

# The Introduction of Anesthesia Technology in Halifax

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### Introduction:

After the first public demonstration of ether as an anesthetic, on October 16, 1846, by William T.G. Morton, news of this important milestone travelled around the world in the span of about 3 months. However, this demonstration had been delayed until Morton could develop a means of vaporizing the liquid ether anesthetic to permit the patient to inhale the gas. From the very beginning, the relationship between inhalation anesthesia and technology was critical. This discovery expanded the potential for surgical intervention for patients. The following year, an eminent Scottish obstetrician, James Simpson, demonstrated that the anesthetic properties of chloroform could be used for pain free child birth. From this point on, surgeons could offer a pain free surgery to their patients, and surgery was no longer generally limited to amputations and the treatment and removal of skin lesions. In the beginning, surgeons were mainly responsible for the administration of both the anesthetic and the surgery for their patients.

The evolution of hospitals in Nova Scotia began with cottage clinics and charity institutions for the sick poor<sup>1</sup>. The hospital was generally a charity institution for those who suffered from poor nutrition, squalid living conditions, and impoverishment. The Halifax City Hospital first opened in 1859, and quickly became non-functional as it could not be financially supported from a population of approximately 20,000 in the Halifax area. After several failed attempts to re-open the hospital, financial support was finally secured from the Provincial Government, and it was re-opened as the City and Provincial Hospital in 1867. Twenty years later, in 1887, it was re-named the Victoria General Hospital (VGH) in celebration of the Golden Jubilee of Queen Victoria.

The quarter century prior to the First World War was witness to renewed and progressive activity around Nova Scotia Hospitals, resulting in several specialties being recognized and implemented at the Victoria General. More specifically, Dr. J.F. Lessel was appointed as the first anaesthetist in November 1912 at the VGH which had 3 Operating Rooms. The Department of Anaesthesia soon expanded, including the recruitment of Dr. W.L. Muir in 1920, and he served in until 1948. Of special note, Dr. Clarence M. "Tabby" Bethune joined the Department of Anaesthesia in 1931, shortly after graduating from Dalhousie University. Dr. Bethune left the Department in 1939 on a leave of absence to become Registrar of the Halifax Military Hospital and to serve overseas, receiving the M.B.E. (Member of the Order of the British Empire) from King George VI. He returned to Canada in 1945 to take the position of Chief Administrator, Victoria General Hospital.<sup>2</sup>

Wars and conflicts became a major catalyst for the expanding need and use of anaesthesia. In the United Kingdom, this was the stimulus for the development of a support group, Operating Theatre Technicians (OTTs), dedicated to the management of equipment and supplies for Field Surgical teams. After the war, a formal letter supporting the continued utilization of an OTT group appeared in the British Medical Journal 24 May 1947<sup>3</sup>. As a result, the Anaesthetists

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<sup>1</sup> Howell Colin D., A Century of Care A History of the Victoria General Hospital in Halifax 1887-1987, Page 9

<sup>2</sup> Howell Colin D., A Century of Care A History of the Victoria General Hospital in Halifax 1887-1987, Page 77-80

<sup>3</sup> Warner, A. Hon. Secretary, BMJ May 24, 1947, Pg. 741

Group Committee of Consultants and Specialists endorsed the OTT group as a recognized auxiliary to the practice of anesthesia, and this practice has continued to this day. Presently, this discipline is entitled 'Operating Department Practitioners', reflecting their evolving role and scope of practice in the United Kingdom.

Similar support was needed by the Canadian and American armed forces. Soldiers were recruited to provide clinical and logistical support in the activities of Field Hospitals. After the war, these individuals who had acquired a wealth of knowledge and a valuable skill set, were commonly employed in hospital settings as aids or attendants, at least in the military setting. However, outside the military, such activity was generally the domain of persons from civilian nursing backgrounds.

