLYIT SIMULATORS, <http://www.flyit.com/news.html> (last visited Sept. 28, 2016) (discussing the various simulation options available in a popular helicopter simulator).

277. See *Cost Justification*, FLYIT SIMULATORS, <http://www.flyit.com/helicopter-simulator-cost-justification.html> (last visited Sept. 28, 2016) (taking the parameters for monthly payments supplied by the vendor (\$2280 per month, 60 month loan, 5.9% interest rate) and using them to calculate the initial loan amount, the total comes to \$118,500).

278. *Id.*

279. See, e.g., *Professional Helicopter Simulator*, FLYIT SIMULATORS, <http://www.flyit.com/professional-helicopter-simulator.html> (last visited Sept. 28, 2016) (showing FLYIT’s generic dual simulator, capable of flying IFR approaches and discussing how users can select instrument panels for Robinson, Bell, and other popular training-level helicopters).

280. Alton K. Marsh, *ABCs of Simulators: A Tangled Web We Weave*, AIRCRAFT OWNERS & PILOTS ASS’N, <https://www.aopa.org/news-and-media/all-news/2011/may/01/abcs-of-simulators> (last visited Sept. 28, 2016).

281. *Id.*

282. Vern Weiss, *Flight Simulator Training: Cutting Costs and Improving Skills*, UPPER LIMIT AVIATION (Dec. 8, 2015), <http://www.upperlimitaviation.edu/flight-simulator-training-cutting-costs-and-improving-skills/>.

simulators in HEMS pilot training.<sup>283</sup> It makes simulators available for an hourly fee.<sup>284</sup> Helicopter manufacturers such as Airbus provide simulator training, as well.<sup>285</sup>

## VI. HUMAN RESOURCES

The typical HEMS helicopter has an aircrew comprising a pilot, a flight nurse, and a paramedic.<sup>286</sup> Recruiting, training, and managing crewmembers are core activities for any HEMS operator. Human factors account for far more HEMS accidents than mechanical failures.<sup>287</sup> Demanding high levels of experience for consideration as a HEMS pilot may increase safety and reduce training costs. A widely predicted shortage of pilots over the next couple of decades,<sup>288</sup> however, may increase personnel costs as entry-level salaries must be increased and more post-hiring training be required due to gaps in applicant experience or training.

Working conditions loom as a major factor in HEMS personnel decisions. HEMS professionals trade off the excitement and gratification of saving lives against irregular working hours: having to be on call at the operating base for periods extending to a week or two weeks, and then being off-duty for equivalent periods of time. The rhythm of the schedule attracts some people; it frees up large blocks of time for leisure activities or other employment. But, HEMS working schedules do not mesh very well with the schedules of most everyone else in the society, and thus limit social activity and strain relationships.

---

283. Linda Werfelman, *On the Rebound*, FLIGHT SAFETY FOUND.: AEROSAFETY WORLD (Mar. 2013), <http://flightsafety.org/AEROSafety-world-magazine/mar-2013/on-the-rebound> (“While there are other safety objectives . . . none of them can provide a level of risk mitigation equal to that of a frequent training program that makes use of available flight training devices, simulators or operational aircraft with instructors . . .”).

284. *Professional Training Programs for Bell Helicopters*, FLIGHTSAFETY INT’L, [https://www.flight-safety.com/fs\\_service\\_aviation\\_training\\_aircraft.php?type=00003&code=C](https://www.flight-safety.com/fs_service_aviation_training_aircraft.php?type=00003&code=C) (last visited Sept. 28, 2016) (discussing simulator training for professional pilots of Bell helicopters).

285. *Simulator Training*, AIRBUS HELICOPTERS, [http://airbushelicoptersinc.com/training/simulator\\_training.asp](http://airbushelicoptersinc.com/training/simulator_training.asp) (last visited Sept. 28, 2016).

286. Air Methods 2015 Annual Report, *supra* note 33, at 7. On December 31, 2015, Air Methods had 4,554 full time and 244 part time employees, consisting of 1,456 pilots; 935 aviation machinists, airframe and power plant (A&P) engineers, and other manufacturing and maintenance positions; 1,314 flight nurses and paramedics; 365 dispatch and transfer center personnel; and 728 business development, billing, and administrative personnel. *Id.*

287. See *infra* Section VI.A.2.

288. Birgit Andersen, *Pilot Shortage Threatens to Slow U.S. Airline Growth*, FORBES (Jan. 28, 2016, 5:20 PM), <http://www.forbes.com/sites/oliverwyman/2016/01/28/pilot-shortage-threatens-to-slow-u-s-airline-growth/#121e4de5bb6e>.

### A. Pilots

#### 1. Recruitment and Qualifications

Recruitment standards for HEMS pilots are stringent.<sup>289</sup> Typically, pilots must have 2,500 total hours, 500 to 1,000 turbine hours, 100 hours at night, and 50 to 100 hours of actual or simulated instrument time.<sup>290</sup> They must have commercial helicopter ratings, and Air Transport Pilots (ATPs) receive special consideration. Many HEMS operators also require NVG time.<sup>291</sup>

Placing these requirements in context requires a basic understanding of how careers of helicopter pilots develop. The first three steps are to earn a private, then a commercial, and then an instrument rating.<sup>292</sup> A pilot typically has 250 to 300 hours of total time when these training steps are completed.<sup>293</sup> That is obviously far short of the minimum experience requirement for HEMS. Almost all pilots work as flight instructors to build time and gain valuable experience, and that necessitates getting a Certified Flight Instructor (CFI) rating. Virtually all helicopter flight instruction, however, occurs in piston-engine helicopters.<sup>294</sup> Most HEMS helicopters have turbine engines, and most HEMS pilot job requirements include several hundred turbine hours.<sup>295</sup> So, HEMS pilot aspirants need to graduate from flight instruction to a position where they can build turbine time. This typically occurs by working for a rides-and-tours operator,<sup>296</sup> or a television traffic-and-news operator.<sup>297</sup> Neither of these jobs builds any IFR experience, though.

A growing pilot shortage<sup>298</sup> may have an impact on HEMS. Air Methods

289. In other words, Webster, the fictional pilot in the story that introduces this Article, is extremely fortunate to have obtained a HEMS job with his relatively low level of experience. Webster is how he is, however, to make the story more compelling, with a relatively inexperienced, but eager and ambitious pilot.

290. See generally JSFIRM.COM, [http://www.jsfirm.com/Job/Pilot-Rotary+Wing/EMS+IFR+EC-145+Pilot/Peru-Illinois/jobID\\_302336](http://www.jsfirm.com/Job/Pilot-Rotary+Wing/EMS+IFR+EC-145+Pilot/Peru-Illinois/jobID_302336) (last visited Sept. 28, 2016) (displaying a pilot job board with various job listings and their respective requirements).

291. See *Flyer Soliciting New Pilots*, AIR METHODS, <https://www.airmethods.com/docs/default-source/air-methods---human-resources/hr-recruit-pilot-single.pdf> (last visited Sept. 28, 2016) (stating requirements for HEMS pilots).

292. See *Helicopter Training Costs*, HILLSBORO AERO ACAD., <http://www.flyhaa.com/helicopter/costs/details/#pro-pilot-helicopter> (last visited Sept. 28, 2016) (showing \$64,331.00 total cost of professional pilot training course, including CFI); see also *Bristow Academy*, BRISTOW, <http://www.bristowgroup.com/about-bristow/bristow-academy/> (last visited Sept. 28, 2016).

293. 14 C.F.R. § 61.129(a) (2016) (requiring total time of 250 hours before being eligible for the commercial flight test).

294. AIR SAFETY INST., ACCIDENTS DURING FLIGHT INSTRUCTION: A REVIEW 22 (2014), <https://www.aopa.org/-/media/files/aopa/home/pilot-resources/safety-and-proficiency/accident-analysis/special-reports/instructionalaccidentreportfinal.pdf>.

295. See generally *Flyer Soliciting New Pilots*, *supra* note 291 (stating requirements for HEMS pilots).

296. See, e.g., CHI. HELICOPTER EXPERIENCE, <http://chicagohelicopterexperience.com> (last visited Sept. 28, 2016) (providing one example of a helicopter tour operator).

297. See Andrew Dodson, *TV News Choppers Flying High Once Again*, TVNEWSCHECK (Aug. 8, 2013 12:28 PM), <http://www.tvnewscheck.com/article/69563/tv-news-choppers-flying-high-once-again> (referring to two national firms that contract with television stations: Helicopters, Inc. and U.S. Helicopters, Inc.; and three smaller contractors: Sky Helicopters, Helinet, and Angel City Air).

298. Compare Andersen, *supra* note 288 (predicting that pilot shortage will slow growth of regional airlines), with Patrick Smith, *Fact and Fallacy of the "Pilot Shortage"*, ASK THE PILOT (Mar. 1, 2016), <http://www.askthepilot.com/pilot-shortage/> (arguing that any shortage involves regional airlines, and these airlines could solve the shortage by increasing entry-level compensation).



anticipated a pilot shortage by acquiring two high-volume rides-and-tours operators, Blue Hawaiian and Sundance.<sup>299</sup> According to the Air Methods CEO, the purpose of the acquisitions was not to diversify; it was to establish a reliable pipeline of new pilots for its air ambulance operations.<sup>300</sup>

The labor market for helicopter pilots, though, is distinct from the labor market for fixed wing pilots. The factors producing a pilot shortage for fixed-wing aviation may not extend to the rotary wing industry, mostly because the demand for helicopter services is declining,<sup>301</sup> while the demand for fixed-wing operations is increasing.<sup>302</sup> Mobility between the two labor markets is low; aspiring aviators mostly decide at the outset whether they want to be airplane or helicopter pilots.

Romance has always been important in the labor market for pilots, and this works in favor of HEMS. “When you’ve actually saved someone’s life,” says Clayton Beckmann, a pilot for Air Methods, “it gives you a boost. It’s entirely different from flying oil and gas, where you’re the driver, and they’re just commuting to their jobs.”<sup>303</sup>

If a pilot shortage develops in the HEMS industry, it may increase costs in two ways. First, it could require HEMS operators to bid up pilot compensation, either by increasing base rates of pay or by paying substantial hiring bonuses to those who meet current requirements. Second, it would increase training costs, to the extent that operators are forced to fill their hiring needs with pilots who do not meet the formal requirements and train them thereafter on NVG and allow them to build flight time in actual IMC flying as copilots.

Bidding up entry-level compensation is not a likely response, however. The air ambulance market is fluid, with operators coming into a state, opening up bases, and then closing those that do not make money. In this environment, the larger operators are assured of an internal flow of pilot personnel. Air

---

299. Howard Pankratz, *Denver’s Air Methods to Acquire Blue Hawaiian Helicopters*, DENVER POST (Apr. 28, 2016, 5:08 AM), <http://www.denverpost.com/2013/11/18/denvers-air-methods-to-acquire-blue-hawaiian-helicopters/>; Howard Pankratz, *Denver-Based Air Methods Completes Purchase of Sundance Helicopters*, DENVER POST (Dec. 31, 2012, 7:39 AM), <http://www.denverpost.com/2012/12/31/denver-based-air-methods-completes-purchase-of-sundance-helicopters/>.

300. See Press Release, Air Methods Corp., Air Methods Announces Agreement to Acquire Sundance Helicopters, Inc. (Dec. 21, 2012), <http://www.airmethods.com/airmethods/investors/press-releases/detail/2012/12/21/air-methods-announces-agreement-to-acquire-sundance-helicopters-inc-#> (quoting CEO Aaron Todd: “Air medical transport remains Air Methods’ core business and expansion into these industries is expected to enhance our ability to train and recruit experienced pilots and provide pilots a more direct career path into our air medical operations.”).

301. The two largest segments for helicopter operations are oil-and-gas and HEMS. The collapse in oil prices has diminished the demand for oil-and-gas helicopters. The changes in industry structure predicted by this Article will shrink the HEMS industry. See Lewis Krauskopf, *Oil Price Plunge Could Leave Helicopters Sputtering*, REUTERS (Jan 15, 2015, 1:00 AM), <http://www.reuters.com/article/oil-helicopters-idUSL1N0UO2JB20150115> (discussing how financial difficulties in the oil industry negatively affect the helicopter industry).

302. The principal driver of demand for fixed-wing pilots is growth in airline demand. Michael McGee, *Air Transport Pilot Supply and Demand* (Mar. 2015) (unpublished Ph.D. dissertation, Pardee RAND Graduate School), [http://www.rand.org/content/dam/rand/pubs/rgs\\_dissertations/RGSD300/RGSD351/RAND\\_RGSD351.pdf](http://www.rand.org/content/dam/rand/pubs/rgs_dissertations/RGSD300/RGSD351/RAND_RGSD351.pdf).

303. Telephone Interview with Clayton Beckmann, HEMS Pilot, Air Methods (Mar. 23, 2016).

Methods has the feed of pilots from its rides-and-tours operators. If higher pilot compensation would make a base unprofitable, the operator is not going to pay the higher compensation; it will just close the base. As to entry-level experience requirements, the larger operators already relax these considerably for particularly desirable applicants, on a case-by-case basis. As operators implement Subpart L, they will be ramping up their training programs and may discover that they are better off economically and in terms of overall pilot proficiency to pay lower compensation, get less experienced pilots, and train them internally to their own standards.

## 2. *Training and Safety Culture*

Advanced technology is one way to improve HEMS safety, as Section V.B considers, but it is insufficient, unless human factors receive at least as much attention. Zuccaro observed that the technology requirements of Subpart L were only part of the solution.<sup>304</sup> Many fatal HEMS accidents would not have been prevented had the Subpart L requirements been met.<sup>305</sup> He emphasized the need also to address human factors, as a critical area of focus:

- Risk assessment
- Decision making
- Perceived or real pressures on operations
- Safety culture.<sup>306</sup>

The impact of human factors was apparent in the 2011 crash of an Air Methods HEMS helicopter near Mosby, Missouri, in 2011.<sup>307</sup> The 2100-hour pilot took off with a flight nurse, paramedic, and patient on board for an interfacility transfer.<sup>308</sup> He knew when he took off that the helicopter was low on fuel, having discussed refueling options with the Air Methods dispatcher.<sup>309</sup> He pressed on, though, and when the helicopter ran out of fuel and the engine quit, he unaccountably failed to enter an autorotation.<sup>310</sup> He apparently was distracted by repeated personal text messaging during the flight and on the ground while he was assessing the fuel state.<sup>311</sup> No conceivable technology requirements could have prevented this.

IFR-equipped helicopters and IFR-qualified pilots are not, of themselves, sufficient to prevent accidents. In 2013, a 10,000-hour pilot flying a twin-engine Super Puma on an IFR approach to an airport entered vortex ring state, apparently without realizing it, and killed four of sixteen passengers on

---

304. Zuccaro, *supra* note 164.

305. *Id.*

306. *Id.*

307. *Crash Following Loss of Engine Power Due to Fuel Exhaustion, Air Methods Corporation Eurocopter AS350 B2, N352LN*, NAT'L TRANSP. SAFETY BD. (Apr. 9, 2013), <http://www.nts.gov/investigations/AccidentReports/Pages/AAR1302.aspx> (analyzing crash by 2100-hour pilot, killing pilot, flight nurse, paramedic, and patient during an interfacility flight; and concluding that pilot failed to consider low fuel state and apparently did not enter an autorotation correctly, if at all, when the engine stopped).

308. *Id.* at 40.

309. *Id.* at 6.

310. *Id.* at 36.

311. *Id.* at 27.

board.<sup>312</sup> The pilot in the fatal March 2016 HEMS crash in Alabama was Chad Hammond, a twenty-nine-year-old airline transport pilot, CFII and thus instrument rated, and type rated in twin-engine AW-139s, which he flew in oil and gas operations for four years.<sup>313</sup> The weather conditions were foggy, with low visibility.<sup>314</sup> Recovery personnel, who arrived about dawn, were working in heavy rain and low clouds.<sup>315</sup> These facts suggest IIMC as a cause of the accident. The fact that the pilot had four years of experience flying twin-engine helicopters in oil and gas operations suggests that he had substantial actual IMC time.<sup>316</sup>

The unusually detailed NTSB preliminary report<sup>317</sup> indicates that the experienced Hammond took off a little after midnight after picking up a patient at an accident site and deliberately<sup>318</sup> flew into a cloud layer about one hundred feet above ground level (AGL).<sup>319</sup> The conditions were unchanged from when the helicopter landed at the accident site about twenty-five minutes before, which included fog, mist, and reduced visibility, and the weather as reported from an airport four nautical miles away included three miles visibility in drizzle and overcast clouds at three hundred feet.<sup>320</sup>

After takeoff, the helicopter climbed in a left turn to about seven hundred feet AGL.<sup>321</sup> About ninety seconds later the left turn steepened as the helicopter continued to climb briefly to about eight hundred feet AGL.<sup>322</sup> It remained at that altitude for twenty-four seconds and then began a descent, reaching about six thousand feet per minute before the helicopter impacted the ground.<sup>323</sup>

The preliminary report excludes mechanical failures, based on a detailed inspection of flight control, engine, and rotor components. The rotors were powered at the time of impact, ruling out engine failure.<sup>324</sup> The preliminary report, like all preliminary reports, does not assign a probable cause, but some inferences are reasonable from the facts. First, the pilot was an experienced instrument pilot and had actual IMC time, probably in twin-engine helicopters

---

312. AIR ACCIDENTS INVESTIGATION BRANCH, REPORT ON THE ACCIDENT TO AS332 L2 SUPER PUMA HELICOPTER, G-WNSB ON APPROACH TO SUMBURGH AIRPORT ON 23 AUGUST 2013 (Mar. 15, 2016), [https://assets.publishing.service.gov.uk/media/56e7eaeaed915d0379000023/AAR\\_1-2016\\_G-WNSB.pdf](https://assets.publishing.service.gov.uk/media/56e7eaeaed915d0379000023/AAR_1-2016_G-WNSB.pdf).

313. Ebony Davis, *More Details Released of Fatal Medical Helicopter Crash*, DOTHAN EAGLE (Mar. 27, 2016, 7:22 PM), [http://www.dothaneagle.com/news/local/more-details-released-of-fatal-medical-helicopter-crash/article\\_223f23ba-f47b-11e5-8fe9-a7d86658431d.html](http://www.dothaneagle.com/news/local/more-details-released-of-fatal-medical-helicopter-crash/article_223f23ba-f47b-11e5-8fe9-a7d86658431d.html).

314. *Id.*

315. *Id.*

316. *Id.*

317. NTSB *Identification: ERA16FA140*, NAT'L TRANSP. SAFETY BD. (2016), [http://ntsb.gov/\\_layouts/ntsb.aviation/brief.aspx?ev\\_id=20160326X80544](http://ntsb.gov/_layouts/ntsb.aviation/brief.aspx?ev_id=20160326X80544) [hereinafter *Preliminary Report*].

318. The deputy sheriffs and other professionals at the accident site say the ceiling was approximately 150 feet. *Id.* If they could see it, presumably he could see it, as well, in which case the adverb, "deliberately," is appropriate. It is possible, however, that he had his NVG goggles on and failed to see the scud.

319. *Id.*

320. *Id.*

321. The ground elevation in the area is 200–300 feet above sea level (MSL). The *Preliminary Report* says that he leveled off at 1,000 feet MSL and that the maximum altitude reached was 1,110 feet. *Id.*

322. *Id.*

323. *Id.*

324. *Id.*

that were IFR certificated and had autopilots or stabilization systems.<sup>325</sup> The AS350, though not IFR certificated, likely had an artificial horizon and a turn indicator.<sup>326</sup> Every instrument pilot qualifies on “partial panel” IFR flying, using just those instruments.<sup>327</sup> Any instrument-rated pilot assumes he can do what he trained for.

The conditions when he took off were about the same in which he had successfully navigated to and landed at the accident site. The pilot, given his experience, including 260 hours in actual IMC, his type rating in AW139, certificated for IFR, and factory equipped with a four-axis autopilot, instilled confidence that he could maintain control of the AS350 under IMC, even though it was not technically legal.

The fact that the helicopter already had picked up the patient no doubt created a strong mission-completion bias. Why should he decline the return flight when he had successfully made it in, in the same conditions? The radar track of the climb, a steepening turn followed by a rapid descent, suggests spatial disorientation. In other words, he was overconfident about his abilities, and underestimated the effects of spatial disorientation in a helicopter not equipped with an autopilot or stabilization system.<sup>328</sup> The pilot was well qualified to fly a suitably equipped helicopter in IMC, but he was not current, let alone proficient, in IFR flying, given his limited flight time during the preceding six months.<sup>329</sup>

In August 2010, an Air Evac Bell 206L-1 crashed near Walnut Grove, Arkansas, killing everyone on board.<sup>330</sup> The data suggests IIMC. The data recorder showed classic vertigo: sudden increase in power, a descent, then a climb, and a steepening turn.<sup>331</sup> Apparently, all the aggressive maneuvers caused mast bumping.<sup>332</sup> The rotor separated and apparently went through the

325. The pilot held an ATP rating, type ratings for the twin-engine AW139, and a CFII rating. *Id.* He had worked for Metro Aviation for approximately six months and had ninety hours total flight experience in the AS 350 B2. *Id.* He had total flight time of 5301 hours, 474 hours at night and 265 in actual IMC. *Id.* He had flown forty-seven hours during the ninety days, and twenty hours during the thirty days before the accident. *Id.*

326. EUROCOPTER, EUROCOPTER AS350B3 TECHNICAL DATA 8 (2009), [http://airbushelicoptersinc.com/images/products/AS350/AS350B3-tech\\_data\\_2009.pdf](http://airbushelicoptersinc.com/images/products/AS350/AS350B3-tech_data_2009.pdf). Eurocopter is now Airbus Helicopters. Ian Sheppard, *Eurocopter to Be Renamed Airbus Helicopter*, AINONLINE (Aug. 1, 2013, 4:28 PM), <http://www.ainonline.com/aviation-news/business-aviation/2013-08-01/eurocopter-be-renamed-airbus-helicopter>.

