ANESTHESIA AT *THE HOUSE*

From the earliest days of the "ether cone," to modern techniques tailored to the tiniest of infants, the practice of anesthesiology has a rich and nuanced history. A new book from University of Vermont Associate Professor of Anesthesiology **Joseph Kreutz, M.D.,** titled *Anesthesia at the House,* chronicles the development of the specialty at UVM.

The project was no small undertaking: Kreutz spent the better part of a decade researching and writing the illustrated history. He combed through archives and special collections at UVM and UVM Medical Center, and interviewed more than 20 surviving members of the department. The result is a detailed history of anesthesiology at UVM, from the early 1800s up until the present day. Kreutz addresses the vast technological changes the specialty has seen, as well as the personalities that helped shape its practice in Burlington. And personalities there were, from Edward Ford, described as "quite the talker" and likely Vermont's first true anesthesiologist, to the brilliant and volatile John Abajian, who founded the Department of Anesthesiology and helped to bring it from a fledgling department of two into the modern era. And then there are the quieter, but no less important stories, like those of the nurse anesthetists who put in long days caring for patients during World War II when many men were serving overseas. The following excerpts from *Anesthesia at the House* showcase some of the work Kreutz has done to bring to life the history of the practice of anesthesiology at UVM.

Above: the Mary Fletcher Hosptal, known as "the House" to the doctors that practiced there, in an old postcard view from the early 20th century.

JOHN HAZEN DODDS

In the late 19th century, anesthesia as a specialty was in its infancy. Although anesthetists began to pop up at major hospitals, medical students, nurses and interns with little training continued to handle many of the procedures. Kreutz points to John Hazen Dodds as the person who helped move the practice of anesthesia in Vermont into a new era when he was hired as the first "Instructor in Anaesthetization." Born in 1873 in North Hero, Vt., Dodds was the ninth of thirteen children born to John Dodds, a Scottish immigrant farmer, and Sarah Hazen. He was able to continue his education at the New York Military Academy thanks to financial help from a wealthy brother-in-law, which put him ahead of many of his peers. Kreutz notes that when Dodds enrolled at the UVM College of Medicine, he was "one of only a few students there who had good high school education." After residency and two years of additional training, he returned to Burlington in August of 1907 as an "anesthetist" at Mary Fletcher Hospital and instructor in the specialty. It's unclear what specific anesthesia training Dodds had, beyond exposure to the use of ether as an intern. A description of the "Dodds Routine," as it was referred to by some students, provides a window into how anesthesiology was practiced at the turn of the last century.

John Hazen Dodds, M.D., in 1963, a few months before his death.

> How did Dodds do anesthesia? He was initially a classic "etherizer," using open drop techniques to deliver ether and (occasionally) chloroform. Later in his career, he learned how to administer nitrous oxide — usually called "gas" — at an anesthesia course in New York City and from Burlington-area dentists. He probably used nitrous oxide in what was called the "nitrous oxide-ether sequence," a technique introduced by Thomas Bennett in which "gas" is inhaled for a few moments before ether was administered.
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> Unfortunately, only one first-hand account of Dodds' practice exists, related by Ellsworth Amidon, a UVM College of Medicine student in the late 1920s. He called it the "Dodds Routine":
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> "No preop medication was used so a child, usually crying, was placed on an OR table. As a deep breath was taken, in preparation for another yell, the intern would place the gauze cone soaked with ether over the child's face so he would get the full benefit. Not too many breaths were required before sleep mercifully took over. The trauma to both patient and 'anesthetizer' probably lasted a lifetime."

GROWING PAINS

Although the John Hazen Dodds continued to train students into the early 1930s, upon his retirement in 1933, Mary Fletcher Hospital brought on an instructor three decades younger than him: Albert Mackay. A surgeon with no additional anesthesia training beyond rotating on the service as an intern, his appointment was typical of his time. Kreutz points out that his role included many duties, just one of which was practicing anesthesia clinically. Other medical professionals often handled that job.