### **Implementation:**

During the 20 years after WWII, the VGH became the major referral Hospital in the Maritimes. The newly expanded 15 story Victoria General Hospital was completed in 1948, with newly constructed north, south and west wings surrounding the original rotunda. It was the tallest hospital in the British Empire at the time<sup>4</sup>. The following year, Dr. Carl Creelman Stoddard, a former Canadian Naval officer, became the Head of the Department of Anaesthesia, serving this post until he retired in 1973. It was during Dr. Stoddard's tenure, that the VGH was to undergo another major expansion. Renewed funding for health care during the 1960's resulted in a significant expansion of the hospital with the construction of the Centennial Wing of the VGH which was opened on April 15, 1967. It was so named because it was opened in the Centennial year of Canada, and because it was the centennial year of the VGH, since its' official renaming in 1867. This expansion provided an additional 500 beds, expanding the total bed capacity to 875. The Department of Anaesthesia expanded to 24 operating rooms and eight induction rooms, to prepare patients for surgery, and to eliminate the need for patients to line up in busy hallways.

Prior to the opening of the newly expanded operating rooms, there was significant preparation and organization required to ensure the smooth running of the large and complex system. Disposable items for the administration of drugs and the delivery of anaesthetic gases were not yet available and as many items as possible, were re-used. All items, including needles, syringes, airways, endotracheal tubes, suction catheters, collection jars, spinal and epidural needles, and oxygen tubing and masks were all reprocessed and reused. Trays needed to be prepared for each case, with the necessary supplies for each anesthesiologist.

In preparation for the opening of the new operating rooms, Dr. Stoddard recognized that a dedicated group of employees, reporting directly to the Department of Anaesthesia, was necessary to assure consistent practice and quality control for inventory needed daily in the 24 new operating rooms. And so, Janette (Whalen) Deganis, a Nursing Assistant, employed in the recovery room of the VG Hospital was selected by Dr. Stoddard to head up this defined support group.

In addition to inventory control and infrastructure maintenance, the newly formed anaesthesia support team were also tasked with appropriate clinical duties, for example, placing blood pressure cuffs on the patients. It was understood that considerable education and training would be required, and this responsibility was accepted by Dr. Alan Drysdale, as the main

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<sup>4</sup> Howell Colin D., A Century of Care A History of the Victoria General Hospital in Halifax 1887-1987, Page 77

physician responsible for anaesthesia technician training, with the support of other anaesthesia staff members, most notably Dr. Ian Purkis and Dr. Ralph Ballam. The training was short (4-6 weeks) and “on the job” as the trainers had heavy on-going clinical responsibilities.

There were six anaesthesia technicians subsequently hired in 1967 (Ruby Burry, Vera Bonnell, Vera Baxter, Debbie Boutlier, Barb Potter, and Bonnie Cameron). Sharon Leahy would join the Department in the Fall of 1967. Both Ruby Burry and Sharon Leahy remained with the Department until their retirement, serving as Supervisors for most of their careers, and contributing a total of approximately 60 years to Anaesthesia.

There was a very limited number of cardiac monitors (about 5 ECG machines) for the 24 operating rooms, so staff anaesthetists were obliged to determine, prior to surgery, if the condition of the patient was satisfactory enough to proceed with the anesthetic without a monitor. Many rooms did not have an ECG monitor, and clinical observation skills were relied upon to assess patient condition and progress during surgery. Invasive intra-arterial pressure monitoring was rare and central venous pressure was usually monitored using a water manometer taped to an IV pole. All supplies and equipment were reusable. One of the major responsibilities of the anaesthesia technicians was to clean and reprocess supplies, and prepare critical items for sterilization through the Sterile Processing Department. Further, all anaesthesia machine breathing circuits were disassembled at the end of each day, all inventory checked in the drawers, and all drug cart supplies were checked and replaced as necessary. Individual trays were prepared for each room, a head harness and mask were placed on the OR table, and IV solutions and lines were placed on IV poles.

As surgical knowledge increased and surgical procedures became more complex, the need for more clinical information was necessary to monitor patient progress during surgery and post-operatively. This was most evident in the evolution of the cardiac surgery program. Specialized training was required to support the need for more information on the part of the anaesthetists. Reliance on invasive hemodynamic monitoring to monitor patient progress necessitated the purchase of specialized equipment and supplies for both the operating rooms and the intensive care units. This also required specialized manpower to assemble and calibrate the equipment and supplies. This expertise was initially brought to the operating rooms by specialized nurses from the cardiac catheterization laboratories. These nurses would come to the operating rooms to set-up the equipment and work with the anaesthetists during the application of the monitoring supplies to the patient as accuracy was imperative to obtain good results.