327. See generally *Flyer Soliciting New Pilots*, *supra* note 291 (stating requirements for IFR pilots).

328. The *Preliminary Report*, *supra* note 317, says that the AS350 B2 was not certificated for IFR. It is reasonable to infer that it did not have an autopilot or stabilization device. Some single-engine, single-pilot helicopters, however, are certificated for VFR-only but have two- or three-axis autopilots, and it is possible that in the accident the AS350 was similarly equipped.

329. The report's summary of his time in the AS350 and his total time during the same period suggests that he was flying only the AS350 for six months. If it was not IFR certificated—and the *Preliminary Report* says it was not—it is reasonable to infer that he was not IFR current. And if he had flown no IFR in six months, it is reasonable to infer that he was not proficient. Although he might have had company IMC simulator training.

330. NTSB Identification: CEN10FA509, NAT'L TRANSP. SAFETY BD., [http://www.nts.gov/about/employment/\\_layouts/nts.gov/aviation/brief2.aspx?ev\\_id=20100831X75841&ntsbn=CEN10FA509&akey=1](http://www.nts.gov/about/employment/_layouts/nts.gov/aviation/brief2.aspx?ev_id=20100831X75841&ntsbn=CEN10FA509&akey=1) (last visited Sept. 25, 2016) (analyzing fatal accident of Air Evac Bell 206L-1 near Walnut Grove, Ark.); Confidential Telephone Interview with a HEMS Pilot (Mar 29, 2016).

331. NTSB Identification: CEN10FA509, *supra* note 330.

332. *Id.*

cockpit.<sup>333</sup> The pilot had 3,312 hours in rotorcraft, was instrument rated, had 311 hours in actual and simulated instrument conditions, and 200 hours NVG flight time.<sup>334</sup> He had received company training in IIMC.<sup>335</sup> The pilot was “really sharp” and had flown in the Marine Corps, but mostly in two-pilot operations; he had less time as a single pilot.<sup>336</sup>

Finding a way to ensure that pilots perform the procedures they train for repeatedly, and that they follow FAA or company procedures in the real world, when they are tired or distracted, is a challenge for the entire aviation community.<sup>337</sup> The HEMS world is not exempt.

IIMC continues to be a serious safety threat to HEMS operations for three reasons. First, fear of repercussions from their employers and the FAA cause pilots suddenly entering IMC to make bad decisions. Second, IIMC training is inadequate and focuses on the wrong things. Third, low flight frequency erodes pilot proficiency. Less flight time means less opportunity for pilots to stay proficient. One EMS pilot reported in March 2016 that it had been three weeks since he flew a mission.

Two facets of HEMS safety culture must be understood. The first relates to objective decision making and managerial response. The second relates to subjective concerns by the pilot. The first facet involves the decision whether to accept a callout. That facet has been addressed by most HEMS operators and by the Subpart L requirement that larger operators have an operations center. All of the interviews conducted by the author and all third-party reports indicate that the maxim “one to say no and four to say yes” is widely practiced, and that pilots rarely, if ever, face repercussions for declining a flight for weather or other safety reasons.<sup>338</sup>

The second facet is far more challenging because subjective concerns are not apparent to others unless the pilot articulates them. He fears that he will always be compared to his peers. If he turns down more flights than other pilots, there may not be overt repercussions for any particular turndown, but, over time, management will perceive him as less valuable than the other pilots. Even worse, if he gets into IIMC and reports it to his employer, it will be a black mark on his record. He may even be disciplined for violating employer safety policies and getting into IMC in the first place. If he declares an emergency and asks for ATC help (the appropriate course of action for IIMC), the employer will find out about it. The temptation may be overwhelming to solve the problem without asking for ATC help. The best way to do this, he thinks, is to turn around, and if he remains in IMC, to land. He rationalizes that he can land safely; it is a helicopter, after all.

---

333. *Id.*

334. *Id.*

335. *Id.*

336. *Id.*

337. See Section V.A (discussing why pilots may disregard IIMC training).

338. See all interviews cited *supra* notes 51, 75, 83, 247, 330, and *infra* notes 402, 493; see also COMM’N ON ACCREDITATION OF MED. TRANSP. SYS. (CAMTS), ACCREDITATION STANDARDS § 5.03.06(1) (10th ed. 2015), [http://www.camts.org/10th\\_Edition\\_Standards\\_For\\_Website.pdf](http://www.camts.org/10th_Edition_Standards_For_Website.pdf) (requiring that any team member have right to request no launch or return to safer conditions when uncomfortable with safety).

Then, something like this occurs: the pilot descends and initiates a turn, stays in IMC, keeps his visual reference outside the cockpit, crashes, and kills himself, his medical crew, and maybe a patient. This problem is extremely difficult to fix. The stronger the operator's safety commitment overall, the stronger might be the temptation to conceal mistakes that endanger safety. The employer may articulate a policy that immunizes pilots who report mistakes, but few operators will want to grant immunity for the most egregious and unjustifiable mistakes, which makes the policy ambiguous. Moreover, pilots may or may not believe the policy will actually be followed. That depends on a level of trust between pilots and management, which may not exist at a particular base or within the entire enterprise.

IIMC is insidious, and so are the psychological forces that cause accidents related to it. Every helicopter pilot knows that most IIMC is not a white out or a blackout; he still has some visibility in almost all rain showers or snow showers. So that makes it easy to rationalize that he can handle deteriorating weather and will fly out of it. And then it gets worse. The worst scenario is ground fog. It is, by definition, near the ground. If a pilot is in it, he is also among a tangle of wires, trees, and other obstacles. It changes rapidly. Flying into a cloud at two thousand feet is a piece a cake by comparison.

The pilot knows he is supposed to do the five C's<sup>339</sup>—but then he sees a light on the ground and decides he is going to be able to land. The problem is that the light may not be what he thinks it is, and he does not know what is above it or around it. He fixates on the light and shifts reference outside the cockpit instead of keeping it on the gauges. The army calls it “target fixation.”<sup>340</sup> “You do that, and it's going to bite you. It takes you back to seat-of-the-pants flying instead of relying on the instruments.”<sup>341</sup>

Even stronger is the fear of adverse employment or regulatory action, not because the pilot has made a conservative, safe decision, but because he has made a mistake undermining safety. He accepts a flight and encounters deteriorating weather. If he aborts the flight at that point, especially if he makes a precautionary landing, he is going to have to explain what happened and subject his decision making to employer scrutiny. The employer may praise him for making a safe decision, but it may criticize him and subject him to discipline for making an unsafe decision—taking off in the first place in marginal weather.

The unfortunate part to this whole thought out plan . . . is, [the pilot] would probably just opt to land at a suitable helipad or open field (soccer, football, baseball field in town or open farm field out of town). Then [he] would have less explaining to do to the local FSDO [Flight Standards District Office]. It shouldn't be part of [the] decisionmaking process, but in the world we live in it is. I'm

---

339. Control; Climb; Call; Confess; Comply. Doug Stewart, *Teaching VMC-IMC: Right and Wrong*, SAFE, Summer 2014, <http://safemagazine.org/article/teaching-vmc-imc-right-and-wrong/> (explaining five C's).

340. See WILLIAM B. COLGAN, ALLIED STRAFING IN WORLD WAR II: A COCKPIT VIEW OF AIR TO GROUND BATTLE 44 (2010) (discussing the phenomenon of target fixation).

341. Confidential Telephone Interview with a HEMS Pilot (Mar. 29, 2016).

afraid that is part of the mentality of professional helicopter pilots—the repercussions you face from your employer and FAA. Maybe that’s part of the problem the industry needs to address.<sup>342</sup>

Tracking software, properly analyzed and combined with readily available weather reporting data, enhances the likelihood that an operator will discover an IIMC pilot mistake even if the pilot tries to conceal it, much as maintenance tracking software has reduced the impulse to conceal hot starts, overtorqueing, or rotor and engine over-speeds.<sup>343</sup>

Training can play a more substantial role. Too much IIMC training is benign. The instructor has the pilot put on a hood or goggles<sup>344</sup> to obscure his vision, has him incline his head down, and puts a helicopter into a climbing or descending turn. He tells the pilot to pick up his head and recover. The pilot has substantial warning, both because the entry into simulated IMC is gradual, and because he expects some kind of IIMC maneuver on the checkride. He usually need not do much more than recover to straight and level flight. This is a far more modest challenge than suddenly losing ground reference on low altitude climb-out and trying to return for a landing. Attempts by instructors to simulate vertigo are tough; simulators for this scenario are a great aid to pilot training.

Additionally, as long as most HEMS operators fly single-engine helicopters that are not certificated for IFR,<sup>345</sup> a considerable percentage of HEMS pilots do not get much actual IFR, and even if they remain current, they are not likely to be IMC proficient. Low total flight time for weeks or months exacerbates the loss of proficiency. Operators can address this gap by a combination of more frequent training flights in IFR-certificated aircraft and more intense simulator training.

### B. *Flight Nurses*

Flight nurses must be RNs, and a bachelor’s degree in nursing is preferred.<sup>346</sup> In addition, they must hold certification by state and local agencies for emergency treatment specialties and have flight medical certification or be prepared to obtain such certification in parallel with their initial employment.<sup>347</sup> Typically, they must possess a minimum of three to

---

342. E-mail from Eliot O. Sprague, Chief Operating Officer, Modovolate Aviation, LLC, to author (Mar. 28, 2016) (on file with author).

343. See HEMS ADVISORY CIRCULAR, *supra* note 3 (explaining requirements of new Subpart L of Part 135).

344. See Mike Berlin, *To Log Pic or Not to Log Pic, That Is the Question!*, PREMIER FLIGHT CTR., LLC, <https://www.premierflightctr.com/newsletters/TrainingArticles/SafetyPilotRules.html> (last visited Sept. 25, 2016) (describing the effects of goggles as a view limiting device).

345. Jamie Luster, *Improving Safety in Single-Engine Helicopter IFR Operations*, GENESYS AEROSYSTEMS (Oct. 26, 2015), <http://genesys-aerosystems.com/blog/improving-safety-single-engine-helicopter-ifr-operations>.

346. See *Flyer Soliciting New Medical Personnel*, AIR METHODS, <https://www.airmethods.com/docs/default-source/air-methods---human-resources/so-you-want-medical-e-single.pdf> (listing requirements for flight nurses and paramedics).

347. *Id.*

five years experience as a nurse.<sup>348</sup>

As one HEMS operator says:

Those inquiring about flight positions mistakenly believe that our service is an air paramedic service. This is simply not the case. Approximately 92% of all service missions are interfacility transfers. This means that a critically ill or injured patient is transferred from one hospital's ICU or ED unit to a facility capable of providing a higher level of care. It certainly makes sense that a well-trained critical care nurse would be facilitating this type of transfer. It is in these types of situations that demand an aircraft be staffed by competent critical care RNs.<sup>349</sup>

The labor market for nurses is notoriously volatile. Acute shortages exist for one or two years, replaced by a surplus, and then by another shortage.<sup>350</sup> The labor market for flight nurses is distinct from the labor market for nurses in general because of the special training and experience HEMS requires. Someone qualified to work as a flight nurse, however, is also qualified to work in many other jobs, so the lateral ebb and flow is high. While pilots are unlikely to jump from one part of the industry to another and then back on a short-term basis,<sup>351</sup> nurses are.<sup>352</sup>

### C. Paramedics

Flight paramedics must be certified under state and local rules, and like flight nurses, must have their own type of emergency treatment certification and flight certification.<sup>353</sup> The barriers to entry for paramedics are lower than for flight nurses and pilots, and therefore the fluidity of the labor market is greater. Paramedics are more likely to assess labor market conditions in the short term and jump from one job to another as soon as they perceive that pay or working conditions are better somewhere else.<sup>354</sup>

Because insurers prefer that all personnel aboard a helicopter be employees of the operator, as explained in Part VII, HEMS operators have an incentive to use their own flight nurses and paramedics rather than using ones employed by their hospital customers.

HEMS flight nurses and flight paramedics are “phenomenal,” says one

---

348. *So You Want to Be a Flight Nurse?*, OSF HEALTHCARE, <http://osflifeflight.org/about/flight-nurse.html> (last visited Sept. 28, 2016) (explaining requirement of a minimum of three years' experience as a critical care nurse).

349. *Id.*

350. Peter I. Buerhaus et al., *Recent Trends in the Registered Nurse Labor Market in the US: Short-Run Swings on Top of Long-Term Trends*, 25 NURSE ECON. 59, 59–66 (2007).

351. Some lateral movement occurs; few pilots stay with one operator for their whole careers.

352. See Buerhaus et al., *supra* note 350 (stating that depending on wages and working conditions, nurses change industries).

353. *Flyer Soliciting New Medical Personnel*, *supra* note 346.

354. P. Daniel Patterson et al., *The Longitudinal Study of Turnover and the Cost of Turnover in EMS*, 14 PREHOSPITAL EMERGENCY CARE 209 (2010) (reporting various studies of paramedic turnover); Robert Powers, *Employee Retention: Applying Hospital Strategies to EMS*, EMS WORLD (Oct. 1, 2007) (reporting on labor-market churning and high turnover for EMS and nursing personnel).



paramedic, who has experience calling out air ambulances.<sup>355</sup> They must meet very high standards, and have a high failure rate after they enter service. “I’ve never had a bad interaction in twenty-two years.”<sup>356</sup> The turnover among them is not very high, although they are not paid as well as they should be for their qualifications, and some use HEMS as a steppingstone for a lateral move to better pay.<sup>357</sup>

#### D. Dispatchers

The Federal Aviation Regulations now require HEMS operators with more than ten helicopters to have operations control centers.<sup>358</sup> These centers must be staffed by “operations control specialists” who provide two-way communications with pilots, provide weather briefings, monitor flight progress, and sign off on flight dispatch.<sup>359</sup> The rules require training comprising at least eighty hours and satisfactory completion of an FAA-approved knowledge and practical test.<sup>360</sup> The total number of hours is reduced for personnel with at least two years of experience as a pilot, flight engineer, flight navigator, air traffic controller, or meteorologist.<sup>361</sup>

Work in this capacity is likely to attract flight dispatchers and pilots who have lost their medical certification.

### VII. REGULATION

#### A. Safety Regulation

The high accident rate for HEMS operations raises the question whether HEMS safety is appropriately regulated. The most serious regulatory lapses involve not requiring autopilots for all air ambulances, not imposing more detailed pilot training requirements, and not collecting data on HEMS accidents.

HEMS operators are commercial operators regulated by the FAA.<sup>362</sup> The FARs impose three categories of operating rules on commercial aircraft operators, depending on their size and the nature of the operation.<sup>363</sup> Part 91 contains basic rules for flight profiles, equipment, and the type of rated pilot who must be used.<sup>364</sup> Part 91 contains the VFR and IFR requirements discussed in Section V.A.<sup>365</sup> An operator-specific certificate from the FAA is

---

355. Wienke Interview, *supra* note 83.

356. *Id.*

357. *Id.*

358. 14 C.F.R. § 135.619(a) (2016).

359. *Id.*

360. *Id.* § 135.619(d).

361. *Id.* § 135.619(d)(1).

362. See HEMS ADVISORY CIRCULAR, *supra* note 3.

363. *Publications, Forms, & Records*, in FED. AVIATION ADMIN., AVIATION MAINTENANCE TECHNICIAN HANDBOOK—GENERAL 12-1 (2011), [https://www.faa.gov/regulations\\_policies/handbooks\\_manuals/aircraft/amt\\_handbook/media/faa-8083-30\\_ch12.pdf](https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/amt_handbook/media/faa-8083-30_ch12.pdf).

364. 14 C.F.R. pt. 91.

365. *Id.*

not required by Part 91. Part 135 applies to most commercial operators who hold themselves out to the public.<sup>366</sup> It imposes additional requirements for organization, internal operating rules, and pilot proficiency checks, beyond those required by Part 91.<sup>367</sup> A Part 135 operator's procedures must be approved by the FAA in order for the operator to obtain and maintain its operating certificate. Part 121 applies to scheduled operators—passenger airlines and cargo carriers—flying larger aircraft.<sup>368</sup> It imposes much more stringent requirements than Part 135 for internal operating procedures and pilot training.<sup>369</sup> Most HEMS operators are covered by Part 135 when they have patients on board and Part 91 when they do not.

Safety regulation of HEMS is uneven. Medicare imposes almost no requirements on the types of equipment that must be provided and defers largely to the states to set personnel qualification requirements.<sup>370</sup> States otherwise are preempted from imposing requirements on HEMS equipment, personnel, or economics.<sup>371</sup>

Until 2016, the FAA did not explicitly differentiate HEMS operations from other commercial and air carrier operations. Then, in response to the poor safety record of HEMS operators compared to the helicopter industry more generally, the FAA tightened its operating rules for HEMS,<sup>372</sup> albeit through a protracted regulatory process dominated by the largest HEMS provider, Air Methods.<sup>373</sup>

Now, HEMS pilots must be IFR capable,<sup>374</sup> and HEMS helicopters must be equipped with terrain warning systems and flight recorders.<sup>375</sup> The new rules impose visibility and ceiling restrictions more stringent than those for other VFR flights.<sup>376</sup> HEMS flights can be dispatched only after an explicit risk assessment by the pilot,<sup>377</sup> reinforced for larger operators<sup>378</sup> by oversight

366. *Id.* pt. 135.

367. *Id.*

368. *Id.* pt. 121.

369. *Id.*

370. Medicare Program; Fee Schedule for Payment of Ambulance Services, 67 Fed. Reg. 9100, 9107 (Feb. 27, 2002) (to be codified at 42 C.F.R. pts. 410, 414) (explaining modification of proposed rule to set skill level of EMT-Basic as whatever is required by state or local law).

371. U.S. DEP'T OF TRANSP., GUIDELINES FOR THE USE AND AVAILABILITY OF HELICOPTER EMERGENCY MEDICAL TRANSPORT (HEMS) 3 (Apr. 2015), [https://www.ems.gov/pdf/advancing-ems-systems/Reports-and-Resources/Guidelines\\_For\\_Helicopter\\_Emergency\\_Medical\\_Transport.pdf](https://www.ems.gov/pdf/advancing-ems-systems/Reports-and-Resources/Guidelines_For_Helicopter_Emergency_Medical_Transport.pdf) (citing *Med-Trans Corp. v. Benton*, 581 F. Supp. 2d 721, 732–40 (E.D.N.C. 2008)).

372. 14 C.F.R. pt. 135, subpt. L, §§ 135.601–.621; *see also* HEMS ADVISORY CIRCULAR, *supra* note 3 (explaining new Part 135 Subpart L requirements that address safety improvements for HEMS operations).

373. *See* NVG REPORT, *supra* note 250 (explaining role of advisory committee chaired by Air Methods).

374. 14 C.F.R. § 135.603(2) (“After April 24, 2017, no certificate holder may use, nor may any person serve as, a pilot in command of a helicopter air ambulance operation unless that person meets the requirements of § 135.243 and holds a helicopter instrument rating or an airline transport pilot certificate with a category and class rating for that aircraft, that is not limited to VFR.”).

375. *Id.* § 135.605 (regulating helicopter terrain awareness and warning systems (HTAWS)); *id.* § 135.607 (regulating flight data recorders).

376. *Id.* § 135.609.

377. *Id.* §§ 135.615–.617.

378. Large operators are those flying ten or more helicopters. *Id.* § 135.619; FED. AVIATION ADMIN., AC NO. 120-96A, ADVISORY CIRCULAR: OPERATIONS CONTROL CENTER (OCC) FOR HELICOPTER AIR AMBULANCE (HAA) OPERATIONS § 1-1 (Jan. 7, 2016).

by ground-based dispatch specialists.<sup>379</sup>

The new rules also impose tighter flight and duty time restrictions, permitting pilots to fly no more than eight hours per day,<sup>380</sup> with prescribed rest periods of at least ten hours before each duty period<sup>381</sup> and at least twenty-four hours off every week.<sup>382</sup> They prohibit assignments longer than seventy-two hours.<sup>383</sup> The new rules do not, however, impose any requirements with respect to aircraft, leaving it to the operator to decide when a twin-engine helicopter or two-pilot operation is mandated by safety considerations.

An additional measure of regulatory oversight results, however, from the FAA's authority to approve or reject Part 135 and Part 121 certificate applications.<sup>384</sup> Direct air ambulance carriers—those flying their own aircraft and pilots—must have Part 121 or Part 135 authority and also must have economic authority as a specific carrier or under a Part 298 air-taxi exemption.<sup>385</sup> HEMS helicopters not carrying patients may, however, be flown under the less stringent Part 91.<sup>386</sup>

Generally, Part 135 operators must have written operating procedures that meet specified requirements,<sup>387</sup> must employ chief pilots and directors of operations meeting certain rating and experience requirements,<sup>388</sup> and must subject pilots to recurrency training and check rides at least annually.<sup>389</sup> They must have a certain number of aircraft dedicated to their operation,<sup>390</sup> as opposed to leasing or renting them on a mission-by-mission basis. The rules impose no requirements on aircraft types, configurations, or capabilities except that they must meet basic airworthiness requirements and certain basic equipment for VFR, day, night, and IFR operations.<sup>391</sup>

The HEMS Part 135 certification requirements are more stringent. Applicants for certificates must demonstrate the suitability of their helicopters and onboard equipment for HEMS, and show that they have appropriate inspection and maintenance procedures for the type of operation involved.<sup>392</sup>

379. 14 C.F.R. § 135.619 (requiring operations control centers).

380. *Id.* § 135.271(c) (“No flight crewmember may accrue more than 8 hours of flight time during any 24-consecutive hour period of a HEMES [helicopter hospital emergency medical evacuation service] assignment, unless an emergency medical evacuation operation is prolonged.”).

381. *Id.* § 135.271(b).

382. *Id.* § 135.271(h)–(i) (“The certificate holder must provide each flight crewmember at least 13 rest periods of at least 24 consecutive hours each in each calendar quarter.”).