Albert Mackay, M.D, Ellsworth Amidon, M.D., and Keith Truax, M.D. pose by the front steps of the Mary Fletcher Hospital in 1932.

> By the 1920s, nurse anesthetists were employed at many hospitals and were generally preferred by surgeons over interns. Nurses were better trained than interns (who had three months of anesthesia training, at most), they provided better care than interns (who would often be distracted by the technical aspects of the surgery instead of focusing on their anesthetic), and they protected the surgeon's medical license better than interns (who were often working under the direct supervision of the surgeon).

One surgeon who made his mark during this time was George Sabin, a 1900 UVM College of Medicine graduate. Kreutz notes that he was "hired by UVM in 1903, but did not advance quickly, achieving the rank of assistant professor only in 1926. (He was blind in one eye and his poor depth perception was a problem.) He did, however, introduce spinal anesthesia to Burlington in the 1920s, and was credited with saving many lives that may have been lost if inhalation anesthetic has been used."

UVM'S FIRST ANESTHESIOLOGIST

Edward Ford, likely the first true anesthesiologist in Vermont history, came with superb "postgraduate medical training," according to Kreutz. After completing a fellowship at Lahey Clinic in Boston, and co-authoring a paper on "Intravenous Anesthesia," he served as chief of anesthesia at a hospital in Pennsylvania for eight months before arriving in Vermont in 1937. Ford was an athlete in college, participating in track, wrestling and lacrosse, and worked summers as a brakeman for the Pennsylvania Railroad while a medical student at Hahnemann Medical College. He was among the anesthesiologists leading the specialty into a new era.

Edward Ford, M.D.

> Experienced, published, and well connected, Ford must have been a rising star in the small world of 1937 American anesthesiology. He was one of about 230 full-time anesthetists in the United States — there were only 700 anesthetists in all, most "casual anesthetists who do not consider anesthesia to be their one and only life's work" — and an expert on cyclopropane anesthesia. He lectured on "newer anesthetic agents" at the May 1938 meeting of the Vermont State Medical Society, "with an emphasis on cyclopropane, intratracheal, intravenous, and spinal anesthesia."

Ford left Burlington in 1939 under unclear circumstances, served in World War II, and then went on to practice in Pennsylvania.

THE BIRTH OF A DIVISION

After Ford left, John Abajian came to Burlington with a directive to create a department of anesthesiology at

John Abajian, M.D.

Surgeon Lyman Allen, M.D., operating at Mary Fletcher Hospital in the 1920s.

John Abajian, M.D., in his uniform during World War II.

Mary Fletcher Hospital. A city boy who attended Long Island University and New York Medical College, Kreutz notes that Abajian arrived in Vermont feeling like he had been "banished to Siberia." He quickly earned a reputation as both brilliant and difficult.

> Almost immediately, some members of the UVM medical staff were put off by Abajian's personality: cocky, opinionated, and extremely outspoken, he made enemies easily. It turned out that he was a very good anesthesiologist, though, and he "managed to survive the next few months." Soon "known and admired by the surgeons for his great intellect, innovative ideas, and capable performance of his duties," Abajian later credited some of them — Al Mackay, Walford "Wally" Rees, Keith Truax, Lyman Allen, even old George Sabin — with helping him through his turbulent first year in Burlington. He also singled out T.S. Brown, who became "like a second father" to him, saying:
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> "The only thing I really regret now is that I wasn't born a Vermonter. The type of cooperation I received from people at the Fletcher at that time, and from the medical school, is the best any anesthesiologist could obtain and receive anywhere in the United States."

Abajian soon recruited 24 year-old nurse anesthetist Elizabeth "Betty" Wells to his newfound division. The techniques they used where "atypical for the era," Kreutz notes, with a focus on local and regional anesthesia. Although it's unclear why he preferred these methods, the duo continued to shape the practice of anesthesiology through their partnership. Wells later proved to be indispensable, as World War II began to call men into military service.

