

# Research at the Harvard Anesthesia Departments

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**W**E are delighted that ANESTHESIOLOGY is publishing this Special Edition, highlighting research at the Harvard-affiliated departments. Harvard Medical School (HMS) is unusual, perhaps unique, in that it has approximately 10,000 faculty appointees, including many physicians with additional appointments at multiple affiliated and financially independent academic hospitals that provide clinical training to HMS students, residents, and fellows, and also accommodate academic researchers. There are currently four academic hospitals with anesthesia departments that are affiliated with HMS: Boston Children's Hospital, Brigham and Women's Hospital, Beth Israel Deaconess Medical Center, and Massachusetts General Hospital (MGH). Here, we briefly review the history of the Department of Anesthesia (traditionally Anaesthesia) at HMS, essentially that of its affiliated hospital departments, and some of their collaborative initiatives that have influenced patient care, trainee education, and research.

The HMS Department of Anesthesia officially came into existence with the unanimous approval of the faculty on October 16, 1969, the date chosen to coincide with Ether Day.<sup>1</sup> Before this, the HMS-affiliated hospitals had established autonomous anesthesia service groups, some functioning as academic departments. In 1936, Professor Henry Knowles Beecher, M.D. (1904–1976) became the first anesthesiologist-in-chief at MGH (established in 1811). Subsequent chairs of the MGH department have been Professor Richard Kitz, M.D. (Chair, 1969–1994), Professor Warren Zapol, M.D. (Chair, 1994–2008), and Professor Jeanine Wiener-Kronish, M.D. (Chair, 2008 to present). Anesthesia at Peter Bent Brigham Hospital was led from 1954 until 1979 by Professor Leroy Vandam, M.D. (1914–2004). Vandam's successor was Professor Benjamin Covino, M.D., Ph.D. (1914–1991) (chair 1979–1991), who led the Brigham department



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dren's Hospital (established in 1869) first created a physician anesthesia department in 1946, led by Robert M. Smith, M.D. (Clinical Professor, 1912–2009). In 1980, Smith was succeeded by Milton Alper, M.D. (Associate Professor, 1930–1991) who also led the Boston Hospital for Women group from 1969 to 1979. Professor Paul Hickey, M.D., has chaired the Boston Children's Hospital department since 1992. This leadership history illustrates remarkable stability: over periods ranging from 45 to 78 yr, each department has had only three or four leaders. These leaders have consistently been physician-investigators, who have shown tremendous commitment to growing their research programs by recruiting, mentoring, and nurturing young investigators, and retaining established ones.

The HMS Department of Anesthesia has no executive chair and is managed by an executive committee consisting of the chairs of the affiliated hospital departments with accredited residency and fellowship training programs. Executive committee members rotate as the recording secretary

through the 1980 merger with the Boston Hospital for Women that created Brigham and Women's Hospital. Subsequent Brigham and Women's Hospital chairs have been Professor Simon Gelman, M.D., Ph.D. (Chair, 1992–2002) and Professor Charles Vacanti, M.D. (Chair, 2002–2014). The Beth Israel Hospital (established in 1916) created an academic anesthesia department in 1969 chaired by Professor John Hedley-Whyte, M.D. Professor Edward Lowenstein, M.D., led the Beth Israel Hospital department from 1991 to 1998, and through a 1996 merger with the Deaconess Hospital, creating the Beth Israel Deaconess Medical Center. Subsequent chairs of the Beth Israel Deaconess Medical Center department have been Professor Carol Warfield, M.D. (Chair, 2000–2008) and Professor Brett Simon, M.D., Ph.D. (Chair, 2008–2014). Boston Children's

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responsible for administrative work. The first was Dr. Vandam, and now is Dr. Hickey. The executive committee vets academic faculty for HMS appointments and promotions, and also initiates collaborative programs that in some cases have broadly influenced anesthesia practice and the focus of academic anesthesia. These include establishing a Harvard Anesthesia Research Center Grant, a Harvard Anesthesia Basic Research Training Grant (T32-GM007592), and a Center for Medical Simulation.

The Harvard Anesthesia Research Center Grant was first led by Henrik Bendixen, M.D. (Professor, HMS/MGH) (1923–2004) and later by Richard Kitz and then Keith Miller, D.Phil. (Professor, HMS/MGH), who was an early nonphysician researcher in a clinical department.<sup>2</sup> The Anesthesia Center Grant supported and helped launch a number of outstanding investigators who went on to develop successful independent research programs, including Charles Berde, M.D., Ph.D. (Professor, HMS/Boston Children's Hospital), John Savarese, M.D. (Professor, currently at Weill Cornell Medical College, New York), Gary Strichartz, Ph.D. (Professor, HMS/Brigham and Women's Hospital), John Hedley-Whyte (Beth Israel Hospital, currently at Boston Veterans Affairs Medical Center), and Warren Zapol (MGH). Bendixen and his coinvestigators received National Institutes of Health funds to add the Harvard Anesthesia Bioengineering Unit to the Center Grant in 1967. The Bioengineering unit, consisting of academic engineers and physicists, was initially led by Jozef Cywinski, Ph.D. (Principal Associate, HMS); who recruited Ronald Newbower, Ph.D. (Associate Professor, HMS/MGH) and Jeffrey Cooper, Ph.D. (Professor, HMS/MGH). This group's research into the genesis of critical incidents in the operating room environment, particularly Cooper's recognition that modifiable human factors frequently contribute to medical errors, was seminal in the evolution of the patient safety movement and practice standards.<sup>3</sup> Out of this initiative emerged the Harvard Medical School Standards for Monitoring during general anesthesia,<sup>4</sup> versions of which were adopted as practice standards by the American Society of Anesthesiologists and World Federation of Societies of Anesthesiologists. International standards for various types of operating room equipment were also established with input from the Bioengineering unit.