383. *Id.* § 135.271(e) (“A HEMES assignment may not exceed 72 consecutive hours at the hospital.”).

384. *Id.* § 119.5 (imposing requirement for “air carrier certificate” for Part 121 operators and “operating certificate” for Part 135 operators); *see also* HEMS ADVISORY CIRCULAR, *supra* note 3, at 43 (discussing FAA considerations for HEMS helicopter equipment).

385. Diederich, *supra* note 27, at 69 (summarizing regulatory requirements).

386. Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations; Final Rule, 79 Fed. Reg. 9932, 9943 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135) (explaining relationship between Part 91 and Part 135 flights).

387. 14 C.F.R. §§ 135.21–.23.

388. *Id.* §§ 119.65–.71.

389. *Id.* §§ 135.293, .299.

390. *Id.* § 135.25(b) (requiring certificate holders to have exclusive use of at least one aircraft).

391. *See id.* pt. 135.

392. HEMS ADVISORY CIRCULAR, *supra* note 3, at 12, §§ 2-6, 2-7 (discussing additional equipment, inspection, and maintenance requirements).

They must demonstrate appropriate operating procedures, with special attention to IIMC.<sup>393</sup> They must also provide details of their training programs for flight crews.<sup>394</sup>

Given the prominence of IIMC as an accident cause, the FAA has not done enough to require autopilots<sup>395</sup> and to prescribe training. The FAA has published specific training curriculum items for pilots and co-pilots of helicopter air ambulances (HAAs).<sup>396</sup> FAA pilot training requirements do not stress NVG and IIMC training sufficiently, however.

Neither the FAA's Instrument Flying Handbook, nor the FAA's Helicopter Instructor's Handbook give any significant attention to IIMC. IIMC training falls between two stools. Private- and commercial-level training has a certain amount of IIMC instruction, but it typically is focused on cruise altitude.<sup>397</sup> It does not typically try to replicate the conditions under which a pilot suddenly in IIMC is likely to lose control.<sup>398</sup> Most instrument training does not deal with the particular circumstances that make IIMC so dangerous; the instrument student assumes from the beginning that he will be flying in IMC, under an IFR flight plan, with appropriate charts and radio frequencies selected and flight plans loaded into electronic navigation computers.<sup>399</sup> While VFR training nominally addresses IIMC, the scenarios rarely are realistic—they make no attempt to induce vertigo, and they direct the student to rely on instruments after a brief head-down, eyes-closed period during which the instructor puts the helicopter in a turn or a modest descent.<sup>400</sup> Far more effective is the technique used by a few instructors, who tell the student to keep the helicopter flying straight and level while he puts his head down and closes his eyes.<sup>401</sup> When the student opens his eyes, he inevitably discovers that he is in a turn and is climbing or diving.<sup>402</sup>

The FAR requirements for flight training require only that candidates for private and commercial helicopter ratings receive instruction in “emergency operations.”<sup>403</sup> The commercial rating experience requirements include five hours on “control and maneuvering of a helicopter solely by reference to instruments,” including “recovery from unusual flight attitudes.”<sup>404</sup> The requirements for an instrument rating require only instruction in “emergency

---

393. *Id.* at 26, § 3-9(a) (suggesting specific operational procedures for IIMC, including pre-planned coordination with ATC).

394. *Id.* at 12, § 2-5 (discussing training requirements).

395. *See supra* Section V.A.3 (explaining how autopilots could reduce IIMC accidents even in a helicopter not certificated for IFR).

396. *See* HEMS ADVISORY CIRCULAR, *supra* note 3, app. C.

397. *See, e.g.,* Bryan Smith, *IIMC Training Recommendations*, AIRBORNE L. ENFORCEMENT ASS'N, [http://alea.org/images/Safety\\_Program\\_Overview/IIMC\\_Training\\_Recommendations.pdf](http://alea.org/images/Safety_Program_Overview/IIMC_Training_Recommendations.pdf) (last visited Sept. 28, 2016).

398. *Id.*

399. *Id.*

400. *Id.* § II.4(f).

401. *Id.*

402. Interview with Jeff Thomasson, Assistant Chief Flight Instructor, Quantum Helicopters (Apr. 6, 2016).

403. 14 C.F.R. § 61.107(b)(3)(x) (2016) (private); *id.* § 61.127(b)(3)(ix) (commercial).

404. *Id.* § 61.129(c)(3)(i).

operations.<sup>405</sup> The aeronautical experience requirements include nothing on IIMC.<sup>406</sup> The FAA's practical test standards for helicopter commercial ratings, which specify the tasks that must be assigned by examiners for the practical test, include no IFR flying tasks.<sup>407</sup> The Practical Test Standards (PTS) for helicopter instrument ratings include nothing about IIMC.<sup>408</sup> The Airborne Law Enforcement Association (ALEA) guide for IIMC training recognizes the shortcomings in the formal training requirements and highlights the differences between planned IFR flight and planned VFR flight that encounters IMC:

- a) IFR flight allows for pre-planning and set up of avionics and radios.
- b) Planned IFR flight is conducted in IFR certified aircraft.
- c) Planned flight into instrument conditions does not carry the surprise or shock that IIMC flight does.
- d) Planned IFR flight is conducted within the IFR/ATC system based on minimum safe altitudes, radio communications, and IFR routing.
- e) During planned IFR flight, entry into IMC conditions is usually done in a "wings level" attitude and in a climb. IIMC entry in law enforcement often occurs during low level maneuvering.
- f) While the 180-degree turn is still taught by some agencies, we need to recognize that no IIMC/CFIT accidents have resulted from a wings-level climb in IMC (outside of mountainous terrain).<sup>409</sup>

It recommends a training protocol that recognizes these differences, conducted at least quarterly.<sup>410</sup> It distinguishes avoidance of IMC, which involves a 180-degree turn, from dealing with IMC when it occurs, which involves a zero-degree roll, 500 fpm climb, maintaining airspeed, followed by declaration of an emergency and contact with ATC for navigation assistance.<sup>411</sup>

One particular difficulty in this regard is training pilots to deal with vertigo.<sup>412</sup> Vertigo occurs even in the most experienced instrument pilot; it is described as being an almost unbearable belief that the instruments are wrong, and therefore hard to resist with proper instrument flying technique.<sup>413</sup> A pilot who never has experienced it is likely to discount the possibility of it

405. *Id.* § 61.65(c)(7).

406. *Id.* § 61.65(e).

407. FED. AVIATION ADMIN., COMMERCIAL PILOT PRACTICAL TEST STANDARDS FOR ROTORCRAFT 8 (Feb. 2013), [https://www.faa.gov/training\\_testing/testing/test\\_standards/media/FAA-S-8081-16B.pdf](https://www.faa.gov/training_testing/testing/test_standards/media/FAA-S-8081-16B.pdf).

408. FED. AVIATION ADMIN., INSTRUMENT RATING PRACTICAL TEST STANDARDS FOR AIRPLANE, HELICOPTER, AND POWERED LIFT 1-7 (Jan. 2010), [https://www.faa.gov/training\\_testing/testing/test\\_standards/media/FAA-S-8081-4e.pdf](https://www.faa.gov/training_testing/testing/test_standards/media/FAA-S-8081-4e.pdf).

409. Smith, *supra* note 397, § I.3.

410. *Id.* § III.3.

411. *Id.* § II.4; see also Pat A. Leone, *Inadvertent IMC Avoidance Tactics and Strategies*, FLIGHT SAFETY FOUND. (2014), <http://www.ihst.org/Portals/54/presentations/2014%20IIMC%20Tactics%20and%20Strategies.pptx> (PowerPoint slides) (noting causes of IIMC accidents, avoidance strategies, and training).

412. Smith, *supra* note 397, § I.5.

413. *Id.* § I.

happening to him. Yet the tasks required upon sudden entry into IMC are precisely those likely to induce vertigo: lots of head movement coupled with changes in aircraft attitude around multiple axes.<sup>414</sup> Therefore, the training goal should be to put a pilot into a situation that induces vertigo. That may be hard to do in simpler simulators, because the key is to introduce a perturbation in airspeed, climb, descent, or turn that is just below the threshold detectable by the human perceptual apparatus and then reverse the movement by one that is perceivable. Since most simulators do not move much,<sup>415</sup> they usually cannot do that.

None of this training, however, deals with mistake-concealment.<sup>416</sup> Thus, a central piece of an appropriate safety culture is a strong commitment not to punish reported mistakes.<sup>417</sup> At the top of the list of acceptable mistakes should be adherence to the five C's. The most severe sanctions should be reserved for cover-ups, and IMC or icing-related mistakes that are not reported by the pilot but discovered through other means.

The emphasis in traditional IFR training or retraining is not IIMC; it focuses on approaches, holds, and simulated instrument failures, for flights that intentionally occur in IMC, for which the pilot has carefully prepared.<sup>418</sup> In the new Subpart L, Section 135.603 requires that all PICs must be instrument *rated*, but not that they be current, let alone proficient.<sup>419</sup> Nothing in Subpart L itself requires training in IIMC.<sup>420</sup> FAA Circular AC-135-14B does suggest IIMC training as part of operator-adopted curricula, to be reviewed in conjunction with approving a HEMS Part 135 certificate.<sup>421</sup> But, IIMC is buried, as item twenty-two, on the suggested qualification/proficiency check-ride list.<sup>422</sup>

It should not be all that hard to add an IIMC task to training and check rides: prohibit the pilot from prepping IFR charts and settings preflight; have the pilot fly a basically VFR mission; and then, during some other demanding maneuver, like a pinnacle or confined-area approach, flip down the hood.

The Advisory Circular provides even less emphasis on NVG training,<sup>423</sup> presumably because Subpart L makes NVGs optional for HEMS.<sup>424</sup>

Improving safety worsens the reimbursement crisis, because safety costs money. Mandates for autopilots, NVG, and IFR-equipped helicopters increase fixed costs, and more stringent qualification requirements for HEMS pilots increase compensation.<sup>425</sup> More highly qualified applicants demand higher

---

414. *Id.*

415. *Id.*

416. *Id.*

417. Leone, *supra* note 411.

418. 14 C.F.R. § 61.129(a) (2016) (explaining why sudden entry into IMC raises risks considerably).

419. *Id.* § 135.603.

420. *Id.*

421. HEMS ADVISORY CIRCULAR, *supra* note 3, at 34–35.

422. *Id.* app. C at 4.

423. *Id.* at 27, 34.

424. 14 C.F.R. § 135.603.

425. NAT'L TRANSP. SAFETY BD., PUBLIC HEARING ON HELICOPTER EMERGENCY MEDICAL SERVICES 18–25, 35 (Feb. 2009), [https://www.vdh.virginia.gov/OEMS/Files\\_page/Medevac/HEMSSummary.pdf](https://www.vdh.virginia.gov/OEMS/Files_page/Medevac/HEMSSummary.pdf).

salaries. Training for NVG, dealing with IIMC, improving risk assessment, and improving cockpit resource management increase training costs.<sup>426</sup>

Finding the right regulatory balance is made much more difficult by the absence of data. No systematic data collection effort exists with respect to HEMS accidents. A 2014 DOT Inspector General's report was critical of the FAA's effort to enhance HEMS safety.<sup>427</sup> Among other things, it noted the FAA's failure to meet a statutory mandate to collect data on the HEMS industry and to provide effective oversight of the industry.<sup>428</sup>

### B. Federal Preemption of State Economic Regulation

Almost every aspect of health care in the United States is subject to detailed economic regulation at the federal or state level.<sup>429</sup> Air ambulances are not. The federal Airline Deregulation Act (ADA) has consistently been interpreted to preempt state regulation of air ambulance services, which, counter-intuitively, are airline services under the ADA.<sup>430</sup>

Preemption is a central pillar of the ADA. Before airline transportation was deregulated by the ADA, the federal Civil Aeronautics Board (CAB) shared authority with state authorities over airline market entry, exit, and fares.<sup>431</sup> After the statute abolished the CAB and replaced its economic regulation with a relatively free market, continued state regulation of entry, exit, and fare levels would have interfered with the statutory goal.

Most of the cases involving air ambulances involved efforts by state health regulatory agencies to limit entry by air ambulance operators as they do with many other offerings of health care.<sup>432</sup> In *Med-Trans Corp. v. Benton*, for example, the district court described North Carolina's extensive system for regulating health care providers.<sup>433</sup> It concluded that requirements that an air ambulance provider obtain state certification as a health care provider and a certificate of need before operating in North Carolina was preempted by the ADA.<sup>434</sup>

The determinative question was whether the HEMS operator was an "air

426. *Id.* at 9.

427. 2014 OIG HEMS REPORT, *supra* note 153, at 2.

428. *Id.* (concluding that the FAA met only three of six congressional mandates regarding HEMS safety).

429. Robert Field, *Why Is Health Care Regulation So Complex?*, 33 PHARMACY AND THERAPEUTICS 607, 608 (Oct. 2008), [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2730786/pdf/pj33\\_10p607.pdf](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2730786/pdf/pj33_10p607.pdf).

430. State and local governments also are preempted from regulating most aspects of aircraft safety and pilot requirements. *See* Henry H. Perritt, Jr. & Albert J. Plawinski, *One Centimeter over My Back Yard: Where Does Federal Preemption of State Drone Regulation Start?*, 17 N.C. J.L. & TECH. 307 (2015); *see also* Bailey v. Rocky Mountain Holdings, LLC, 136 F. Supp. 3d 1376, 1382 (S.D. Fla. 2015) (granting summary judgment to defendant and holding that state limitations on HEMS charges were preempted).

431. *Hiawatha Aviation of Rochester, Inc. v. Minn. Dept. of Health*, 389 N.W.2d 507, 509 (Minn. Ct. App. 1986).

432. *See, e.g., id.* (noting state health regulatory agencies attempting to maintain their role in delivering medical services).

433. *Med-Trans Corp. v. Benton*, 581 F. Supp. 2d 721, 736, *enforced*, 591 F. Supp. 2d 812 (E.D.N.C. 2008) (citing other state and federal cases finding preemption).

434. *Id.*

carrier.”<sup>435</sup>

Here, plaintiff is a federally certified entity that provides air services indiscriminately when its service is requested by members of the public. Plaintiff is compensated for each flight; that such compensation may come from third parties is irrelevant. The mere fact that plaintiff does not collect tickets at the boarding gate does not mean that it is not a common carrier as required by the federal statute. Because plaintiff falls within the parameters of the common law definition for a common carrier, and in addition is certified as an air carrier by the Federal Aviation Administration, the court finds that it is a common carrier for purposes of ADA preemption.<sup>436</sup>

More recently, HEMS operators have taken the position that the ADA also preempts state limitations on private insurance reimbursement rates, including those under workers’ compensation insurance policies.<sup>437</sup>

### VIII. ECONOMICS OF HEMS OPERATIONS

HEMS prices have almost tripled in the last five years.<sup>438</sup> The central argument of this Article is that the pressure for reimbursement increases is occasioned, not only by increases in variable costs, but by excess capacity, which forces each operator’s utilization rates down and therefore provides fewer flight hours—revenue hours—over which to spread fixed costs. To assess the validity of this assertion, one must understand the basic cost structure of a HEMS operation.

#### A. *Fixed and Variable Costs*

For any helicopter operation, fixed costs swamp variable costs.<sup>439</sup> The most significant elements of fixed costs are the helicopters themselves, physical facilities, insurance, and personnel compensation.<sup>440</sup> Expenditures for all of these categories must be made regardless of how much the helicopters fly.

Helicopter purchase or lease payments are the largest fixed cost.<sup>441</sup> A basic single-engine, single-pilot EMS helicopter costs \$1–\$3 million on the used market and has a list price of \$2–\$4 million new.<sup>442</sup> Twin-engine and

---

435. *Id.* at 731.

436. *Id.* at 733.

437. *See infra* Section IX.A.

438. Eavis, *supra* note 2 (reporting an average Air Methods bill of \$40,766 in 2014, compared with \$17,262 five years earlier). The reference to “prices” in the text refers to the full price invoiced to a patient.

439. THOMAS ET AL., *supra* note 17, at 94.

440. *See generally* ELIZABETH FADALI ET AL., UNIV. OF NEV. ECON. DEV. CTR., FEASIBILITY OF HELICOPTER EMERGENCY MEDICAL SERVICES IN HUMBOLDT COUNTY (Mar. 2011), <https://www.unr.edu/Documents/business/uced/technical-reports/humboldt/technical-humboldt2011-485.pdf> (noting that the cost of helicopters, cost of facilities, and cost of insurance assume a significant portion of fixed costs for helicopter operations).

441. *Id.*

442. *See* Perritt et al., *supra* note 144, at 529 (discussing the cost of these types of helicopters); *see also* 2014 OIG HEMS REPORT, *supra* note 153, at 3 (noting a range of the cost of single-pilot helicopters).



two-pilot aircraft cost two to four times that.<sup>443</sup> An international market exists for these helicopters, so regional differences in price are not important.<sup>444</sup>

Investment in the helicopter is not completely sunk, because there is an active used market.<sup>445</sup> In addition, various lease arrangements are available.<sup>446</sup> It is rare, however, for any form of time payment—financing charges or lease charges—to vary with how much the helicopter actually flies; they are lump sum or periodic obligations that are fixed in the lease or financing agreement.<sup>447</sup>

The next most important fixed cost is insurance, comprising hull insurance to protect the value of a helicopter,<sup>448</sup> and liability insurance to protect the enterprise in the event it is subjected to a civil judgment for damages growing out of an accident.<sup>449</sup> As Part V explains, HEMS has a worse safety record than the helicopter industry generally, and liability insurance rates are therefore high, approximating \$100,000 to \$150,000 per helicopter.<sup>450</sup>

Three factors influence insurance rates: flight time, helicopter size, and safety culture.<sup>451</sup> More total flight time increases rates because of greater exposure.<sup>452</sup> Larger helicopter capacity increases rates because of the greater likelihood of more people onboard not employed by the HEMS operator.<sup>453</sup> The insurer's subjective impression of the strength of the operator's safety culture also affects rates and availability of insurance.<sup>454</sup> The business model also matters.<sup>455</sup> When everyone on the helicopter is employed by the operator, they are all covered by the workers' compensation bar,<sup>456</sup> significantly limiting liability for an accident. Conversely, if the medical personnel are employed by someone else, for example by a hospital contracting with the HEMS operator, exposure is much higher because the medical personnel are not covered by the workers' compensation bar vis-à-vis the HEMS operator, and an accident

---

443. See 2014 OIG HEMS REPORT, *supra* note 153, at 3 fig.1 (showing that the cost of \$800,000–\$3 million for single-engine, single-pilot Bell 206, \$4–\$6 million for twin-engine, two-pilot capable Eurocopter EC135, and \$7–\$12 million for twin-engine, two-pilot capable Sikorsky S-76).

444. See Honeywell 2015 Forecast, *supra* note 178 (showing that a strong international market exists).

445. *Id.*

446. See generally FADALI ET AL., *supra* note 440, at 4–5 (noting various leasing options for provision of helicopter EMS).

447. *Id.*

448. *Id.*; see also *Maneuver Risk with Helicopter Insurance*, TRUSTED CHOICE, <https://www.trustedchoice.com/professional-liability-insurance/pilot-coverage/helicopter-coverage/> (last visited Sept. 28, 2016) (noting insurance cost comprises a significant portion of helicopter operation fixed cost).

449. *Id.*

450. See *supra* Part V.

451. See jhadmin, *How to Cut Your Helicopter Insurance Costs*, ROTOCRAFTPRO (June 2, 2015), <http://www.justhelicopters.com/articlesnews/communityarticles/tabid/433/article/87302/how-to-cut-your-helicopter-insurance-costs.aspx> (describing various ways to lower insurance costs, all related to reducing the level of risk an insurer must cover).

452. *Id.*

453. *Id.*

454. *Id.*

455. Careless, *supra* note 137.

456. State workers' compensation statutes bar tort claims for injuries covered by workers' compensation. See generally *Miller v. Enders*, 425 S.W.3d 723 (Ark. 2013) (holding that pilot of Air Evac helicopter that crashed was within the state workers' compensation bar against tort claims by co-employee flight nurse).

plaintiff can recover whatever a jury will award.<sup>457</sup>

The next most important fixed cost is that for ground facilities. Helicopters must be hangared in a space where maintenance can be performed.<sup>458</sup> Ready rooms must be provided for pilots and other members of the flight crew, who often work shifts that require them to sleep at the base.<sup>459</sup> Electronic and communications infrastructure must be provided for dispatch operations, mandated by 14 C.F.R. § 135.619.<sup>460</sup> Managerial and executive personnel and their supporting administrative staff also require space. A typical HEMS base adequate for three helicopters requires about 10,000 square feet, at a monthly rental of \$50,000 to \$100,000 per month.<sup>461</sup>

Maintenance is a hybrid cost. Some aspects of it are fixed; others vary with flight time. Every helicopter must have an annual inspection, which is a fixed cost because it must be performed regardless of how much the helicopter has flown in the preceding year.<sup>462</sup> Helicopters flown under Part 135—and this includes all HEMS helicopters—must also have hundred-hour, and in many cases, more frequent, inspections, the cost of which varies with flight time, making them a variable cost.<sup>463</sup>

In addition, many aircraft have life-limited parts, which means that the part must be replaced after it has flown a certain number of hours or experienced a certain number of “cycles,” engine starts, or takeoffs and landings.<sup>464</sup>

Maintenance can be provided by mechanics who are employees, and thus paid regardless of how much work they perform, or it can be contracted for, which makes the cost variable, depending, at least to a significant extent, on how much work is done. Aircraft maintenance operations, even the smallest, must maintain a certain inventory of parts or “spares.”<sup>465</sup> Infrequently replaced parts are unlikely to be held in inventory, because most manufacturer service operations provide overnight delivery on regularly used parts. Whatever parts are maintained in inventory constitute a fixed cost.<sup>466</sup>

Compensation for aircrews presents strategic opportunities for different

---

457. Careless, *supra* note 137.

458. FADALI ET AL., *supra* note 440, at 7.

459. See Jarrett D. Bruhn, *True Costs of Air Medical vs. Ground Ambulance Systems*, 12 AIR MED. J. 262, 264–65 (1993) (noting importance of ready rooms for pilots and crews).