On March 1, 1973, Dr. Stoddard retired as Head, Department of Anesthesia, after 24 years at the Victoria General Hospital. He was succeeded by Dr. Emerson Moffitt. Research, clinical practice and education became the focus of the Department. Dr. Moffitt received his training in anesthesia at the Mayo Clinic, where he had worked since 1957, with a particular interest in cardiovascular anaesthesia and extracorporeal circulation.

Dr. Moffitt recognized the need for technical expertise within the Department to continue his research in the cardiac program, and for cost centre management for the Department. In the Fall of 1974, Dr. Moffitt hired a recently graduated Respiratory Therapist, Michael Breen to fulfill these needs. Mr. Breen became involved with all the technical aspects of setting up and operating research equipment for cardiac patients. Annual budget preparation and cost centre management ensured that adequate supplies and manpower were obtained and assigned. Further, he began to assist with the training of the anaesthesia technicians as an on-the-job venture and introduced them to hemodynamic monitoring equipment and supplies. He also began a maintenance program for anaesthesia equipment and supplies. The earlier reliance on

the nurses from the cardiac catheterization lab to set up cardiac monitoring equipment was no longer needed as select technicians were trained to take on this role. During this time, all operating rooms were eventually outfitted with ECG monitoring, and ventilators. Of specific note, scavenging systems were being implemented for the first time to reduce the environmental exposure to waste anesthetic gases. Mr. Breen remained in the role of Chief Anaesthesia Technologist for 5 years and then accepted a job with private industry in 1979. On March 5, 1979, Dan Cashen, also a Respiratory Therapist, was hired to the Department of Anaesthesia to replace Mike Breen as Chief Anaesthesia Technologist. In the Fall of 1979, Dr. Moffitt went on sabbatical for one year at the Mayo Clinic prior to retiring his position as Professor and Head, Department of Anesthesia. He was succeeded by Dr. Charles E. Hope, who was the acting Chief and Head of the Department during Dr. Moffitt's sabbatical.

Also in the early 1980s, Richard Criddle, Administrator of the VGH, elected to review all OJT (On the Job Training) programs and asked Ardythe Wildsmith, a resource nurse, to produce a white paper on these roles, with the intent of eliminating these functions, or developing education programs that would require some form of certification or diploma for these roles. If the proposal included the elimination of roles, some other group within the hospital would have to take on the responsibilities by expanding their role. Anaesthesia Technicians were included in this review, together with approximately 18 other roles within the hospital. The review resulted in a recommendation to develop a syllabus and curriculum for training all anaesthesia technicians.

Dan Cashen reviewed the current role of the anesthesia technician to determine the minimum entry requirements for candidates applying to the program and to establish a scope of practice accepted by the Head of the Department of Anaesthesia, Dr. Charles Hope. Once the entry requirements and scope of practice were accepted, an education program was developed by Dan Cashen in 1985 and approved by Dr. Hope. Entry level consideration was given to LPN's, Operating Room Technicians, Pharmacy technicians, Paramedics and University graduates. The program was one year in length and based on 1 full day of didactic education and 4 days of experiential learning per week. The students were awarded a certificate at the end of their training signed by the Head of the Department of Anaesthesia, the Instructor of the training program and the Administrator of the Hospital. This program was used to train the existing staff of anesthesia technicians as well as all new candidates hired to this position. Technicians were expected to perform all aspects of the job and were rotated through all OR's.

The training program was developed and taught by Dan Cashen, now titled Manager, Department of Anaesthesia. Candidates were selected from within the hospital, and from outside the hospital if a candidate could not be identified from within. All students were hired into the Department for a one year temporary position, where they learned the job while fulfilling the requirements of the curriculum. All students who successfully challenged the exams with a passing grade, were awarded a certificate and offered a full-time job. The students received an entry level salary during their training, and once they became certified, were offered full-time employment, and paid the contract rate for a certified anaesthesia technician. The training program was specific to the Victoria General Hospital. However, a number of hospitals sent staff representatives to the Department at the VGH to learn the role and responsibilities of the technician. Staff from the IWK Hospital in Halifax, the St. John Regional Hospital in New Brunswick and the Charlottetown Hospital in Prince Edward Island were trained through an abbreviated program to fulfill the needs of those Hospitals. It should be noted, that outside of the VGH in Halifax, all hospitals with active OR's in Canada use ancillary personnel, (Nurses, Respiratory Therapists and others) to complete the functions of their designated anaesthesia technicians. This is unnecessary at the VGH, because of the unique scope of the VGH training program.

