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No Way to Run an "Airline": Surviving an Air Ambulance Ride

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NO WAY TO RUN AN "AIRLINE": SURVIVING AN AIR AMBULANCE RIDE

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I. INTRODUCTION

IF YOU LIVE IN THE UNITED STATES and are involved with a helicopter air ambulance, you are more likely to die or be crippled than if you are a construction worker, a logger, or a

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Mr. Perritt has written twenty books and nearly one hundred law review articles on public policy and law and technology. In *Sharing Public Safety Helicopters*, 79 J. AIR LAW & COMMERCE 501 (2014), written with Eliot O. Sprague and Christopher L. Cue, he evaluated organizational structures for expanding helicopter support for law enforcement. He wrote *An Arm and a Leg: Paying For Helicopter Air Ambulances*, 2 U. ILL. J.L. TECH. & POL'Y 317 (2016), and *Medics, Markets, and Medicare*, published in 43 RUTGERS COMPUTER & TECH. L.J. 37 (2017). He is familiar with health care policy issues, having written a number of law review articles on application of ERISA to health care plans and a book on the Clinton Administration's health care reform proposal, and having served as Vice-Chairman of the Coal Commission, a commission appointed by former 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 Randy Manis, longtime air ambulance pilot and safety advocate, Clayton Beckmann, an Air Methods HEMS pilot flying for Guardian Air in Winslow, AZ; Yasser Abdullah, a CPA and first-year law student at Chicago-Kent College of Law; Joel Brumlick, Chief of the Winthrop Harbor, IL, Police Department; LT Greg Whalen of the Glencoe, IL, Public Safety Department; Michael I. Bitton, Commander of the Winthrop Harbor, IL, 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; and Jeff Fair, line pilot with Air Methods, flying for Life Star in Joliet, Illinois.

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deep-sea fisherman.[1] And if you don't get killed, you well may be presented with a $45,000 bill for your ride.[2]

The central problem in healthcare economics is that technological innovation has rapidly produced an array of life-saving and life-improving treatments and procedures over the last half-century that are very expensive.[3] Healthcare economics in the United States are closely regulated to deal with this and other problems, but aviation's contribution to the industry gets a pass.[4] The result has been a safety crisis in the industry generally and a financial crisis for many operators.[5]

Because the same phenomena that make markets function poorly for healthcare in general are behind the crises in the helicopter emergency medical services (HEMS) industry, the best way to deal with these twin crises is to level the playing field and extend the usual healthcare regulatory tools to air ambulances. In particular, the fiction that air ambulance operations are airlines should be abandoned.

This article begins with a description of the healthcare marketplace, emphasizing the reasons why public policymakers beginning a half-century ago decided that this market needs a greater degree of government intervention than is customary in a market economy. It explains how air ambulances fit in the larger industry framework and then explains how a 2002 adjustment in the reimbursement formula for Medicare resulted in a threefold increase in the number of air ambulances in a little over three years. The article also explains why the usual mechanisms that prevent an oversupply of subsidized healthcare ser-

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1 *See* Alan Levin, *Expert: Air-Ambulance Crews Among Most Likely to Die*, USA TODAY, Feb. 3, 2009, http://usatoday.com/news/nation/2009-02-03-medchopper_N.htm [https://perma.cc/S7Z3-HN9H].

2 *See* Bernard F. Diederich, *Air Ambulance Resuer or Rescuee?*, 62 FED. LAW. 66, 66 (2015); Peter Eavis, *Air Ambulances Offer a Lifeline, and Then a Sky-High Bill*, N.Y. TIMES, May 6, 2015, at B1, http://www.nytimes.com/2015/05/06/business/rescued-by-an-air-ambulance-but-stunned-at-the-sky-high-bill.html?_r=o [https://perma.cc/8F5X-TYR2].

3 *See* Corinna Sorenson et al., *Medical Technology as a Key Driver of Rising Health Expenditure: Disentangling the Relationship*, CLINICOECONOMICS AND OUTCOMES RES., May 29, 2013, at 226, https://www.dovepress.com/medical-technoloy-as-a-key-driver-of-rising-health-expenditure-disent-peer-reviewed-article-CEOR [https://perma.cc/Q33K-8YH2].

4 *See* Bart Elias, CONG. RESEARCH SERV., RL33430, THE SAFETY OF AIR AMBULANCES (2006), at CRS-14; U.S. FED. TRADE COMM'N & U.S. DEP'T OF JUSTICE, IMPROVING HEALTH CARE: A DOSE OF COMPETITION (2004), at 4.

5 *See* Steven R. Pounian & Justin T. Green, *Aviation Law; Emergency Helicopter Safety Crisis, Federal Preemption*, N.Y. L.J., Nov. 18, 2008, at 1.

vices do not operate in the HEMS industry because of a counterintuitive interpretation of the Airline Deregulation Act (ADA).

The next part explains why air ambulance operations inherently pose greater safety risks and how the supply glut has intensified those risks. It reviews the Federal Aviation Adminstration's (FAA) incomplete effort to reduce these risks through specialized safety regulations. The article explains how market forces will take care of the oversupply if the Medicare formula remains the same, argues that air ambulances should be subject to the same state regulation as other healthcare services, and advocates requiring autopilots and protecting air ambulance pilots from FAA or employer action when they ask for help.

II. MARKETS AND MEDICINE

Healthcare is an unusual market[6] in two respects. First, virtually all of the revenue received by sellers of healthcare services is paid, not by the recipients of those services, but by third parties: private healthcare insurers, the federal government through Medicare, and states through Medicaid.[7] The amount of money involved is vast, some $3.207 trillion in the United States in 2015,[8] constituting about twenty percent of GDP, which was $17.95 trillion in 2015.[9] Third-party payment rebuts the assumption that supply and demand come into balance because of price elasticity of demand exhibited by buyers.[10]

Second, the pace of technological innovation over the last half-century has produced many life-saving and life-improving treatments that even the richest patient cannot afford.[11] Each new technology, whether a new kind of surgical procedure or a new pharmaceutical drug, costs more—usually much more—than its predecessor. Students of healthcare regularly predict

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6 *See* Thomas L. Greaney, *Managed Competition, Integrated Delivery Systems and Antitrust*, 79 CORNELL L. REV. 1507, 1509–15 (1994) (explaining market failure in healthcare economics and policy solutions).

7 *See id.* at 1513–14.

8 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/#226c3be294c9 [https://perma.cc/AUQ4-QYQ4].

9 *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/ [https://perma.cc/6JSE-MD4N].

10 *See* Greaney, *supra* note 6, at 1513–14.

11 *See id.*

that healthcare expenditures could consume the entire budget of most developed countries unless public policy restrains the rate of increase.[12] Insurance markets and public policy responded to meet the funding gap, as Congress enacted Medicare and Medicaid in the late 1960s, adding an enormous new funding source, and creating demand pull pressures that stimulated even more rapid innovation.[13] The increase in demand was driven by Medicare but fueled also by nearly universal employer-funded private health insurance.[14] Before long, healthcare price inflation substantially exceeded inflation in the economy generally.[15]

The employer community and federal budget experts realized something had to be done. There were then, and continue to be now, calls for greater reliance on market forces. Price elasticity of demand, if allowed to operate, would eventually eliminate the over-production problem, they argued. But almost no one was really willing to eliminate the subsidies and return to a complete reliance on market forces and private resources. So reformers began a decade-long process of experimenting with hybrid regulatory schemes—ones that continued, and mostly enlarged, the subsidies while using other mechanisms to ration care and control costs. Some of them, like certificates of need, imposed direct limitations on new entrants for certain kinds of services.[16] Others, like various forms of capitation for physicians and diagnostic-related groups (DRGs) for hospitals, sought to harness economic self-interest so that healthcare providers would ration care—or at least not deliver too much of it.[17]

The health care industry in the United States is consolidating.[18] Sixty percent of acute care hospitals in the United States

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[12] *See generally* SOC. SEC. ADVISORY BD., THE UNSUSTAINABLE COST OF HEALTH CARE (2009), at 1–2, http://ssab.gov/portals/0/documents/TheUnsustainableCostofHealthCare_508.pdf [https://perma.cc/93NK-Y6QN].

[13] *See generally* Daniel J. Kevles, *Medicare, Medicaid, and Pharmaceuticals: The Price of Innovation*, 15 YALE J. HEALTH POL'Y. L. & ETHICS 241, 242 (2015).

[14] *See* Donald W. Moran, *Whence and Whither Health Insurance? A Revisionist History*, 24 HEALTH AFFAIRS 1415, 1416–20 (2005).

[15] *See id.* at 1417–19.

[16] *See generally* Gerard R. Goulet, *Certificate-of-Need Over Hospitals in Rhode Island: A Forty Year Retrospective*, 15 ROGER WILLIAMS U. L. REV. 127, 129–30 (2010).

[17] *See generally* Timothy Stoltzfus Jost, *Policing Cost Containment: The Medicare Peer Review Organization Program*, 14 U. PUGET SOUND L. REV. 483, 483–84 (1991).

[18] *See* David M. Cutler & Fiona Scott Morton, *Hospitals, Market Share, and Consolidation*, 310 JAMA 1964, 1964 (2013), http://scholar.harvard.edu/files/cutler/files/jsc130008_hospitals_market_share_and_consolidation.pdf [https://perma.cc/NP68-RZ4R].

are now part of hospital systems, in which community hospitals are clustered around a high-tech tertiary care center, often university-affiliated.[19] 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. 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.

Consolidation among healthcare providers encourages consolidation among healthcare insurers and vice versa as each seeks to strengthen its negotiating power to determine reimbursement levels. Higher reimbursement increases hospital revenue, but it puts pressure on insurance premiums.[20]

> [C]ompanies in both industries [are trying] to gain the scale and heft to succeed amid changes unleashed or accelerated by the health law. Those include growing pressures to constrain costs, and new forms of payment that require providers to meet efficiency and care-quality goals. Health systems are adding hospitals, doctor practices and a range of other services that enable them to manage all of a patient's care. And each industry is bulking up to amass leverage in contract negotiations against the other.[21]

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, sixty percent of American hospitals are part of hospital systems.[22] The average hospital system comprises 3.2 hospitals.[23] The trend away from freestanding community acute care hospitals and toward coordinated systems has been fueled by dramatic improvements in tertiary care treatment technologies, which are expensive.[24] Few hospitals can afford state-of-the-art capability across a broad range of life-threatening health conditions.[25] Significant economies of scale operate when a system is able to treat lower acuity patients in lower technology commu-

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19 *See id.* at 1965–66.

20 *See id.* at 1967.

21 Anna Wilde Mathews, *Health-Care Providers, Insurers Supersize*, WALL ST. J. (Sep. 21, 2015, 11:46 AM), http://www.wsj.com/articles/health-care-providers-insurers-supersize-1442850400 [https://perma.cc/5RSX-A9NM].

22 *See* Cutler & Morton, *supra* note 18, at 1965, Table 1.

23 *See id.*

24 *See id.* at 1966.

25 *See id.*

nity hospitals and to move higher acuity patients to a single, high-technology tertiary care system at the center of a hospital system as necessary.[26]

In a recent interview, a physician at Johns Hopkins University explained: "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."[27] At the same time, the success of healthcare reform cost containment efforts has dramatically reduced the length of patient stays and thus the traditional revenue base for community hospitals.[28] This induces smaller hospitals to merge into larger systems for access to necessary resources, including capital for improving specialized patient care.[29] Specialization among hospitals increases the need for interfacility transport, which increases demand for air or ground ambulance service. Consolidation increases the likelihood that consolidated systems will use their market power to rationalize the delivery of air ambulance services.

III. REGULATION AND RATIONING

A. Generally

When price elasticity does not blunt demand, some other mechanism must ration supply. No one likes to use the word "rationing" when it comes to healthcare policy, but all forms of healthcare economic regulation represent some kind of rationing. Healthcare cost control strategies typically take one or more of three forms. First, healthcare providers can be reimbursed based on a price schedule rather than for their costs or unilateral provider determinations of prices. DRGs and the 2002 air ambulance fee schedule reflect that approach.[30] Second, healthcare providers can be afforded a fixed amount to cover treat-

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26 *See generally id.* at 1969.

27 Interview by Kristin Gourlay with Gerard Anderson, Johns Hopkins University (Oct. 22, 2015), http://ripr.org/post/pulse-how-does-hospital-consolidation-help-or-hurt-patients [https://perma.cc/KZD6-H6LR].

28 *See* Cutler & Morton, *supra* note 18, at 1965–66 (reporting a 33% decline in hospital days from 1981 to 2011 and a 15% reduction in the number of hospitals).

29 *See id.* at 1967.

30 Ctr. for Medicare & Medicaid Servs, Ambulence Fee Schedule (2006), https://www.cms.gov/medicare/medicare-fee-for-service-payment/ambulance feeschedule/index.html [https://perma.cc/9BUH-TKLY].

ment of a large pool of potential patients. This is the "capitation approach" used in many managed care insurance schemes.[31] 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. The third approach fixes an overall amount available for reimbursement of multiple providers for certain broad categories of treatment. 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. This approach is used by Medicare in setting and resetting the annual fee schedule for Helicopter Emergency Medical Services (HEMS) reimbursement. All three approaches create economic incentives to control costs and the frequency and intensity of treatment so that our providers' total cost does not exceed the amount available for reimbursement.

The most basic change in healthcare policy, implemented in the United States beginning in the late 1980s, was to shift from a cost reimbursement system to a prospective payment system.[32] Cost-based reimbursement provided few incentives to control costs and actually encouraged healthcare providers to use more costly procedures.[33] Prospective payment systems reimburse predetermined amounts for specified procedures and conditions, known as DRGs, discussed above.[34] DRGs had a profound effect on the length of hospital stays, which was its main goal. Hospital stays fell some thirty percent after DRGs were introduced.[35]

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[31] Brent C. James & Gregory P. Poulsen, *The Case for Capitation*, HARVARD BUS. REV. (2016), http://www.hbr.org/2016/07/the-case-for-capitation [https://perma.cc/2YD9-XFYY].