460. 14 C.F.R. § 135.619 (2016).

461. See HANGERTRADER, <http://www.hangartrader.com/final/search.php> (last visited Sept. 28, 2016) (reporting sale prices up to \$405,000 for 4,000 square-foot hangar and lease rates of \$1.65 per square foot for 64,000 square-foot hangars).

462. 14 C.F.R. § 91.409.

463. *Id.*

464. See, e.g., ROBINSON, R44 SERIES MAINTENANCE MANUAL (Dec. 2011), [http://www.robinsonheli.com/manuals/44\\_mm/r44\\_mm\\_3.pdf](http://www.robinsonheli.com/manuals/44_mm/r44_mm_3.pdf) (listing life-limited components that need replacing after a certain number of flight hours).

465. HELICOPTER ASS'N INT'L ECON. COMM., GUIDE FOR THE PRESENTATION OF HELICOPTER OPERATING COST ESTIMATES § III, at 7 (2010), <https://www.rotor.org/portals/1/membership/Guide%20for%20the%20Presentation%20of%20Helicopter%20Operating%20Cost%20Estimates.pdf> (noting that maintaining spare parts is one factor affecting operation costs).

466. *Id.* § I, at 2 (describing a fixed cost as a cost that remains constant, despite changes in the total flight time).

pay structures.<sup>467</sup> Pilots can be salaried employees—and usually are with larger HEMS operators—where they often are covered by collective bargaining agreements.<sup>468</sup> They are paid an annual salary, regardless of how much they fly, but often are entitled to overtime payment as well.<sup>469</sup> Most receive benefits, at least personal days off, vacation, and sick leave and, in about half of the industry, health care benefits.<sup>470</sup> A common rule of thumb for payroll taxes and benefits is 35% of base compensation.<sup>471</sup>

Even for salaried pilots, however, their employment agreements, whether collectively bargained or individual, usually provide for termination or layoff on thirty days' notice.<sup>472</sup> Thus, an operator experiencing a downturn in volume and expecting it to continue can reduce its compensation costs through layoffs. Operators may be reluctant to do this, however, because the market for pilots is expected to tighten in favor of applicants over the next decade or so, and training costs for EMS pilots are much higher than they are for helicopter pilots in other parts of the industry. If an operator lays off a pilot, he may have trouble finding an equally qualified replacement when business picks up again and will have to incur training costs for the new hire.

A HEMS operator must have enough pilots to support a 24/7 operation. FAA restrictions on pilot flight and duty time<sup>473</sup> set a floor for the complement necessary to staff one helicopter—typically four pilots for one helicopter, three per twenty-four hours, plus a 10% factor for vacations and sick leave.<sup>474</sup> Multi-base operators often have relief pilots who are available to travel to cover shorter vacancies.<sup>475</sup>

The alternative to salaried pilots is contract pilots. Contract pilots are paid only when they are called out and fly.<sup>476</sup> A typical contract arrangement comprises a fixed component for the call out or on-call time and a separate

---

467. See Bruhn, *supra* note 459, at 262.

468. *Id.*

469. See *Air Methods Corp.*, HELICOPTER SALARIES, <http://www.helicoptersalaries.com/Home/AirMethods/tabid/332/Default.aspx> (last visited Sept. 28, 2016) (giving the salary schedule for Air Methods' pilots and stating overtime is paid).

470. *Id.*

471. See Jennifer F. Bender, *The Ratio of Payroll Taxes & Costs to Payroll*, CHRON, <http://smallbusiness.chron.com/ratio-payroll-taxes-costs-payroll-18767.html> (last visited Sept. 28, 2016) (noting recommended ratio of payroll taxes and other costs to total payroll).

472. 29 U.S.C. § 2101 (2012).

473. *Fact Sheet—Pilot Flight Time, Rest, and Fatigue*, FED. AVIATION ADMIN. (Jan. 27, 2010), [https://www.faa.gov/news/fact\\_sheets/news\\_story.cfm?newsId=6762](https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=6762); see also *supra* Section VII.A.

474. Adams, *supra* note 26. For example, in 2010, Air Methods employed 957 pilots and operated 238 helicopters (approximately four pilots per helicopter (p/h)); Air Evac employed 367 pilots and operated 93 helicopters (~4 p/h); Omniflight employed 290 pilots and operated 76 helicopters (~4 p/h); PHI employed 290 pilots and operated 70 helicopters (~4 p/h); Metro Aviation employed 242 pilots and operated 47 helicopters (~5 p/h); MedTrans employed 160 pilots and operated 39 helicopters (~4 p/h); EraMED employed 70 pilots and operated 29 helicopters (~2.5 p/h); and STAT MedEvac employed 75 pilots and operated 21 helicopters (~3.5 p/h). *Id.*; see also CAMTS ACCREDITATION STANDARDS, *supra* note 338, § 5.05.01 (requiring four flight-ready pilots permanently assigned per single-pilot aircraft that is available twenty-four hours a day).

475. SAN DIMAS TECH. & DEV. CTR., U.S. DEP'T OF AGRIC., PROFESSIONAL HELICOPTER PILOT GUIDE 12–13 (Feb. 1996), [http://www.fs.fed.us/fire/aviation/av\\_library/professional\\_helic\\_pilot\\_guide.pdf](http://www.fs.fed.us/fire/aviation/av_library/professional_helic_pilot_guide.pdf).

476. Ron Rapp, *Contracting: A Great Career Option for the Professional Pilot*, AOPA BLOG (Apr. 16, 2014), <http://blog.aopa.org/opinionleaders/2014/04/16/contract-pilot/>.

component for flight time.<sup>477</sup> Short-term contract pilots are unlikely to be feasible for HEMS operators, because of the unpredictability and the quick-response requirements of HEMS callouts.

Economists like to say that all costs are variable in the long run.<sup>478</sup> This is true because any of the fixed cost items can be eliminated by a HEMS operator adjusting to lower-than-expected demand. It can sell or lease its helicopters; it can dispose of a hangar and offices; and it can lay off its salaried employees. But, these adjustments cannot be made on a day-to-day basis and most cannot be made on a month-to-month basis, meaning that an operator is stuck with a certain fixed cost structure in the short to medium term.

### B. Utilization Is Critical

The high proportion of fixed costs makes helicopter utilization a critical factor in determining profitability.<sup>479</sup> Average costs per hour or per mission vary depending on how many flight hours are available to absorb fixed costs. A 2009 *Forbes* feature story on Air Methods reported an average reimbursement of \$7,000 per flight.<sup>480</sup> With a reported average fixed monthly cost of \$180,000 per base, and a marginal cost of \$1,000 per flight hour (including fuel and manpower), Air Methods had to operate thirty flights per month per base to break even.<sup>481</sup> The average<sup>482</sup> at the time of this writing was thirty-five,<sup>483</sup> producing an operating profit of 16%–17%. This is somewhat less than the 23.5% operating profit reported for 2015 by Air Methods,<sup>484</sup> but more than the 9.6% profit reported in its 2009 annual report.<sup>485</sup>

The marginal cost figure of \$1,000 is consistent with the advertised operating cost of an AS350 EMS helicopter—a bit on the low side. Airbus advertises an independently developed figure of \$653.81 for direct operating

477. See *Sample Pilot Services Agreement for a Single-Engine Aircraft*, METZINGER AIR SERV., LLC, [http://www.metzair.com/business/pilot\\_services\\_agreement.htm](http://www.metzair.com/business/pilot_services_agreement.htm) (last visited Sept. 25, 2016) (illustrating typical components of a contract agreement).

478. See, e.g., *Long Run*, INVESTOPEDIA, <http://www.investopedia.com/terms/l/longrun.asp> (last visited Sept. 28, 2016); *Variable and Fixed Costs*, EFIN. MGMT., <https://www.efinancemanagement.com/costing-terms/variable-and-fixed-costs> (last visited Sept. 28, 2016).

479. See Honeywell 2015 Forecast, *supra* note 178. Utilization varies by helicopter industry sector: Oil and gas operators report approximately 850 hours per year, followed by tourism with just under 700 hours per year. *Id.* Law enforcement utilization exceeds 600 hours per year. *Id.* Emergency medical services, training, firefighting, and general-utility utilization approximates 400–450 hours per year. *Id.* Corporate operators experienced just over 360 hours per helicopter per year. *Id.*

480. Press Release, Air Methods Corp., Air Methods Announces Year 2009 Financial Results and Provides First Quarter 2010 Update (Mar. 11, 2010), [http://www.airmethods.com/airmethods/investors/press-releases/detail/2010/03/12/air-methods-announces-year-2009-financial-results-and-provides-first-quarter-2010-update#.V-Bu\\_WXVbWc](http://www.airmethods.com/airmethods/investors/press-releases/detail/2010/03/12/air-methods-announces-year-2009-financial-results-and-provides-first-quarter-2010-update#.V-Bu_WXVbWc).

481. See Burke, *supra* note 6 (indicating further that if one inflates these numbers by the compound increase in the CPI from 2009 to 2016 (15.06%) one gets \$182,710 fixed cost per base, \$1,015 marginal cost per hour, and \$7,105 reimbursement, producing the same thirty hours per month per base breakeven).

482. See *id.* (suggesting that the figures reported are not those for any particular base, but for an average base).

483. *Id.*

484. Air Methods 2015 Annual Report, *supra* note 33, at F-29 (reporting operating profit of \$219,693,000 and revenue of \$933,412,000 for air medical services segment).

485. Air Methods Corp., Annual Report (Form 10-K) F-5 (Mar. 12, 2010) (reporting operating profit of \$47,104,000 and flight revenue of \$486,303,000).

costs (fuel, oil, and maintenance).<sup>486</sup> That would leave \$346.19 per hour for crew costs.<sup>487</sup>

The \$180,000 per month fixed costs—\$2.26 million per year—is consistent with a base having three \$5-million helicopters requiring 10%-per-year debt service: \$1.5 million total fixed costs for helicopters, and another half-million or so for other fixed charges. This is roughly consistent with Air Methods' 2015 balance sheet, which shows 94% of its assets in equipment, compared with only 6% in fixed facilities,<sup>488</sup> and annual charges of general and administrative expenses as 16.5% of total expenses.<sup>489</sup> Because all pilot compensation arises from fixed annual salaries, with a thirty-day layoff-notice requirement, most pilot compensation is fixed rather than variable<sup>490</sup> and should be charged to base overhead, rather than as a marginal cost. That would result in a higher gross margin but the same overall bottom line. So the *Forbes* magazine figures for Air Methods apparently reflect a simplified, hybrid accounting approach, with some crew costs denominated as variable, and some as fixed.

No reason is apparent why either the fixed costs or the marginal costs should have increased at a rate significantly different from general inflation during that period, except that upgrading to NVG and collision and terrain avoidance systems would increase fixed costs.<sup>491</sup> Indeed, a shift toward smaller helicopters would reduce both fixed and marginal costs. Air Methods, however, reported increased base costs of 10.3% from the end of 2014 to the end of 2015, "occasioned by the addition of personnel to staff forty-two new community-based bases, offset by a decrease for closed bases."<sup>492</sup> Some of the increase results from adding layers of supervision and more marketing personnel.<sup>493</sup> It reported that total aircraft maintenance expenses increased 14.5% in 2015 compared to 2014, while total AMS flight volume increased 2.2% over the same period.<sup>494</sup>

Utilization has decreased dramatically in the HEMS sector in the last few years,<sup>495</sup> but some of the larger operators are exceptions. PHI's air medical

---

486. See *2011 Operating Cost Update*, CUSTOMER SUPPORT NEWSL. (Airbus Helicopters, Inc., Grand Prairie, Tex.), Aug. 2011, at 1, [http://airbushelicoptersinc.com/customer\\_support/CustomerSupportNewsletters/2011/CSNL\\_11\\_V1\\_I8\\_FINAL.PDF](http://airbushelicoptersinc.com/customer_support/CustomerSupportNewsletters/2011/CSNL_11_V1_I8_FINAL.PDF) (reporting direct operating cost for various Airbus helicopters, including AS350).

487. The \$346.19 per hour for crew costs equates to \$124,628 annually at the thirty-hour-per-month breakeven figure. That would cover a \$50,000 salaried pilot, a \$40,000 flight nurse, and a \$34,000 paramedic. Those salary figures are substantially on the low side, but could reflect a salary structure that has a low base rate built into fixed costs, and flight pay added to it.

488. See Air Methods 2015 Annual Report, *supra* note 33, at F-3 (itemizing \$835,380,000 in flight and ground equipment, \$168,725,000 in leased flight equipment, \$251,000 in land, and \$62,503,000 in buildings as part of total assets of \$1,557,281,000).

489. See *id.* at F-5 (itemizing \$146,391,000 for general and administrative expenses as part of total operating expenses of \$885,830,000).

490. Confidential Telephone Interview with a HEMS Pilot (Mar 29, 2016).

491. See *supra* Section VII.A (explaining new FAA requirements).

492. Air Methods 2015 Annual Report, *supra* note 33, at 25, 27.

493. Telephone Interview with Dan Harper, Former Flight Nurse & Flight Paramedic, Air Methods (Apr. 3, 2016) [hereinafter Harper Interview].

494. Air Methods 2015 Annual Report, *supra* note 33, at 24.

495. See Eavis, *supra* note 2 (reporting an average of 469 average annual flight hours per HEMS

segment was more profitable in 2015 than in 2014, primarily due to an increased number of flights and a rate increase.<sup>496</sup> PHI reported 35,858 air medical flight hours in 2015, up from 34,939 in 2014.<sup>497</sup> It owned 101 HEMS helicopters in 2015, down from 104 in 2014.<sup>498</sup> Patient transports were 18,768 for the year ended December 31, 2015, compared to 17,876 for the prior year.<sup>499</sup> Air Methods managed to increase its flight volume for community-based locations to 63,104 in 2015 compared to 57,940 for 2014 only by opening new bases.<sup>500</sup> Patient transports for community-based locations open longer than one year (Same-Base Transports) were 56,577 in 2015 compared to 56,814 in 2014.<sup>501</sup> Total Air Methods flight volume decreased 3.9% for 2014 compared to 2013.<sup>502</sup>

The point of all this is to reinforce the intuition that a business with high fixed costs, like HEMS, must have a certain level of output, with each unit of output earning more than its incremental cost, in order to cover its fixed costs and stay in business. Any HEMS operator with a cost structure similar to that of Air Methods not able to fly thirty missions a month would lose money.<sup>503</sup> One able to fly significantly more than that would make more money and attract capital for expansion.

If reimbursement rates decline relative to incremental costs, say because of health care cost control on the reimbursement side, or because fuel prices and crew compensation costs increase more than the general rate of inflation, the operator can maintain profitability only by cutting fixed costs. It can do that by replacing more expensive helicopters with smaller and less expensive ones. If an operator with the same simplified cost structure of Air Methods replaces \$5-million helicopters with \$2-million ones, it would reduce its fixed cost per base to \$1.1 million from \$2 million, and its breakeven missions per month from thirty to about eighteen, holding non equipment fixed costs, incremental costs, and reimbursement rates constant.

### C. Competition

Competition in the HEMS industry is fierce, based on the perceived capability and safety record of operators and on their prices.

This Article uses Air Methods as a proxy for the HEMS industry generally for several reasons. First, Air Methods is the largest HEMS operator,

---

helicopter in 2013, a 20% decline since 2006 and the lowest number since 1980).

496. PHI 2015 Annual Report, *supra* note 117, at 34.

497. *Id.* at 32.

498. *Id.* at 33.

499. *Id.* at 36.

500. Air Methods 2015 Annual Report, *supra* note 33, at 2. In 2015, Air Methods “opened [twenty-five] new community-based locations, including thirteen resulting from the conversion of three hospital contracts, and closed five due to insufficient flight volume. Two of [its] hospital customers expanded service areas, resulting in two new bases of operation.” *Id.* It renewed eight AMS contracts, while one customer did not renew its contract. *Id.*

501. *Id.* at 23.

502. *Id.* at 28.

503. The breakeven analysis determines how much revenue must be generated to cover total costs—fixed and variable—and calculates how many flights are necessary to produce that level of revenue.

recently having acquired the number two operator,<sup>504</sup> with combined HEMS revenue of \$1.3 billion<sup>505</sup> compared to \$313 million for PHI, the number two provider.<sup>506</sup> Second, most of the big ten HEMS operators are privately owned,<sup>507</sup> and therefore do not publish financial reports. Air Methods is publicly traded and therefore its quarterly and annual reports are available. Third, Air Methods is predominantly a HEMS operator, unlike PHI, which is predominantly an oil and gas operator with HEMS as a sideline.<sup>508</sup> Thus, the Air Methods financial reports, unlike the PHI financial reports, more accurately reflect the economics of HEMS operations rather than a more diverse set of business operations.

The heavy reliance on Air Methods to draw conclusions about HEMS economics may obscure certain realities and thereby undercut the force of the conclusions. Air Methods, because of its size, represents the industry standard—in the advertising motto of the Pennsylvania Railroad one hundred years ago, it is the “standard railroad of the world.”<sup>509</sup> Like the Pennsylvania Railroad, Air Methods is strengthening its hold on the market, flying 39% more HEMS missions in 2015 than five years earlier.<sup>510</sup>

But as Section VII.A explains, the FAA does not regulate the details of HEMS operations, nor do state or federal health care regulators.<sup>511</sup> Each HEMS operator decides what kind of equipment it will use, how to configure the equipment, its minimum criteria for pilots, how the pilots will be trained, and, subject to basic state accreditation requirements, how its medical personnel will be selected and trained, and whether there will be two pilots, or only one, on each HEMS helicopter.<sup>512</sup>

That opens up a fairly wide set of opportunities for cost cutting. Operators with lower fixed costs that use smaller helicopters and flight crews can stay in business and earn a profit at a lower breakeven point in terms of utilization. Thus, Air Methods faces lower-cost competitors at lower levels in the market hierarchy. The strength of its brand allows it to compete successfully with them.

It is also true that operators can cut costs by reducing expenditures on safety.<sup>513</sup> While they must incur certain maintenance and pilot training

---

504. *Air Methods Corporation Announces Agreement to Acquire OF Air Holdings Corporation, Parent Company of Omniflight Helicopters, Inc.*, AIR METHODS (June 2, 2011), <http://www.airmethods.com/airmethods/about-us/happenings/detail/2011/06/03/air-methods-corporation-announces-agreement-to-acquire-of-air-holdings-corporation-parent-company-of-omniflight-helicopters-inc-#>.

505. Air Methods 2015 Annual Report, *supra* note 33, at F-5.

506. PHI 2015 Annual Report, *supra* note 117, at 32.

507. Adams, *supra* note 26.

508. *See Phi, Inc. Is a Leader in Providing Offshore Helicopter Support to Companies Operating in the Gulf of Mexico*, PHI: OIL & GAS, <http://www.phihelico.com/oil-a-gas> (last visited Sept. 28, 2016) (explaining how the oil and gas industry plays a major role in PHI's operation).

509. *The Pennsylvania Railroad, The Standard Railroad of the World*, AMERICAN-RAILS.COM, <http://www.american-rails.com/pennsylvania-railroad.html> (last visited Sept. 25, 2016).

510. *See* Air Methods 2015 Annual Report, *supra* note 33, at 21 (reporting 63,104 patient transports in 2015, compared with 57,940 in 2014, 53,805 in 2013, 55,976 in 2012, and 45,480 in 2011).

511. *See supra* Section VII.A (detailing general FAA regulations of HEMS operations).

512. *Id.*

513. They may rationalize this, even though it is not in their best interest, because then more accidents

expenses mandated by regulation, they can cut safety costs in other ways. They must pay mechanics to perform hundred-hour annual inspections, to accomplish the work required by airworthiness directives and service bulletins, and to fix problems that make the helicopter unairworthy according to its flight manuals. They can perform maintenance work, however, with a well-developed and well-staffed in-house maintenance department or get it done by contract mechanics through a lowest-cost bidding process.

Operators can be similarly hard-eyed when it comes to pilot expenses. They must do the recurrency training and testing required by Part 135,<sup>514</sup> but there are many ways they can economize. For instance, they can omit sending their newly hired pilots to factory training school. The actual cost of Airbus transition training, such as that taken by the fictional Webster in the introductory story, is \$10,000–\$15,000.<sup>515</sup> Avoiding this cost with respect to each pilot represents considerable savings, particularly if an operator has a high pilot turnover rate.

On the other hand, safety can be a part of the competitive equation in a positive way. HEMS operators with twin-engine or two-pilot helicopters can feature that in their advertising and presentations to potential customers. Operators capable of flying IFR and with NVG can emphasize those capabilities. And, if one operator can fly IFR, when the others cannot, that is an obvious competitive advantage. Almost everyone making decisions about HEMS is aware of the potential for accidents, and therefore are likely to be influenced by what they perceive as a safer alternative.

Reaching the actual decision-makers with such a message, however, presents a challenge. For hospital-based operations, the key recipient is the hospital decision-maker in negotiations over a contract.<sup>516</sup> For community-based HEMS, however, the locus of decision making is amorphous, likely to involve some combination of first responders, 911 dispatchers, and emergency department physicians at the receiving hospital.<sup>517</sup> Getting all these participants in the operator selection process to believe that one operator is safer than another is difficult. Furthermore, the dispatch process, as the University of Oklahoma study discussed, is already complicated by HEMS operators' attempts to differentiate themselves in the market.<sup>518</sup>

Going forward, some HEMS operators will benefit from merging with critical care ground ambulance companies. A handful of operators already offer both.<sup>519</sup> Then, they can offer opportunities to first responders that will

---

will occur, which will be bad for business.