These developments also captured the attention of regulators and engendered research focusing on simulated medical care environments as both laboratories and training tools. Professor Cooper now directs the Center for Medical Simulation (<https://harvardmedsim.org/>), an independent nonprofit foundation that was established with support from the HMS Department of Anesthesia. All HMS-affiliated anesthesiologists participate in crisis management training in this facility on a repeating basis. Their patients benefit from this training and their departments also benefit by receiving discounted malpractice insurance from Harvard's medical malpractice insurer.

The Harvard Anesthesia Basic Research Training Grant (T32), directed initially by Richard Kitz, and later Keith

Miller (codirected since 2007 by Stuart Forman, M.D., Ph.D., Associate Professor, HMS/MGH), is now in its 37th year of continuous National Institutes of Health funding. The T32 supports fellows and junior faculty members for up to 3 yr of intensive (80% effort) early research training under the mentorship of established investigators at Harvard Medical School and affiliated academic institutions: the four major academic hospitals, the Harvard School of Public Health, Harvard University, the Massachusetts Institute of Technology, and a number of world-class research institutes. The current T32 grant accommodates up to seven concurrent trainees. Assessment of applicants seeking T32 support and review of T32 trainee progress is a regular agenda item at monthly HMS Anesthesia executive committee meetings. To date, almost 70 individuals have received support from this grant, and approximately 70% of those who have completed this training obtain support from other external sources to continue research activities.

Whereas the HMS Anesthesia Executive Committee members together manage the activities described above, their departments, including researchers, are also driven by intense competitiveness and independence. In the past, these values likely impeded the development of collaborations among HMS-affiliated institutions. More recently, Harvard University and HMS have embraced collaborative research and acted to shift their institutional cultures. The Harvard Catalyst (<http://catalyst.harvard.edu/>), established in 2008 with a National Institutes of Health Clinical and Translational Science Award (1UL1-TR001102) and funding from the university and its affiliated biomedical research institutions, facilitates, and supports innovative collaboration among these institutions. Harvard University campus development in Allston, Massachusetts (across the Charles river from Cambridge) includes planned space for an "enterprise campus" that will house researchers from many disciplines, including medicine, basic sciences, engineering, applied sciences, and design.<sup>5</sup> The depth and breadth of the Boston academic community provides unmatched local opportunities to both learn from and collaborate with outstanding researchers in all disciplines. Collaborative research involving investigators from multiple HMS-affiliated hospitals is also not infrequent, particularly in clinical studies.

If the four HMS-affiliated academic anesthesia departments were combined, HMS would certainly be the leader in anesthesia research grant funding in the nation, if not the world. A merger of this type is highly unlikely and might be detrimental. The current balance of competition and collaboration among the four departments probably contributes to their success, both clinical and academic. The anesthesia chairs remain updated on activities at the other three HMS-affiliated departments through monthly executive committee meetings. At the same time, frequent interactions among these leaders and their faculty members help the four independent HMS anesthesia departments to adopt

and maintain practices that support thriving academic cultures. This “federalized” structure of the HMS Anesthesia Department thus combines the advantages of intellectual depth and breadth from very large total faculty and trainee pools together with departmental independence to innovate in response to academic opportunities and clinical challenges in their distinct hospital environments.

### Competing Interests

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### References

1. Hedley-Whyte J, Milamed DR: The evolution of sites of surgery. *Ulster Med J* 2006; 75:46–53
2. Ali H, Battit G, Cooper J, Gionfriddo M, Goudsouzian N, Kraft M, Kitz RJ, Lowenstein E, McPeck B, Miller E, Miller KW, Pontoppidan H, Ryan J, Todres D, Zapol W: This is No Humbug! Boston, Department of Anesthesia Critical Care and Pain Medicine, Massachusetts General Hospital, 2002, pp 1–459
3. Kohn LT, Corrigan JM, Donaldson MS; Committee on Quality of Health Care in America, Institute of Medicine. *To Err is Human: Building a Safer Health System*. Washington, National Academy Press, 1999, pp 1–287
4. Eichhorn JH, Cooper JB, Cullen DJ, Maier WR, Philip JH, Seeman RG: Standards for patient monitoring during anesthesia at Harvard Medical School. *JAMA* 1986; 256:1017–20
5. Editorial Staff: The Long Game in Allston. *Harvard Magazine* 2014; 116:18–23