Betty Wells, R.N.

JOHN ABAJIAN GOES TO WAR

Abajian enlisted in the U.S. Army in 1942, and headed off to war. He eventually became consulting anesthesiologist to General George Patton, traveling throughout the European Theater teaching nurses and physicians in the field "fundamental anesthesia techniques, pre-and postoperative care, and shock and transfusion therapy." Kreutz says Abajian focused on regional and local anesthesia as opposed to general, just as he had done in Vermont. His work is credited with saving many soldiers' lives.

> George Patton's Army was the epitome of a hard charging, hard hitting, mobile warfare unit, but it endured tremendous losses in the process — from August 1944 through April 1945, it suffered over 91,000 battle casualties. During that period its overall mortality rate fell significantly, though, from 2.9 percent in mid-1944 to 2.6 percent in 1945, and it's possible that John Abajian's work at field and evacuation hospitals was one of the reasons for the improvement. Patton may have thought so, for he recommended Abajian for the Legion of Merit. Odom also credited Abajian for his "most useful" work, writing in a postwar summary:
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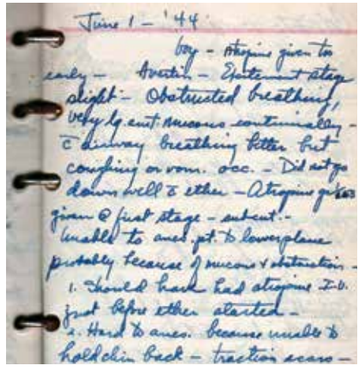
> "By the time Major Abajian left a unit, he had succeeded in giving valuable instruction in both the theory and practice of the administration of anesthetics and had also given valuable assistance in the handling of casualties in the operating room. His work elevated the standards of both anesthesia and surgery in the Third U.S. Army."



June 1 – '44

Boy – atropine given too early – Avertin – Excitement stage slight – Obstructed breathing, very lg amt mucous continually – Airway breathing better but coughing on vom. occ. – Did atp down well & ether – Atropine given @ first stage – subcut – Unable to anes. pt. to lower plane probably because of mucous obstruction – 1. Should have had atropine I.M. just before ether started – 2. Hard to anes. because unable to hold chin back – traction scars –

Betty Wells' 1944 notes on an anesthetic procedure.

Abajian returned to the United States in June of 1945 at the rank of Lieutenant Colonel, and resumed his position at UVM at the start of 1946.

THE HOME FRONT

With Abajian traversing Europe with Patton's Army, back in Vermont, Wells became the leader of the new division at 25 years-old, caring for patients with tireless dedication. She was joined by another nurse, Esther "Jackie" Roberts, whom Kreutz describes as a "plain-spoken farm girl from Barnard, Vt.," and internist Christopher Terrien, Sr., a 1936 grad of the UVM College of Medicine. The young team handled the situation with remarkable grace, according to Kreutz's reporting.

Jackie Roberts, R.N.

> Despite the workload and risks, Wells later wrote, "We survived the frequent call schedule and, more importantly, our patients did too. There were no fatalities due to anesthesia during that period — I probably would have resigned if there had been." But by 1944, Wells and Roberts were worn out and asked Mary Fletcher Hospital's new Superintendent, Lester Richwagen, for more help. He obliged, hiring Mary Fletcher School of Nursing graduates Frances Wool in May 1944 and Florence "Peg" Thompson in January 1945.
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> As World War II wound down, and anticipating the return of many young men seeking employment, the nurse anesthetists who had put in countless long days and call hours caring for patients during the war explored their career options.

Kreutz notes that Wells and Thompson continued to work in anesthesiology, while Wool joined the military before serving as a private nurse in New Hampshire. Roberts found success in a different medical field — she went on to serve as surgical assistant to eminent UVM neurosurgeon R.M.P. Donaghy, who pioneered microsurgery, and in 1969, she was honored as the "Mother of Microneurosurgery." She died in South Burlington, Vt., in 2010, at the age of 90.

