AMA Journal of Ethics

March 2015, Volume 17, Number 3: 258-264

HISTORY OF MEDICINE

The History of Professionalism in Anesthesiology

Kathryn E. McGoldrick, MD

Historical Background

Medical historian Roy Porter wrote in his superb book, *The Greatest Benefit of Mankind*, that the Hippocratic Oath presaged the western model of a profession (an occupation characterized by the profession of an oath) as a morally self-regulating discipline dedicated to serving others [1]. Since the Middle Ages, the word "profession" has denoted an occupation that is given many privileges by society in return for the obligation to serve it. Professionalism, therefore, is a term used to describe certain attitudes, values, and behaviors that are demanded of physicians. It is at its core the ethical and moral commitment to excellence, altruism, integrity, collaboration, lifelong learning, and deep respect for other human beings. Professionalism requires the physician to fully understand that the most important individual in the special patient-doctor relationship is the patient. Toward that end, the physician strives to deliver the best possible care congruent with the patient's beliefs, values, and needs. This patient-centeredness is a vital factor in motivating the physician to maintain the highest standards of care, engage in rigorous ongoing education, actively participate in medical organizations, and strive to seek clinical innovations.

A concatenation of factors gradually led to the "discovery" of anesthesia in the mid-nineteenth century. Arguably the first was use of the somniferous sponge in the thirteenth century. Then, in 1540, Valerius Cordis, the great physician and botanist who authored *Dispensatorium*, described a revolutionary technique to synthesize ether, which involved adding sulfuric acid to ethyl alcohol. Contributions to the development of anesthesia included the experiments of William Harvey (1578-1657), culminating in the discovery of the systemic circulation; identification and characterization of new gases by Joseph Priestley (1733-1804); the use of those gases, most notably by the Bristol Pneumatic Institute, to treat diseases; and the 1820s movement opposing all types of human suffering promoted by surgeon Henry Hill Hickman (1800-1830), in conjunction with England's Romantic Movement in the arts and literature, with its attention to individuality, pain, and suffering [2].

Although Sir Humphry Davy (1778-1829) introduced nitrous oxide into medical practice in 1799 and, in 1800, suggested possible anesthetic qualities of the gas [3], the first successful public demonstration of surgical anesthesia did not occur until 1846. Explanations for this 46-year delay have been proffered by David A. E. Shephard [4], Norman Bergman [5], Nicholas M. Greene [6], Donald Caton [7], and others. Clearly, delay in the introduction of valid observations and scientific innovation into clinical practice is not unusual. Claude Bernard, for example, alluded to the paralytic effect of curare in 1857 [8],

although the drug was not used clinically as a neuromuscular blocking agent until the 1940s. It is likely that Davy considered nitrous oxide an anodyne rather than a definitive solution to the problem of pain in surgical operations [5].

Moreover, contemporary societal attitudes about pain needed to change before surgical anesthesia could be accepted, and amelioration of pain was not a social goal in the era of Davy and Hickman. Many viewed management of pain as interference with a divine plan [6]. Although Jeremy Bentham and John Stuart Mill were able to effect a more positive view about pain management, the belief that blunting of pain was morally wrong had been present in society for years [7]. In addition, mesmerism was widely practiced in the 1830s and 1840s, and an argument could be made against using potentially dangerous chemicals when a less risky alternative was available. As Shephard concludes, societal attitudes and medical circumstances were not propitious for surgical anesthesia to be introduced and accepted until 1846 [4].

Anesthesiology began as a craft or trade rather than a true profession, associated as it was with surgery and dentistry, which at that time had neither the technical facility nor the systematic scientific underpinnings to be considered "professional" [2]. The early years of anesthesia's history in the United States were also blemished by petty squabbles and rivalries about who should be credited for the "discovery" of surgical anesthesia [9], inadequate attention to scientific principles, and egregiously unsafe practices such as the administration of asphyxial concentrations of nitrous oxide, rather than the patient-centered ethos professionalism demands. Anesthesiology was also lacking other important elements of professionalism—standards of care, innovations in clinical science, rigorous educational programs, and professional organizations to discover and disseminate information.

The status of anesthesiology in Europe was not vastly better than in the United States during the latter half of the nineteenth century. The premature death of England's John Snow (1813-1858), a technically facile anesthetist who was also well versed in experimentation, epidemiology, and the scientific literature, left a leadership void for many years. Anesthetists in England focused on devices and instruments rather than on fundamental advances in research that could lead to new drugs and applications.