514. 14 C.F.R. § 135.293 (2016).

515. See, e.g., *Airbus Type Ratings—A320, A330 and A340*, FLIGHT TRAINING INT'L, <http://ftiratings.com/courses/type-ratings/airbus-type-rating/> (last visited Oct. 2, 2016).

516. See, e.g., Rye Druzin, *Cuero Community Hospital Negotiates Helicopter Service*, VICTORIA ADVOCATE (Jan. 31, 2016, 6:27 AM), <https://www.victoriaadvocate.com/news/2016/jan/30/cuero-community-hospital-negotiates-helicopter-ser/> (reporting on helicopter service negotiations between Air Evac and Cuero Community Hospital's Board of Directors).

517. 2010 GAO REPORT, *supra* note 93, at 11.

518. THOMAS ET AL., *supra* note 17, at 6, 9; see also *supra* Section III.B.

519. *About Us*, CAREFLITE, <http://www.careflite.org/aboutus.aspx> (last visited Oct. 5, 2016); *About Us*, SUPERIOR AMBULANCE SERV., <http://www.superiorambulance.com/about-us/about-us/> (last visited Oct. 5,



simplify triage decision making.

#### *D. Reimbursement*

All HEMS operators get much of their revenue from third-party payers: Medicare, Medicaid, or private health care insurers.<sup>520</sup> Medicare represents a substantial percentage of HEMS reimbursement, while Medicaid represents a much smaller percentage.<sup>521</sup>

In 2015, PHI received 74% of its air medical revenue from private insurance, 17% from Medicare, 8% from Medicaid, and 1% from self-pay.<sup>522</sup> It allowed a 65% reserve for contractual discounts and 8% for uncompensated care.<sup>523</sup>

Medicare reimbursement is more important than suggested by the percentage of revenue accounted for by Medicare payments, as private insurers tend to follow the lead of Medicare in calculating reimbursement formulas.<sup>524</sup>

The starting point to understand the reimbursement scheme for HEMS, therefore, is to understand Medicare payments. Air ambulance services<sup>525</sup> are specifically listed in the Medicare regulations as a medical service for which benefits are available,<sup>526</sup> but only if “the service meets the medical necessity<sup>527</sup> and origin and destination<sup>528</sup> requirements.”<sup>529</sup> Both requirements must be

2016). CareFlite is in Texas, and Superior Ambulance operates out of DuPage Airport near Chicago.

520. MEDPAC REPORT, *infra* note 669, at 173.

521. *See id.* (noting that, overall, 35% of ambulance revenue came from Medicare, 40% from private payers, 10% from Medicaid, 10% from subsidies and charity, and 5% from out-of-pocket payments; not distinguishing ground from air ambulance transports).

522. PHI 2015 Annual Report, *supra* note 117, at 55.

523. *Id.*

524. JEFFREY CLEMENS & JOSHUA D. GOTTLIEB, IN THE SHADOW OF A GIANT: MEDICARE’S INFLUENCE ON PRIVATE PHYSICIAN PAYMENTS 1 (Aug. 31, 2015), <http://econweb.ucsd.edu/~jlclemens/pdfs/ShadowOfAGiant.pdf>.

525. For simplicity in expression, this Article refers to helicopter air ambulance services as “HEMS.”

526. 42 C.F.R. § 410.40(b) (2016) (including rotary wing transport as a level of ambulance service covered by Medicare); *id.* § 414.605 (“Rotary wing air ambulance (RW) means transportation by a helicopter that is certified as an ambulance and such services and supplies as may be medically necessary.”).

527. The rule defines medical necessity as:

Medicare covers ambulance services, including fixed wing and rotary wing ambulance services, only if they are furnished to a beneficiary whose medical condition is such that other means of transportation are contraindicated. The beneficiary’s condition must require both the ambulance transportation itself and the level of service provided in order for the billed service to be considered medically necessary. Nonemergency transportation by ambulance is appropriate if either: the beneficiary is bed-confined, and it is documented that the beneficiary’s condition is such that other methods of transportation are contraindicated; or, if his or her medical condition, regardless of bed confinement, is such that transportation by ambulance is medically required.

*Id.* § 410.40 (d)(1).

528. The rule defines eligible origins and destinations as:

Medicare covers the following ambulance transportation:

(1) From any point of origin to the nearest hospital, CAH, or SNF that is capable of furnishing the required level and type of care for the beneficiary’s illness or injury. The hospital or CAH must have available the type of physician or physician specialist needed to treat the beneficiary’s condition.  
 (2) From a hospital, CAH, or SNF to the beneficiary’s home.  
 (3) From a SNF to the nearest supplier of medically necessary services not available at the SNF where the beneficiary is a resident, including the return trip.  
 (4) For a beneficiary who is receiving renal dialysis for treatment of ESRD, from the beneficiary’s home to the nearest facility that furnishes renal dialysis, including the return trip.

certified by a treating physician—usually a physician affiliated with the facility to which HEMS transports. The certification is subject to reversal by the private insurer or by Medicare.<sup>530</sup>

The U.S. Department of Health and Human Services' (HHS) Centers for Medicare and Medicaid Services (CMS) amended the air ambulance reimbursement rules in 2002,<sup>531</sup> pursuant to a mandate in Section 1834(l) of the Social Security Act.<sup>532</sup> The statute required Medicare to replace its existing reasonable cost approach with a nationwide prospective payment schedule and obligated Medicare to write the new rules through negotiated rulemaking.<sup>533</sup> It mandated cost containment provisions and limited total reimbursement under the new rules to that under the existing reimbursement formulas, with an inflation factor.<sup>534</sup> After implementation of the new schedule, total reimbursements for any year could not exceed those for the previous year, increased by inflation and reduced by a productivity factor.<sup>535</sup> Despite the requirement for a national schedule, it authorized Medicare to provide regional adjustments.<sup>536</sup>

The statute authorizes the Secretary of HHS to establish a fee schedule for ambulance services.<sup>537</sup> The fee schedule must:

- (A) establish mechanisms to control increases in expenditures for ambulance services under this part;
- (B) establish definitions for ambulance services which link payments to the type of services provided;
- (C) consider appropriate regional and operational differences;
- (D) consider adjustments to payment rates to account for inflation and other relevant factors; and
- (E) phase in the application of the payment rates under the fee schedule in an efficient and fair manner . . . .<sup>538</sup>

The fee schedule also must ensure that the aggregate amount of payments for ambulance services does not increase at a rate greater than the increase in the consumer price index (CPI), from year to year.<sup>539</sup>

The pre-2002 system favored hospital-based HEMS over independent HEMS. Both were reimbursed retrospectively based on actual cost (in the case

*Id.* § 410.40(e).

529. *Id.* § 410.40(a)(1).

530. See *Kaplan v. Leavitt*, 503 F. Supp. 2d 718, 724 (S.D.N.Y. 2007) (denying Medicare reimbursement and holding that opinions of treating physicians about necessity for air ambulance transport are not controlling).

531. Medicare Program; Fee Schedule for Payment of Ambulance Services, 67 Fed. Reg. 9100 (Feb. 27, 2002) (to be codified at 42 C.F.R. pts. 410, 414).

532. 42 U.S.C. § 1395m(l) (2012).

533. *Id.* § 1395m(l)(1).

534. *Id.* § 1395m(l)(2)(D).

535. *Id.* § 1395m(l)(3)(B)–(C).

536. *Id.* § 1395m(l)(2)(C).

537. *Id.* § 1395m(l)(1).

538. *Id.* § 1395m(l)(2). Oddly, the section prohibits administrative or judicial review of the fee schedule. *Id.* § 1395m(l)(5).

539. *Id.* § 1395m(l)(3)(A).

of hospital systems) or actual prices (in the case of independent systems).<sup>540</sup> But reimbursements for “suppliers”—independent HEMS—were capped, while reimbursements for “providers”—hospital-based HEMS—were not.<sup>541</sup> Additionally, reimbursement data suggests the hospitals were able to roll in a significant part of non-HEMS costs for their emergency departments, and perhaps other aspects of overhead, further inflating their reimbursement.

Medicare benefits are payable to the Medicare-covered individual receiving medical care. Often, but not always, the Medicare beneficiary assigns her benefits to the health care provider,<sup>542</sup> who handles the paperwork to apply for reimbursement. The Medicare Act prohibits “balance billing.”<sup>543</sup> This means that if Medicare covers the service, the provider must accept the Medicare payment and cannot collect the remainder of any charge from the patient.<sup>544</sup> In other words, if a Medicare beneficiary uses HEMS and the prescribed rate for the flight is \$12,000, the HEMS provider may not collect the difference between \$12,000 and its usual fee of \$20,000.<sup>545</sup> That was one of the issues in *Fleet v. Air Methods Corp.*,<sup>546</sup> in which the judge decided that the balance billing section did not apply because the benefit was not covered. Statutory formulas for particular services aside, Medicare pays the usual and customary charge for any medical service,<sup>547</sup> subject to an elaborate process for determining what is customary in a particular market area.

The 2002 rules mostly adopted the consensus recommendations of the negotiated rulemaking committee.<sup>548</sup> It implemented a prospective payment system for helicopter air ambulance services: a base rate and a mileage rate.<sup>549</sup> The base rate is subject to a geographic adjustment, based on geographic

540. See Medicare Program; Fee Schedule for Payment of Ambulance Services, 67 Fed. Reg. 9100, 9100 (Feb. 27, 2002) (to be codified at 42 C.F.R. pts. 410, 414) (defining “provider” and “supplier”).

541. *Id.* at 9131 (explaining differences between provider and supplier reimbursement); *id.* at 9103 (summarizing weaknesses of pre-2002 system).

542. 42 U.S.C. § 1395k(a)(1) (“The benefits provided to an individual . . . shall consist of . . . entitlement to have payment made to him or on his behalf . . .”).

543. See *id.* § 1395u(h) (stating that participating physicians and suppliers must agree to accept Medicare-prescribed payment). Beneficiaries have no legal obligation to make further payment to a provider or Medicare-managed care plan for Part A or Part B cost sharing. Providers who inappropriately bill qualified Medicare beneficiaries for Medicare cost sharing are subject to sanctions. CTRS. FOR MEDICARE & MEDICAID SERVS., DEP’T OF HEALTH & HUMAN SERVS., PROHIBITION ON BALANCE BILLING DUALY ELIGIBLE INDIVIDUALS ENROLLED IN THE QUALIFIED MEDICARE BENEFICIARY (QMB) PROGRAM 2 (Feb. 4, 2016), <https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNMattersArticles/downloads/SE1128.pdf>.

544. Medicare Program; Fee Schedule for Payment of Ambulance Services, 67 Fed. Reg. 9100 (Feb. 27, 2002) (to be codified at 42 C.F.R. pts. 410, 414).

545. See generally *Fleet v. Air Methods Corp.*, No. 11-0172-WS-N, 2011 WL 2531048, at \*1 (S.D. Ala. June 24, 2011) (discussing the declaratory judgment action brought by employer claiming that the reasonable fee for HEMS transport from a fishing vessel was less than \$10,000 but that Air Methods billed \$21,000; and dismissing claim as outside federal question jurisdiction which involved Jones Act liability of employer, not Medicare).

546. *Id.* at \*2.

547. 42 U.S.C. § 1395u(b)(3)(F) (2012) (“[P]ayment shall be determined . . . on the basis of customary and prevailing charge levels in effect at the time the service was rendered . . .”).

548. Medicare Program; Fee Schedule for Payment of Ambulance Services, 67 Fed. Reg. at 9101 (explaining relationship between final rule and negotiated consensus statement).

549. *Id.* at 9104 (summarizing basic approach of new system: a nationally uniform base rate, adjusted for geographic differences and a mileage rate).

variations in private physician practice costs.<sup>550</sup> Both the base rate and the mileage rate are subject to an inflation adjustment based on the CPI.<sup>551</sup> A rural surcharge boosts both components by 50%.<sup>552</sup>

The 2002 system treats all HEMS providers the same: hospital-based, community-based, and public agencies.<sup>553</sup> The basic requirements for reimbursement from the pre-2002 system remained unchanged: HEMS transports must be medically necessary and be to the nearest medical facility adequately equipped to care for the patient.<sup>554</sup> Under the post-2002 rules, no balance billing is permitted.<sup>555</sup>

After the 50% premium for rural HEMS, the 2002 rural base rate was \$4,036.44 and the rural air mileage rate was \$26.27, in 2002 dollars<sup>556</sup> or \$5,315.72 for the base rate in 2016 and \$34.60 for the mileage rate.<sup>557</sup> At one hundred knots average speed, that is a variable cost reimbursement rate of \$346 per hour.<sup>558</sup> The initial rates for 2002 would result in a total of \$5,028 for an urban-based HEMS mission and \$5,767 for a rural-based HEMS mission, in 2016 dollars.<sup>559</sup>

Major operators expect continued downward pressure on Medicare reimbursement rates,<sup>560</sup> which are likely to propagate to private insurers.<sup>561</sup>

The impact of the Affordable Care Act (ACA) may be substantial, but the nature of the impact is not yet clear.<sup>562</sup> The goal is to reduce the number of uninsured, and increasing the number of HEMS customers with private insurance will shift the payer mix in a favorable direction.<sup>563</sup> On the other

550. *Id.* at 9109 (justifying physician practice inflation index as factor to adjust 50% of the air ambulance base rate; labor costs account for about 50% of the total costs of air ambulance services).

551. *Id.* at 9125.

552. *Id.* at 9109–10 (explaining that 50% rural adjustment applies to both base rate and all of mileage for air ambulance reimbursement). Here is a summary of the essentials:

There are just two CPT codes for air ambulance services: A0431 is the base rate and A0436 is the mileage rate. Under Medicare's Ambulance Fee Schedule, the payment rate is determined by the point of pick-up zip code. There is a 50% add-on to each CPT code for any patient pick-up that occurs in a zip code designated "rural" by Medicare. The payment rates are updated annually by Medicare.

James M. Loughlin, *A Flight of Fancy: Air Ambulance Fee Disputes in Workers' Comp*, WORKCOMP CENTRAL (July 24, 2015), <https://www.workcompcentral.com/columns/show/id/800bf72a9ab8a805058833d2c472f9911d9eb0cd>.

553. Medicare Program; Fee Schedule for Payment of Ambulance Services, 67 Fed. Reg. at 9109 ("[T]he ambulance fee schedule applies to all entities that furnish ambulance services, regardless of type. All public or private, for profit or not-for-profit, volunteer, government-affiliated, institutionally-affiliated or owned, or wholly independent supplier ambulance companies, however organized, would be paid according to this ambulance fee schedule . . .").

554. *Id.* at 9101 (restating pre-2000 rule for coverage).

555. *Id.* at 9112 (new rule imposing mandatory assignment; i.e., prohibiting billing patients for the amount of the supplier fee not covered by the Medicare fee—a practice known as "balance billing").

556. *Id.* at 9122 (chart showing rates for rotary wing reimbursement).

557. Adjusted by Author for inflation using 2.88 as a multiplier to represent inflation from 2002 to 2016.

558. Estimated by Author.

559. Medicare Program; Fee Schedule for Payment of Ambulance Services, 67 Fed. Reg. at 9124 (multiplied by 2.88, representing inflation from 2002 to 2016).

560. PHI 2015 Annual Report, *supra* note 117, at 13 (projecting continued downward trends in reimbursement rates by Medicare and private insurance).

561. *Id.*

562. See *id.* at 12–15; Air Methods 2015 Annual Report, *supra* note 33, at 5–9.

563. PHI 2015 Annual Report, *supra* note 117, at 12–13.

hand, the ACA's cost control mandates may cause both Medicare and private insurers to reduce reimbursement levels.<sup>564</sup>

HEMS community-based providers charge fees to the patients they carry, but the patients often cannot or do not pay.<sup>565</sup> Some HEMS providers write their own insurance, guaranteeing "subscribers" that they will not have to pay out of pocket for emergency transport.<sup>566</sup> While this increases the revenue stream for HEMS operators, offsetting bad-debt expense, it complicates the HEMS dispatch function because someone other than the patient usually decides which HEMS operator to call in accident-extraction situations.<sup>567</sup> It also puts pressure on HEMS personnel to get the bills out quickly.

We had one hour from the time we landed to get the paperwork into DIS [DIS Electronic Billing Services, in Miami], which was the billing company. Whoever got the bill in first got paid the most. Air Methods stressed the importance of doing that. Some people got written up for missing the one-hour window to submit the paperwork.<sup>568</sup>

### E. Health Care Reform

Health care is an unusual market<sup>569</sup> because virtually all of the revenue received by sellers of health care services is paid, not by the recipients of those services, but by third parties: private health care insurers, the federal government through Medicare, and states through Medicaid.<sup>570</sup> The amount of money involved is vast, some \$3.207 trillion in the United States in 2015,<sup>571</sup> constituting about 20% of GDP, which was \$17.9 trillion in 2015.<sup>572</sup>

In addition, the pace of technology improvement capable of preserving or extending life is substantial, making health care an unusual market.<sup>573</sup> Each new technology, whether a new kind of surgical procedure or a new pharmaceutical drug, costs more, usually much more, than its predecessor.<sup>574</sup> Students of health care regularly predict that health care expenditures could

564. *Id.*

565. Diederich, *supra* note 27, at 70–71 (describing lack of advance ability-to-pay determinations, basic liability of patient, and high incidence of inability to pay).

566. *Id.* at 71 (describing "subscription service").

567. THOMAS ET AL., *supra* note 17, at 119.

568. Harper Interview, *supra* note 493.

569. See Thomas L. Greaney, *Managed Competition, Integrated Delivery Systems and Antitrust*, 79 CORNELL L. REV. 1507 (1994) (explaining market failure in health care economics and policy solutions).

570. *Id.*

571. Dan Munro, *U.S. Healthcare Spending on Track to Hit \$10,000 per Person This Year*, FORBES (Jan. 4, 2015, 6:54 PM), <http://www.forbes.com/sites/danmunro/2015/01/04/u-s-healthcare-spending-on-track-to-hit-10000-per-person-this-year/#58775696294c>.

572. *Gross Domestic Product (GDP) of the United States of America from 1990 to 2015 (in Billion U.S. Dollars, Current)*, STATISTA, <http://www.statista.com/statistics/188105/annual-gdp-of-the-united-states-since-1990/> (last visited Oct. 3, 2016).

573. See generally John Lechleiter, *Extend Life Expectancy and Reduce Deaths? Yes We Can!*, FORBES (May 22, 2012, 3:33 PM), <http://www.forbes.com/sites/johnlechleiter/2012/05/22/extend-life-expectancy-and-reduce-deaths-yes-we-can/#6facf00d7025> (describing technological advances regarding life expectancy).

574. See R. Krishna Kumar, *Technology and Healthcare Costs*, 4 ANNALS PEDIATRIC CARDIOLOGY 84, 84 (2011), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3104544/> (describing rising health care costs).

consume the entire budget of most developed countries without public policy restraints on the rate of increase.<sup>575</sup>

Health care cost-control strategies typically take one or more of three forms. First, health care providers can be reimbursed based on a price schedule rather than for their costs or unilaterally determined prices.<sup>576</sup> Diagnosis-related groups and the 2002 air ambulance fee schedule reflect that approach.<sup>577</sup> Second, health care providers can be afforded a fixed amount to cover treatment of a large pool of potential patients.<sup>578</sup> This is the “capitation approach” used in many managed care insurance schemes.<sup>579</sup> A provider—usually a physician rather than a hospital—contracts to treat anyone from a defined group for a fixed aggregate payment over the term of the contract.<sup>580</sup> The third approach fixes an overall amount available for reimbursement of multiple providers for certain broad categories of treatment.<sup>581</sup> The level of reimbursement for particular instances of treatment must be adjusted so that the total payments to all providers do not exceed the overall amount.<sup>582</sup> Medicare uses this approach in setting and resetting the annual fee schedule for HEMS reimbursement.<sup>583</sup>

All three approaches create economic incentives to control costs and the frequency and intensity of treatment so that providers’ total costs do not exceed the amount available for reimbursement.<sup>584</sup> Regardless of the aggressiveness with which Medicare and insurers enforce existing or tighten their cost control measures, they are unlikely to allow reimbursement to increase at the rate in which HEMS operators are increasing prices.<sup>585</sup>

The most basic change in health care policy, implemented in the United States beginning in the late 1980s was to shift from a cost reimbursement system to a prospective payment system.<sup>586</sup> Cost-based reimbursement provided few incentives to control costs and actually encouraged health care

---

575. See David Squires & Chloe Anderson, *U.S. Health Care from a Global Perspective: Spending, Use of Services, Prices, and Health in 13 Countries*, COMMONWEALTH FUND (Oct. 8, 2015), <http://www.commonwealthfund.org/publications/issue-briefs/2015/oct/us-health-care-from-a-global-perspective> (discussing health care costs).

576. See generally Helen Adamopoulos, *100 Things to Know About Medicare Reimbursement*, BECKER’S HOSP. REV. (Aug. 19, 2014), <http://www.beckershospitalreview.com/finance/100-things-to-know-about-medicare-reimbursement.html> (describing detailed information on Medicare reimbursement).

577. See 42 C.F.R. § 414.610 (2016) (describing basis of payment for ambulance services).

578. See Brent C. James & Gregory P. Poulsen, *The Case for Capitation*, HARV. BUS. REV., July–Aug. 2016, <https://hbr.org/2016/07/the-case-for-capitation> (describing capitation).

579. *Id.*

580. *Id.*

581. See generally Michael E. Porter & Robert S. Kaplan, *How to Pay for Health Care*, HARV. BUS. REV., July–Aug. 2016, <https://hbr.org/2016/07/how-to-pay-for-health-care> (describing various methods to pay for health care).