[32] *See* Nancy De Lew et al., *A Layman's Guide to the U.S. Health Care System*, 14 HEALTH CARE FIN. REV. 151, 161 (1992), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4193322/pdf/hcfr-14-1-151.pdf [https://perma.cc/FQH8-E8TA].

[33] *See* Judy Sturgeon, *DRGs: Still Frustrating After All These Years*, 21 FOR THE RECORD 14, 14 (2009), http://www.fortherecordmag.com/archives/052509p14.shtml [https://perma.cc/Q3PE-6GTF].

[34] *See id.*; *see also* AM. HEALTH INFO. MGMT. ASS'N, EVOLUTION OF DRGS (2010 UPDATE) (2010), http://library.ahima.org/doc?oid=106590#.WBInaZMrKgA [https://perma.cc/5FBF-AQUL].

[35] *See* Katherine L. Kahn et al., *A Summary of the Effects of DRG-Based Prospective Payment System on Quality of Care for Hospitalized Medicare Patients*, 2 RAND (1990), https://www.rand.org/content/dam/rand/pubs/notes/2007/N3132.pdf [https://perma.cc/PHK4-EWLT] (summarizing literature on initial effect of DRGs and finding a 30% reduction in hospital admissions). *See also* Cutler & Morton, *supra* note 18, 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%).

This approach has gradually been extended into more areas of healthcare, mostly applying now to physician reimbursement as well. The 2002 change in air ambulance reimbursement was entirely consistent with this emphasis; Medicare replaced a cost-reimbursement system with a prospective payment system.[36] Capping the overall budget for air ambulance reimbursement had a roughly similar effect to capitation for physician practices.

President Obama's Affordable Care Act increases the subsidies further and encourages more elaborate private sector networks of healthcare providers that regulate the prices within these networks.[37] Air ambulances operate largely outside this evolving regime because HEMS operators are classified as airlines, resulting in preemption by the Airline Deregulation Act (ADA).[38] While the North Carolina health care agency can regulate ground ambulances, it cannot regulate their air counterparts.[39] Medicare sets reimbursement levels for air ambulances just as it does for other medical services.The Medicare and Medicaid services agency is constantly adjusting the reimbursement schemes for healthcare generally, trying to address over- or undersupply when they emerge, but it has largely left the HEMS industry alone despite fifteen years of oversupply.[40]

HEMS also largely escapes private regulation by insurance networks. It does this by steadfastly remaining out of the networks and therefore remaining free to engage in balance billing. The healthcare insurance market also is heavily regulated. The McCarran Ferguson Act[41] preserves to state governments the power to regulate insurance, and all states have administrative agencies that prescribe coverage, other policy terms, reserves, and claim procedures.[42] But a handful of decided cases

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36 *See* AMBULANCE FEE SCHEDULE, *supra* note 30.

37 *See* De Lew et al., *supra* note 32.

38 *See Guidelines for the Use and Availability of Helicopter Emergency Medical Transport (HEMS)*, U.S. DEP'T OF TRANS., at 4 (Apr. 2015), https://www.ems.gov/pdf/advancing-ems-systems/Reports-and-Resources/Guidelines_for_Helicopter_Emergency_Medical_Transport.pdf [https://perma.cc/P8D8-9YSU].

39 *See* 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 [https://perma.cc/Y327-JD5M].

40 *See id.*

41 McCarran Ferguson Act, 15 U.S.C. § 1011 et seq.

42 *See, e.g.*, ILL. ADMIN. CODE tit. 50, pt. 1604 (valuation of reserves); ILL. ADMIN. CODE tit. 50, pt. 2006 (required benefits for emotional and nervous disorders); ILL. ADMIN. CODE tit. 50, pt. 2007 (minimum standards for individual policies); ILL. ADMIN. CODE tit. 50, pt. 2020 (reimbursement and subrogation); ILL. ADMIN.

displace McCarran Ferguson state regulation of insurance for air ambulances, finding it preempted by the ADA.[43] So private regulation through healthcare insurance does not work the same way for air ambulances as it does for other healthcare institutions. Insurers are not eager to increase the reimbursement rate for air ambulances, but they are happy to keep balance billing,[44] because that relieves at least some of the pressure on their reimbursement rates. They have no reason to want air ambulances to be in-network. Similarly, hospitals do not particularly want their air ambulance partners to be in their networks because then they will face pressure to subsidize the air ambulance operation. If the air ambulance provider is out of network and engages in balance billing, the hospital knows what its financial exposure is for air ambulance service and can leave controversies over pricing to others. Federal displacement of state healthcare insurance regulation also permits HEMS operators to sidestep the growing number of state regulations that prohibit balance billing for out-of-network services.[45]

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

CODE tit. 50, pt. 2026 (premium increase justification and reporting); ILL. ADMIN. CODE tit. 50, pt. 2057 (preferred provider plans); ILL. ADMIN. CODE ti.t 50, pt. 5420.110 (prohibiting pre-approval requirements for out-of-network emergency care).

43 *See* R. Michael Scarano, Jr. & Bill Bryant, *Federal Preemption of State Regulation Over Air Ambulances*, 28 AIR MED. J. 77, 81–83 (Mar. 2009), http://www.airmedicaljournal.com/article/S1067-991X(08)00272-1/pdf [https://perma.cc/4J2V-EMST].

44 *See generally* Jack Hoadley et al., *Balance Billion: How Are States Protecting Consumers from Unexpected Charges?*, THE CTR. FOR HEALTH INS. REFORMS, at 3 (2015), http://www.insurance.pa.gov/Documents/Balance%20Billing/Kevin%20Lucia.pdf [https://perma.cc/BFU8-G37S].

45 *See* Michelle Andrews, *States Make Laws to Protect Patients from Hidden Medical Bills*, HEALTH, INC. (Jul 15, 2015), http://www.npr.org/sections/health-shots/2015/07/15/422964973/states-make-laws-to-protect-patients-from-hidden-medical-bills [https://perma.cc/3GR9-4EYD]; Brooke Murphy, *20 Things to Know About Balance Billing*, BECKER'S HOSPITAL CFO (Feb. 17, 2016), http://www.beckershospitalreview.com/finance/20-things-to-know-about-balance-billing.html [https://perma.cc/4VSK-F9VY] (no. 10 commenting on controversy over air ambulance balance billing, no. 13 reporting that the 2017 budget of the United States proposes to prohibit balance billing, and no. 14 reporting that a quarter of states prohibit balance billing).

> 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 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, this type of treatment can result in financial ruin for some families.[46]

B. Are Air Aambulances Airlines?

The ADA has consistently been interpreted to preempt state regulation of air ambulance services, which, counterintuitively, are airline services under the Act.[47] Preemption is a central pillar of the ADA.[48] Before airline transportation was deregulated by the Act, the Civil Aeronautics Board (CAB) shared authority with state authorities over airline market entry, exit, and fares.[49] 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.[50]

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 healthcare. In *Med-Trans Corp. v. Benton*,[51] for example, the district court described North Carolina's extensive system for regulating healthcare providers. It concluded that requirements that an air ambulance provider obtain state certification as a healthcare

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[46] Bryan Bledsoe et al., *Can EPs Fix the Helicopter EMS System?*, Emergency Physicians Monthly (Dec. 30, 2009), http://epmonthly.com/article/can-eps-fix-the-helicopter-ems-system/ [https://perma.cc/7FTL-JHAR].

[47] State and local governments are also 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, 330–33 (2015).

[48] *See* Scarano & Bryant, *supra* note 43, at 77.

[49] *See generally Records of the Civil Aeronautics Board [CAB]*, Nat'l Archives (1995), https://www.archives.gov/research/guide-fed-records/groups/197.html [https://perma.cc/8LLT-Z6GY].

[50] *See id.*

[51] 581 F. Supp. 2d 721, 736 (E.D.N.C. 2008) (citing other state and federal cases finding preemption), *enforced*, 591 F. Supp. 2d 812 (Mem.) (E.D.N.C. Oct. 15, 2008).

provider and a certificate of need before operating in North Carolina were preempted by the ADA.[52]

The determinative question in Benton was whether the HEMS operator was an air carrier:

> 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.[53]

More recently, HEMS operators have taken the position the ADA also preempts state limitations on private insurance reimbursement rates, including those under workers' compensation insurance policies.[54]

IV. THE REIMBURSEMENT "CRISIS"

The HEMS industry claims that Medicare and private insurance reimbursement is falling far short of covering its costs. Objective assessment of the facts, however, suggests that a major contributor to the problem is oversupply.

A. Reimbursement

All HEMS operators get much of their revenue from third-party payers: Medicare, Medicaid, or private healthcare insurers. Medicare represents a substantial percentage of HEMS reimbursement, while Medicaid represents a much smaller percentage.[55] In 2015, PHI Air Medical (PHI) received 74% of its air medical revenue from private insurance, 17% from Medicare,

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52 *See id.* at 736.

53 *See id.* at 733.

54 Section IV. B of this article considers this possibility.

55 *See* Medicare Payment Advisory Commission, Mandated Report: Medicare Payment for Ambulance Services (2013) at 173 (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).

8% from Medicaid, and 1% from self pay.[56] It allowed a 65% reserve for contractual discounts, and 8% for uncompensated care.[57]

Medicare reimbursement levels are more important than the percentage of revenue suggests, because private insurers use Medicare's model for reimbursement, usually paying a premium over the Medicare rate. The starting point to understand the reimbursement scheme for HEMS, therefore, is to understand Medicare's reimbursement for air ambulances. Air ambulance services[58] are specifically listed in the Medicare regulations as a medical service for which benefits are available,[59] but only if "the service meets the medical necessity[[60]] and origin and destination[[61]] requirements."[62] Both requirements must be certified by a treating physician—usually a physician affiliated with the

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[56] PHI, Inc., 2015 Annual Report 55 (2015) [hereinafter PHI 2015 Annual Report], http://www.phihelico.com/docs/Investor%20Relations/2015/2015%20Annual%20Report.pdf [https://perma.cc/JX8D-7YLF].

[57] *See id.*

[58] For simplicity in expression, this article refers to all helicopter air ambulance services as "HEMS."

[59] *See* 42 C.F.R § 410.40(b)(7)(2013) (coverage of ambulance services specifically includes a rotary wing air ambulance); *see also* 42 C.F.R. § 414.605 (2016) ("[r]otary 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").

[60] The rule defines the requirements of medical necessity as follows:

> 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. 42 C.F.R. § 410.40(d)(1) (2013).

[61] The rule defines eligible origins and destinations:

> Medicare covers the following ambulance transportation:
>
> (1) From any point of origin to the nearest hospital, CAH [or, critical access hospital], or SNF [or, skilled nursing facility] 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.

facility to which HEMS transports.[63] The certification is subject to reversal by the private insurer or by Medicare.[64]

The Department of Health and Human Services Centers for Medicare & Medicaid Services amended the air ambulance reimbursement rules in 2002,[65] pursuant to a mandate in Section 1834(l) of the Social Security Act.[66] 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.[67] It mandated cost containment provisions and limited total reimbursement under the new rules to that under the existing reimbursement formulas, with an inflation factor.[68] 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.[69] Despite the requirement for a national schedule, it authorized Medicare to provide regional adjustments.[70] 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 from year to year.[71]

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

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> (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 [or, end stage renal disease], from the beneficiary's home to the nearest facility that furnishes renal dialysis, including the return trip.

42 C.F.R. § 410.40(e) (2013).

62 *Id.* § 410.40(a)(1).

63 *See id.* § 410.40(d)(2)(ii).

64 *See* Kaplan *ex rel.* Estate of Kaplan v. Leavitt, 503 F. Supp. 2d 718, 724 (S.D.N.Y. 2007) (denying Medicare reimbursement; opinions of treating physicians about necessity for air ambulance transport not controlling).

65 Medicare Program, Fee Schedule for Payment of Ambulance Services, 67 Fed. Reg. 9100, 9100–01 (Feb. 27, 2002) (codified at 42 C.F.R. pts. 410 and 414).

66 42 U.S.C. § 1395m(l) (2012).

67 *Id.* § 1395m(l)(1).

68 *Id.* § 1395m(l)(3)(A).

69 *Id.* §§ 1395m(l)(3)(B)–(C).

70 *Id.* § 1395m(l)(2)(C).

71 *Id.* § 1395m1(l)(3)(B).

the case of independent systems).[72] But "suppliers"—independent HEMS—reimbursements were capped, while reimbursement for providers—hospital-based HEMS—were not.[73] 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 healthcare provider,[74] who handles the paperwork to apply for reimbursement. The Medicare Act prohibits "balance billing."[75] That means that if the service is covered by Medicare, the provider must accept the Medicare payment and cannot collect the remainder of any charge from the patient.[76] 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.[77] Medicare pays the usual and customary charge for any medical service,[78] subject to an elaborate process for determining what is customary in a particular market area.

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72 *See* Fee Schedule for Payment of Ambulance Services, *supra* note 65, at 9102 (defining "provider" and "supplier").

73 *See id.* at 9131 (explaining differences between provider and supplier reimbursement); *see also id.* at 9103 (summarizing weaknesses of the pre-2002 system).

74 42 U.S.C. § 1395k(a)(1) (2012) ("entitlement to have payment made to him or on his behalf").

75 *See id.* § 1395u(h) (participating physicians and suppliers must agree to accept Medicare-prescribed payment).

76 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 QMBs for Medicare cost-sharing are subject to sanctions. *See* DEP'T OF HEALTH AND HUMAN SERVS., PROHIBITION ON BALANCE BILLING DUALLY ELIGIBLE INDIVIDUALS ENROLLED IN THE QUALIFIED MEDICARE BENEFICIARY (QMB) PROGRAM (2010), at 2, https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNMattersArticles/downloads/SE1128.pdf [https://perma.cc/KQZ3-V4G2].

77 *See generally* Fleet v. Air Methods Corp., No. 11–0172–WS–N, 2011 WL 2531048, at *1 (S.D. Ala. June 24, 2011) (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; dismissing claim as outside federal question jurisdiction).