BUILDING A DIVISION

With men returning from the war eager for additional training and employment, a postwar directive from the American Medical Association urged "hospitals around the country to expand their postwar residency programs." With a Division of Anesthesiology once again under the leadership of Abajian, UVM did just that, setting up a residency program and hiring its first anesthesia resident, Antonio Bayuk, in July of 1946. A veteran who had been injured in a parachute jump in Germany, he was soon joined by a second resident, Ernie Mills, also a veteran. Additional residents followed, including Donald Harwood and Charles Cox. These early residents recall both the challenges and the rewards of working in a rapidly changing field.

Charles Cox, M.D., performing a spinal anesthetic.

Ed Brazell, M.D., in 1958.

> Anesthesia was still a relatively dangerous business in the early 1950s, with primitive agents (ether and cyclopropane) and crude monitoring (primarily a "finger on the pulse"), but the residents learned to deal with it. "Safety was primordial," according to Francesca deGerman. "This is why we used local, blocks, spinals, continuous spinals, and general anesthesia, in that order." Harwood remembered that he "learned to be suspicious of redheads and fast-pulsed patients." Cox noted that he didn't lose a single patient during his residency, a remarkable achievement.
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> Betty Wells and Ernie Mills did most of the teaching that took place. "Betty and Ernie and dear experience were our mentors," Harwood recalled:
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> "I learned that we would be integrated into the thick of things very rapidly and it was sink or swim.... John gave us an unfettered opportunity to get into trouble on our own and get back out of it if we could.... [He] helped us cultivate intuition."

These first residents helped to lay the foundation for a robust division that would go on to make some important discoveries in the field.

FLUOTHANE

In the mid-1950s, UVM became one of the first institutions to study a new anesthetic agent, called Fluothane (halothane), which held the potential to replace ether as the go-to agent for anesthesiologists nationwide. Kreutz details how a partnership beween Abajian and Ed Brazell, a brilliant engineer and the new director of anesthesiology research at UVM, led to the development of what came to be known as the "Abajian Scales," a device that controlled dosing of the highly potent drug. Brazell drafted a diagram and prototype for the device,

NEWLY REMODELED ANESTHESIA EQUIPMENT FOR FLUOTHANE administration is demonstrated by Miss Betty Wells, Anesthesia Nurse in MFH Operating Room, with Mr. Eddie Rostowski as "patient". Note "copper kettle" above oxygen tank in left foreground, an essential control device for giving the new non-explosive anesthetic.

Dr. John Abajian Jr. points out highlights of Fluothane exhibit to Dr. Gino A. Dente (center) and Dr. Ernest L. Mills.

Technique With New Anesthetic Brings Honors to City Doctors

Development of a new, precise for subsequent papers on other operating rooms if this new agent

The development of a safe method of administering Fluothane was a key contribution of the UVM Department of Anesthesiology in the 1950s.

which "was a solution so foolproof that even an inexperienced anesthesiologist could precisely control a halothane anesthetic," while the pair continued to work towards publication.

The research continued, with over 5,000 halothane anesthetics done at UVM by 1959. On October 3rd that year, Abajian, Brazell, Dente, and Mills published an article, "Experience with Halothane (Fluothane) in More Than Five Thousand Cases," in *JAMA*. More detailed than their earlier presentations and reports, but with similar results and conclusions, it included a discussion of delivery systems, emphasizing the importance of precision vaporization.

Kreutz notes that the publication attracted a great deal of attention at the time, and Abajian traveled all over North America for speaking engagements. Although the Abajian Scales lost prominence after the development of a different device, the early work at UVM helped increase adoption of the new anesthetic agent.

MAZU

The late 1950s brought important advances in surgery — including the first heart-lung transplant — as well as personnel changes that would shape the division for years to come. John Mazuzan joined the department in 1959: His unique friendship with Abajian, and his patient tenacity, brought the department through a time of rapid change.

