Postgraduate Training in Aviation and Space Medicine

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The field of aerospace medicine began during the First World War, when it was recognized that pilots, even more than soldiers and other military personnel, needed to meet visual, hearing, cardiopulmonary, and other medical standards for flying. The Aero Medical Association was established in 1929 by Dr. Louis Bauer and others as the Aviation Medical Association and continued to be primarily a military organization as new aviation technologies developed in the 1930s and 1940s to meet increasing physiological challenges related to hypoxia, acceleration, and spatial disorientation. At the same time, general and commercial aviation were rapidly developing, with the first pressurized aircraft in the late 1930s and early 1940s, fast jet aircraft in the military in the 1940s and 1950s, and the first commercial airline jet aircraft in the 1950s. As general aviation developed, the U.S. Civil Aeronautics Board, forerunner of the Federal Aviation Administration, established medical standards for general aviation as well as for commercial and airline pilots. The space age started in the late 1950s and 1960s with NASA's Mercury, Gemini, and Apollo astronauts, culminating in the Moon landings of the late 1960s and early 1970s followed by the Space Shuttle program starting in the 1980s and the International Space Station, with construction starting in the late 1990s. [Charles Berry, Wyckliffe Hoffler, Clarence Jernigan, Joseph Kerwin, and Stanley Mohler reviewed the "History of space medicine: the formative years at NASA" in 2009 (Aviat Space Environ Med. 2009; 80(4):345–352), which can be found at https://pubmed.ncbi.nlm.nih.gov/19378903/.]

The American Board of Medical Specialties (ABMS) was formed in 1933 to provide a forum for discussing issues common to all medical specialties and to ensure exacting standards in medical education and certification (https://www.abms.org/member-boards/specialty-subspecialty-certificates/). Dermatology, Ophthalmology, Surgery, Internal Medicine, and other specialties established educational requirements and examinations under the auspices of ABMS for their specialty areas in the 1930s. ABMS first recognized emergency medicine as a medical specialty in the United States in 1979.

The American Board of Preventive Medicine and Public Health was formed in 1948, initially to certify public health physicians. Its name changed in 1952 to The American Board of Preventive Medicine (ABPM; https://www.theabpm.org/about-us/history-of-the-board/). It was soon recognized that aerospace, occupational, and preventive medicine physicians should fall under the same Board. Aviation (now Aerospace) Medicine became the first ABPM subspecialty board in 1953, Occupational (now Occupational and Environmental) Medicine in 1955, and General Preventive Medicine and Public Health combined in 1960. The American Osteopathic Association likewise has an Osteopathic Board of Preventive Medicine (AOBPM; https://en.wikipedia.org/wiki/American_Osteopathic_Board_of_Preventive_Medicine) which accredits Aerospace Medicine and other preventive medicine residencies (https://certification.osteopathic.org/preventive-medicine/).

Eligibility for board certification for each preventive medicine specialty requires completion of a course of graduate academic study and award of a Master of Public Health, Master of Science, or equivalent master's or doctoral post-graduate degree "the course content of which shall include epidemiology, biostatistics, health services administration, environmental health sciences, and social and behavioral sciences" (https://www.theabpm.org/become-certified/specialties/aerospace-medicine/; https://certification.osteopathic.org/preventive-medicine/certification-process/). Residency training is specific to the needs of the specialty area. Initially, residency training programs in aerospace medicine were established by the three U.S. military services—Air Force, Navy, and Army—with civilian programs at Harvard University and Ohio State University. Over time, new civilian residency programs were established at Wright State University, the University of Texas Medical Branch (UTMB) in Galveston, TX, and at Mayo Clinic. Only the latter two civilian programs remain. Many aerospace

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Residents competing in the 2024 RAM Bowl.

Speed mentoring at the 2024 AsMA Annual Scientific Meeting.

medicine physicians have primary board certification in internal, family, or emergency medicine or participate in a residency which combines internal or emergency medicine with aerospace medicine. Physicians with such training have a broad range of competencies, including clinical medicine, aviation medicine, and space medicine.

As a medical student at McGill University in Montreal, Canada, my principal interest was aerospace medicine, and I was able to complete electives at NASA Ames Research Center in California, the Lovelace Clinic in Albuquerque, NM, and the U.S. Air Force School of Aerospace Medicine at Brooks AFB, San Antonio, TX. For career advice, I contacted Dr. Lloyd Buley, Medical Director of the International Civil Aviation Authority (ICAO). He emphasized the importance of building a solid foundation for my career before taking a residency in aerospace medicine, and recommended internal medicine, which I subsequently completed at Mayo Clinic in Rochester, MN. There, I benefited from mentorship by Dr. Earl Carter, Mayo Clinic Consultant and Medical Director of Northwest Airlines. I also learned about Mayo's rich aerospace medicine history (https://mayomagazine.mayoclinic.org/2022/03/mayo-clinic-in-space/) with the development of the BLB mask for oxygen delivery at altitudes above 10,000 feet, the M-1 maneuver, G-suits, and centrifuges (https://history.mayoclinic.org/books-films/heritage-films/rising-to-the-challenge-the-mayo-aero-medical-unit-in-world-war-ii/). While my initial interest in the field had been space, it shifted to civil aviation medicine and airline medicine over time, and this is where I have spent most of my aerospace medicine career.

There are emerging self-designated programs in space medicine associated with Emergency Medicine programs. The programs are not accredited by the Accreditation Council for Graduate Medical Education (ACGME) or the American Osteopathic Association (AOA) and do not have certification pathways. Aerospace Medical Association members recently passed two Resolutions establishing Board Certification in Aerospace Medicine as the standard for practice in aviation and space medicine. The resolutions affirm the importance of accredited and standardized training and board certification in aerospace medicine. In 2024 the AOA passed an equivalent resolution in their House of Delegates. The Potomac Institute has independently produced a document on aerospace medical training outlining core competencies and milestones for practitioners in our field (https://www.potomacinstitute.org/index.php/featured/aerospace-medicine-core-competencies-2), stating that not only should Aerospace Medicine physicians be equipped "to identify, diagnose, and treat physiological changes not typically encountered in terrestrial medicine" but also "to prevent adverse medical events before they occur, rather than attempting to treat them." Aerospace medicine is a broad specialty, and its practitioners will have differing career roles and responsibilities over time. Preventive medicine principles are essential for both aviation and space medicine practice.

One-year space medicine fellowships are not recognized by ABMS or AOA and, given their curricula and duration, will not be. Innovative programs in Aerospace Medicine should follow established pathways for the ACGME, ABMS, ABPM, AOA, and AOBPM. UTMB offers combined residencies in both internal medicine and emergency medicine with aerospace medicine, and their graduates can be certified in both by ABPM. ACGME and AOA accredited residency training is the only way to strengthen and to move our specialty of aerospace medicine forward into the future (https://www.amsro.org/residencies). I would encourage emergency medicine colleagues to remain actively involved in aerospace medicine and in our Aerospace Medical Association for the benefit of passengers, crewmembers, pilots, and astronauts in all forms of aviation and space activities.

AsMA is a family. No one belongs here more than you!