78 *See* 42 U.S.C. § 1395(b)(3)(F) (2012) (providing that reasonable charges shall be determined on the basis of customary and prevailing charge levels in effect at the time the service was rendered).

The 2002 rules mostly adopted the consensus recommendations of a negotiated rulemaking committee,[79] adopting a prospective payment system for helicopter air ambulance services comprising a base rate and a mileage rate.[80] The base rate is subject to a geographic adjustment based on geographic variations in private physician practice costs.[81] Both the base rate and the mileage rate are subject to an inflation adjustment based on the Consumer Price Index (CPI).[82] A rural surcharge boosts both components by 50%.[83]

The 2002 system treats all HEMS providers the same: hospital-based, community-based, and public agencies.[84] The basic requirements for reimbursement from the pre-2002 system remained unchanged: that HEMS transports be medically necessary and be to the nearest medical facility adequately equipped to care for the patient.[85] Under the post-2002 rules, no balance billing is permitted.[86] 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,[87] or $5315.72 for

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79 Fee Schedule for Payment of Ambulance Services, *supra* note 65, at 9101 (explaining relationship between final rule and negotiated consensus statement).

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

81 *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).

82 *Id.* at 9125.

83 *Id.* at 9109–10 (explaining that the 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 [or, current procedural terminology] 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*, WORKCOMPCENTRAL (July 24, 2015), https://www.workcompcentral.com/columns/show/id/800bf72a9ab8a805058833d2c472f9911d9eb0cd [https://perma.cc/J7DN-USGC] (reporting on Texas experience).

84 Fee Schedule for Payment of Ambulance Services, *supra* note 65, at 9109 (new 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 . . . however organized").

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

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

87 *Id.* at 9122 Table 1(showing rates for rotary wing reimbursement).

the base rate in 2016 and $34.60 for the mileage rate. At 100 knots average speed, that is a variable cost reimbursement rate of $346 per hour. The initial rates for 2002 would result in a total of $5028 for an urban-based HEMS mission and $5767 for a rural-based HEMS mission, in 2016 dollars.[88] Major operators expect continued downward pressure on Medicare reimbursement rates,[89] which is likely to propagate to private insurers.

The impact of the Affordable Care Act may be substantial, but the nature of the impact is not yet clear.[90] 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. On the other hand, the Act's cost control mandates may cause both Medicare and private insurers to reduce reimbursement levels. HEMS community-based providers charge fees to the patients they carry, but the patients often cannot, or do not, pay.[91] Some HEMS providers write their own insurance, guaranteeing "subscribers" that they will not have to pay out of pocket for emergency transport.[92] 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.[93]

B. The Perceived Problem

The HEMS industry claims that reimbursement rates are far too low to cover actual costs.[94] Most private healthcare insurers

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[88] *Id.* at 9124 (multiplied by 2.88, representing inflation from 2002 to 2016).

[89] PHI 2015 Annual Report, *supra* note 56, at 13 (projecting continued downward trends in reimbursement rates by Medicare and private insurance).

[90] *Id.* at 12; *see also* Air Methods Corp., 2015 Annual Report (Form 10-K) (Feb. 19, 2016), at 5 [hereinafter Air Methods 2015 Annual Report].

[91] Diederich, *supra* note 2, at 71 (describing lack of advance ability-to-pay determinations, basic liability of patient, and high incidence of inability to pay).

[92] *Id.* (describing subscription service).

[93] *See* Stephen H. Thomas et al., *Helicopter Emergency Medical Services in Oklahoma: An Overview of Current Status and Future Directions*, Okla. State Dep't of Health 73 (Apr. 22, 2012), https://www.ok.gov/health2/documents/HEMS%20OK%20Report%20Final.pdf [https://perma.cc/Y3ZC-9PWF] (discussing problem that subscriber programs causes).

[94] *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/medical-allied-healthcare [https://perma.cc/SBU5-22R7] (summarizing industry view that reimbursement rates must be increased and praising House bill).

set their benefit schedules in imitation of Medicare.[95] Private insurers, including workers' compensation insurers, often link their reimbursement rates to the Medicare rates, as explained in Section IV.A of this article.[96] Texas is an example: it reimburses 125% of the Medicare rate.[97] 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.[98]

> 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 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%.[99]

Private insurers have their own limitations. Typically, their reimbursement rates are higher than the Medicare rates, but most of them have "utilization review departments."[100] These departments decide if a claim is payable under whatever limitations the particular healthcare policy provides.[101] Most of them apparently have language similar to the Medicare regulation: the air

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95 *See generally* Jeffrey Clemens & Joshua D. Gottlieb, *In the Shadow of a Giant: Medicare's Influence on Private Physician Payments*, NAT'L BUREAU OF ECON. RES. (Oct. 2013), at 2–3, http://econweb.ucsd.edu/~j1clemens/pdfs/ShadowOfAGiant.pdf [https://perma.cc/B326-TLA9].

96 *Id.*

97 28 TEX. ADMIN. CODE § 134.203 (2008).

98 Loughlin, *supra* note 83 (reporting on Texas experience and listing other states, besides Texas, that link reimbursement to Medicare).

99 *Id.*

100 *See* INSTITUTE OF MED., COMM. ON UTILIZATION MGMT. BY THIRD PARTIES, CONTROLLING COSTS AND CHANGING PATIENT CARE? THE ROLE OF UTILIZATION MANAGEMENT 169–70 (1989).

101 *Id.*

ambulance service must be medically necessary and provide transportation no farther than to the nearest capable facility.[102]

If a HEMS customer is not insured and is not covered by Medicare, the customer is personally liable for the transport fee.[103] Air Methods' annual report has a fair amount of discussion about the risks it faces with various sources of reimbursement.[104] In 2014, $772,695,000 of Air Method's revenue came from third-party payers, and $275,677,000 came from self-pay.[105]

Many individuals who are not covered by Medicare or private insurance simply default.[106] The HEMS provider sues many, but not all, of them.[107] 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 $372,159,000 for uncollectable fees against total charges of $1,048,372,000 for 2014, or nearly 35%.[108] Private insurance does not necessarily prohibit balance billing.[109] So, if a privately insured person's insurance does not cover the entire claim, the person is liable for the remainder.[110] This might be different, however, for "in-network" care. Large health insurers negotiate arrangements with networks of healthcare 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.[111] So it is kind of like Medicare's prohibition against balance billing—light.

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[102] The author's Blue Cross Blue Shield policy, for example, covers "AMBULANCE TRANSPORTATION . . . [which] 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."

[103] *See* Eavis, *supra* note 2.

[104] *See* AIR METHODS 2015 ANNUAL REPORT, *supra* note 90, at 23.

[105] *See id.* at F-17.

[106] *See* Eavis, *supra* note 2.

[107] *See id.*

[108] *See* AIR METHODS 2015 ANNUAL REPORT, *supra* note 90, at F-5.

[109] *But see* UnitedHealthcare Servs., Inc. v. Asprinio, 16 N.Y.S.3d 139, 150 (N.Y. Sup. Ct. 2015) (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).

[110] *See* Eavis, *supra* note 2.

[111] *See generally* Sammy Mack, *They Paid How Much? How Negotiated Deals Hide Health Care's Cost*, NPR: HEALTH INC. (Nov. 15, 2014), http://www.npr.org/sec-

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.[112] In other words, the industry argues that inflation in HEMS costs has been greater than U.S. inflation generally, as reflected by the consumer price index. That seems like a compelling argument, except that the major reason for cost increases is overcapacity. Too many HEMS providers have too many helicopters, and none of them flies enough fully to cover the fixed costs of their helicopters, bases, and crews at reasonable charges.[113]

On April 30, 2015, Sen. David Vitter (R-LA) introduced Senate Bill 1149.[114] 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 percent per year; and that costs have grown at a far greater rate.[115] 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."[116]

The bill would require that Medicare increase the rates by twenty percent for 2017, and by five percent per year for 2018–2019,[117] and that HEMS providers submit certain cost data after the increases go into effect.[118] By July 1, 2019, the Secretary of Health and Human Services and the Government Accountability Office must submit reports analyzing the data and recommending reimbursement rate changes.[119] The bill is languishing in the Senate Finance Committee.

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tions/health-shots/2014/11/15/364064088/they-paid-how-much-how-negotiated-deals-hide-health-cares-cosst [https://perma.cc/CX6H-JLTH].

112 *See* Eavis, *supra* note 2.

113 *See id.*

114 S. 1149, 114th Cong. (2015).

115 *Id.* § 1.

116 *Id.*

117 Illinois Senator Mark Kirk and four others are cosponsors of the bill. They are all Republicans except for Senatory Michael Bennett of Colorado, who is a Democrat. Both Colorado Senators are cosponsors, which makes sense given Air Methods' Colorado origins. *See Cosponsors: S.1149—114th Congress (2015–2016)*, CONGRESS.GOV, https://www.congress.gov/bill/114th-congress/senate-bill/1149/cosponsors [https://perma.cc/PN5V-G7P4].

118 S. 1149 § 2 (amending 42 U.S.C. § 1395(m)(1)(16)(D); listing 15 cost items).

119 *Id.*

The HEMS operators are getting more aggressive with respect to private insurers. 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.[120] The operators now took the position that the ADA preempts the division's reimbursement rates for air ambulance serves and that the workers compensation carriers were therefore obligated to reimburse "fair and reasonable" charges.[121] Several hundred consolidated cases went before an administrative law judge of the Texas division in 2005,[122] who issued a decision in late 2015.[123] 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.[124]

The administrative law judge (ALJ) held that the ADA does not displace state power to regulate workers compensation reimbursement for air ambulances.[125] The McCarran Ferguson Act[126] preserves state power to regulate insurance, and that overrode a broad interpretation of the ADA, which does not explicitly say anything about insurance.[127] But the ALJ also held that the workers' compensation division had not exercised its authority to set quantitative limits on air ambulance reimbursement; its 125% limit was more general.[128] Accordingly, the relevant state statutory and regulatory provisions were those that required that reimbursement for air ambulance services be "fair and reasonable."[129] Under the state statute, determination of "fair and rea-

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120 *See* Loughlin, *supra* note 83.

121 *Id.*

122 *Id.* (reporting on litigation, in which he represented the insurance carriers).

123 *See* Reimbursement of Air Ambulance Servs. Provided by PHI Air Medical, Docket No. 454-15-0681.M4 (State Office of Admin. Hearings Sep. 8, 2015), http://www.tdi.texas.gov/medcases/soah15/454-15-0681%20M4(R).pdf [https://perma.cc/Z2GK-VSQN].

124 *See id.*

125 *Id.*

126 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).

127 *See generally* Airline Deregulation Act of 1978, Pub. L. No. 95-504, 92 Stat. 1722, 49 U.S.C. § 1301 (2012).

128 Reimbursement of Air Ambulance Servs. Provided by PHI Air Medical, *supra* note 123.

129 *Id.*

sonable" must meet several statutory touchstones, including requirements that the reimbursement level be such as to ensure 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.[130]

Based on the evidentiary record generated in the proceeding, the ALJ found that the 125%-of-Medicare-fee preferred by the insurance carriers would cause PHI to operate at a loss,[131] but that the fees-as-charged approach urged by PHI would cause Texas to subsidize other PHI operations[132] and would not encourage cost control.[133] 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.[134] The ALJ determined that 149% of the Medicare rate would be fair and reasonable because it ensured PHI the same level of profit it had earned in the preceding four years.[135] The ALJ also found no evidence that PHI was inefficient, which would have justified reimbursing less than that necessary for it to maintain profits.[136] The result was the product of fairly traditional rate litigation: scrutinize costs, and if they seem to be reasonable, award a rate that ensures a particular level of profit.[137]

In November, 2015, Air Evac filed a civil action against Medical Mutual of Ohio in Ohio state court.[138] The complaint alleged that the defendant insurance company was liable for underpaying claims for HEMS services.[139] It asserted breach of implied contract, quantum meruit, open account, and sought a

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[130] *Id.* (summarizing criteria in Texas Labor Code § 413.011).

[131] *Id.* (finding that 125% would have caused losses to PHI for 2010–2013).

[132] *Id.* (justifying 149% as "subsidization neutral").

[133] *Id.*

[134] *Id.*

[135] *Id.* (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).

[136] *Id.*

[137] "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, 180 n.45 (1993) (extensively discussing traditional rate-of-return regulation and exploring alternatives).

[138] Air Evac EMS, Inc. v. Med. Mut. of Ohio, CV 15 854950 (Ct. of C.P., Cuyahoga Cty., OH, Nov. 25, 2015).

[139] *Id.* ¶ 1.

declaratory judgment that Medical Mutual was obligated to pay AirEvac's billed charges.[140]

Specifically, the complaint alleged that Medical Mutual refused to pay more than 65% of Air Evac's typical price of $20,000 per transport.[141] It claimed that Medical Mutual in effect forced Air Evac to accept the same rates Medical Mutual negotiated with its in-network hospital-based HEMS providers.[142] It also claimed that Medical Mutual owed $3.5 million for underpayments over the preceding two years.[143] The breach of implied contract claim was premised on the allegation that Medical Mutual knew of Air Evac's rates, but still advised its beneficiaries to use the most convenient and accessible air ambulance services in an emergency, knowing that Air Evac frequently would be the most convenient and accessible, and knowing Air Evac rates.[144] Thus, the complaint reasoned, an implied contract arose to pay Air Evac rates.[145]

The quantum meruit theory argued 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.[146] The open account theory argued that Air Evac and Medical Mutual maintained an ongoing relationship through accounts allowing Medical Mutual to pay Air Evac's charges,[147] and that Medical Mutual refused to pay the charges to the open accounts in full.[148]

The declaratory judgment count sought a judicial determination that "[t]he ends of justice require a declaratory judgment issue that Medical Mutual is obligated to pay Air Evac's billed charges."[149] The legal theories alleged are recognized, but their application to the facts is aggressive and ambitious. It is unlikey

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140 *Id.*

141 *Id.* ¶ 19.