During most of the nineteenth century, the vast majority of notable advances in the science of anesthesiology were achieved by basic scientists [10]. Among physiologists, Pierre Jean Marie Flourens, François Magendie, and Claude Bernard are respected for their work on the effects and site of action of anesthetic gases. Pharmacologists and chemists, including Joseph Friedrich von Mering, Hans Meyer, and Charles Overton, synthesized novel drugs and investigated the properties that enabled a chemical to function as an anesthetic. Surgeons, obstetricians, and dentists contributed the bulk of clinical advances in the field [10]. Most of the practicing anesthetists functioned primarily as technicians who made meager contributions to advancing the scientific underpinnings of the discipline. But in the late nineteenth century, this would begin to change.

Emergence of the Triumvirate

Although nurses, rather than doctors, had been administering anesthetics [2], physician anesthetists gradually ascended to prominence. At the very end of the nineteenth century and in the first few years of the twentieth, doctors began to be appointed professors of anesthesia in medical schools and chiefs of anesthesia in hospitals [2]. In his history, anesthesiologist Leroy Vandam identified three anesthesiologists of this period whose impact "merit[s] special notice" [11]: Ralph M. Waters, Francis H. McMechan, and Elmer I. McKesson.

Although Ralph Milton Waters (1883-1979) was widely recognized for designing the "to and fro" carbon dioxide canister and for introducing cyclopropane as an anesthetic, his most pivotal contribution was probably the inculcation and development of professionalism in anesthesia. When Waters was brought in to create a separate department of anesthesiology at the University of Wisconsin in 1927, the condition of anesthesiology was primitive. There were few journals and no professional societies to define standards, disseminate important information, and promote research [10].

Waters was a bold and astute visionary who realized that, if anesthesiology was to become a true profession, the following developments were critical: a systematic body of knowledge must be taught to students; organizations must establish, implement, and oversee standards of education and practice; research programs must be nurtured with close links to basic science and clinical care; meetings must be conducted regularly to foster dissemination of new information and promote discussion of patient care issues; and, most critically, practitioners of anesthesiology must be dedicated to the service of the public and to seeking improvements in their academic and clinical practice [10].

Waters insisted on high-level anesthesia training programs for medical students and graduates. The residency program that he instituted in Madison was rigorous, consisting of three years of demanding training. Under his direction, at least 27 alumni of the Department of Anesthesia at Wisconsin went on to become department heads, including Virginia Apgar [2].

Despite his strengths, Waters held some of the prejudices of his times, specifically with regard to women in medicine. Indeed, in a 1932 letter Waters wrote, "…MD ladies…are useless in the profession. I am through with them. Ladies are nice socially but not (as) professionals" [12].

Nonetheless, Waters had a genius for networking, forming enduring friendships with many gifted leaders who facilitated his visionary goals. He worked with such luminaries as the basic scientist Chauncey Leake and the educators Arthur Guedel and Emery Rovenstine [10]. In addition, Waters joined with John Silas Lundy and Paul Meyer Wood to eventually establish appropriate specialty certification in anesthesiology when the American Board of Anesthesiology (ABA) separated from the American Board of Surgery to become an independent entity in 1940 [13], an important step toward professionalization.

Vandam identifies two illustrious associates of Waters's as particularly influencing him and anesthesiology: Francis H. McMechan and Elmer I. McKesson. Francis Hoeffer McMechan (1879-1939) was the consummate organizer, with an agile mind and a dramatic, forceful

personality. Ankylosing rheumatoid arthritis terminated his promising clinical career, so he focused on organizational and editorial activities. In 1912, he helped form the American Association of Anesthetists. Owing to McMechan's persuasion, the *American Journal of Surgery*, in 1914, began publication of the *Quarterly Supplement of Anesthesia and Analgesia*, which endured until 1926. Waters recollected that, at a time when there was little in the way of textbooks or journals about anesthesiology, he felt "considerable joy" upon finding the *Quarterly Supplement*. Vandam speculates that Waters's first paper, "Why the Professional Anesthetist?" was "probably inspired by conversations with McMechan" [14]. In 1915, McMechan cofounded, with W. H. Long and Ira McKesson, what ultimately became the International Anesthesia Research Society. Beginning in 1922, the society published *Current Researches in Anesthesia and Analgesia*, the first journal in the United States devoted exclusively to anesthesia, with McMechan as editor [2].

Elmer I. McKesson (1880-1935), known as "Ira," made the kind of scientific contributions to anesthesiology that many nineteenth-century anesthesiologists had not pursued. In addition to being a capable anesthesiologist, he founded the Toledo Technical Appliance Company and produced many notable inventions: the first on-demand interflow nitrous oxide and oxygen machine, with percentage calibration of the two gases; oxygen tents; suction machines; and his Nargraf machine of 1930, which was capable of producing a semiautomated record of inspired oxygen, tidal volume, and inspiratory gas pressure. In his "spare" time, McKesson helped found the University of Toledo and served as professor of physiology and physiologic chemistry [2].