The anaesthesia technician role is considered cost effective and efficient, because it has a comprehensive, dedicated knowledge and practice based education program, designed to address the specific needs of the Anaesthesia Department. This is very similar to the role of the anaesthesia technician in the United States, which is also recognized as a cost effective and efficient service. For hospitals that use nursing personnel to provide the functions and role of the technician, the difference in annual salary is approximately \$20,000.00, based on the salary levels in the most recent negotiated hospital contracts.<sup>5</sup>

Once the training program was instituted, approval was received to hire 5 more anaesthesia technicians to provide additional coverage. An additional technician was placed on shift work, weekend coverage was implemented, and an on-call system was initiated as part of the emergency backup for trauma and urgent cases during the night. A dedicated anaesthesia technician was also placed in the regional block room just outside the OR's, to support the anaesthetists in the administration of blocks for a variety of patients for chronic pain management. These patients were usually identified in the Pain Clinic and once determined acceptable candidates for a block, were referred to the Pain Management satellite OR. Also, permanent Charge technicians were selected from the existing staff in the four OR locations (11A General, 11B Cardiac, 10A Gynecology and Urology and 2B Neuro), to ensure consistent coverage, and to keep the other technicians abreast of any changes in techniques or procedures specific to those areas. The Training program for anaesthesia technicians ran once per year.

A fleet replacement of Anaesthesia Machines in the late 1980's and early 1990's saw the first introduction of automated record keeping in Anaesthesia. This also heralded the first electronic controlled systems for administering general anaesthesia - up to this time all anaesthesia machines were pneumatically powered and controlled. All staff received extensive in-service training in the operation and function of these machines, as the technicians would be responsible for trouble-shooting any problems and completing the daily functional check list procedure for these new machines.

By the mid 1990's Dr. Charles Hope retired and was replaced by Dr. Tom Coonan, initially working in collaboration with Dr. Keith Hamilton as clinical chief. In 1993, the Canadian Anaesthesia community decided to change the spelling of its discipline from anaesthesia to anesthesia, and from Anaesthetist to Anesthesiologist. This terminology will be used for the remainder of this history. Health care costs were being reviewed with the goal of reducing the Provincial Budget. Hospitals were being benchmarked across the country in terms of total patient beds per provincial population. Efficiencies within Health Care were being reviewed by national groups (i.e., Price Waterhouse, and Corpus Sanchez) and practices were being compared in the hope of discovering and implementing efficiencies. One of the major outcomes of these reviews was the amalgamation of the Halifax Infirmary and the Victoria General Hospital. The new name of the Hospital Corporation was the QEII Health Sciences Centre and this was launched in 1997, a timely occurrence indeed, as a new building was under construction to replace the existing Halifax Infirmary.

An undertaking of this magnitude necessitated a review of practices and standards across the two parent institutions, and an assessment of the technical support in Anesthesia at both

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<sup>5</sup> NSGEU and Capital Health Local 42 (Healthcare) Collective Agreement 2011-2014, signed June 27, 2011

hospital sites was undertaken by Dr. Frank King, Professor and Head, Department of Anesthesia, Memorial University in Newfoundland. This evaluation included an assessment of manpower efficiency and operating room turnover times between the VGH which utilized anesthesia technicians, and the Halifax Infirmary which employed nursing personnel to provide support services. This review recommended anesthesia technicians be adopted across the enterprise for Anesthesia support. As a new building was being constructed to replace the existing Halifax Infirmary this allowed a further rationalization of services within the greater Halifax area.

The ultimate result of these adjustments was an increase in Departmental support staff by approximately six new anesthesia technicians, and it was opted that the four Charge technicians at the VGH would be replaced by two anesthesia technician Team Leaders. Once the new Building was in place and opened in the Spring of 2000, the corporation became known as the Capital District Health Authority (CDHA), encompassing all hospitals in the Halifax Region, with the exception of the IWK Hospital. The Dartmouth General Hospital (DGH) anesthesia group, while a full and important component of the CDHA, opted not to merge with the CDHA group practice at that time and continued to use nursing personnel to provide technical support. Two major advances in Anesthesia services were introduced around the opening of the New Halifax Infirmary; Cardiac Ultrasound and Regional Ultrasound. These two programs would ultimately contribute very greatly to the level of required technical support.