142 *Id.* ¶ 23.

143 *Id.* ¶ 27.

144 *Id.* ¶ 29.

145 *Id.* ¶ 30.

146 *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 Cty., 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 is available only in the absence of a contract).

147 *Air Evac EMS*, CV 15 854950, ¶ 41.

148 *Id.* ¶ 46.

149 *Id.* ¶ 55.

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.[150] This complaint argued that the state action is preempted by federal law, specifically by the ADA and the Employment Retirement Income Security Act of 1974.[151] On February 5, 2016, the state court stayed the state court action pending resolution of the federal lawsuit.[152]

The insurance industry is not taking this lying down. It is sharply critical of HEMS industry efforts to increase reimbursement. 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%).[153]

C. The Real Problem: Too Many Air Ambulances

Overall, 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 ambu-

[150] Complaint, Med. Mut. of Ohio v. Air Evac EMS, Inc., No. 1:16-cv-00080 (N.D. Ohio, Jan. 13, 2016).

[151] *Id.* ¶ 1.

[152] *See Air Evac EMS*, CV 15 854950 (granting Medical Mutual's motion to stay, docket sheet entry 02/05/2016).

[153] Loughlin, *supra* note 83 (reporting on Texas experience).

lances, and away from urban areas to rural areas.[154] All independent analyses agree that the effect of the 2002 fee schedule was to increase the supply of air ambulance providers.[155] It increased rapidly after the fee schedule went into effect[156] and continues to increase, albeit more slowly.[157]

HEMS prices have almost tripled in the last five years.[158] The pressure for reimbursement increases is occasioned not so much by increases in 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 legitimacy of this assertion, one must understand the basic cost structure of a HEMS operation.

The high proportion of fixed costs makes helicopter utilization a critical factor in determining profitability.[159] Average costs per hour or per mission vary depending on how many flight hours are available to absorb fixed costs. A 2009 feature story on Air Methods reported an average reimbursement of $7,000 per flight.[160] With a reported average fixed monthly cost of $180,000

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154 *See* Fee Schedule for Payment of Ambulance Services, *supra* note 65, at 9131 (projecting shifts in relative reimbursement levels).

155 U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-10-907, AIR AMBULANCE EFFECTS OF INDUSTRY CHANGES ON SERVICES ARE UNCLEAR (2010) [hereinafter 2010 GAO REPORT] [https://perma.cc/AEB6-AEBW] (concluding that the number of HEMS helicopters has increased dramatically since implementation of the 2002 fee schedule).

156 *See* MEDICARE PAYMENT FOR AMBULANCE SERVICES, *supra* note 55, at 169 (number of air ambulance supplies increased "rapidly" after implementation of 2002 fee schedule "and its add-on payments for air ambulance services to rural areas").

157 MEDICARE PAYMENT FOR AMBULANCE SERVICES, *supra* note 55, at 173 (reporting 420 air ambulance suppliers that billed Medicare in 2011, up three percent from 2008).

158 *See* 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).

159 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. Law enforcement utilization exceeds 600 hours per year. Emergency medical services, training, firefighting and general-utility utilization approximates 400–450 hours per year. Corporate operators experienced just over 360 hours per helicopter per year. *Honeywell Forecasts Steady Global Helicopter Demand For Next Five Years*, HONEYWELL (Mar. 1, 2015), https://honeywell.com/News/Pages/Honeywell-Forecasts-Steady-Global-Helicopter-Demand-For-Next-Five-Years.aspx.

160 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 [https://perma.cc/WLU6-CT4G].

per base, and a marginal cost of $1,000 per flight (including fuel and manpower), Air Methods' breakeven was thirty flights per month per base to break even.[161] Its average[162] at the time of the writing was thirty-five,[163] producing an operating profit of 16% to 17%. This is somewhat less than the 22.8% operating profit reported for 2014 by Air Methods,[164] but more than the 9.6% profit reported in its 2009 annual report.[165]

The marginal cost figure of $1,000 is consistent with the advertised operating cost of an AS350 emergency medical service (EMS) helicopter, which is a bit on the low side.[166] Airbus advertises an independently developed figure of $653.81 for direct operating cost (fuel, oil, and maintenance).[167] That would leave $346 per hour for crew costs.[168]

The $180,000 per month fixed costs figure—$2.26 million per year—is consistent with a base having three $5-million helicopters requiring 10%-per-year debt service: $1,500,000 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 and report, which shows sixty-four percent of its assets in equipment, compared with only four percent in fixed

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161 *Id.* 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 30 hours per month per base breakeven.

162 The *Times* story suggests that the figures reported are not those for any particular base, but for an average base. *See* Eavis, *supra* note 2.

163 Burke, *supra* note 160.

164 AIR METHODS 2015 ANNUAL REPORT, *supra* note 90, at F-30 (reporting operating profit of $196,959,000 and revenue of $863,867,000 for air medical services segment in 2014).

165 AIR METHODS CORP., 2009 ANNUAL REPORT (FORM 10-K) (Mar. 5, 2010), at F-5, http://www.sec.gov/Archives/edgar/data/816159/000114036110011494/form10k.htm [https://perma.cc/N9PP-6G5N] (reporting flight revenue of $486,303,000 and operating income of $47,104,000).

166 *2011 Operating Cost Update*, CUSTOMER SUPPORT NEWSLETTER (Airbus Helicopters, Inc., Grand Prarie, TX), Aug. 2001, at 1 http://airbushelicoptersinc.com/customer_support/CustomerSupportNewsletters/2011/CSNL_11_V1_I8_FINAL.pdf [https://perma.cc/8XEZ-R4M4] (reporting direct operating cost for various Airbus helicopters, including AS350).

167 *Id.*

168 $346 per hour equates to $124,560 annually at the 30-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. *See* Burke, *supra* note 160.

facilities,[169] and annual charges of general and administrative expenses as 16.5 percent of total expenses.[170] Because all pilot compensation arises from fixed annual salaries, with a 30-day layoff-notice requirement, most pilot compensation is fixed rather than variable[171] 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 *Time* magazine figures for Air Methods apparently reflect a simplified, hybrid accounting approach, with some crew costs denominated as variable, and some as fixed.[172] It is unlikely that either the fixed costs or the marginal costs increased at a rate significantly different from general inflation during that period. Indeed, a shift toward smaller helicopters would reduce both fixed and marginal costs. Upgrading to night vision goggles (NVG) and collision and terrain avoidance systems would increase fixed costs.

Utilization has decreased dramatically in the HEMS sector in the last few years,[173] but some of the larger operators are exceptions. PHI's air medical segment was more profitable in 2015 than in 2014, primarily due to an increased number of flights and a rate increase.[174] PHI reported 35,848 air medical flight hours in 2015, up from 34,939 hours in 2014.[175] It owned 101 HEMS helicopters in 2015, down from 104 in 2014.[176] "Patient transports were 18,768 for the year ended December 31, 2015, compared to 17,876 for the prior year."[177]

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

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169 *See* Air Methods 2015 Annual Report, *supra* note 90, at F-3 (calculations based on reported $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).

170 *See id.* at F-5 (statement of comprehensive income data, showing $146,391,000 for general and administrative expenses, compared with operating expenses of $739,439,000, or 16.5% of total expenses).

171 *See* Air Methods Corp. Collective Bargaining Agreement (Aug. 28, 2014), at 13, https://www.sec.gov/Archives/edgar/data/816159/000114036114034817/ex10_1.htm [https://perma.cc/4XQX-KGRM].

172 *See generally* Eavis, *supra* note 2.

173 *Id.* (reporting an average of 469 average annual flight hours per HEMS helicopter in 2013, a 20% decline since 2006 and the lowest number since 1980).

174 *See* PHI 2015 Annual Report, *supra* note 56, at 34.

175 *Id.* at 32.

176 *Id.* at 33.

177 *Id.* at 36.

Methods not able to fly thirty missions a month would lose money.[178] 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 healthcare 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 from $2 million to $1.1 million, and its breakeven missions per month from thirty to about eighteen, holding non-equipment fixed costs, incremental costs and reimbursement rates constant.[179]

For any helicopter operation, fixed costs swamp variable costs. The most significant elements of fixed costs are the helicopters themselves, physical facilities, insurance, and personnel compensation.[180] Expenditures for all of these categories must be made regardless of how much the helicopters fly. Helicopter purchase or lease payments are the biggest fixed cost. 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.[181] Twin-engine and two-pilot aircraft cost two-to-four times that.[182] An international market exists for these helicopters, so regional differences in price are not important.

Investment in the helicopter is not completely sunk, because there is an active used market.[183] In addition, various lease ar-

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178 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. *See* Burke, *supra* note 160.

179 *See id.* (identifying Air Methods cost structure used as a framework for this cost-cutting example).

180 *See generally* AIR METHODS 2015 ANNUAL REPORT, *supra* note 90, at F-5 (listing cost of flight centers, aircraft operations, and general and administrative costs as three largest components of operating expenses).

181 *See generally* Robert L. Sumwalt, *Current Issues with Air Medical Transportation: EMS Helicopter Safety*, NAT'L TRANSP. SAFETY BD. (May 4, 2011), http://www.ntsb.gov/news/speeches/rsumwalt/Documents/Sumwalt_050411.pdf (estimating costs of HEMS aircraft by type) [https://perma.cc/GYU8-NLZP].

182 *See id.* (estimating high end of HEMS helicopter cost at $12 million for twin-engine and two-pilot aircraft).

183 *See generally* Lawrence Leonard, *Developing an Air Ambulance Service for a Remote Area of West Texas*, 46 J. HEALTHCARE MGMT. 68, 69–70 (2001) (describing various options for purchasing or leasing HEMS aircraft).

rangements are available.[184] 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.

The next most important fixed cost is insurance, comprising hull insurance to protect the value of a helicopter, and liability insurance to protect the enterprise in the event it is subjected to a civil judgment for damages growing out of an accident. 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.

Three factors influence insurance rates. More total flight time increases rates because of greater exposure. Larger helicopter capacity increases rates because of the greater likelihood of more people onboard not employed by the HEMS operator. The insurer's subjective impression of the strength of the operator's safety culture also affects rates and availability of insurance. The business model also matters. When everyone on the helicopter is employed by the operator, they are all covered by the workers' compensation bar, significantly limiting liability for an accident.[185] Conversely, if the medical personnel are employed by someone else, such as 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 plaintiff can recover whatever a jury will award.[186]

The next most important fixed cost is that for ground facilities. Helicopters must be hangared in a space where maintenance can be performed. 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. Electronic and communications infrastructure must be provided for dispatch operations, mandated by 14 C.F.R. § 135.619.[187] Managerial and executive personnel and their supporting administrative staff also require space. A typical HEMS base adequate for three heli-

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184 *See id.*

185 State workers' compensation statutes bar tort claims for injuries covered by workers' compensation. *See* Alan S. Pierce, *Workers' Compensation: No Longer the Exclusive Remedy*, 2 ANN. 2002 ATLA-CLE 3001 (2002).

186 *See* AIR METHODS 2015 ANNUAL REPORT, *supra* note 90, at 12.

187 14 C.F.R. § 135.619 (2016).

copters requires on the order of 10,000 square feet at a monthly rental of $50,000 to $100,000 per month.[188]

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.[189] 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.[190]

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.[191] 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."[192] 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.

Compensation for aircrews presents strategic opportunities for different pay structures. Pilots can be salaried employees—and usually are with larger HEMS operators—where they often are covered by collective bargaining agreements. They get paid an annual salary, regardless of how much they fly, but often are entitled to overtime payment as well. Most receive benefits, at least personal days off, vacation, and sick leave and, in about half of the industry, healthcare benefits. A common rule of thumb for payroll taxes and benefits is 35% of base compensation.

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188 *See* HANGARTRADER, http://www.hangartrader.com/final/search.php [https://perma.cc/N422-9PLG] (reporting sale and lease prices for hangars of assorted sizes).

189 14 C.F.R. § 135.73 (2016).

190 *Id.*

191 *See* 14 C.F.R. § 43.10 (2016).

192 *See* Fed. Aviation Admin. Inventory Mgmt. Guide (2012), at 3–2, https://www.faa.gov/documentLibrary/media/order/4600.27B_Inventory_Mgmt_Guide.pdf [https://perma.cc/7EPK-H6BH].

Even for salaried pilots, however, their employment agreements, whether collectively bargained or individual, usually provide for termination or layoff on thirty days' notice. 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 pilot 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.[193] FAA restrictions on pilot flight and duty time[194] set a floor for the complement necessary to staff one helicopter—typically six pilots for one helicopter, three per twenty-four hours, plus a 10% factor for vacations and sick leave.[195] Multi base operators often have relief pilots who are available to travel to cover shorter vacancies.

The alternative to salaried pilots is contract pilots. Contract pilots are paid only when they are called out and fly. A typical contract arrangement comprises a fixed component for the call out or on-call time and a separate component for flight time. 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." This is true because any of the fixed cost items can be eliminated by a HEMS operator's adjusting to lower-than-expected demand. It can sell or lease its helicopters; it can it can dispose of a hangar and offices; 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

193 *See* COMM'N ON ACCREDITATION OF MED. TRANSP. SYS., TENTH EDITION ACCREDITATION STANDARDS 5.3 (10th ed. 2015), http://www.camts.org/10th_Edition_Standards_For_Website.pdf [https://perma.cc/WJ5A-BC8W] (requiring four salaried pilots per helicopter).

194 *See, e.g.*, 14 C.F.R. § 91.1059.

195 *See generally* Charlotte Adams, *Top 10 HEMS Providers*, ROTOR & WING INT'L (Oct. 1, 2010), http://www.rotorandwing.com/2010/10/01/top-10-hems-providers/ [https://perma.cc/5L5B-23G5] (describing fleet sizes and crew ratios for the top 10 HEMS providers).

that an operator is stuck with a certain fixed cost structure in the short to medium term.