582. *Id.*

583. See 42 C.F.R. § 414.610 (2016) (discussing basis of payment for ambulance services).

584. See Porter & Kaplan, *supra* note 581 (describing methods of paying for health care).

585. Mark Huber, *HEMS at Odds with Insurers, Medicare*, AINONLINE (Aug. 23, 2016, 11:15 AM), <http://www.ainonline.com/aviation-news/business-aviation/2016-08-23/hems-odds-insurers-medicare>.

586. DAVID DRAPER ET AL., RAND CORP., *EFFECTS OF MEDICARE’S PROSPECTIVE PAYMENT SYSTEM ON THE QUALITY OF HOSPITAL CARE* 1 (2006), [http://www.rand.org/content/dam/rand/pubs/research\\_briefs/2006/RAND\\_RB4519-1.pdf](http://www.rand.org/content/dam/rand/pubs/research_briefs/2006/RAND_RB4519-1.pdf).

providers to use more costly procedures.<sup>587</sup> Prospective payment systems reimburse pre-determined amounts for specified procedures and conditions, known as diagnosis-related groups (DRGs).<sup>588</sup> DRGs had a profound effect on the length of hospital stays, its main goal.<sup>589</sup> They fell some 30%–60% after DRGs were introduced.<sup>590</sup>

This approach has gradually been extended into more areas of health care, mostly applying now to physician reimbursement as well.<sup>591</sup> The 2002 change in air ambulance reimbursement was entirely consistent with this emphasis; Medicare replaced a cost reimbursement system with a prospective payment system.<sup>592</sup> Capping the overall budget for air ambulance reimbursement had a roughly similar effect to capitation for physician practices.<sup>593</sup>

Helicopter air ambulances are but a small part of overall expenditures on health care, but their production and consumption reflect the same characteristics as other health care sectors.<sup>594</sup> They thus engender the same controversies and offer public policy alternatives similar to those confronting health care policy makers more generally.<sup>595</sup>

The current prevailing business model for HEMS in the United States is to accept and transport all requests with very little, if any, inquiry as to medical necessity. Such a practice increases risk exposure for both patients and providers. It is not an uncommon scenario for a motor vehicle collision (MVC) patient to undergo a \$15,000 helicopter transport followed [by] a \$5,000–\$7,000 ED trauma work up (primarily based upon the fact that the patient arrived by helicopter) only to be discharged to home hours later. Considering the number of patients who lack any health insurance,

587. See Stuart Guterman & Allen Dobson, *Impact of the Medicare Prospective Payment System for Hospitals*, 7 HEALTH CARE FINANCING REV. 97 (1986), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4191526/pdf/hcfr-7-3-97.pdf> (describing impact of the Medicare prospective payment system for hospitals).

588. Judy Sturgeon, *DRGs: Still Frustrating After All These Years*, 21 FOR THE REC. 14 (2009), <http://www.fortherecordmag.com/archives/052509p14.shtml>; Judy A. Bielby, *Evolution of DRGs (2010 Update)*, J. AHIMA (Apr. 2010), [http://library.ahima.org/doc?oid=106590#.V\\_cajju9j0s](http://library.ahima.org/doc?oid=106590#.V_cajju9j0s).

589. KATHERINE L. KAHN ET AL., RAND CORP., A SUMMARY OF THE EFFECTS OF DRG-BASED PROSPECTIVE PAYMENT SYSTEM ON QUALITY OF CARE FOR HOSPITALIZED MEDICARE PATIENTS 2 (Oct. 1990), <http://www.rand.org/content/dam/rand/pubs/notes/2007/N3132.pdf>.

590. *Id.* (summarizing literature on initial effect of DRGs; finding 30%–60% reduction in hospital admissions); Cutler & Morton, *supra* note 49, at 1965 fig.1 (showing decline from over 260 million inpatient days in 1981 to about 180 million in 2011, or a decrease of more than 31%).

591. See Adamopoulos, *supra* note 576 (“Medicare uses the Physician Fee Schedule to reimburse providers for covered physicians’ services provided to Medicare Part B beneficiaries.”); see also OFFICE OF INSPECTOR GEN., DEP’T OF HEALTH & HUMAN SERVS., MEDICARE HOSPITAL PROSPECTIVE PAYMENT SYSTEM: HOW DRG RATES ARE CALCULATED AND UPDATED (Aug. 2001), <https://oig.hhs.gov/oei/reports/oei-09-00-00200.pdf> (discussing how DRG rates are calculated).

592. See Stuart H. Altman, *The Lessons of Medicare’s Prospective Payment System Show that the Bundled Payment Program Faces Challenges*, 31 HEALTH AFF. 1923, 1923 (2012), <http://content.healthaffairs.org/content/31/9/1923.full.pdf> (“[T]his article provides an analysis of how Medicare implemented the prospective payment system approach, how hospitals responded to the then new financial incentives, and lessons learned that could help the current bundled payment initiative succeed.”).

593. See Cutler & Morton, *supra* note 49.

594. THOMAS ET AL., *supra* note 17, at 48 (explaining the cost-effectiveness of HEMS in contrast to ground transport).

595. Adamopoulos, *supra* note 576.

this type of treatment can result in financial ruin for some families.<sup>596</sup>

## IX. THE REIMBURSEMENT CRISIS

The HEMS industry claims that Medicare and private insurance reimbursement is falling far short of covering its costs.<sup>597</sup> Objective assessment of the facts, however, suggests that a major contributor to the problem is oversupply.<sup>598</sup> “There are way too many helicopters,” said one experienced flight nurse.<sup>599</sup>

### A. *The Perceived Problem*

The HEMS industry claims that reimbursement rates are far too low to cover actual costs.<sup>600</sup> Most private health care insurers set their benefit schedules in imitation of Medicare.<sup>601</sup>

Private insurers, including workers’ compensation insurers, often link their reimbursement rates to the Medicare rates, explained in Section VIII.D.<sup>602</sup> Texas is an example. It reimburses 125% of the Medicare rate.<sup>603</sup> One commentator reported that air ambulance fee disputes were the largest category of medical fee disputes before the Texas workers’ compensation division in 2015, amounting to 575 active disputes, compared to 292 “professional” fee disputes.<sup>604</sup>

The disputed amount in most cases is the difference between the air ambulance providers’ billed charges and 125% of the Medicare rate. The average disputed amount for the disputes currently at the division is \$28,126.16. Most carriers have reimbursed air ambulance services at 125% of the Medicare rate pursuant to the division’s Medical Fee Guideline because it was understood by most system participants that the fee guideline applies to ambulance services.

The average disputed amount will continue to grow as air ambulance providers rapidly increase their charges. One of the largest commercial air ambulance providers in Texas is PHI Air

---

596. Bledsoe et al., *supra* note 11.

597. See Eavis, *supra* note 2 (“The number of helicopters used for medical emergencies has soared in the last two and a half decades. But some analysts say there are now too many, and their utilization has declined to its lowest point in the same time period.”).

598. *Id.*

599. Harper Interview, *supra* note 493.

600. See Mark Huber, *Will the Government Finally Stop Short-Changing HEMS Providers?*, MULTIBRIEFS: EXCLUSIVE (Apr. 2, 2015), <http://exclusive.multibriefs.com/content/will-the-government-finally-stop-short-changing-hems-providers> (summarizing industry view that reimbursement rates must be increased, and praising house bill).

601. AMA, PRIVATE HEALTH INSURANCE REPORT CARD 2016 (Mar. 2016), <https://www.hbf.com.au/health-insurance/~media/files/pdfs/AMA-report-card-2016>.

602. Harper Interview, *supra* note 493.

603. See Loughlin, *supra* note 552 (reporting on Texas experience and listing other states, besides Texas, that link reimbursement to Medicare).

604. *Id.*



Medical. According to the division's medical bill/payment public use data files, PHI Air Medical's base rate increased from \$11,492.00 in 2010 to \$26,177.00 in 2014, a 128% increase. At the same time, its mileage rate increased from \$150 per mile to \$290 per mile, an increase of 93%.<sup>605</sup>

Private insurers have their own limitations. Typically, their reimbursement rates are higher than the Medicare rates, but most of them have "utilization review departments."<sup>606</sup> These departments decide if a claim is payable under whatever limitations the particular health care policy provides.<sup>607</sup> Most of them apparently have language similar to the Medicare regulation: the air ambulance service must be medically necessary and provide transportation no farther than to the nearest capable facility.<sup>608</sup>

If a HEMS customer is not insured, and is not covered by Medicare, the customer is personally liable for the transport fee.<sup>609</sup> Air Methods' annual report has a fair amount of discussion about the risks it faces with various sources of reimbursement.<sup>610</sup> In 2014, \$864,647,000 of Air Methods' revenue came from third-party payers, and \$275,677,000 came from self-pay.<sup>611</sup>

Many individuals who are not covered by Medicare or private insurance simply default.<sup>612</sup> The HEMS provider sues many, but not all, of them. If the provider sues someone who does not have any money to pay the judgment, it has simply wasted money on legal fees. Air Methods, for example has a reserve of \$464,111,000 for uncollectable fees against total charges of \$1,140,324,000 for 2014, or nearly 40%.<sup>613</sup> Private insurance does not necessarily prohibit balance billing.<sup>614</sup> So, if a privately insured person's

605. *Id.*

606. See Richard A. Spector, *Utilization Review and Managed Health Care Liability*, 97 S. MED. J. 284 (2004), <http://www.medscape.com/viewarticle/472608> ("Utilization review (UR) is a safeguard against unnecessary and inappropriate medical care. It allows health care providers to review patient care from perspectives of medical necessity, quality of care, appropriateness of decision-making, place of service, and length of hospital stay."); see also *Answers to Frequently Asked Questions About Utilization Review (UR) for Claims Administrators*, STATE OF CAL. DEP'T OF INDUS. RELATIONS, [http://www.dir.ca.gov/dwc/UtilizationReview/UR\\_FAQ.htm](http://www.dir.ca.gov/dwc/UtilizationReview/UR_FAQ.htm) (last visited Oct. 6, 2016) ("Q. What is utilization review (UR) and why is it used for workers' compensation? A. UR is the process used by employers or claims administrators to determine if a proposed treatment requested for an injured worker is medically necessary. All employers or their workers' compensation claims administrators are required by law to have a UR program. This program is used to decide whether or not to approve medical treatment recommended by a treating physician.").

607. *Id.*

608. See, e.g., *Your Health Care Benefit Program (Northwestern University HDHP Plan)*, BLUE CROSS BLUE SHIELD (Jan. 1, 2011), <http://www.northwestern.edu/hr/benefits/health-plans/employee-plans/Value-Cert.pdf> (example of a Blue Cross Blue Shield health care policy). In this policy:

AMBULANCE TRANSPORTATION . . . means local transportation in a specially equipped certified vehicle from your home, scene of accident or medical emergency to a Hospital, between Hospital and Hospital, between Hospital and Skilled Nursing Facility or from a Skilled Nursing Facility or Hospital to your home. If there are no facilities in the local area equipped to provide the care needed, Ambulance Transportation then means the transportation to the closest facility that can provide the necessary service.

*Id.*

609. See Eavis, *supra* note 2 (explaining the financial difficulties of an uninsured patient in Arizona).

610. Air Methods 2015 Annual Report, *supra* note 33, at 7–10, 13.

611. *Id.* at F-17.

612. Eavis, *supra* note 2.

613. Air Methods 2015 Annual Report, *supra* note 33, at F-5.

614. *But see* UnitedHealthcare Servs., Inc. v. Aspinio, 16 N.Y.S.3d 139, 150 (N.Y. Sup. Ct. 2015)

insurance does not cover the entire claim, the person is liable for the remainder.<sup>615</sup> This might be different for “in network” care.<sup>616</sup> Large health insurers negotiate arrangements with networks of health care providers that limit what the provider can charge, and these contractual arrangements usually address co-pays and deductibles and limit individual patient obligation to the benefit levels prescribed in the policy.<sup>617</sup> So it is kind of like Medicare’s prohibition against balance billing—light.

The current effort by the HEMS industry to increase Medicare reimbursement levels is premised on the argument that Medicare reimbursement levels have not kept up with cost increases.<sup>618</sup> In other words, the industry argues that inflation in HEMS costs has been greater than U.S. inflation generally, reflected by the consumer price index.<sup>619</sup> That seems like a compelling argument, except that the major reason for cost increases is overcapacity.<sup>620</sup> Too many HEMS providers have too many helicopters, and none of them fly enough fully to cover the fixed costs of their helicopters and bases and crews at reasonable charges.<sup>621</sup>

The insurance industry is sharply critical of HEMS-industry efforts to increase reimbursement.<sup>622</sup> Here is what one insurance lawyer said about the magnitude of the dispute:

Phi Air Medical had a base charge in 2014 of \$26,177.00 and a per mile charge of \$290. For 2014, Medicare’s rural base payment rate is \$5,167.61 and its rural mileage rate is \$33.65. Therefore, PHI’s billed charges are 507% of Medicare’s rural base payment rate ( $\$26,177.00/\$5,167.61 = 506.56\%$ ) and 862% of Medicare’s rural mileage rate ( $\$290.00/\$33.65 = 861.81\%$ ).

The comparison to Medicare’s urban rates is even more staggering. For 2014, Medicare’s urban base payment rate is \$3,445.07 and its urban mileage rate is \$22.43. Therefore, PHI’s billed charges are 759.84% of Medicare’s urban base payment rate ( $\$26,177.00/\$3,445.07 = 759.84\%$ ) and 1,292.91% of Medicare’s urban mileage rate ( $\$290.00/\$22.43 = 1,292.91\%$ ).<sup>623</sup>

---

(referring to practice by insurers to prohibit balancing billing by in-network providers; and denying claim to limit balance billing by out-of-network surgeon).

615. *How Much Does an Air Ambulance Cost?*, COSTHELPER HEALTH, <http://health.costhelper.com/air-ambulances.html> (last visited Oct. 6, 2016) (“For patients without health insurance, the cost of air ambulance service typically depends on: the current cost of jet fuel, the type of aircraft used, the distance flown and the type of medical staff required.”).

616. See generally BLUE CROSS BLUE SHIELD OF N.C., A STEP-BY-STEP GUIDE: UNDERSTANDING WHAT YOU OWE AFTER VISITING YOUR PROVIDER (2014), <https://www.bcbsnc.com/assets/members/public/mms/pdfs/what-you-owe.pdf> (guiding insured customers on different types of plans and what they entail).

617. *Id.*

618. Eavis, *supra* note 2.

619. *Id.*

620. *Id.*

621. *Id.*

622. Loughlin, *supra* note 552.

623. *Id.*

### 1. *Proposed Legislation*

On April 30, 2015, Senator David Vitter (R-LA) introduced S. 1149.<sup>624</sup> The text of the bill makes it obvious that it is favorable to the HEMS industry. Its findings recite that the “Medicare air ambulance fee schedule has never reflected true costs;” that inflation adjustments have averaged 2.2% per year; and costs have grown at a far greater rate.<sup>625</sup> It concludes that “balance [must] be restored to the air ambulance fee schedule to preserve access to timely care for tens of millions of Americans.”<sup>626</sup>

The bill would require that Medicare increase the rates by 20% for 2017, and by 5% per year for 2018–2019,<sup>627</sup> and that HEMS providers submit certain cost data *after* the increases go into effect.<sup>628</sup> By July 1, 2019, the Secretary of HHS and the Government Accountability Office must submit reports analyzing the data and recommending reimbursement rate changes.<sup>629</sup>

The bill is presently before the Senate Finance Committee.<sup>630</sup> The Committee’s website does not refer to the bill or to any hearings on it.<sup>631</sup> So it apparently is languishing in committee.

### 2. *Texas and Ohio Litigation Against Private Insurers*

The HEMS operators are getting more aggressive with respect to private insurers.<sup>632</sup> A major dispute erupted in Texas when PHI and other operators abandoned their historical acceptance of the 125%-of-Medicare-rate standard for workers’ compensation reimbursement, established by the state workers’ compensation division.<sup>633</sup> The operators now took the position that the Airline Deregulation Act preempts the division’s reimbursement rates for air ambulance services and that the workers’ compensation carriers were therefore obligated to reimburse “fair and reasonable” charges.<sup>634</sup> Several hundred consolidated cases went before an administrative law judge (ALJ) of the Texas division in 2005,<sup>635</sup> who issued a decision in late 2015.<sup>636</sup>

---

624. S. 1149, 114th Cong. (introduced Apr. 30, 2015).

625. *Id.*

626. *Id.* § 1.

627. Illinois Senator Mark Kirk and four others are co-sponsors, all Republicans, except for Senator Michael Bennett of Colorado, who is a Democrat. Both Colorado Senators are co-sponsors, which makes sense, given Air Methods’ Colorado origins.

628. S. 1149 § 2, amending 42 U.S.C. § 1395m(l)(16)(D) (2012) (listing fifteen cost items).

629. *Id.*

630. *S. 1149: A Bill to Amend Title XVIII of the Social Security Act to Require Reporting of Certain Data by Providers*, GOVTRACK, <https://www.govtrack.us/congress/bills/114/s1149> (last visited Oct. 6, 2016).

631. *Legislation*, U.S. SENATE COMM. ON FIN., [http://www.finance.senate.gov/legislation?PageNum\\_rs=1&c=114&maxrows=999999](http://www.finance.senate.gov/legislation?PageNum_rs=1&c=114&maxrows=999999) (last visited Oct. 3, 2016).

632. *See, e.g.*, Reimbursement of Air Ambulance Servs. Provided by PHI Air Med., No. 454-15-0681.M4 (Tex. Admin. Ct. Sept. 8, 2015) [hereinafter TX ALJ], [http://www.tdi.texas.gov/medcases/soah15/454-15-0681%20M4\(R\).pdf](http://www.tdi.texas.gov/medcases/soah15/454-15-0681%20M4(R).pdf).

633. *Id.*

634. *Id.*

635. *See* Loughlin, *supra* note 552 (reporting on litigation, in which he represented the insurance carriers).

636. TX ALJ, *supra* note 632.

An ironic aspect of the case is that the HEMS operators challenged the state workers' compensation division's rate as preempted by federal law, while also basing their claim for higher levels of reimbursement on the same state law.<sup>637</sup>

The ALJ held that the Airline Deregulation Act did not displace state power to regulate workers' compensation reimbursement for air ambulances.<sup>638</sup> The federal McCarran Ferguson Act<sup>639</sup> preserves state power to regulate insurance, and that overrode a broad interpretation of the ADA, which does not explicitly say anything about insurance.<sup>640</sup> But, he also held that the workers' compensation division had not exercised its authority to set quantitative limits on air ambulance reimbursement.<sup>641</sup> Its 125% limit was more general.<sup>642</sup> Accordingly, the relevant state statutory and regulatory provisions were those that required the reimbursement for air ambulance services to be "fair and reasonable."<sup>643</sup> Under the state statute, determination of "fair and reasonable" must meet several statutory touchstones, including requirements that the reimbursement level be such as to assure the quality of medical care; that they be such as to achieve effective medical cost control; and that they not exceed the reimbursement earned for similar treatment.<sup>644</sup>

Based on the evidentiary record generated in the proceeding, the ALJ found that the fee of 125% of Medicare preferred by the insurance carriers would cause PHI to operate at a loss,<sup>645</sup> but that the fees-as-charged approach urged by PHI would cause Texas to subsidize other PHI operations<sup>646</sup> and would not encourage cost control.<sup>647</sup> The evidence showed that PHI's requested level would be two to three times the rate actually paid by 72% of PHI's other patients.<sup>648</sup> He determined that 149% of the Medicare rate would be fair and reasonable, because it ensured PHI of the same level of profit it had earned in the preceding four years.<sup>649</sup> He also found no evidence that PHI was inefficient, which would have justified reimbursing less than that necessary to maintain profits.<sup>650</sup>

The result was the product of fairly traditional rate litigation: scrutinize costs, and if they seem to be reasonable, award a rate that assures a particular

---

637. *Id.*

638. *Id.* at 5. The ALJ decision published by the Texas Office of Administrative Hearings does not have page numbers. The version available on the office's website, however, is in PDF format, and it therefore is reasonable to assume that the page numbers provided by the Author of this Article are useful in the pinpoint citations to the opinion.

639. See 15 U.S.C. § 1011 (2012) (declaring that "silence on the part of the Congress" should not be interpreted as a barrier to state regulation of insurance).

640. TX ALJ, *supra* note 632, at 4.

641. *Id.* at 13.

642. *Id.* at 12–13.

643. *Id.* at 13.

644. *Id.* at 6 (summarizing criteria in Texas Labor Code § 413.011).

645. *Id.* at 14 (finding that 125% would have caused losses to PHI for 2010–2013).

646. *Id.* at 17–18 (justifying 149% as "subsidization neutral").

647. *Id.* at 17.

648. *Id.*

649. *Id.* at 22 (finding that PHI earned a pre-tax profit margin of 9.15% and an after-tax margin of 5% based on average recovery of 149% of the Medicare reimbursement amount).