Anesthesiology…and Beyond

The extraordinary contributions of three remarkable anesthesiologists extended well beyond the confines of anesthesiology and advanced the practice of medicine globally. These trailblazers in science, public health, and ethics were Robert A. Hingson, Virginia Apgar, and Henry K. Beecher.

Concerned about the pain that women endured in childbirth, Robert Andrew Hingson (1913-1996) and obstetrician Waldo B. Edwards designed the 19-gauge Hingson-Edwards caudal malleable stainless steel needle to provide continuous caudal analgesia [15]. Hingson also suggested that continuous caudal block could be used for battlefield and other trauma surgery. No doubt his most far-reaching, potentially life-saving contribution was the Hypospray, which he and an engineer designed in the 1940s [16]. While at Staten Island, Hingson had treated a merchant seaman who sustained a high-pressure trauma that forced diesel oil transdermally into his hand without a visible surface wound. Using this observation, Hingson developed a small jet injector whose high pressure forced fluid subcutaneously, without breaking the epidermis. Subsequently, the instrument was used worldwide to immunize millions of people against influenza, typhoid, cholera, smallpox, and polio. The recipient of countless international humanitarian awards, Robert Hingson was also nominated for the Nobel Peace Prize [17].

Virginia Apgar (1909-1974) went to the University of Wisconsin as a "visitor" in Waters's program on January 2, 1937 [12]. In 1938, she became the first director of the Division of Anesthesia and attending anesthetist at Columbia. Apgar devoted herself to the previously neglected area of obstetric anesthesia. She became a world-famous pioneer in the clinical

use of and research into aspects of obstetrical anesthesia. She also developed a brilliantly simple, rapid method to assess the status of the newborn, focusing on heart rate, respiratory effort, muscle tone, reflex irritability, and color [18]. Using the Apgar score and other measures, Apgar and her team soon discovered that maternal and neonatal outcomes improved with the use of regional, rather than general, anesthesia for delivery. Thus, they initiated the salutary transition to regional anesthesia for obstetrics.

Apgar became clinical professor of pediatrics (teratology) at Cornell University Medical College and director of the campaign of the National Foundation (previously the March of Dimes) to prevent birth defects [19]. In addition, she was an outspoken advocate for universal vaccination during the rubella pandemic of 1964-1965 [20]. Apgar was awarded the American Society of Anesthesiologists' Distinguished Service Award, its highest honor, in 1961, the first woman to be so acknowledged [21].

Henry Knowles Beecher (1904-1976) made significant contributions to professionalism and medical ethics. Born Harry Unangst in Peck, Kansas, he changed his name to Beecher in his 20s, allegedly to capitalize on the name recognition of the great nineteenth century abolitionist and preacher Lyman Beecher, his preacher son Henry Ward Beecher, and his daughter, the influential author Harriet Beecher Stowe. Beecher was brilliant, driven, complex, and controversial, thriving on contrarian opinions. Although he had no formal training in anesthesiology, Beecher was named the Henry Isaiah Dorr Professor of Anaesthesia at Harvard Medical School in 1941 [22].

He proceeded over the next three decades to mold the environment in which every specialty in medicine is practiced. He advocated for the use of placebos in all drug trials, effectively becoming the father of the prospective, double-blind, placebo-controlled clinical trial. His and Donald P. Todd's watershed exploration of the factors contributing to perioperative mortality in the early 1950s was one of the first multicenter studies performed in the United States [23]. His landmark 1966 article identified unethical practices in medical experimentation and established the need for protocols and review boards for human experimentation [24]. His insistence on informed consent for clinical research was crucial in enabling acceptance of the concept of patient autonomy despite a previously established paternalistic culture. Moreover, his focus on brain, rather than cardiac, death redefined the endpoint of life and greatly facilitated the growth of organ transplantation [10].

Ironically, in 2007, a German television documentary claimed that, during the 1950s, Beecher was involved in human drug experiments in secret Central Intelligence Agency prisons in western Germany [25]. It was alleged, although without irrefutable evidence, that Beecher consulted frequently with the CIA staff and recommended testing of several drugs, possibly including mescaline, without the prisoners' consent. If this allegation is accurate, it is tempting to speculate that Beecher reflected on this experience and, with time, came to realize the necessity of informed consent in clinical experimentation.

Conclusion

A fascinating combination of ideas, events, influences, and individuals enabled anesthesiology to progress from a craft or trade to a profession. The evolution of

professionalism occurred with the establishment of professional societies, the birth and growth of formal training programs and academic departments, and the initiation of accreditation processes. The ingenuity and integrity fostered by observant, creative minds in the rich history of anesthesiology are inspiration for advances to come, while instances of scientific folly and human foibles caution against future repetition.