V. HOW THE ECONOMICS UNDERMINE SAFETY

A. Air Ambulance Operations Inherently Pose Risks

1. Risks

Helicopter flying is a risky business, and HEMS flying especially so.[196]

> 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.[197]

In 2011, National Transportation Safety Board (NTSB) member Robert Sumwalt made a presentation that concluded with a slide showing accident fatality statistics, on which HEMS flying was ranked as the most dangerous occupation in the United States, ahead of fishing, logging, structural iron and steel work, and coal mining.[198] He recommended that the FAA require HEMS helicopters to be equipped with terrain warning systems, that they use NVGs, and that they utilize autopilots for single-pilot operation.[199] He also recommended that hospitals impose these requirements in their HEMS contracts.[200]

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196 Ira Blumen, *An Analysis of HEMS Accidents and Accident Rates*, NAT'L TRANSP. SAFETY BD. 2 (Feb. 2009), http://www.ntsb.gov/news/events/Documents/NTSB-2009-8a-Blumen-revised-final-version.pdf [https://perma.cc/77GR-H95N] [hereinafter *NTSB Blumen Report*] (reporting HEMS accident rates nearly double that of other Part 135 operations).

197 Fed. Aviation Admin., 14 C.F.R. Parts 91, 120, and 135 Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations, 79 Fed. Reg. 9931, 9935 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135) [hereinafter Final HEMS Rule].

198 Robert Sumwalt, Current Issues with Air Medical Transportation: EMS Helicopter Safety 29 (Power Point slide presentation May 4, 2011), http://www.ntsb.gov/news/speeches/rsumwalt/Documents/Sumwalt_050411.pdf [https://perma.cc/FH8X-J4WZ] [hereinafter Sumwalt Presentation].

199 *Id.* at 18 (recommending that the FAA require helicopter terrain avoidance warning systems (HTAWS), use of NVG, autopilot if second pilot is not available).

200 *Id.* at 28 (recommending that HEMS contracts require "that pilots must be trained and helicopters equipped per NTSB recommendations").

In 2014, the FAA identified four common factors in HEMS accidents: "inadvertent flight into [instrument meteorological conditions (IMC)], loss of control, controlled flight into terrain (which includes mountains, ground, water, and man-made obstacles), and night conditions."[201]

Helicopter engines rarely fail in flight, but when they do, the pilot must act quickly to ensure a safe landing. In a single-engine helicopter, the pilot must detect an engine failure instantly, because he has only about two seconds to lower the collective[202] to flatten blade pitch, while pulling back on the cyclic[203] to increase the flow of air upward through the rotor.[204] If he does both timely, the upward flow of air through the rotor continues to spin it despite the loss of engine torque, and the pilot can fly the helicopter in a steep glide to a safe landing. If the pilot fails to react quickly enough or correctly, the drag on the rotor will reduce its revolutions per minute (RPM) below the point at which autorotation as possible, and the helicopter will simply fall from the sky, without the possibility of recovery.[205]

Moreover, the steep angle of descent in an autorotation means that he can land in a very small space—a parking lot or a small athletic field—if the pilot effectively and precisely manages the finite amount of kinetic energy produced by the descent's causing air to flow upward through rotor.[206] The steep descent also means, however, that a helicopter flown at typical heights above the ground, at 1,000 feet, for example, must be landed within about a quarter mile radius of the point at which

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201 Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations, 79 Fed. Reg. at 9935.

202 The collective stick is one of the main controls in a helicopter. It controls the pitch and therefore the lift of the main rotor blades. The pilot pulls up on the collective to increase blade pitch symmetrically and lowers it to reduce, or flatten, blade pitch. *See* FED. AVIATION ADMIN., U.S. DEP'T OF TRANSP., NO. FAA-H-8083-21A, HELICOPTER FLYING HANDBOOK 3–2 (2012) [hereinafter HELICOPTER FLYING HANDBOOK], https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/helicopter_flying_handbook/media/helicopter_flying_handbook.pdf [https://perma.cc/ZP3P-YXGV].

203 The cyclic stick is the second main control on a helicopter. It changes main rotor blade pitch asymmetrically. The pilot moves it forward to pitch the nose down, to move forward, and backward, to pitch the nose up, to slow down. *Id.* at 3-3.

204 In powered flight, the rotor blades pull air down through the rotor disc. *See id.* at 1-2.

205 *Id.* at 11-2.

206 *See id.*

the engine fails. In a congested area there may not be many athletic fields or parking lots within that radius.[207]

A helicopter must descend in order to develop the upward flow of air that results in an autorotation.[208] If it is too close to the ground when an engine fails, it does not have enough room to descend to develop an autorotation before it hits the ground.[209] Even at a greater height, if it is in a hover or is flying slowly, the pilot may not have enough time to develop the requisite forward speed for an acceptable glide ratio. Those two realities have caused the FAA to require every manufacturer to establish a "height velocity diagram" (HV diagram) as a part of the certification process for each model of helicopter.[210] The HV diagram portrays an area of high risk where the combination of airspeed and height above the ground is unlikely to permit a successful autorotation to be established, typically, at speeds below forty knots and heights below 500 feet above ground level. Faster and higher reduces the risk because greater speed provides more kinetic energy to be translated into rotor RPM and greater height gives more time to establish and to manage the autorotation.[211]

The high-risk area of the HV diagram is not a prohibited flight regime. It is a cautionary area, not a flight limitation.[212] Pilots should construct their mission profiles so that they minimize flights at lower speeds close to the ground. That is why routine helicopter takeoffs are not straight up, but stay close to the ground until airspeed speed greater than forty knots is obtained, and landing approaches are at an angle instead of coming straight down.[213]

Many HEMS missions, especially confined-area accident victim extraction require flying in the cautionary area of the HV diagram. For this reason, many HEMS operators prefer twin-engine helicopters to limit exposure to a potentially unrecoverable engine-failure scenario.

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[207] *See id.* at 10-9–10-10 (discussing confined landing areas).

[208] *See id.* at 11-2.

[209] This possibility depends on rotor design. Heavier rotors, with greater moments of inertia, continue to develop lift longer after an engine failure. *See id.* at 11-15.

[210] *See* 14 C.F.R. § 27.87 (2016).

[211] HELICOPTER FLYING HANDBOOK, *supra* note 202, at 11-2, 11-8.

[212] *Id.* at 11-8–11-9.

[213] *See id.*

The single most common cause of fatal HEMS accidents is unplanned entry into instrument meteorological conditions (IMC).[214] Weather accounts for some twenty percent of HEMS accidents.[215] HEMS flights take place under two distinct regulatory regimes: under visual flight rules (VFR) and under instrument flight rules (IFR).[216] VFR relies on a pilot being able to see obstacles and other aircraft in time to take appropriate action to avoid them (the "see and avoid" philosophy). When rain, snow, or other meteorological conditions obscure visibility, implementation of the see and avoid philosophy is not possible. 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 800 feet above the ground for HEMS flights.[217]

On March 26, 2016, shortly after midnight, an AS350 HEMS helicopter operated by Metro Aviation for Haynes Life Flight crashed in south Alabama. The accident killed the pilot, the flight nurse, the flight paramedic, and the patient, the victim of an automobile accident.[218]

When VFR criteria are not met, or when in IMC, a pilot can fly in controlled airspace only when he has an IFR clearance from air traffic control (ATC).[219] An IFR clearance specifies exact times, altitudes, and routes of flight to maintain traffic sepa-

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214 Patrick Veillette, *How to Develop Helicopter-Centric IFR*, AVIATION WK. (Jan. 29, 2016), http://aviationweek.com/bca/how-develop-helicopter-centric-ifr [https://perma.cc/J99S-AD9N].

215 *NTSB Blumen Report*, *supra* note 196, at 16 (reporting that weather accounted for nineteen percent of all HEMS accidents).

216 *See* 14 C.F.R. §§ 91.55–.159 (2016) (VFR); *id.* §§ 91.167–.193 (IFR).

217 14 C.F.R. § 91.155 (establishing basic VFR weather minimums); *id.* § 135.609 (establishing VFR minima for HEMS operations, including 800-foot ceiling and two miles visibility for non-mountainous, local flying areas in the daytime, with higher minima for mountainous and non-local areas and for night operations).

218 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 [https://perma.cc/XX9J-AEUQ].

219 An ATC clearance is not required in Class G airspace. 14 C.F.R. § 91.173 (requiring ATC clearance for IFR flight in *controlled* airspace); 14 C.F.R. § 91.179(b) (prescribing cruising altitudes for IFR flight in uncontrolled airspace). *See* 14 C.F.R. § 1.1, note to definition of controlled airspace ("Controlled airspace is a generic term that covers Class A, Class B, Class C, Class D, and Class E airspace.").

ration and typically involves radar contact between the aircraft and ATC.[220] 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.[221]

To be qualified legally to fly IFR, pilots must be instrument rated and flying an aircraft model that is certificated to fly IFR.[222] 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.[223] 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."[224]

Every pilot knows not to fly into IMC in a helicopter that is not certificated for IFR. But accident statistics show that inadvertent entry into IMC (IIMC) is altogether too common.[225]

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. 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.[226]

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220 *See* Air Ambulance and Commercial Helicopter Operations, Part 91 Helicopter Operations, and Part 135 Aircraft Operations; Safety Initiatives and Miscellaneous Amendments, 75 Fed. Reg. 62,640, 62,651 (proposed Oct. 12, 2010) (to be codified at 14 C.F.R. pts. 1, 91, 120, 135).

221 *See* HELICOPTER FLYING HANDBOOK, *supra* note 202, at 12-4 ("continuing VFR flight in IMC is often fatal").

222 *See* Air Ambulance and Commercial Helicopter Operations, Part 91 Helicopter Operations, and Part 135 Aircraft Operations; Safety Initiatives and Miscellaneous Amendments, 75 Fed. Reg. at 62,671–72.

223 *See* Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations, 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).

224 Veillette, *How to Develop Helicopter-Centric IFR*, *supra* note 214 (quoting HEMS pilots).

225 *Id.* (analyzing NASA voluntary incident reports that involved loss of control from IIMC, with seventy-five percent of such incidents occurring at night).

226 *See* Richard Weber & Bryan Smith, *Inadvertent Instrument Meteorological Conditions*, INT'L HELICOPTER SAFETY TEAM 30, http://www.ihst.org/Portals/54/IHSS/

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 whiteout 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 you are in it, you are also among a tangle of wires, trees, and other obstacles. It changes rapidly. Flying into a cloud at 2,000 feet is a piece a cake by comparison.[227]

The pilot knows to do the four Cs,[228] 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." "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."[229]

Even when the helicopter is not certificated for IMC flight, an instrument-rated pilot is more likely to handle IIMC safely:

> [T]he FAA found that inadvertent flight into IMC is a common factor in helicopter air ambulance accidents. In general, many accidents result when pilots who lack the necessary skills or equipment to fly in marginal VMC or IMC attempt flight without outside references. This proposal is intended to ensure that helicopter air ambulance pilots are equipped to handle these situations and extract themselves from these dangerous situations. A pilot who receives the more extensive training on navigating a helicopter solely by reference to instruments provided by obtaining an instrument rating is better able to maintain situational awareness and maneuver the helicopter into a safe environment than a pilot without an instrument rating.[230]

2014/The%20IIMC%20Threat%20-%20Avoidance%20and%20Survival.pdf [https://perma.cc/75HL-XXHM] (slide presentation summarizing accidents and simulator results).

227 *See id.* at 33, 40.

228 *See* HELICOPTER FLYING HANDBOOK, *supra* note 202, at 11-23 (discussing the four Cs).

229 The author conducted a confidential telephone interview with a HEMS Pilot on March 29, 2016.

230 Air Ambulance and Commercial Helicopter Operations, Part 91 Helicopter Operations, and Part 135 Aircraft Operations; Safety Initiatives and Miscellaneous Amendments, 75 Fed. Reg. 62,640, 62,656 (proposed Oct. 12, 2010) (to be codified at 14 C.F.R. pts. 1, 91, 120, 135).

But IFR capability is not a silver bullet. 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.[231] 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.

The Federal Aviation Rules (FARs) permit landings at and departures in IMC to be made only by use of published approach or departure procedures. Establishing an approach or departure approach procedure is a demanding process that requires detailed engineering calculations of runway length, height above sea level, nearby obstacles, aircraft approach speeds, rates of dissent, and rates of climb.[232]

The wider use a global positioning system (GPS) for all forms of air navigation and the relatively recent deployment of autopilots and other automation on helicopters has led the FAA to allow new types of procedures designed for helicopters from the outset.[233] Because helicopters can fly slower than airplanes and are more maneuverable even at low speeds, they can avoid obstacles and other aircraft in lower flight visibilities and can fly steeper approach angles and make more aggressive turns at low

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231 *See id.* at 62,660 ("The FAA understands that aircraft are configured differently and instrument approaches may not be readily available in all places where helicopters operate").

232 Hickok & Associates, Inc. develops and publishes "Point in Space" procedures (PinS) under FAA approved guidance. *See Helicopter Instrument Approach and Departure Charts*, HICKOK & ASSOCIATES, INC., http://hickokgpsifr.com/wp-content/uploads/2016/01/Charting-Legend-Revision-21.pdf [https://perma.cc/B5CN-CNTH] [hereinafter *Hickok Chart*]. As Hickok develops new procedures, it uploads them to an FAA database, from which the FAA reviews and approves them. *Company Flyer*, HICKOK & ASSOCIATES, INC., http://hickokgpsifr.com/wp-content/uploads/2016/01/Tri-Fold.pdf [https://perma.cc/F3EY-TAVJ] ("At Hickok & Associates, we build and coordinate helicopter airspace systems, sometimes covering entire states, to provide approach, departure, and enroute capabilities. Our en route segments are typically hundreds of feet lower than the traditional Minimum Instrument Altitude (MIA) or Minimum Vector Altitude (MVA) that ATC would otherwise have to use").