John Mazuzan, M.D.

John Morgan, M.D, Wendy Marshall, R.N., Bob Deane, M.D., and Tom Shinozaki, M.D. in the ICU in 1973.

"First Heart-Lung Surgery Makes Area History," trumpeted the August 7, 1959 edition of the *Burlington Free Press*. A week earlier, cardiac surgeon Donald Miller had patched the "somewhat larger than a fifty cent piece" atrial septal defect of Bernard Wetherby, a twenty-five year-old from Berkshire Center, Vermont. The operation, which had taken over six hours to complete, had been the result of five years of preparation by multiple departments at UVM College of Medicine and Mary Fletcher Hospital. Not only had members of the anesthesia division administered the anesthetic — which John Abajian described as 'fairly routine,' — but Ed Brazell's earlier blood volume research had been critical in estimating Wetherby's blood requirements.

About two weeks later, another significant event occurred at the hospital, but the local press made no mention of it. It was just a routine personnel move by Abajian, who needed a replacement for the departed Brazell. On August 24th, a week after completing his anesthesia residency at Massachusetts General Hospital, thirty-one-year-old John Mazuzan joined the UVM Division of Anesthesiology. The division would never be the same.

John Mazuzan was born April 2, 1928, in Montpelier, Vermont, but grew up in Northfield, the son of the editor of the Northfield News. From a young age, he had "his fingers in printer's ink," learning to set type when he was in third grade. Although he had always assumed that he would follow in his father's footsteps, his plans began to change in 1944, when he developed a persistently high fever. Bacterial endocarditis — usually fatal at the time — was suspected. With Mazuzan in a coma and near death, his family physician, Harvey Whiting, appealed to the armed forces for a new wonder drug, penicillin, then in short supply and restricted only to military use and "special civilian cases." Mazuzan was the first Vermonter to receive the antibiotic.

Mazuzan eventually went on to attend the UVM College of Medicine, and after service in the Air Force and training at Massachusetts General Hospital, returned to his home state at Abajian's behest to practice anesthesiology. Kreutz describes the relationship between "Big John" and "Mazu" — two men with very different personalities — as one of deep mutual respect, if also one fraught with some difficulty. Kreutz quotes Mazuzan: "John and I had a love-hate relationship. I was like a surrogate son to him. He would call me almost every night and talk with me for an hour, not just about anesthesia, but also things like politics and books. He was a very interesting guy, had a brilliant intellect, and we enjoyed each other's company."

SPECIAL CARE

As ventilators and other new technology began to come online — saving many lives in the process — special hospital wings were set up to care for critically ill patients. In Vermont, the first "special care unit" was founded in 1962, followed by the Robert F. Patrick Intensive Care Unit in what was then the Medical Center Hospital of Vermont in 1969. Bob Deane and Tom Shinozaki became co-directors of the ICU in 1972, and over the year Kreutz says that their names "became synonymous with intensive care in Burlington."

Bob and Tom's ICU was a busy place. In 1973, about 850 patients were admitted — 75 percent surgical, 25 percent medical — and admissions only increased over time. The pair regularly spent eighteen hours a day at the hospital, year after year for three decades. The number of lives they saved is uncountable.

The two men complemented each other. Shinozaki was the technical wizard, the "brains of the department," according to Roy Bell. In addition to his patient care responsibilities, Shinozaki developed computerized data collection systems, work that culminated in the founding of Vertek, a manufacturer of nitrogen washout computers and pulmonary compliance measuring devices, in 1969. (Vertek was sold to Hewlett-Packard in 1972.) Shinozaki also built prototypes of carbon dioxide monitors, oximeters, high frequency ventilators, and infrared thermometers.

Deane's strength was his congeniality and empathy. He had been a general practitioner in South Africa for five years before his anesthesia career, and strongly connected on a personal level with everyone he came into contact with. He was named "Teacher of the Year" several times by UVM College of Medicine students, and also received the Karl Jefferson Thompson Teaching Award from UVM in 1980.