The gain and loss of anesthetists is a continuing reality in a large academic Department of anesthesia, and even a few net losses can create a great stress for those who are called upon to compensate for a shortfall in complement. Such was the case for the newly merged CDHA in the year following the Department mergers. It became increasingly arduous for anesthesiologists who were obliged to spend long hours alone without relief or support, and it became even more difficult for the Department to meet its commitments (such as airway support) to the hospital outside the operating room. The latter was particularly true at the VGH site, where it was not possible to assign anesthesiology residents at night and on weekends.

Options were explored, especially in regard to the possible employment of an anesthesia assistant (AA) model that had been used extensively in Quebec, and was under consideration in other parts of Canada. This model was supported in principle by the Canadian Anesthesiologists Society, and in general involved Respiratory Therapists who undertook a year of theoretical online training in anesthesia, and practical experience in an accredited hospital program (the CDHA was an accredited site). These concepts were presented by Dan Cashen and Tom Coonan and were embraced enthusiastically by the hospital. And so a new discipline was born at the CDHA. The scope of practice of the Anesthesia Assistant included the appropriate monitoring of patients under anesthesia, appropriate intervention under the direction of anesthesiology, the assessments of patients coming to anesthesia, airway support in emergencies and the administration of conscious sedation under the immediately available supervision of an anesthesiologist.

This model has proven invaluable to the Department of Anesthesia at all the Halifax hospitals, and is now utilized in other hospitals in Atlantic Canada. The role of the AA does not compete with the anesthesia technician's role, but rather compliments the general support available to the anesthesiologist. The roles of both the Anesthesia Assistant and the Anesthesia Technician are outlined in the most recent edition of the CAS Guidelines to Practice (2017) Appendix 5.

After 33 years of service Dan Cashen retired from the Department of Anesthesia in November 2011. William Hill replaced Dan Cashen in January 2012. The Anesthesia Technician training

program continues, now under the auspices of the Maritime Business College (MBC). The first class was taught at MBC in Dartmouth in the Fall of 2013 and continues to graduate students in Anesthesia Technology as recently as July 2017. A new class intake is already filled with 5 students for September 2017. The AA program was introduced into the Dalhousie University Respiratory Therapy curriculum for a few years, but is presently inactive for reasons of cost. AA training can still be taken on line, and the practical component can be undertaken at the CDHA.

#### Conclusion:

The success of Anesthesia Technology at Capital Health over the past 50 years has been remarkable. From its' very humble beginning as a group of individuals hired to ensure the proper preparation of supplies and equipment, using aseptic technique, and inventory management, Anesthesia Technicians have adapted to the changing Operating room environment. Today, anesthesia technicians setup, prepare and provide first line troubleshooting of life support equipment, assist with the set up and calibration of hemodynamic lines and supplies in sterile fields, assemble all airway supplies and equipment and operate point of care analyzers. The current staff complement of anesthesia technicians is about 21 FTE's. Using the monetary figure (\$20,000) cited above regarding the difference in salary between the registered nurse and the anesthesia technician, this dedicated group has conservatively saved approximately \$500,000.00 in salary difference per year. The adoption of this role in other regional hospitals could provide significant manpower savings.

The technology used in the delivery of Anesthesia care has increased considerably over the past 50 years. Most machines require calibration and constant care for the proper function and operation to ensure safe performance when used on the patient. The knowledge base and experience required to complete the functional assessment of this equipment is significant. Capital Health, through the Department of Anesthesia, continues to recognize Anesthesia Technicians to complete this work efficiently and safely.

#### Acknowledgements:

This history of the introduction of Anesthesia Technology in Halifax resulted from personal interviews with Sharon Leahy, Ruby Burry, Mike Breen, and Janette Deganis, who I owe a debt of gratitude for their contributions and insight into the early development of the Department. I also relied upon the book "A Century of Care, A History of the Victoria General Hospital in Halifax 1887-1987, by Colin D. Howell for the history and development of the Victoria General Hospital. I also recognize and appreciate the encouragement, review and comments by Dr. Tom Coonan in the production of this history.