233 *See Satellite Navigation – NAS Implementation*, FED. AVIATION ADMIN., http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/nas/procedures/lpv/ [https://perma.cc/39UV-WT62] (FAA guidance for establishing PinS).

altitude altitudes to accomplish landings in very low visibility conditions.[234]

Typical of these new types of helicopter approach and departure procedures are PinS. A PinS procedure has two segments, a VFR segment and an IFR segment.[235] On an approach, the IFR segment guides the pilot to a point in space near the ground, from which he can fly VFR to the landing zone—typically a heliport, but sometimes a conventional airport. Some PinS approaches support multiple helipads near each other.[236]

A significant number of helicopter accidents involve colliding with obstacles fixed to the ground, what the FAA calls "controlled flight into terrain" (CFIT).[237] Some of these involve flying into the terrain itself, such as a hitting a mountain, a radio tower, or a wind turbine. 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 rotor tip or with the tail rotor. Most involve colliding with wires, especially electric transmission wires.[238] Wires are largely invisible from the air unless the sunlight happens to hit them just right.[239] 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 the tower.[240]

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.[241]

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[234] *See* HELICOPTER FLYING HANDBOOK, *supra* note 202, at 1-3 (discussing helicopter uses).

[235] *See Hickok Chart*, *supra* note 232.

[236] *See* Proposed Amendment of Class E Airspace for [Selected] Ohio Towns, 81 Fed. Reg. 66,221, 66,223–24 (proposed Sept. 27, 2016) (to be codified at 14 C.F.R. pt. 71).

[237] *See NTSB Blumen Report*, *supra* note 196, at 14–15.

[238] Stuart Lau, *Helo Air Safety: A Plan for Reducing Wire Strike Accidents*, PROF. PILOT, Nov. 2012, at 84.

[239] HELICOPTER FLYING HANDBOOK, *supra* note 202, at 13-6.

[240] *Id.*

[241] *See* Patrick Veillette, *Wire Wary: What You Don't See Can Kill, and Does*, BUS. & COM. AVIATION, Oct. 2015, at 24, 28.

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.[242] 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.[243] That only makes the problem worse. He must quickly, while he still has full lateral control, lower the collective and fly out of the downwash forward or sideways.[244] When fully developed, vortex ring state produces descents of several thousand feet per minute and also reduces lateral control.[245] 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.

Helicopters are complex machines comprising many parts that can malfunction or fail. They are subjected to higher levels of vibration than airplanes, and this increases the stress on components. Design and manufacturing requirements mitigate risks of failure by, among many other things, mandating safety wiring of critical fasteners to control the effect of vibration. Pilot preflight inspections using manufacturer-provided checklists are aimed at detecting component anomalies before takeoff. Pilot training in emergency procedures stresses appropriate responses to different types of system failure, including engine stoppages. Nevertheless, component failures occasionally occur that are beyond a well-trained pilot's capacity to recover from them. Failure of a main rotor hub or separation of the tail boom are examples. Nevertheless, unrecoverable system failures are extremely rare. Effective pilot training and frequent proficiency checks prevent most component failures from becoming accidents.[246]

2. *Risk-Reducing Technologies*

Five basic variables influence suitability of a particular helicopter model for HEMS operations: (1) whether it has one engine or two; (2) whether it is designed to be flown by one pilot

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[242] HELICOPTER FLYING HANDBOOK, *supra* note 202, at 11-9; *see also* J. GORDON LEISHMAN, PRINCIPLES OF HELICOPTER AERODYNAMICS 252–57 (2d ed. 2006) (explaining the aerodynamics of vortex ring state).

[243] HELICOPTER FLYING HANDBOOK, *supra* note 202, at 11-10.

[244] *Id.*

[245] *Id.*

[246] *Id.* at 11-11, 11-16, 11-21–22, 13-7–8.

or by two; (3) whether it is capable of flight in IMC; (4) whether it is equipped for NVG operation; and (5) its interior volume.[247]

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,[248] and most light helicopters are not. 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 managing aircraft systems, 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.[249]

A second crew member sitting in the left seat (helicopter pilots in most helicopters sit in the right seat) is helpful.[250] 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 crew member 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.

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247 *See* Air Ambulance and Commercial Helicopter Operations, Part 91 Helicopter Operations, and Part 135 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. 1, 91, 120, 135) (reviewing the common causes of helicopter air ambulance accidents, including CFIT, loss of control, IIMC, and poor night vision).

248 *See* FED. AVIATION ADMIN., U.S. DEP'T OF TRANSP., NO. FAA-H-8083-25B, PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE 2-27 (2016), https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/pilot_handbook.pdf [https://perma.cc/PGC5-JWGP] ("In a single-pilot environment, an autopilot system can greatly reduce workload") [hereinafter PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE].

249 *See* HELICOPTER FLYING HANDBOOK, *supra* note 202, at 14-1 to 14-18 (discussing "effective aeronautical decision-making").

250 *See* PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, *supra* note 248, at 2-2 to 2-4 (discussing crew resource management techniques).

Some larger helicopters are certificated to require two pilots, but light helicopters usually require only one pilot.[251] 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, making it impossible to carry a second pilot.[252]

As the number of HEMS operators increased, cost pressures caused HEMS operators to shift from twin-engine helicopters to single-engine helicopters.[253] This gives rise to safety concerns, not so much because engine failures in single-engine helicopters are more serious, but because most single-engine helicopters are not certificated to fly in IMC.[254] As might be expected, more capable HEMS helicopters cost more.[255]

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.[256]

Some commentators argue that twin-engine helicopters should be the norm for HEMS operations because they are

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251 *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-10-907, AIR AMBULANCE: EFFECTS OF INDUSTRY CHANGES ON SERVICES ARE UNCLEAR 4 (2010), http://www.gao.gov/assets/320/310527.pdf [https://perma.cc/N26T-MU2H] (noting that most air ambulances only carry a single pilot).

252 *See id.* at 16–17.

253 Veillette, *How to Develop Helicopter-Centric IFR*, *supra* note 214 (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).

254 *See* HELICOPTER FLYING HANDBOOK, *supra* note 202, at 12-4 to 12-5.

255 The Maryland State Police's AW139 twin-engine, two-pilot aircraft capable of carrying four patients and with advanced terrain-avoidance, NVG, and IFR systems costs $12.6 million. *Maryland State Police Unveils New Medevac Helicopter, More Coming*, WBALTV (Oct. 5, 2012), http://www.wbaltv.com/news/maryland/Maryland-State-Police-unveils-new-Medevac-helicopter-more-coming/16869264 [https://perma.cc/9FGE-FRFR] (reporting on the Maryland State Police's purchase of an AW139 twin-engine HEMS helicopter with room for four patients as the first of ten to upgrade its fleet). Single-engine, single-pilot AS350s are available on the used market for $1 to $2 million. *See Eurocopter As 350B-3 Aircraft for Sale*, CONTROLLER, http://www.controller.com/listings/aircraft/for-sale/list/?manu=eurocopter&mdltxt=as+350b-3 [https://perma.cc/4TA6-D686].

256 *See* HELICOPTER FLYING HANDBOOK, *supra* note 202, at 11-22.

safer.[257] But others disagree.[258] 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.[259] When it 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.[260] It got the contract.[261] 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.[262] 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."[263]

Determining any objective truth is quite difficult, as it is in so many other policy-sensitive statistical analyses. Most of the arguments by knowledgeable observers are self-interested. HEMS operators with a large number of twin-engine helicopters have an incentive to distinguish themselves competitively by emphasizing—and exaggerating—the enhancements in safety and pa-

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[257] Abernethy, *supra* note 39 (arguing that most countries use mostly dual-engine helicopters for HEMS, but that single-engine helicopters prevail in the U.S. HEMS fleet); *see also* AIR AMBULANCE: EFFECTS OF INDUSTRY CHANGES ON SERVICES ARE UNCLEAR, *supra* note 251, at 16 (questioning the ability of single-engine helicopters to provide adequate care when a patient's lower body is adjacent to the pilot, beyond effective reach of the medical team).

[258] Thomas et al., *supra* note 93 (finding no consensus on relative safety of single-engine, compared with twin-engine helicopters).

[259] *See 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*, DOCPLAYER (July 28, 2009) (discussion draft), http://docplayer.net/10697742-Draft-comparison-and-analysis-of-existing-and-proposed-primary-air-ambulances-used-by-mercy-air-service-in-kern-county-draft.html [https://perma.cc/4985-A68M] [hereinafter *Kern Report*].

[260] *Id.* at 6–7 (quoting from Mercy Air's October 2007 proposal).

[261] *Id.*

[262] *Id.* at 9–10 (explaining the motivation for the substitution).

[263] *Id.* at 10.

tient care made possible by twin-engine helicopters; operators with fleets dominated by single-engine helicopters, or that want to reduce cost by shifting their fleet toward single-engine helicopters, have an incentive to minimize the advantages of twin-engine helicopters.

Some facts are undeniable, however. The probability of both engines quitting is less than the probability of one quitting. Twin-engine helicopters are far more likely to be certificated for IFR.[264]

The FAA makes it very difficult to certify single-engine helicopters for IFR.[265] The aircraft must require two pilots, which is difficult or impossible to arrange in a single-engine helicopter configured for HEMS, or it must have a stability augmentation system, a kind of simplified autopilot.[266] Few single-engine models are certificated for IFR, and therefore HEMS operators desiring IFR capability must buy more expensive twins to achieve that capability. A campaign is underway to persuade the FAA to modify its single-engine IFR certification requirements, but the effect is uncertain.[267]

On the other hand, the greater complexity of two engines increases the probability of some kind of malfunction. 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.[268]

Most HEMS operators fly single-engine helicopters, and the accident statistics show few accidents caused by engine failures. In its 2014 annual report, Air Methods reported 248 single-engine helicopters and 171 twin-engine helicopters.[269] In 2007,

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264 *See generally* James T. McKenna, *Whither the Single-Engine IFR Helo?*, ROTOR & WING INT'L (June 1, 2015), http://www.aviationtoday.com/rw/issue/features/Whither-the-Single-Engine-IFR-Helo_85138.html [https://perma.cc/24JK-9LJC].

265 *See id.*

266 *See id.*; HELICOPTER FLYING HANDBOOK, *supra* note 202, at 4-16 to 4-17 (explaining stability augmentation systems).

267 *See* McKenna, *supra* note 264 (explaining certification difficulty and the campaign to make certification easier).

268 U.K. AIR ACCIDENTS INVESTIGATION BRANCH, AIRCRAFT ACCIDENT REPORT 3/2015, REPORT ON THE ACCIDENT TO EUROCOPTER (DEUTSCHLAND) EC135 T2+, G-SPAO GLASGOW CITY CENTRE, SCOTLAND ON 29 NOV. 2013 77–80 (2015), https://assets.publishing.service.gov.uk/media/5628ea4ded915d101e000008/3-2015_G-SPAO.pdf [https://perma.cc/5Q9Z-JUZU] (analyzing sequence and concluding that pilot did not attempt autorotation).

269 AIR METHODS CORP., 2014 ANNUAL REPORT (FORM 10-K) at 13 (Feb. 27, 2015).

43% of the HEMS fleet in the United States was single-engine.[270] Moreover, twin-engine helicopters do not necessarily have larger cabin volumes than single-engine helicopters.[271]

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 safe landing area even if one is within the limited autorotation radius. That is where NVG come in. If the pilot is wearing NVG 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 use NVG.[272] According to a 2009 *Forbes* article, Air Methods began retrofitting its entire fleet with NVG and collision- and obstacle-avoidance technology in 2006, at a cost of $100,000 per aircraft.[273] In 2010, 195 of Air Methods' 306 helicopters were equipped with NVG.[274] All of Air Evac Lifeteam's, the industry's number two operator, helicopters were equipped with NVG.[275] Industry number four PHI's helicopters were all NVG capable,[276] as were number five Metro Aviation's,[277] and number six Med Trans's.[278]

HEMS pilots[279] and HEMS safety experts[280] say that NVG 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 equipped with NVG.[281]

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270 *Kern Report*, *supra* note 259, at 13 (quoting the Atlas and Database of Air Medical Services).

271 *See* AIR AMBULANCE: EFFECTS OF INDUSTRY CHANGES ON SERVICES ARE UNCLEAR, *supra* note 251, at 16 n.21 (comparing the AS350 with the AS355 and the Bell 205 with the Bell 429); Thomas et al., *supra* note 93, at 64–65 (concluding that single-engine helicopters have adequate space for medical crews to do an effective job and that some singles are ergonomically better than some twins).

272 Sumwalt, *supra* note 181, at 18.

273 Burke, *supra* note 160.

274 Adams, *supra* note 195.

275 *Id.*

276 *Id.*

277 *Id.*

278 *Id.*

279 Telephone Interview with Clayton Beckmann (Mar. 25, 2016) ("NVG is amazing; it's almost essential.").

280 Telephone Interview with Ira Blumen, Professor of Medicine, Univ. of Chi. Med. Ctr. (Mar. 25, 2016) ("NVG are huge; they are very important and long overdue").

281 *Id.*

Autopilots are less common on helicopters than on airplanes, especially light helicopters.[282] 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.[283] Most can automatically hold altitude and fly whatever heading the pilot specifies.[284] Many can do more than that, accepting an entire flight plan—including approach procedures—and flying that flight plan, detecting arrival at waypoints, making appropriate turns and altitude changes, and even flying most of the approach without pilot intervention.[285] With sophisticated autopilots, pilot responsibility shifts away from hand-flying the helicopter toward monitoring autopilot performance.

Autopilots are not a regular feature of HEMS flying, although basic autopilot capability is required for IFR flight in single-pilot helicopters.[286] New technologies are lighter and more capable, enabling single-engine helicopters to be equipped to allow IFR certification.[287] If operators can prove to the FAA such improvements allow for safe IFR operations with improved pilot currency training, new certification guidelines may be implemented. The NTSB recommended that the FAA require HEMS helicopters to be equipped with autopilots for single-pilot operation.[288] 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."[289]

Technology has greatly simplified aerial navigation, although all pilots train to be able to navigate by combination of dead

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282 *See* Ron Bower, *No Hands*, ROTOR & WING INT'L (Apr. 1, 2004), http://www.rotorandwing.com/2004/04/01/no-hands/ [https://perma.cc/MUS4-ZRER].