650. *Id.* at 14 n.19.

level of profit.<sup>651</sup>

In November 2015, Air Evac filed a civil action against Medical Mutual of Ohio in Ohio state court.<sup>652</sup> The complaint alleges that the defendant insurance company is liable for underpaying claims for HEMS services.<sup>653</sup> It asserts breach of implied contract, quantum meruit, and open account, and seeks a declaratory judgment that Medical Mutual is obligated to pay Air Evac's billed charges.<sup>654</sup>

It alleges that Medical Mutual refused to pay more than 65% of Air Evac's typical price of \$20,000 per transport.<sup>655</sup> It claims that Medical Mutual in effect forced Air Evac to accept the same rates Medical Mutual negotiated with its in-network hospital-based HEMS providers.<sup>656</sup> It claims that Medical Mutual owes \$3.5 million for underpayments over the preceding two years.<sup>657</sup>

The breach of implied contract claim is premised on the allegation that Medical Mutual advises its beneficiaries to use the most convenient and accessible air ambulance services in an emergency, with knowledge that Air Evac frequently would be the most convenient and accessible, and with knowledge of Air Evac rates.<sup>658</sup> Thus, the complaint reasons, an implied contract arose to pay Air Evac rates.<sup>659</sup>

The quantum meruit theory argues that Air Evac conferred a benefit on Medical Mutual and that it would be unjust to allow Medical Mutual to retain the benefit without compensating Air Evac for the full value of its services.<sup>660</sup>

To prevail on its claim for quantum meruit, Air Ambulance must demonstrate that [1] it conferred a benefit upon Angel Jet; (2) Angel Jet either requested the benefit or knowingly and voluntarily accepted it; and (3) under the present circumstances it would be inequitable for Angel Jet to retain the benefit. The Eleventh Circuit has explained that "the remedy of quantum meruit derives from contracts 'implied in fact.' In these contracts the parties have in fact entered into an agreement but without sufficient clarity, so a fact finder must examine and interpret the parties' conduct to give definition to their unspoken agreement." In addition, "a claim for

---

651. "Traditional rate-of-return regulation attempts to set rates to give utilities a reasonable opportunity to recover costs incurred in providing service. The revenue requirement of a utility is set equal to the company's expenses plus a return on investment." Curtis B. Toll, *Telecommunications Infrastructure Development in Pennsylvania: A Prescription for Effective Regulatory Reform*, 98 DICK. L. REV. 155, 162 n.45 (1993) (discussing the traditional rate-of-return regulation and exploring alternatives).

652. Complaint, *Air Evac EMS, Inc. v. Med. Mut. of Ohio*, CV-15-854950 (Ct. C.P., Cuyahoga County, Ohio filed Nov. 25, 2015) [hereinafter *Air Evac Complaint*], <https://assets.documentcloud.org/documents/2714520/courttdoc2.pdf>.

653. *Id.* ¶ 1.

654. *Id.* ¶¶ 28–56.

655. *Id.* ¶ 19.

656. *Id.* ¶ 23.

657. *Id.* ¶ 27.

658. *Id.* ¶ 29.

659. *Id.* ¶ 30.

660. *Id.* ¶¶ 37–38. Quantum meruit recovery is available only in the absence of a contract. *See Life Care Ambulance, Inc. v. Hosp. Auth. of Gwinnett Cnty.*, 415 S.E.2d 502, 504 (Ga. Ct. App. 1992) (rejecting quantum meruit claim for 85% of amount invoiced for air ambulance transport because hospital and HEMS operator had an express contract for 60% of the invoiced amount).

quantum meruit requires that plaintiffs demonstrate an expectation of compensation.”<sup>661</sup>

The open account theory argues that Air Evac and Medical Mutual maintained an ongoing relationship through accounts allowing Medical Mutual to pay Air Evac’s charges,<sup>662</sup> and that Medical Mutual refused to pay in the full the charges to the open accounts.<sup>663</sup>

The declaratory judgment count seeks a judicial determination that “[t]he ends of justice require declaratory judgment issue that Medical Mutual is obligated to pay Air Evac’s billed charges.”<sup>664</sup>

The legal theories presented are recognized, but their application to the facts is aggressive and ambitious. It is unlikely that a trial on the merits would result in a judgment in Air Evac’s favor.

In any event, a trial on the merits is unlikely any time soon. Medical Mutual responded to the complaint, not by answering it, but by filing a separate action in federal court.<sup>665</sup> This complaint argues that federal law, specifically the Airline Deregulation Act and ERISA, preempts the state action.<sup>666</sup> On February 5, 2016, the state court stayed the state court action pending resolution of the federal lawsuit.<sup>667</sup>

### B. The Facts

Overall, all the evidence and expert analysis suggests that the 2002 reimbursement system has significantly distorted the market for HEMS, creating an oversupply of mostly private, for-profit community-based services in rural areas. The regulatory analysis in the 2002 Federal Register notice was prescient in predicting that the effect of the new system would be to shift reimbursement away from hospital-linked HEMS to community-based suppliers, away from ground ambulances to air ambulances, and away from urban areas to rural areas.<sup>668</sup>

All independent analyses agree that the effect of the 2002 fee schedule was to increase the supply of air ambulance providers. It increased rapidly after the fee schedule went into effect<sup>669</sup> and continues to increase, albeit more

---

661. Total Mktg. Techs., Inc. v. Angel MedFlight Worldwide Air Ambulance Servs., LLC, No. 8:10-CV-2680-T-33TBM, 2012 WL 2912515, at \*8 (M.D. Fla. July 16, 2012) (internal citations omitted) (quoting Tooltrend, Inc. v. CMT Utensili, SRL, 198 F.3d 802, 806 (11th Cir.1999)) (citing Eller Media Corp. v. Nat’l Union Fire Ins. Co., 355 F. App’x 340, 341–42 (11th Cir.2009)).

662. Air Evac Complaint, *supra* note 652, ¶ 41.

663. *Id.* ¶ 46.

664. *Id.* ¶ 55.

665. Complaint, Med. Mut. of Ohio v. Air Evac EMS, Inc., 1:16-cv-00080 (N.D. Ohio, filed Jan. 13, 2016), <https://assets.documentcloud.org/documents/2714519/courtdoc1.pdf>.

666. *Id.* ¶¶ 17–18.

667. Medical Mutual’s Motion to Stay the Case Granted, Air Evac EMS, Inc. v. Med. Mut. of Ohio, CV-15-854950 (Ct. C.P., Cuyahoga County, Ohio Feb. 5, 2016).

668. See Medicare Program; Fee Schedule for Payment of Ambulance Services, 67 Fed. Reg. 9100, 9131 (Feb. 27, 2002) (to be codified at 42 C.F.R. pts. 410, 414) (projecting shifts in relative reimbursement levels).

669. See MEDICARE PAYMENT ADVISORY COMM’N, REPORT TO THE CONGRESS: MEDICARE AND THE HEALTH CARE DELIVERY SYSTEM 169 (June 2013) [hereinafter MEDPAC REPORT], [http://www.kslaw.com/library/publication/hh061713\\_junereport.pdf](http://www.kslaw.com/library/publication/hh061713_junereport.pdf) (reporting the number of air ambulance supplies increased “rapidly” after implementation of 2002 fee schedule “and its add-on payments for air ambulance services to

slowly.<sup>670</sup> While HEMS constituted a relatively small portion of total Medicare reimbursement requests (1%)<sup>671</sup> it represented a much higher proportion of total dollars reimbursed (8%).<sup>672</sup> Additionally, urban HEMS reimbursement was smaller than reimbursement for rural HEMS,<sup>673</sup> despite much larger populations living in urban areas.<sup>674</sup>

Evidence supporting a *need* for more air ambulances is shaky, however.<sup>675</sup> The number of automobile accidents actually decreased during this period.<sup>676</sup> Decreasing numbers of highway accidents does not suggest a need for more air ambulances for accident-extraction transport.

The evidence for more interfacility transport, however, is persuasive. The number of acute care hospital admissions has declined,<sup>677</sup> and fewer patients seem to suggest *fewer* interfacility transports. On the other hand, more specialization by hospitals<sup>678</sup> supports the need for more interfacility transports, and improvements in organ-transplant technology suggests the need for more air ambulance missions for that purpose. Specialization is part of a trend toward hospital system consolidation,<sup>679</sup> which opens up the possibility for more coordination of HEMS and a possible trend back toward a hospital-based model for HEMS.

---

rural areas”).

670. See *id.* at 173 (reporting 420 air ambulance suppliers that billed Medicare in 2011, up 3% from 2008).

671. *Id.* at 169.

672. *Id.* (“Air ambulance transports made up less than 1% of total ambulance claims but, because of their high cost, represented 8% of total Medicare spending on ambulance services in 2011.”).

673. See *id.* at 176 (reporting 58,532 rural claims receiving add-on in 2012, compared with 24,000 urban air ambulance claims not receiving rural add-on).

674. *Id.* at 178.

675. 2010 GAO REPORT, *supra* note 93 (agreeing that the number of HEMS helicopters increased dramatically since implementation of 2002 fee schedule but concluding that there is insufficient evidence to take a position on effect).

676. See *General Statistics: Fatality Facts for 2014*, IIHS HLDI (Feb. 2016), <http://www.iihs.org/iihs/topics/t/general-statistics/fatalityfacts/overview-of-fatality-facts> (showing steady decline from 38,491 fatal accidents in 2002 to 29,989 in 2014).

677. Trustee Staff, *7% Decline in Inpatient Admissions per Capita Between 2008 and 2012*, TRUSTEE MAG., May 12, 2014, at 36, <http://www.ahadataviewer.com/Global/Trustee%20Dashboards/May%202014%20Trustee%20Dashboard.pdf>.

678. Few hospitals can afford state-of-the-art capability across a broad range of life-threatening health conditions. Ronald A. Wirtz, *Health Care Consolidation: Which Way Is Up, and Why Are We Going There?*, FEDGAZETTE, Oct. 2015, at 5–6. Significant economies of scale operate when a system is able to treat lower acuity patients in lower technology community hospitals, and to move higher acuity patients to a single high-technology tertiary care system at the center of a hospital system as necessary. See, e.g., Kristin Gourlay, *The Pulse: How Does Hospital Consolidation Help, or Hurt Patients?*, R.I. PUB. RADIO (Oct. 22, 2015), <http://ripr.org/post/pulse-how-does-hospital-consolidation-help-or-hurt-patients> (“The second thing [about hospital consolidation] is identifying which hospital will take the lead in certain very specialized services like heart transplants or liver transplants. You want one hospital to do it really well, instead of having two doing it ok, each one of them.”).

679. According to a 2013 study published in the Journal of the American Medical Association by a member of the Harvard economics faculty and a member of the Yale School of Management faculty, 60% of American hospitals are part of hospital systems. Cutler & Morton, *supra* note 49, at 1965 tbl.1. The average hospital system comprises 3.2 hospitals. *Id.* At the same time, the success of health care reform cost containment efforts has dramatically reduced the length of patient stays and thus the traditional revenue base for community hospitals. See *id.* at 1965–66 (reporting a 33% decline in hospital days from 1981 to 2011 and 15% reduction in the number of hospitals). This induces smaller hospitals to merge into larger systems for access to necessary resources, including capital for improving specialized patient care. *Id.*

The increasing market power of large hospital systems reduces fragmentation in hospital contract-based HEMS service.<sup>680</sup> HEMS operators can obtain larger contracts to provide support to a health care system rather than having to negotiate many smaller contracts with individual hospitals.<sup>681</sup> Larger systems are more likely than small independent hospitals to have the resources to negotiate hybrid HEMS deals, in which the HEMS operator does not have to fund all of the fixed costs.<sup>682</sup>

It also opens up new possibilities for coordination among HEMS operators. The Sentara Healthcare system in Virginia,<sup>683</sup> for example, has a total of twelve hospitals, several of them clustered in the Norfolk-Newport News area, and others clustered in central Virginia around Charlottesville.<sup>684</sup> Sentara offers contract-based HEMS through its Nightingale air ambulance service in the Norfolk region,<sup>685</sup> operated by Metro Aviation.<sup>686</sup> Sentara also could enter into a contract with the same or another HEMS operator in the Charlottesville area. With two such HEMS arrangements, the system would be in a position to coordinate coverage between the two operators.

It is easy to attack the high list prices for self-payers as a form of price gouging, suggesting some kind of moral failure in the leadership of HEMS operators. But, it is not a moral failing; it is simply the market and microeconomics at work. Fixed costs are what they are; variable costs are what they are; the frequency of the need for HEMS services is determined by the fortuity of accidents and acute illnesses.<sup>687</sup> And the total available revenue is a result of those fortuities.<sup>688</sup> If total reimbursement from third-party payers does not cover average costs, prices to self-payers must increase accordingly.<sup>689</sup>

In the absence of a universal, single-payer health care system, price discrimination<sup>690</sup> will continue to be the norm in health care,<sup>691</sup> including

---

680. *Id.*

681. *Id.*

682. *Id.*

683. SENTARA, <https://www.sentara.com> (last visited Oct. 6, 2016).

684. *Hospitals & Locations*, SENTARA, <https://www.sentara.com/hospitalslocations.aspx> (last visited Oct. 6, 2016).

685. *Nightingale Regional Air Ambulance*, SENTARA, <http://www.sentara.com/medicals/services/services/nightingale/about-nightingale/history.aspx> (last visited Oct. 6, 2016).

686. *Operations Customers: Nightingale*, METRO AVIATION, <http://www.metroaviation.com/operations-customers.php?id=17&cid=3> (last visited Oct. 6, 2016) (summarizing the Nightingale arrangement).

687. See generally Daniel J. Gifford & Robert T. Kudrle, *The Law and Economics of Price Discrimination in Modern Economies: Time for Reconciliation?*, 43 U.C. DAVIS L. REV. 1235, 1245 (2010).

688. *Id.*

689. *Id.*

690. See *id.* (analyzing price discrimination and pointing out that it may be necessary in markets where suppliers have high fixed costs). The classic example of price discrimination involves a monopolist who sets prices high in markets where it enjoys monopoly power, and low in markets where it confronts competition. *Id.* at 1241. In the health care market, price discrimination occurs, not because of monopoly power by sellers but because of monopsony power by buyers. See generally Jack A. Rovner, *Monopsony Power in Health Care Markets: Must the Big Buyer Beware Hard Bargaining?*, 18 LOY. U. CHI. L.J. 857, 863–65 (1987) (discussing monopsony in health care markets). A monopsonistic market is one in which there is only one buyer. *Id.* at 863. An oligopsonic market is one in which there are only a few buyers. *Oligopsony*, BUS. DICTIONARY, <http://www.businessdictionary.com/definition/oligopsony.html> (last visited Oct. 6, 2016). The health care market is an oligopsony. Todd Heilskov, *Hospital Mergers Can Raise Costs, Have Some Benefits*, WALL ST. J.



helicopter air ambulance transportation. Governmental payers like Medicare and Medicaid have market power to set reimbursement rates at or below provider costs. Most private health care insurers also have some significant market power, although competition among them is not entirely absent.<sup>692</sup> Because of their market power, they also can set reimbursement rates below, at, or only slightly above provider costs.

In any market, suppliers with high fixed costs are better off to sell an additional unit of service as long as the price exceeds their marginal cost.<sup>693</sup> The net result, however, is that they may not earn enough total revenue to cover their fixed costs, and eventually go out of business or enter bankruptcy reorganization.<sup>694</sup> HEMS operators will provide service in exchange for very low Medicare and private insurance rates as long as they are high enough to cover their marginal costs.<sup>695</sup> Then, they will charge much higher prices to buyers who will pay more.<sup>696</sup> That may be health care insurers with “Cadillac plans” that pay the full price charged or a significantly higher percentage than other insurers, or it may be individuals who have enough wealth and income to pay the higher price out-of-pocket.

---

(Oct. 8, 2014, 3:49 PM), <http://www.wsj.com/articles/hospital-mergers-can-raise-costs-have-some-benefits-letters-to-the-editor-1412797781>. In such a market, seller pricing is constrained by the market power of buyers. *Id.* In order to achieve a profit, sellers must charge lower prices to the oligopsonists and make up for it with higher prices in markets where there are multiple buyers. Gifford & Kudrle, *supra* note 687.

691. See *Ball Mem'l Hosp. v. Mut. Hosp. Ins., Inc.*, 784 F.2d 1325, 1339, 1340 (7th Cir. 1986) (exploring price discrimination in health care market and explaining why price discrimination need not be justified by costs); *Rome Ambulatory Surgical Ctr., LLC v. Rome Mem'l Hosp., Inc.*, 349 F. Supp. 2d 389, 411 (N.D.N.Y. 2004) (holding that discounted prices in some markets are legitimate); see also William P. Kratzke, *Tax Subsidies, Third-Party Payments, and Cross Subsidization: America's Distorted Health Care Markets*, 40 U. MEM. L. REV. 279, 294 (2009) (exploring role of price discrimination and cross subsidization in health care market). “This ‘cost-shifting’ requires that those who *can* pay more to do so for the benefit of those who cannot pay (enough), and that those who provide health care services to provide them to those who cannot pay (enough) for them.” Kratzke, *supra*, at 294.

692. Kratzke, *supra* note 691, at 281.

693. See *Celanese Chem. Co. v. United States*, 632 F.2d 568, 571 nn.4–6 (5th Cir. 1980) (explaining variable costs and observing that railroad has incentive to accept rates that cover variable costs even if they do not cover full costs).

694. That was the central dilemma of railroad rate regulation. Russell W. Pittman, *The Economics of Railroad “Captive Shipper” Legislation*, 62 ADMIN. L. REV. 919, 924 (2010). In a competitive market, railroad companies compete with each other at rates that cover their marginal costs but not their fixed costs. See *id.* (explaining how high fixed costs lead to price discrimination, and explaining fully-allocated cost concept). The result was a continuing series of railroad reorganizations in bankruptcy. Churchill Rodgers & Littleton Groom, *Reorganization of Railroad Corporations Under Section 77 of the Bankruptcy Act*, 33 COLUM. L. REV. 571, 571–72 (1933). A central purpose of railroad rate regulation under the Interstate Commerce Act was not to set *ceilings* for rates, but instead to set *floors*, which disallowed rates below “fully allocated costs.” See David Boies, Jr., *Experiment in Mercantilism: Minimum Rate Regulation by the Interstate Commerce Commission*, 68 COLUM. L. REV. 599, 601 (1968) (analyzing minimum rate floors imposed by the Interstate Commerce Commission (ICC)); *id.* at 602–03 (exploring history of ICC in the conflict over maximum- and minimum-rate regulation); *id.* at 604–05 (analyzing railroad advocacy of regulation to limit rate competition, which was not covering fixed costs); *id.* at 606–07 (explaining that Elkins Act and Mann-Elkins responded to railroad pressure to limit rate cutting); *id.* at 631–32 (explaining rate-setting standard that requires rates to cover full costs).

695. Pittman, *supra* note 694, at 926.

696. See generally *Hous. Lighting & Power Co. v. United States*, 606 F.2d 1131, 1147 (D.C. Cir. 1979) (reviewing ICC determination of fully allocated costs and need for capital-investment incentive). “Since much railroad traffic moves at rates below fully allocated costs because of competitive pressures, a railroad must be allowed to set some rates in excess of their full cost level where competition, market conditions and demand permit.” *Id.*

The problem HEMS operators are facing is that their average costs are increasing much faster than the Medicare and typical insurance reimbursement levels, and they therefore must greatly increase the prices to a diminishing pool of individuals who can afford them.<sup>697</sup> While individuals may have sufficient liquid assets to pay a \$40,000 air ambulance bill, a sudden expense of that magnitude represents a serious disruption to the economic welfare of anyone except the truly wealthy.

The larger the gap between average costs and reimbursement levels at the low-end, the greater the burden on a very small minority of patients.<sup>698</sup> Lawsuits and personal bankruptcy are not a very good way of working this out.

## X. THE SOLUTION

If, as this Article argues, there are too many air ambulances, the solution is not to increase payments for air ambulance services. Instead, the present price-cost squeeze will eventually rationalize the industry, encouraging consolidation and closing bases that do not have adequate volume. Moreover, immunizing air ambulance service from the health care planning mechanisms that extend to all other health care institutions is a mistake. Air ambulances are not airlines, within the intended scope of the Airline Deregulation Act. The FAA, the courts, and Congress, if necessary, should repudiate the idea that the ADA preempts regulation of air ambulances by state health care agencies.

These policies, aimed at the economic crisis, will also improve air ambulance safety. Better aircraft utilization will improve the ability to absorb equipment enhancement, such as the installation of autopilots, and it will improve pilot proficiency to deal with IIMC and other emergencies.

Arguments always will exist that more health care—and more air ambulances—would be better, but given the substantial public sector involvement with health care and the fact that air ambulances, like most health care, is intertwined with public finance, the same mechanisms used to rationalize and ration health care in general should be applied to air ambulance service.

### A. *Economics*

As Part VIII explains, HEMS average costs are increasing much faster than Medicare and insurance reimbursement levels, and HEMS operators therefore must greatly increase the prices to a diminishing pool of wealthier and wealthier individuals.<sup>699</sup>

The advocates of the existing system have valid justifications for an increase in HEMS service after the 2002 Medicare fee increase: many communities, especially rural ones, were underserved—and still are. Changes in the structure of institutional health care justify an increase in non-trauma

---

697. Eavis, *supra* note 2.

698. *Hous. Lighting & Power Co.*, 606 F.2d at 1147.

699. Kratzke, *supra* note 691.

HEMS transportation, as advanced care is centralized in some hospitals, necessitating more interfacility transport. Data shows that HEMS transport, properly triaged, does improve outcomes for accident victims.<sup>700</sup>

The problem is that the market has reacted as markets are supposed to: an increase in price has drawn more suppliers into the marketplace—too many to earn an acceptable rate of return.<sup>701</sup>

A number of options exist to address the perceived problem:

- Increase Medicare reimbursement, as the HEMS industry proposes and as S. 1149<sup>702</sup> would do;
- Restructure the Medicare reimbursement formula;
  - Distinguish emergency HEMS flights from non-emergency flights. The statute authorizes Medicare to “consider” “operational differences” in setting the fee schedule;<sup>703</sup>
  - The 2002 fee schedule distinguishes emergency transport from non-emergency transport for ground ambulance reimbursement<sup>704</sup> but makes no such distinction for HEMS;
  - Introduce some form of quality measure and utilization incentives in the reimbursement formula;
- Relax preemption to allow state health care regulators to limit HEMS provider entry, by requiring certificates of need or otherwise;<sup>705</sup> or
- Keep the Medicare reimbursement fee schedule as it is, and rely on other means to cover increasing HEMS costs such as state and local subsidies or insurance.