References

1. Porter R. *The Greatest Benefit to Mankind.* New York, NY: Norton; 1997.
2. Vandam LD. Early American anesthetists: the origins of professionalism in anesthesia. *Anesthesiology*. 1973;38(3):264-274.
3. Davy H. *Researches, Chemical and Philosophical, Chiefly Concerning Nitrous Oxide, or Dephlogisticated Nitrous Air, and Its Respiration.* London, England: J. Johnson; 1800.
4. Shephard DA. Why was there a four-decade delay before anesthesia was introduced in 1846? *Bull Anesth Hist*. 2009;27(2):33-38.
5. Bergman N. Humphry Davy's contribution to the introduction of anesthesia: a new perspective. *Perspect Biol Med*. 1991;34(4):534-541.
6. Greene NM. A consideration of factors in the discovery of anesthesia and their effects on its development. *Anesthesiology*. 1971;35(5):515-522.
7. Caton D. The secularization of pain. *Anesthesiology*. 1985;62(4):493-501.
8. Bernard C. *Leçons sur les Effets des Substances Toxiques et Médicamenteuses*. Paris, France: JB Baillière; 1857:311-325.
9. Wolfe RJ. *Tarnished Idol: William Thomas Green Morton and the Introduction of Surgical Anesthesia—A Chronicle of the Ether Controversy*. San Anselmo, CA: Norman Publishing; 2001.
10. McGoldrick KE. Reflections on professionalism: learning from the past as we look toward the future. *ASA Newsl*. 2009;73(11):30, 32-33.
11. Vandam, 269.
12. Calmes SH. A history of women in American anesthesiology. In: Eger EI II, Saidman LJ, Westhorpe RN, eds. *The Wondrous Story of Anesthesia.* New York, NY: Springer; 2014:185-203.
13. Bacon DR. John S. Lundy, Ralph Waters, Paul Wood: the founding of the American Board of Anesthesiology. *Bull Anesth Hist*. 1995;13(3):1, 4-5, 15.
14. Vandam, 272.
15. Edwards WB, Hingson RA. Continuous caudal anesthesia in obstetrics. *Am J Surg*. 1942;57(3):459-464.
16. Hingson RA, Hughes JG. Clinical studies with jet injection; a new method of drug administration. *Curr Res Anesth Analg*. 1947;26(6):221-230.
17. Maltby JR. Hingson-Edward caudal needle. In: Maltby JR, ed. *Notable Names in Anaesthesia.* London, UK: Royal Society of Medicine Press; 2002:95-97.
18. Apgar V. A proposal for a new method of evaluation of the newborn infant. *Curr Res Anesth Analg*. 1953;32(4):260-267.
19. Huggard-Nelson D. Apgar score. In: Maltby JR, ed. *Notable Names in Anaesthesia.* London, UK: Royal Society of Medicine Press; 2002:4-6.
20. March of Dimes honors 100th anniversary of Virginia Apgar [press release]. White Plains, NY: March of Dimes; June 24, 2009. http://www.marchofdimes.org/news/march-of-dimes-honors-100th-anniversary-of-virginia-apgar.aspx. Accessed January 23, 2015.

21. Schaner PJ. A history of the Distinguished Service Award. *ASA Newsl*. 2005(theme issue):17-19.
22. Kopp VJ. Henry K. Beecher, MD: contrarian (1904-1976). *ASA Newsl*. 1999;63(9):9-11.
23. Beecher HK, Todd DP. A study of deaths associated with anesthesia and surgery: based on a study of 599,548 anesthesias in ten institutions 1948-1952, inclusive. *Ann Surg*. 1954;140(1):2-34.
24. Beecher HK. Ethics and clinical research. *N Engl J Med*. 1966;274(24):1354-1360.
25. Koch, ER. *Folterexperten – Die geheimen Methoden der CIA* [DVD]. Stuttgart, Germany: Südwestrundfunk; 2007.

Kathryn E. McGoldrick, MD, is a professor in and the chairman of the Department of Anesthesiology, director of the anesthesiology residency program, and assistant dean for student affairs at New York Medical College in Valhalla, New York. She is editor in chief of the *Survey of Anesthesiology*, an associate editor of *Clinical Decision Support: Anesthesiology*, and a member of the editorial board of *Current Reviews in Clinical Anesthesia*. Her academic interests include undergraduate and graduate medical education and the history of anesthesiology.

Related in AMA Journal of Ethics
Quality Improvement and Patient Safety Organizations in Anesthesiology, March 2015

ISSN 2376-6980