283 *See id.*

284 HELICOPTER FLYING HANDBOOK, *supra* note 202, at 4-17.

285 *Id.*

286 *See* Veillette, *How to Develop Helicopter-Centric IFR*, *supra* note 214.

287 *See Genesys Aerosystems Earns FAA STC to Retrofit HeliSAS in R66*, VERTICAL (Mar. 29, 2016), https://www.verticalmag.com/press-releases/genesys-aerosystems-earns-faa-stc-for-helisas-stability-augmentation-and-autopilot-system/ [https://perma.cc/CV35-53ZX] (reporting on FAA certification of $71,509, fifteen-pound stability augmentation system with two-axis autopilot for Robinson R66 and other light helicopters).

288 Sumwalt, *supra* note 181, at 18.

289 Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations, 79 Fed. Reg. 9,932, 9,958 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135).

reckoning and ground references. Virtually every pilot flies with a navigation application[290] 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, groundspeed of the helicopter, and many other navigation functions.[291] Increasingly, helicopters also have "glass panels"—large video displays installed in the panel that display essentially the same graphical information.[292] 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, also providing the pilot with compass headings to navigate to the point.[293] The only important challenges are to make sure the pilot is adequately trained to confidently and quickly access the multiple layers of these computer applications, confidently and quickly and to assure reliability, either by system design or by providing backups. The precision of installed GPS navigation systems can also be enhanced by a wide area augmentation system (WAAS).[294]

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.[295] Air pressure decreases as altitude increases.[296] 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 can be sensors built into digital flight management displays. For an altimeter to be accurate, it must be reset periodically with changes in the sea level pressure as weather

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290 One of the most popular is ForeFlight. *See* FOREFLIGHT, https://foreflight.com/ [https://perma.cc/JMR7-D8LF].

291 *See* HELICOPTER FLYING HANDBOOK, *supra* note 202, at 14-7.

292 The Garmin G1000 is a popular example. *See G1000*, GARMIN, https://buy.garmin.com/en-US/US/prod6420.html [https://perma.cc/SCQ4-59E3]; GARMIN, G1000: GUIDE FOR DESIGNATED PILOT EXAMINERS AND CERTIFIED FLIGHT INSTRUCTORS (2004), https://www.faa.gov/training_testing/training/fits/guidance/media/G1000.pdf [https://perma.cc/KM3U-T8V7].

293 *See* HELICOPTER FLYING HANDBOOK, *supra* note 202, at 12-5.

294 *What Is WAAS?*, GARMIN, http://www8.garmin.com/aboutGPS/waas.html [https://perma.cc/7ZGU-4FZS] (explaining that WAAS enhances the accuracy of GPS from fifteen meters to less than three meters).

295 PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, *supra* note 248, at 8-3 to 8-4 (explaining how a barometric altimeter works).

296 *Id.* at 4-3.

patterns and their associated pressure systems move across the earth.[297]

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 pulses to return.[298] The aviation community believes that they are significant enhancers of safety for low-level flights.[299]

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.[300] 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 powerlines and wind turbines.[301] They sometimes also use forward-looking radar.[302] Of the types of equipment that can enhance HEMS safety, they are the second-most expensive, after autopilots. Radio altimeters, in contrast, have relatively modest costs.

Well-designed simulators allow pilots to experience all the flight regimes of which a particular model of helicopter 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. 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

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297 *See id.* at 8-4–8-5.

298 *See* Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations, 79 Fed. Reg. 9,932, 9,939 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135).

299 *See id.*

300 *See* FED. AVIATION ADMIN., U.S. DEP'T OF TRANSP., ADVISORY CIRCULAR 25-23, AIRWORTHINESS CRITERIA FOR THE INSTALLATION APPROVAL OF A TERRAIN AWARENESS AND WARNING SYSTEM (TAWS) FOR PART 25 AIRPLANES 5–6 (May 22, 2000), https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC25-23.pdf [https://perma.cc/WM3V-8UE3].

301 *See id.* at 13–15.

302 *See id.* at 5–6.

autorotations and recovery from vortex ring state close to the ground without the hazards of actual flight.[303]

Importantly for purposes of enhancing HEMS safety, simulators also permit practicing inadvertent entry into IMC.[304] 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. 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.

"Generic" helicopter simulators are available for about $120,000 and cost pilots slightly more than $100 per hour for training time.[305] These simulators are capable of simulating IFR flight and have hundreds of published approach procedures in their databases.[306] 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 helicopters and the instrumentation and automation systems installed on them.[307] To get that level of simulator training, a pilot must use a class D simulator, which costs much more.[308] In a class D simulator, however, the FAA allows pilots to start earning time as if they were in the actual helicopter.[309] Flight Safety Foundation has been an aggressive promoter of wider use of simulators in HEMS pilot

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303 *See, e.g.*, *Professional Helicopter Simulator*, FLYIT SIMULATORS, http://www.flyit.com/professional-helicopter-simulator.html [https://perma.cc/G26Y-GMDU] (describing the capabilities of the FLYIT Professional Helicopter Simulator).

304 *See id.*

305 *See id.* (The author took the parameters for monthly payments supplied by the vendor ($2,280/month, sixty month loan, 5.9% interest rate) and used them to calculate the initial loan amount: $118,500.).

306 *See, e.g.*, *id.* (noting that users can select instrument panels for Robinson, Bell, and other popular training-level helicopters).

307 *See* HELICOPTER FLYING HANDBOOK, *supra* note 202, at 14-8.

308 *See* Marcel Bernard, *Real Learning Through Flight Simulation: The ABCs of ATDs*, FED. AVIATION ADMIN. SAFETY BRIEFING, Sept./Oct. 2012, https://www.faa.gov/news/safety_briefing/2012/media/SepOct2012ATD.pdf [https://perma.cc/54YU-7WTM].

309 *See id.*

training. It makes simulators available for an hourly fee.[310] So do helicopter manufacturers such as Airbus.[311]

The FARs impose three categories of operating rules on commercial aircraft operators, depending on their size and the nature of the operation. Part 91 contains basic rules for flight profiles, equipment, and the type of rated pilot who must be used.[312] Part 91 contains the VFR and IFR requirements discussed in *supra* Section V.A.1.[313] An operator-specific certificate from the FAA is not required by Part 91.[314] Part 135 applies to most commercial operators who hold themselves out to the public.[315] It imposes additional requirements for organization, internal operating rules, and pilot proficiency checks, beyond those required by Part 91.[316] A Part 135 operator's procedures must be approved by the FAA for it to obtain and maintain its operating certificate.[317] Part 121 applies to scheduled operators—passenger airlines and cargo carriers—flying larger aircraft.[318] It imposes much more stringent requirements than Part 135 for internal operating procedures and pilot training.[319] Most HEMS operators are covered by Part 135 when they have patients on board and Part 91 when they do not.[320]

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.[321] States otherwise are preempted from imposing requirements on HEMS equipment, personnel, and economics.[322]

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310 *See Professional Training Programs for Bell Helicopters*, FLIGHT SAFETY IN'TL, https://www.flightsafety.com/fs_service_aviation_training_aircraft.php?type=00003&code=C [https://perma.cc/DA7A-KER8].

311 *Simulator Training*, AIRBUS HELICOPTERS, http://airbushelicoptersinc.com/training/simulator_training.asp [https://perma.cc/VES3-FLDN].

312 *See generally* 14 C.F.R. §§ 91.1–.1609 (2016).

313 *See id.* §§ 91.151–.193.

314 *See id.* § 91.203.

315 *See id.* § 135.1.

316 *See id.*

317 *See, e.g.*, *id.* § 135.325.

318 *See id.* § 121.1.

319 *See, e.g.*, *id.* §§ 121.171–.207, 121.400–.427.

320 *See id.* §§ 135.601(a), (b)(1).

321 *See* Fee Schedule for Payment of Ambulance Services, *supra* note 66, at 9107 (explaining modification of the proposed rule to set the skill level of EMT-Basic as whatever is required by state or local law).

322 *See, e.g.*, Med-Trans Corp. v. Benton, 581 F. Supp. 2d 721, 740 (E.D.N.C. 2008) ("FAA preemption in the area of aviation safety is absolute.").

Until 2015, the FAA did not explicitly differentiate HEMS operations from other commercial and air carrier operations.[323] 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.[324] It adopted a new Subpart L to Part 135 in the FARs, focused specifically on HEMS.[325]

Now, HEMS operations must be IFR-capable,[326] and HEMS helicopters must be equipped with terrain warning systems and flight recorders.[327] The new rules impose visibility and ceiling restrictions more stringent than those for other VFR flights.[328] HEMS flights can be dispatched only after an explicit risk assessment by the pilot,[329] backed up for larger operators with oversight by ground-based dispatch specialists.[330]

The new rules also impose tighter flight and duty time restrictions, permitting pilots to fly no more than eight hours per day,[331] with prescribed rest periods of at least ten hours before each duty period[332] and at least twenty-four hours off every week.[333] They prohibit assignments longer than seventy-two hours.[334] The new rules do not, however, impose any requirements with respect to aircraft, leaving 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.[335] Direct air ambulance carri-

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323 *See* 14 C.F.R. § 135.601.

324 *See id.* §§ 135.601–.621; FED. AVIATION ADMIN., U.S. DEP'T OF TRANSP., ADVISORY CIRCULAR 135-14B, HELICOPTER AIR AMBULANCE OPERATIONS (Mar. 26, 2015), http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_135-14B.pdf [https://perma.cc/TL7Z-V7MZ] (advisory circular explaining the requirements of the new Subpart L of Part 135).

325 *See* HELICOPTER AIR AMBULANCE OPERATIONS, *supra* note 324.

326 14 C.F.R. § 135.603 (requiring HEMS pilots in command to hold instrument ratings).

327 *Id.* §§ 135.605, .607 (requiring terrain avoidance and flight data recorders, respectively).

328 *See id.* § 135.609.

329 *Id.* §§ 135.615–.617.

330 14 C.F.R. § 135.619 (requiring operations control centers).

331 *Id.* § 135.271(c).

332 *Id.* § 135.271(b).

333 *See id.* § 135.271(i) (requiring thirteen twenty-four-hour rest periods in each calendar quarter).

334 *See id.* § 135.271(e).

335 *See id.* §§ 119.5(a), (b) (imposing requirement for "air carrier certificate" for Part 121 operators and "operating certificate" for Part 135 operators); HELI-

ers—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 be under a Part 298 air-taxi exemption.[336] HEMS helicopters not carrying patients may, however, be flown under the less stringent Part 91.[337]

Generally, Part 135 operators must have written operating procedures that meet specified requirements,[338] must employ chief pilots and directors of operations meeting certain rating and experience requirements,[339] and must subject pilots to recurrent training and check rides at least annually.[340] They must have a certain number of aircraft dedicated to their operation,[341] 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 day, night, VFR, and IFR operations.

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.[342] They must demonstrate appropriate operating procedures, with special attention to IIMC.[343] They must provide details of their training programs for flight crews. The FAA has published HAA-specific training curriculum items for pilots and co-pilots.[344]

FAA pilot training requirements might not stress NVG and IIMC training sufficiently. The emphasis in traditional IFR training or retraining is not on IIMC; it focuses on approaches, holds, and simulated instrument failures for flights that inten-

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COPTER AIR AMBULANCE OPERATIONS, *supra* note 324, at 43 (discussing FAA considerations for HEMS helicopter equipment).

336 *See* Diederich, *supra* note 2, at 69 (summarizing regulatory requirements).

337 *See* Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations, 79 Fed. Reg. 9,932, 9,943–44 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135) (explaining the relationship between Part 91 and Part 135 flights).

338 14 C.F.R. §§ 135.21–.23.

339 *Id.* §§ 119.65–71.

340 *Id.* §§ 135.293, 299.

341 *Id.* § 135.25 (b) (requiring the exclusive use of at least one aircraft).

342 HELICOPTER AIR AMBULANCE OPERATIONS, *supra* note 324, at 12–13 (discussing additional equipment, inspection, and maintenance requirements).

343 *Id.* at 26–29 (suggesting specific operational procedures for IIMC, including pre-planned coordination with ATC).

344 *Id.* at app. C.

tionally occur in IMC for which the pilot has carefully prepared.[345] In the new Subpart L, section 135.603 requires that all pilots in command (PICs) must be instrument *rated*, but not that they be current, let alone proficient.[346] Nothing in Subpart L itself requires training in IIMC. The FAA Advisory Circular does suggest IIMC training as part of operator-adopted curricula, to be reviewed in conjunction with approving a HEMS Part 135 certificate.[347] But IIMC is buried, as item twenty-two, on the suggested qualification/proficiency check-ride list.[348]

It should not be too 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 FAA Advisory Circular provides even less emphasis on NVG training,[349] presumably because Subpart L makes NVG optional for HEMS. Contractual requirements that HEMS operations be accredited by the industry accrediting body Commission on Accreditation of Medical Transport Systems (CAMTS) and the accreditation standards of that body represent an additional source of safety requirements,[350] but the standards do little to extend the FAA requirements on the most serious problems.

B. Too Many Helicopters Translates into More Accidents

The oversupply of their ambulances makes the inherent safety problems worse in three ways. First, it puts pressure on operating and capital budgets to cover high fixed costs because utilization is depressed. This discourages aggressive investment in additional safety equipment and enhanced crew training. While most air ambulance operators have gone beyond minimum FAA requirements by equipping their helicopter and flight crews with night vision equipment, they have not done the same with

345 *See infra* Section V.C (explaining why *sudden* entry into IMC raises risks considerably).

346 *See* 14 C.F.R. § 135.603.

347 *See* Helicopter Air Ambulance Operations, *supra* note 324, at 34–36.

348 *See id.* at app. C.

349 *See id.* at 27, 36.