Bob Deane, M.D.

Tom Shinozaki, M.D.

In many ways, their work set the department up for the proliferation of sub-specialties to come in the next decade.

SUBSPECIALTY GROWTH

In the 1970s, as new techniques continued to be developed, UVM hired sub-specialists in a diversity of fields, including cardiothoracic anesthesia, neuro-anesthesia, and vascular anesthesia. One particularly note-worthy hire was John Abajian's son, Chris Abajian, who joined the division in July of 1974. Kreutz calls him a "true sub-specialist," as he focused almost solely on pediatric anesthesia techniques. Eva "Heidi" Kristensen also joined the team during this time, setting up the first epidural service for labor and delivery.

Chris Abajian, M.D.

Eva "Heidi" Kristensen, M.D.

Mazuzan's obstetrical anesthesiologist was Eva "Heidi" Kristensen. Kristensen was a former high school science teacher in an Amish area in western Ontario who had changed careers, graduating from McMaster University Medical School in 1976. During her UVM residency, she had developed an interest in obstetrical anesthesia, mainly because she "liked to talk to people" and "OB just made sense for my personality." In July 1978, Kristensen was hired as a "junior attending" or "OB fellow" — her title mattered little to anyone — to set up an epidural service on MCHV's labor and delivery ward. She was taught the basics of epidural analgesia by Chris Abajian, and supplemented that with a month working with an obstetrician in Grand Bend, Ontario, and short stints at Hammersmith and Queen Charlotte's Lying-in Hospitals in London.

With Kristiansen providing key leadership, the department hired additional physicians to help her carry the workload as demand for epidural services continued to rise through the 1980s.

MAGIC

Infant spinal anesthesia has helped to save many young lives over the past three decades, with UVM anesthesiologist Chris Abajian playing a key role in pioneering its use. His seminal publication brought the technique into the limelight, and at UVM, he spent countless hours sharing his knowledge with the next generation. Before his retirement in 2012, he "personally taught almost 300 UVM anesthesia residents the technique," Kreutz says.

No UVM anesthesiologist, past or present, is better known throughout the world today than the "Magic Man," Chris Abajian. An expert at magic tricks in the latter part of his career, he shared this skill with colleagues at numerous anesthesia conferences over the years. It was an amazing talent — using magic during his preoperative visits to bond with even the most frightened, skeptical children, all in a (usually successful) attempt to convince them that accepting an anesthesia mask full of "smelly" isn't such a bad idea after all.

But magic isn't really what Abajian is remembered for. Instead, his status as one of the best-known pediatric anesthesiologists of his generation is the result of the 1984 publication of an article in *Anesthesia and Analgesia* that changed the anesthetic care of premature infants forever.

Thirty years later, infant spinal anesthesia is performed around the world and has become an essential part of the pediatric anesthesiology armamentarium. Chris Abajian's infant spinal database — now called the Vermont Infant Spinal Registry — is still growing and includes data on over two thousand UVM cases.

As the turn of the 20th century drew closer, the Department of Anesthesiology continued to evolve under the leadership of several different physicians, including Thomas Poulton, M.D., and Howard Schapiro, M.D. From 2013 to 2016, David Adams, M.D., served as interim chair until the College welcomed Mazen A. Maktabi, M.B.B.H., in August of 2016 as the chair of the Department of Anesthesiology and health care service chief of anesthesiology. VM

Anesthesia At The House *is available for purchase from the UVM Department of Anesthesiology. All proceeds from sales of the book benefit the John Abajian-John Mazuzan Endowment Fund (aka, the Johns' Fund) at the Larner College of Medicine. For more information or to obtain copies of the book, contact the author at joe.kreutz@uvmhealth.org.* Anesthesia At The House *is also available at select bookstores, including the UVM Bookstore.*