### 1. *Adjusting Medicare Reimbursement*

As health care reformers have done in other areas of price inflation, air ambulance reimbursement under the 2002 approach is aimed at cost control, by providing fixed rates for defined services instead of simply reimbursing costs or prices.<sup>706</sup> The problem is that the level of the fixed rate has drawn in too many suppliers. The theme of all health care funding now is to provide economic incentives for health care decision-makers not to over-utilize expensive procedures and to slow the tendency toward overinvestment in expensive capital.<sup>707</sup> The answer is not public policy that increases the price

700. Karen Kaplan, *Trauma Patients More Likely to Survive if Rescued by Helicopter*, L.A. TIMES (Apr. 17, 2012), <http://articles.latimes.com/2012/apr/17/news/la-heb-helicopter-vs-ambulance-20120417>.

701. MEDPAC REPORT, *supra* note 669.

702. S. 1149, 114th Cong. (introduced Apr. 30, 2015); *see also supra* Section IX.A.1.

703. 42 U.S.C. § 1395m(l)(2)(C) (2012).

704. *See* Medicare Program; Fee Schedule for Payment of Ambulance Services, 67 Fed. Reg. 9100, 9108 (Feb. 27, 2002) (to be codified at 42 C.F.R. pts. 410, 414) (explaining justification for higher payment for emergency medical response by ground ambulance is to recognize the additional cost of maintaining readiness for sudden callout, e.g., in response to 911 call).

705. 2010 GAO REPORT, *supra* note 93, at 21 (summarizing state EMS officials’ advocacy of state power to regulate the number of HEMS helicopters).

706. *CMS Releases Medicare Ambulance Fee Schedule*, INT’L ASS’N FIRE CHIEFS, [www.iafc.org/files/iafcfinalrulesummary.doc](http://www.iafc.org/files/iafcfinalrulesummary.doc) (last visited Oct. 6, 2016).

707. *See, e.g.,* Elizabeth Teisberg et al., *Making Competition in Health Care Work*, HARV. BUS. REV.,

further, only making the problem worse. It is not appropriate policy, nor is it consistent with market economics, simply to increase government payments whenever, and only because, the recipients would like them to be higher. The answer is to let the market work. Markets are very good at adjusting for excess supply.<sup>708</sup>

It is possible that the Medicare formula should be different. In other words, maybe the HEMS reimbursement should be more elaborate than the simple approach embodied in the 2002 fee schedule. It is possible, of course, that the geographic adjustment factors are not appropriate for HEMS or that using the consumer price increase as the basis for an inflation index is not appropriate. It is not clear, however, why either measure is inappropriate, and the burden should be on those seeking a price increase to show why they are.

Fuel prices are a major component of HEMS operating costs, and they rose sharply during part of the post-2002 period.<sup>709</sup> Recently, however, they have declined even more sharply.<sup>710</sup> Over the fourteen-year period since the fee schedule was promulgated, fuel costs have dropped.<sup>711</sup> So, if anything, the importance of fuel in the HEMS cost equation says that the CPI is *too* generous as an inflation adjustor. Nothing indicates that labor costs in the HEMS industry have increased more rapidly than in the economy generally. So there is no *prima facie* indication that the geographic adjustment formula is flawed.

Compliance with the new Subpart L in FAR Part 135 will increase some HEMS operator costs,<sup>712</sup> and it is arguable that government payments should increase to cover these costs. It is also arguable, however, that the new regulatory requirements simply reflect best practices already in wide use by the better HEMS operators, in which case there is no reason now to reward their competitors who have been less willing to spend voluntarily on safety.

## 2. *Allowing State Regulation*

One physician urges more complex incentives:

CMS reimbursement for HEMS transport must be tied to quality measures and appropriate utilization, as it is in almost every other aspect of modern medicine. When quality is incentivized, much of

---

July–Aug. 1994, <https://hbr.org/1994/07/making-competition-in-health-care-work> (describing incentive structures and financial strategies in health care).

708. *Impacts of Surpluses and Shortages on Market Equilibrium*, BOUNDLESS ECON. (May 26, 2016), <https://www.boundless.com/economics/textbooks/boundless-economics-textbook/introducing-supply-and-demand-3/market-equilibrium-48/impacts-of-surpluses-and-shortages-on-market-equilibrium-180-12278/>.

709. James Murray & David King, *Oil's Tipping Point Has Passed*, 481 NATURE 433 (Jan. 26, 2012), [http://www.washington.edu/research/SITEPARTS/documents/.or/Nature\\_Comment\\_01\\_26\\_2012.pdf](http://www.washington.edu/research/SITEPARTS/documents/.or/Nature_Comment_01_26_2012.pdf).

710. Rachel Premack, *Gas Prices Dip to a 13-Year Low Ahead of July 4 Holiday Weekend*, WASH. POST (June 30, 2016), [https://www.washingtonpost.com/business/economy/gas-prices-dip-to-a-13-year-low-ahead-of-july-4-holiday-weekend/2016/06/30/5f23233a-3ee0-11e6-a66f-aa6c1883b6b1\\_story.html](https://www.washingtonpost.com/business/economy/gas-prices-dip-to-a-13-year-low-ahead-of-july-4-holiday-weekend/2016/06/30/5f23233a-3ee0-11e6-a66f-aa6c1883b6b1_story.html).

711. See, e.g., *id.* (recounting an instance of particularly low fuel prices).

712. See Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations; Final Rule, 79 Fed. Reg. 9932, 9961 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135) (estimating costs of compliance at approximately \$9.1 million). Air Methods estimates the cost of compliance with the new equipment requirements as \$4.2 million to \$5.5 million. See Air Methods 2015 Annual Report, *supra* note 33, at 1, 4 (estimating the three-year cost of complying with Subpart L).

the redundant, profit-driven subsection of the HEMS industry will fade away and so will many of its inherent problems.<sup>713</sup>

But that begs the question of who will choose the quality measures and determine “appropriate” utilization. State and local governments regulate market entry and exit of ground ambulances and, they argue, they should be able to do the same for air ambulances.<sup>714</sup>

The creation of an EOA [exclusive operating area] is an “important administrative tool for designing an EMS system” because “an EOA permits local EMS agencies to offer private emergency service providers protection from competition in profitable, populous areas in exchange for the obligation to serve unprofitable, more sparsely populated areas.”<sup>715</sup>

Markets generally are better at allocating resources than regulation.<sup>716</sup> That counsels skepticism about proposals to empower states to impose certificate-of-need requirements or other entry restrictions on HEMS operators. But the sellers in most markets do not derive 30%–40% of their revenue from government payments, and from other payers (private-sector health insurers) who do not receive services.<sup>717</sup> The evidence is unmistakable that changes in Medicare reimbursement dramatically affected HEMS industry structure, in a way that a purely private market would not have reacted.<sup>718</sup> So the status quo is not really a free market; it is a heavily subsidized and regulated market.

The straightforward way to enable state regulation of HEMS utilization and outcomes is to repudiate federal preemption under the Airline Deregulation Act, a step that could be taken simply by a reinterpretation of the Act’s language, giving more weight to the statutory purpose and the context within which it was enacted.

### 3. *Allowing the Market to Work*

Regardless of whether states are allowed to play a more active role in regulating air ambulances, one obvious first step to solve the oversupply of HEMS services is to refuse the industry’s request for a Medicare rate increase, basically by letting bills like S. 1149<sup>719</sup> die in committee. Maintaining the existing fee schedule, including its inflation adjustment, leaves open at least two possible ways of adjustment. First, the marginal operators who do not attract enough business to cover their fixed costs eventually will be forced out

---

713. Abernethy, *supra* note 7.

714. U.S. DEP’T OF TRANSP., *supra* note 371.

715. *Cty. of Butte v. Emergency Med. Servs. Auth., Inc.*, 115 Cal. Rptr. 3d 128, 133, 140–41 (Cal. Ct. App. 2010) (quoting *Valley Med. Transp., Inc. v. Apple Valley Fire Prot. Dist.*, 952 P.2d 664, 671 (Cal. 1998)) (explaining designation of exclusive operating area for EMS and rejecting division of responsibility among local agencies).

716. See, e.g., Daron Acemoglu et al., *Market Versus Governments*, 55 J. MONETARY ECON. 159, 161 (2008) (describing negative effect rent-seeking by politicians has on allocation of resources).

717. Bob Herman, *Air Ambulance Industry Counts on Congress to Boost Medicare Pay*, MODERN HEALTHCARE (Aug. 11, 2015), <http://www.modernhealthcare.com/article/20150811/NEWS/150819984>.

718. Huber, *supra* note 585.

719. S. 1149, 114th Cong. (introduced Apr. 30, 2015); see also *supra* Section IX.A.1.

of business. A new equilibrium will address the oversupply problem. A second way is to shift the responsibilities for subsidizing HEMS to state and local government.

#### 4. *Private Insurance*

Another solution is to extend the idea of operator memberships. Any HEMS operator is free, of course, to offer memberships as a form of insurance.<sup>720</sup> The membership revenue covers the shortfall in other sources of revenue.<sup>721</sup> But, as the University of Oklahoma study observed, when multiple providers serve a market, and some HEMS patients have memberships and some do not, matching the member with his operator is unrealistic in an urgent, life-threatening situation.<sup>722</sup>

The membership idea could be extended if operators get together and form a mutual insurance company, specializing in air ambulance insurance. LifeShield Alliance<sup>723</sup> already offers this approach, through insurance underwritten by the Chubb Group.<sup>724</sup>

Unless membership-insurance coverage is nearly universal, though, the price discrimination problem would continue. It is hard to imagine that air ambulance service would be provided or withheld depending on whether a patient has insurance, whether through such a mutual insurance scheme or otherwise. Volunteer fire departments that refuse to fight fires at residences or businesses that have not subscribed have been so unpopular that the practice is uncommon.<sup>725</sup>

#### 5. *Subsidies for Low Population Density Areas*

Assuring adequate HEMS coverage for rural areas presents a policy dilemma that cannot be solved by greater reliance on markets; in some parts of the country, the population density is simply inadequate to make air ambulance service compensatory.<sup>726</sup> The existence of the rural add-on in the 2002 Medicare formula represents policymakers' recognition of that fact.<sup>727</sup> The

---

720. See, e.g., Huber, *supra* note 585 ("Air Methods has an air medical membership (\$49 per year per household) called OmniAdvantage; there is no additional transport cost for members flown via Air Methods.").

721. *Id.* ("The poor outcomes relative to unresolved balance bills are usually the result of a patient's refusal to engage with us in the process.").

722. THOMAS ET AL., *supra* note 17, at 7; see also *supra* Section III.B.

723. *About Us*, LIFE SHIELD ALLIANCE, <http://www.lifeshieldalliance.com/about-us> (last visited Oct. 6, 2016); *About Us: FAQs*, LIFE SHIELD ALLIANCE, <http://www.lifeshieldalliance.com/about-us/faqs> (last visited Oct. 6, 2016) ("No matter which air ambulance provider carries you, and no matter where, you are covered because the insurance coverage you receive through Chubb applies to any air ambulance provider in the United States.").

724. *Chubb Terms and Conditions*, LIFE SHIELD ALLIANCE, <http://www.lifeshieldalliance.com/chubb-terms-conditions> (last visited Oct. 6, 2016).

725. *Rural Firefighters Watch as Fire Hits Nonmember*, COLUMB. DAILY TRIB. (Feb. 16, 2006), <http://archive.columbiatribune.com/2006/Feb/20060216News009.asp>.

726. THOMAS ET AL., *supra* note 17, at 11.

727. A. CLINTON MAC KINNEY ET AL., RURAL POL'Y RES. INST., MEDICARE PHYSICIAN PAYMENT POLICY AND THE RURAL PERSPECTIVE 3 (Nov. 2008), <http://cph.uiowa.edu/rupri/publications/finalreports/Medicare>

rural add-on represents a significant portion of HEMS revenue,<sup>728</sup> and this has provided a continuing incentive to increase air ambulance availability in rural areas. A Medicare advisory committee report to Congress found that, overall, rural areas were well served<sup>729</sup> and recommended elimination of the 50% premium for rural HEMS service.<sup>730</sup>

Whether rural areas are “well served” by HEMS depends on the value society attaches to reducing mortality and morbidity in people who suffer accidents or acute illness such as heart attack or strokes in isolated areas, where the population density and automobile traffic levels are insufficient to result in breakeven flight frequencies for HEMS operators. For someone suffering a heart attack or a stroke in a rural area or experiencing a farm, logging, or hunting accident in such an area, the availability of helicopter air ambulance transportation is likely to make a difference between life and death.

A pure market approach will not make air ambulance service available in those circumstances, because the total revenue is insufficient to provide a rate of return adequate to attract investors.<sup>731</sup> Some form of subsidy is necessary.<sup>732</sup> It can come from higher across-the-board reimbursement rates by Medicare, Medicaid, and private insurance, or it can come from the same state and local sources that support community hospitals.

Society may make a political judgment that it simply costs too much to save a life in extreme circumstances. That decision is unlikely to be justified explicitly in terms of the value of a life, but it implicitly results from financial support decisions couched in other terms.

If health care policy were to deal with this at the national level, it could do so by adjusting the rural adjustment for the Medicare fee schedule based on population densities—a higher adjustment for low-density areas, and a lower adjustment one for higher-density areas. But that approach would intensify the criticism that Medicare is subsidizing an excess supply of operators where they are not needed.

The pros and cons of allocating additional resources for low-density population areas is better handled at lower levels of government, where local residents can make the tradeoff between tax levels and emergency medical transportation.

The final, and best, possibility is for states and localities believing that they need more HEMS service to contract with existing operators to provide it. That would result in an infusion of public funds from the state and local level to address localized shortages. The public finance impact is essentially a wash;

---

%20Physician%20Payment%20Policy%20and%20the%20Rural%20Perspective%20Final%20Report.pdf.

728. See MEDPAC REPORT, *supra* note 669, at 176 (reporting that air rural add-on applied to 58,532 claims in 2012, with an average add-on per claim of \$2,144, and total spending impact of \$126 million).

729. *Id.* at 186 (finding no evidence of difficulty accessing ambulance services).

730. *Id.* at 185 (recommending termination of rural add-on for air ambulance reimbursement).

731. See, e.g., THOMAS ET AL., *supra* note 17, at 106–07 (“No one . . . criticized the air medical service that ran the Guymon aircraft, for removing that aircraft. All understood the economics . . .”).

732. See, e.g., THOMAS ET AL., *supra* note 17, at 108 (noting that a prehospital provider familiar with the panhandle situation noted that the helicopter removal “crippled our ability to move people quickly,” and that “we really need some state-subsidized helicopter service”).

increased revenues for HEMS from state and local budgets rather than from the federal budget.

Localities threatened by a diminution or relocation of HEMS service can assess their emergency medical air transportation needs and offer subsidies or contracts to private HEMS operators to meet those needs. This might take the form of grants or it might take the form of contracts. This form of financial support for HEMS operations need not be accompanied by any specific limitations on aircraft, equipment, crews, or operations, although it could be.

While state *regulation* of HEMS service is preempted, the preemption does not extend to contract or grant conditions.<sup>733</sup>

This is not a revolutionary idea. Some HEMS providers already enter into contracts that exchange HEMS service at a particular location for local support, for example, in the form of free hangar space.<sup>734</sup> And, of course, HEMS providers regularly enter into contracts with hospitals that vary enormously in the terms of service the private sector operator is obligated to provide under the contract.<sup>735</sup> If the local officials have a view on particular characteristics of HEMS service, such as whether only twin-engine helicopters should be flown, only two-pilot helicopters, only NVG-equipped helicopters, or only IFR-capable helicopters, they can include those limitations in solicitation of proposals, and interested operators can educate them about the cost through the negotiation process. It is likely that the operator will want some economic security under the grant or contract. Therefore, it is likely the terms of such contracts or grants would run for three to five years.

Not every HEMS provider in the area need get a contract or grant, as long as state procurement or grant procedures are followed. In effect, it permits states and their subdivisions to select a preferred HEMS provider, as several states have tried to do unsuccessfully due to federal preemption.<sup>736</sup>

This approach provides something for everyone. It provides a source of additional revenue for HEMS operators. It spares an additional draw on the Medicare budget. It provides a pathway for health care resource coordination by states. It decentralizes decisions about the details of HEMS service, reflecting local needs and priorities identified by those that know them best. It

---

733. See, e.g., *Am. Airlines v. Wolens*, 513 U.S. 219, 233 (1995) (finding that a state breach of contract action for violating terms of frequent flying program was not preempted). “[T]erms and conditions airlines offer and passengers accept are privately ordered obligations ‘and thus do not amount to a State’s ‘enact[ment] or enforce[ment] [of] any law, rule, regulation, standard, or other provision having the force and effect of law’ within the meaning of [§] 1305(a)(1).” *Id.* at 228–29 (quoting Brief for United States as Amicus Curiae at 9).

734. See Lisa Broadt, *Fla. County to Enter into Negotiations with Vendor to Replace Lifestar Air Medical Service*, EMS WORLD (Oct. 22, 2014), <http://www.emsworld.com/news/12012099/fla-county-to-enter-into-negotiations-with-vendor-to-replace-lifestar-air-medical-service> (reporting on county fire-rescue unit’s negotiations over five-year contract with PHI); Eric Blom, *County Ambulance Service Talks Continue with Private Helicopter Firm*, RANGER (Oct. 25, 2015), [https://www.dailyranger.com/story.php?story\\_id=20253&headline=county-ambulance-service-talks-continue-with-private-helicopter-firm](https://www.dailyranger.com/story.php?story_id=20253&headline=county-ambulance-service-talks-continue-with-private-helicopter-firm); Sabina Bhasin, *Lee County Picks Private Company to Run Air Ambulance Service*, NAPLES DAILY NEWS (Feb. 19, 2013), <http://www.naplesnews.com/news/local/lee-county-picks-private-company-to-run-air-ambulance-service-ep-384735943-342231511.html> (reporting on negotiations with Air Methods to take over county-run HEMS for a base fee of \$13,504 to respond to a call and \$135 per mile).

735. See, e.g., Broadt, *supra* note 734; Blom, *supra* note 734; Bhasin, *supra* note 734.

736. See *supra* Section VII.B (explaining application of preemption).



avoids the need for amending the Medicare Act or the Airline Deregulation Act with attendant political uncertainties and delays.

#### 6. *Centralizing Dispatch*

Air Methods and PHI, the largest HEMS operators, maintain centralized dispatch functions.<sup>737</sup> First responders decide which HEMS operator to call when several are available in the area.<sup>738</sup> The transaction costs of deciding whom to call, the safety risks associated with multiple calls when the first operator turns down a call for weather reasons, and unreliable ETA estimates have led some states to consider inserting a state- or county-run HEMS dispatch center between first responders and the HEMS operator centers.<sup>739</sup> Such a step, however, likely would increase net transaction costs because it would require two handoffs, one from the first responders' dispatcher to the HEMS center, and another from the HEMS center to one or more HEMS operators.

The technology exists, of course, to tie all this together, just as an individual operator's center is tied to the necessary radio transceivers around the country to maintain communications with that operator's helicopters.

Consolidation of 911 centers around the country may ease the problem<sup>740</sup> because it will provide a better focus for training 911 operators on how to deal with requests for air ambulances.

Centralizing dispatch also can provide leverage for regulation of HEMS providers because a state dispatch center could refuse to call operators that do not meet certain standards.

#### B. *Safety*

Section VII.A analyzes recent FAA regulatory initiatives aimed at improving HEMS safety. It concludes that the agency should go further, by mandating autopilots and fulfilling its statutory obligation to establish a better safety data collection system.

FAA regulation also can help reduce the most serious safety threat not already addressed: pilot reluctance to "fess up" to weather mistakes. Pilots declaring IIMC emergencies and asking ATC for assistance should be immunized from FAA enforcement action. That would remove the fear that declaring an emergency will lead to trouble with the FAA. A straightforward way to do this is for the FAA to adopt the following rule, immediately following the existing safe harbor for incidents reported to the NTSB database:

---

737. Adams, *supra* note 26.

738. AARON DURKEE ET AL., WORCESTER POLYTECHNIC INST., UNDERSTANDING THE ROLE OF HEMS IN EMERGENCY CARE AND WORKING TO REDUCE ACCIDENTS, COSTS, AND TRANSPORT TIME 31 (Mar. 29, 2012), [https://web.wpi.edu/Pubs/E-project/Available/E-project-041813-124558/unrestricted/Master\\_Copy\\_%5bPDF%5d.pdf](https://web.wpi.edu/Pubs/E-project/Available/E-project-041813-124558/unrestricted/Master_Copy_%5bPDF%5d.pdf).

739. THOMAS ET AL., *supra* note 17, at 9.

740. See Attorney General Act Amendment, Ill. Pub. Act 99-6 (S.B. 96) (2015) (amending 15 ILL. COMP. STAT. 205/6.5 (2016) to establish a state board to oversee consolidation of local 911 centers).

**14 C.F.R. § 91.26 Part 135, Subpart L Emergencies: Prohibition against use of declarations of emergency for enforcement purposes.**

(a) Scope. This section applies to any pilot operating a flight covered by Part 135, Subpart L.

(b) Immunity from enforcement. The Administrator of the FAA will not use any declaration of an emergency under 14 C.F.R. § 91.3 requesting ATC assistance after an inadvertent flight into IFR (or information derived therefrom) in any enforcement action for enforcement concerning accidents or criminal offenses.

Adoption of the following addition to OSHA's whistleblower rules for aviation personnel would address pilot concern about adverse employment action if he declares an emergency:

**29 C.F.R. § 1979.102 Obligations and prohibited acts.**

(b) It is a violation of the Act for any air carrier or contractor or subcontractor of an air carrier to intimidate, threaten, restrain, coerce, blacklist, discharge or in any other manner discriminate against any employee because the employee has:

. . . .

(5) Declared an emergency, as pilot in command, under 14 C.F.R. § 91.3 requesting ATC assistance after an inadvertent flight into IFR in a flight covered by 14 C.F.R. Part 135, Subpart L.

Air ambulance operators are classified as air carriers under Part 135; that is why regulation of entry and scope of operation is preempted, as explained in Section VII.B.<sup>741</sup>

---

741. Med-Trans Corp. v. Benton, 581 F. Supp. 2d 721, 733 (E.D.N.C. 2008).