350 *See* Tenth Edition Accreditation Standards, *supra* note 193, at 5.4 (generally requiring IIMC recovery procedures and "encourag[ing]" IFR currency).

autopilots.[351] Some people argue that a truly safe HEMS industry would use two-pilot helicopters, which probably would mean twin-engine helicopters.[352] That would enormously increase capital costs for the industry. In fact, the trend is in the opposite direction—toward more single-engine, single-pilot helicopters.[353]

It is undeniable that operators can cut costs by reducing expenditures on safety.[354] While they must incur certain maintenance and pilot training expenses mandated by regulation, they can cut safety costs in other ways. They must pay mechanics to perform hundred-hour and 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. But they can perform maintenance work with a well-developed and well-staffed in-house maintenance department or save money by getting it done by contract mechanics through a lowest-cost bidding process.

They can be similarly hard-eyed when it comes to pilot expenses. They must do the recurrency training and testing required by Part 135, but there are many ways they can economize. They can omit sending their newly hired their pilots to factory training school[355] and do the minimum in recurrent training.

Second, the need to increase flight hours and revenue leads to unsafe dispatching practices. Some observers and participants report self-dispatching where an air ambulance operator monitors emergency radio frequencies and, when it hears about an automobile accident or other medical emergency, launches

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351 *See* Adams, *supra* note 195 (evaluating recent technology upgrades to HEMS providers' helicopters but not mentioning autopilots).

352 *See* Abernethy, *supra* note 39 (suggesting that twin-engine helicopters are superior to single engines).

353 *See id.* ("The use of small single engine helicopters is a rarity everywhere except in the U.S. where these small helicopters compose over 90% of the current corporate HEMS fleet.").

354 They may rationalize greater expenditures on safety, even though it is not in their best interest, by claiming that safety cuts would result in more accidents, which would be bad for business.

355 The actual cost of Airbus transition training can exceed $12,000. *See American Eurocopter 2010 Summary of Pilot Training Prices*, AIRBUS HELICOPTERS, http://airbushelicoptersinc.com/training/2010_Pilot_Price_List.pdf [https://perma.cc/FK5Q-F3M6]. Particularly, if an operator has a high turnover of pilots, avoiding this cost with respect to each pilot represents considerable savings.

its helicopter without waiting for a request.[356] The result may be two or more air ambulances rushing to the same scene.[357] More generally, operators and crews feel pressure not to turn down a flight on weather or mechanical grounds and therefore engage in unsafe practices, particularly regarding the weather.[358]

Third, low utilization leads to low flight time for pilots, which dogs their proficiency to deal with emergencies.

C. The Psychology of Safety Compliance

The reality is that regulatory compliance always depends to some extent on economics. Many and perhaps most rule violations go undetected and therefore unpunished. The FAA can mandate pre-flight safety reviews and weather briefings, but it cannot determine how seriously they are undertaken. It can offer assistance to pilots who fly into unsafe weather, but it is difficult to ensure that the pilots will ask for help, given their fears about damage to their reputations and status with their employers. To ask for ATC help in an IIMC situation is to admit a mistake, and no one likes to do that.[359]

The psychological forces are, for the most part, not external; they are internal, growing out of pilot fears about job security. No one reports any pressure on PICs to fly in bad weather. To the contrary, pilots report many instances of turning down flights and facing no repercussions. One pilot, who otherwise was quite critical of his employer, said "they stress that even if the weather is above minimums and forecast to stay that way, if something you cannot articulate makes the hair stand up on the back of your neck, you should turn down the flight. And they mean it."[360]

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[356] *See* Thomas et al., *supra* note 93, at 106 (discussing autolaunch, or the "dispatch of an aircraft based upon pre-EMS information, on the contingency that HEMS will be needed").

[357] *See id.*

[358] *See* discussion *infra* Section V.C

[359] *Cf.* Marshall Allen, *Why Doctors Stay Mum About Mistakes Their Colleagues Make*, ProPublica (Nov. 8, 2013), https://www.propublica.org/article/why-doctors-stay-mum-about-mistakes-their-colleagues-make [https://perma.cc/6LBV-PYQ5] (reporting that physicians cover up other physicians' mistakes); Marshall B. Kapp, *Legal Anxieties and Medical Mistakes: Barriers and Pretexts*, 12 J. Gen. Intern. Med. 787, 787 (1997), http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1497208/ [https://perma.cc/TXK3-MVL6] (reporting tendency of physicians to cover up mistakes).

[360] Confidential Telephone Interview with HEMS Pilot (Mar. 29, 2016).

But the reality is that a pilot who is an outlier, turning down more flights than his peers at a base, believes that he eventually will be subjected to adverse employment action, whether or not that is true. When everyone else is willing to fly, he is likely to suppress his concerns and go along with the crowd.

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.

Or, suppose he begins to fly into meteorological conditions that obscure his visibility. If he follows the three Cs, declares an emergency, and gets a clearance from ATC, then the employer is likely to know about it and criticize him for not turning around before he entered IIMC. The employer gets itself off the hook and can brag about how its commitment to safety caused it to discipline the pilot for making an unsafe decision.

If he presses on successfully in either scenario, he will not open himself up to criticism. It is very difficult for any training program to extinguish the natural instinct to cover up one's mistakes. The stronger the safety culture, the stronger the instinct to cover up.

> 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 and open farm field out of town). Then [he] would have less explaining to do to the local FSDO [or, Flight Standards District Offices]. It shouldn't be part of [the] decisionmaking process, but in the world we live in it is. I'm 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.[361]

[361] Emails from Eliot O. Sprague, ENG Pilot, U.S. Helicopters Inc. (Mar. 28, 2016) (on file with author).

D. Upping the Safety Game

The accident rate cannot be reduced to zero, as much as people would like to do so. Some activities are inherently dangerous—HEMS among them. At some point, safety regulation encounters diminishing returns. At that point the marginal improvement in safety resulting from additional regulation is far exceeded by the cost. Air ambulance accidents could be eliminated altogether by eliminating air ambulances, but few people advocate that approach. Excessive regulation, however, has that effect. Layering more and more approval obstacles before a flight can be launched eventually has the effect of eliminating flights in conditions raising any question in the approval chain. Getting approval for a night flight in less-than-perfect weather, for example, could become so difficult that HEMS becomes a daytime-only operation.

So the question is this: has the HEMS industry reached that point? If it has, the best safety policy is simply to say, "We've done the best we can; the rest of it is luck."

But that point has not been reached. Fairly complete risk-based assessments of IIMC risks in particular suggest that the FAA has not done all that it can, and the following sections explain what else it should do.

The FAA embraces a regulatory culture in which it routinely says to the aviation industry, "We have a problem. You guys go work out the solution."[362] Then it puts together an advisory committee, and does not take further action until the advisory committee reaches consensus and presents a consensus recommendation—often including the text of a rule.[363] This negotiated rulemaking approach has many advantages, as this author argued in the late 1980s and early 1990s as negotiated rulemaking became a topic of conversation among students of the administrative agency process.[364]

But the track record for the HEMS industry is not good in this regard. Relying on industry consensus and industry advisory committees has resulted in protracted inaction in the face of

[362] *See, e.g.*, Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations, 79 Fed. Reg. 9,932, 9,935 (Feb. 21, 2014) (to be codified at 14 C.F.R. pts. 91, 120, 135).

[363] *See id.* at 9,934–35.

[364] *See generally* Henry H. Perritt, Jr., *Negotiated Rulemaking Before Federal Agencies: Evaluation of Recommendations by the Administrative Conference of the United States*, 74 Geo. L.J. 1625 (1986).

continued high accident rates. The FAA's process was so slow in the face of an obvious safety crisis that Congress required it to act.[365] Subpart L is a major step forward, but it omits two key recommendations from the NTSB and others: autopilots and NVG capability. Further, it unaccountably keeps everyone in the dark longer than is necessary by not implementing the statute's data reporting requirements.

1. Collect Data

The 2012 FAA Modernization and Revitalization Act requires the FAA to collect data on HEMS accident history.[366] The FAA has not done it, and has not even issued a notice of proposed rulemaking on the subject. It is not clear why this is the case. At least some data should be readily available, and there is no apparent reason why the FAA cannot issue an immediate mandate for these data to be reported, subject to an exception process which would delay implementation of the requirement for operators that can show concrete hardship.

2. Require Autopilots

The most important single thing that can be done to reduce the exposure to IMC accidents is to require autopilot on HEMS helicopters. Autopilots are available for virtually every type of helicopter that flies as an air ambulance. Their vendors promote them on the grounds that they enable a VFR flight to exit from IMC safely by maintaining altitude and executing a controlled turn. To be sure, equipping a VFR helicopter with an autopilot does not result in it becoming certificated for IFR. Considerable additional analysis and discussion between the FAA and the industry is necessary to ease the certification requirements for IFR helicopters. But state-of-the-art autopilots are a step in the right direction. Not only will they improve safety immediately, but a program to equip a larger proportion of the HEMS fleet with autopilots will increase pressure on the FAA and the industry to resolve the question of single-engine helicopter IFR certification.

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365 *See* Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations, 79 Fed. Reg. at 9,936.

366 FAA Modernization and Reform Act of 2012, Pub. L. 112-95, § 306, 126 Stat. 11, 60–61.

3. Mandate IIMC Training

Training practices with respect to IIMC are unclear. Anecdotal evidence suggests that Air Methods—and probably others—do include intensive IIMC exposure as a part of their simulator training.[367] The rules[368] and the CAMTS accreditation standards[369] do not mandate it in sufficient detail, however. The crucial requirement is that the pilot be able to recover from *sudden* IIMC. The FAA could issue a mandate quickly, if not as an emergency rule, then as an amendment to its Part 135 certification guidance for HEMS operators.

Any IIMC training initiative also should consider the frequency of recurrent training in light of reduced pilot proficiency resulting from diminished flight hours. If the practice is to do only annual recurrent training,[370] its frequency should be increased to twice annually, aligning it with the IFR proficiency rule in the FARs.[371] In other words, HEMS pilots would be required to undergo recurrent training as part of an enhanced IFR proficiency check,[372] regardless of how many IFR hours they have flown in the preceding six months.

Pilots should be drilled on activating the autopilot whenever flight conditions are less than good VFR. They should practice triggering altitude control and command turns with minimal fumbling. They should do it as quickly and automatically as they do a handful of other helicopter emergency procedures pilots train on, implanting their responses into muscle memory. Enlisting the aid of an autopilot after IIMC should be as instinctive and perfect as lowering the collective for an autorotation after a power failure.

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367 *See* Adams, *supra* note 195 (noting that PHI Air Medical requires training for "management" of IIMC).

368 *See* 14 C.F.R. § 135.293(c) (2016) (requiring IIMC training for helicopter pilots as part of the mandated annual recurrent check, but only in general terms).

369 *See* TENTH EDITION ACCREDITATION STANDARDS, *supra* note 193, at 5.4 (generally requiring IIMC recovery procedures and "encouraging" IFR currency).

370 *See* 14 C.F.R. § 135.293 (requiring annual recurrent training).

371 The CAMTS rules already require this, but only for IFR operations. *See* TENTH EDITION ACCREDITATION STANDARDS, *supra* note 193, at 5.6.

372 14 C.F.R. § 61.57(d) (stating requirements for instrument proficiency check).

4. Immunize Calling for Help

Section V.A observes that IIMC accidents continue to occur in defiance of good safety practices. For some reason, pilots just do not do what they are supposed to do. Section V.C offers the hypothesis that pilots act unsafely when they inadvertently fly into IMC because they are loath to admit a mistake.

The same section also acknowledges that new rules and procedures have only a limited effect on actual behavior—the more rules, the less the effect, probably. The proposed language set forth below would give pilots and other crewmembers legal recourse if they are in fact subject to sanctions for confessing their mistakes with respect to IIMC. Providing the safe harbor is not a complete answer to the psychological problem, but it should help reduce it and encourage crewmembers to ask for help with respect to IIMC.

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:

> § 91.26 Part 135, Subpart L. Emergencies: Prohibition against use 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
>
> (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. Pt. 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 V.A.2.[373]

VI. DEFLATING THE BUBBLE

The financial crisis in the HEMS industry represents a bubble caused by the 2002 increase in reimbursement rates, especially for rural HEMS service. The market will deflate the bubble if Congress leaves the reimbursement formula alone. It should leave it alone. The reimbursement crisis is the result of too many air ambulances in places where they are not needed. The market will be better at restoring a sustainable equilibrium of supply and demand than any command-and-control regulation. If democratic decision-making in certain areas of the country concludes that more air ambulances are needed than the market supports, local subsidies are better designed to meet local needs than subsidies crafted in Washington as a part of the Medicare program.

Preemption under the ADA is a distinct problem; it is not so much a matter of healthcare policy as it is a distortion in aviation policy. The policy goals and principles that led to enactment of the ADA have nothing to do with air ambulances. The HEMS industry is not an airline under any common sense of the concept of an airline. There is no reason to distort health care policy by treating it as such. There are, of course, health policy aspects of freeing up state and local healthcare regulators to regulate air ambulances along with other types of healthcare service. But the appropriate balance between federal and state regulation of air ambulances presents the same issues for air ambulances as it does for other aspects of healthcare. The appropriate role of state healthcare regulators is a matter of general healthcare policy, and not specific to the air ambulance industry.

Important collateral benefits result both from letting the market deflate the bubble and from freeing state and local governments to regulate the supply of air ambulances. Both initiatives will encourage more partnerships between air ambulance com-

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[373] *See, e.g.*, Med-Trans Corp. v. Benton, 581 F. Supp. 2d 721, 740 (E.D.N.C. 2008) ("FAA preemption in the area of aviation safety is absolute.").

panies and other kinds of healthcare providers—not likely forcing a return to the hospital-based model, but newer hybrids.

Balance billing also is a separate issue. Just as the air ambulance industry should not be singled out with respect to the balance between federal and state regulation, it should not be singled out with respect to balance billing. Price discrimination is common in all industries; it is likely to continue in the healthcare industry.