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1. Introduction

The report provides an overview of the current supply of several diagnostic and therapeutic professional groups in Newfoundland & Labrador. Included are medical laboratory technologists, ultrasound technologists, medical radiation technologists, radiation therapists, nuclear medicine technologists, and diagnostic cytologists. The data provided includes those who are licensed or eligible for license and does not include technicians, aids, or assistants.

This diagnostic supply report is one of the initiatives of the human resource health sector study. It will contribute to the overall evaluation and future planning of human resources in the health sector.

2. General Trends

2.1. Population Aging

There is considerable debate in health care today related to the impact an aging population will have on health service requirements. While reports have suggested a compression of morbidity resulting in healthier older Canadians[1], data from Statistics Canada has shown a) that there has been a decrease in activity limitation by individuals aged 65-74, but b) there has been no significant decrease in the prevalence of most chronic conditions among people in this age group over the past two decades[2]. If, indeed, the incidence of chronic disease among the elderly has not declined, a significant increase in the elderly population will likely result in a substantial increase in the demand for diagnostic and therapeutic services. For example, increases in cancer screening, detection and treatment will likely increase the requirement for services such as diagnostic cytology and radiation therapy.

A recent report by the Canadian Association of Radiologists[3] reported that Canada's 9.8 million baby-boomers will begin to turn 65 in the year 2007 and given that approximately 80% of diseases occur during the last portion on an individual's life, the authors conclude there will be an increase in the demand for health care services in the upcoming years. The authors go on to predict a 200% increase in the demand for diagnostic imaging scans to diagnose, assess and treat the major causes of death in seniors such as cardiovascular disease, cardio-cerebral disease, and cancer.

On the other hand, recent attention to clinical guidelines, utilization reviews, consolidation of health services, and appropriateness criteria for diagnostic testing could mitigate anticipated increases expected from other causes. Technology advancements as well could improve efficiencies and costs per test.

2.2 Advancements in Technology

It is difficult to predict the effect of new diagnostic technologies and interventional approaches on the staffing requirements of diagnostic professionals in the province. As

technology advances and improved diagnostic equipment becomes available, the need for technologists could rise or diminish. The addition of new technologies to the province such as Positron Emission Tomography (PET) scans, may in fact require the addition of new technologists with advanced training to operate the equipment. On the other hand, new technologies may serve to increase the speed and efficiency of many tests, replacing others, and perhaps reducing the number of technologists required. One factor underlying this process will be the availability of capital funds for acquisition and replacement of equipment, a significant cost that totaled 93 million dollars for the past five years in this province.

It is unknown what the impacts will be on staffing levels by such advancements as tele-radiology, increased automation and the use of robotic instrumentation. The potential centralization of radiologists and general pathologists as telehealth capacity improves, may result in an increased independence of technologists, perhaps increasing the time required per case. The increasing complexity of new technologies and equipment combined with the evolution of new testing modalities may also continue to cause a growing demand for services in the future.

Emerging advancements in point-of-care testing will also have a potential effect on staffing requirements for medical laboratory technologists. Point-of-care testing could serve to reduce the volume of testing being conducted by the laboratory by providing instrumentation that can be used outside of the laboratory in areas such as the hospital bedside, home and clinic. A reduction in the volume of some tests conducted in the laboratory suggests a decrease in the number of technologists required. However, increased access to testing by more individuals, increasing incidence of chronic disease, increasing diagnostic patterns of physicians, and an expansion in available tests will likely continue to cause growth in demand for services. New tests are emerging on an ongoing basis that assist in clinical diagnosis and investigation.

Advancements in technology have changed the field of ultrasonography leading to an expanded role for the sonographer. Improved images can now be used on almost every soft tissue area of the body and as result are used to a greater degree as technology continues to improve in this area. In addition, most ultrasound examinations are non-invasive and with minimal risk to the patient. These characteristics facilitate the use of ultrasound technology as an effective screening tool in the detection and diagnosis of disease. In addition to improved testing capability, there is an increase in the complexity level of testing. Demands for early detection have resulted in an increase in the number of advanced imaging probes such as transvaginal, transrectal, and transesophageal probes which require longer testing times and well trained practitioners.

3. Medical Radiation Technologists

Medical Radiation Technologists (MRTs) operate radiographic and radiation therapy equipment to administer radiation treatment and produce images of body structures for the diagnosis and treatment of injury and disease[4]. Within the province, MRTs are mainly employed in regional hospitals and the provincial cancer treatment centre. Their duties include operating equipment/scanners/units, recording and processing patient data, and performing scheduled maintenance and emergency repairs on radiographic equipment.

Radiation technology, as a discipline, includes many areas of advanced or specialized training including radiation therapy, nuclear medicine, magnetic resonance technology, breast imaging, and diagnostic medical sonography.

3.1 Basic Education

The current entry level to practice requirement in this province for a Medical Radiation Technologists (MRT) is a three-year medical radiography diploma program.

3.2 Degree Initiative

In 1995 the members of the Canadian Association of Medical Radiation Technologists (CAMRT) approved an initiative that would change the educational requirement for certification to the degree level, effective 2005[5]. Agreement of provincial/territorial governments is required for the implementation of a change in entry-level educational requirements. Nationally, the degree decision by CAMRT has received varying levels of acceptance. Several of the eastern provinces, however, have begun the transition to the degree requirement. Some employers and Governments continue to suggest, however, that Diploma remain as entry to practice with support for the degree option being available for those who wish to pursue advanced education or as a prerequisite to some specialized positions.

In this province, the provincial branch of CAMRT supports the degree requirement without the retention of any diploma programs. According to CAMRT, the move to a degree requirement was based on the need for a broader knowledge base due to: a) the increasing complexity of medical radiation technology, b) the changing health care environment, c) the acuity of patients, and d) the role of its members in multi-disciplinary teams.

For this province the last diploma graduates will be completing their program in 2004 and first class of degree graduates will not be graduating until 2006. Thus, the degree initiative will result in no graduates of medical radiation technology in 2005.

There have been both benefits and concerns raised regarding the degree initiative. Benefits, as reported by a national environmental scan of the human resource issues affecting medical laboratory technologists and medical radiation technologists[6], include enhancement of career laddering, more career opportunities, greater international

mobility, improved quality of health care service, greater research potential and development, etc. Concerns raised about the degree initiative include opinions that the program should continue as an applied program and higher training costs for students will be incurred.

3.3 Origin of Training

Medical Radiation Technology is taught at the College of the North Atlantic. The three-year medical radiography diploma program graduates approximately 12 students per year.

Beyond 2004, graduates of the diploma program in this province will be required to pursue a one-year Bachelor of Technology (Medical Radiography) from Memorial University in order to obtain licensing with CAMRT.

There is no provincial training program for Nuclear Medicine, Magnetic Resonance Imaging and Radiation Therapy technologists. Training programs located within Canada for these areas are described below.

> The nuclear medicine technology program is a three-year diploma program with the option to continue for a one-year degree exit. The program is offered by QEII/Dalhousie School of Health Sciences, University of New Brunswick, Michener Institute, Southern Alberta Institute of Technology, and the British Columbia Institute of Technology. These programs are largely affiliated with the college systems. In the past the province has purchased seats in these programs to fill specific vacancies**.** Students entering this program are not required to have a radiation technology diploma. As of 2005, candidates seeking accreditation in this area will be required to have a degree.
>
> The Magnetic Resonance Imaging course is an add-on course for medical radiation technologists. The Health Care Corporation of St. John's is currently the only Health Board in the province with an MRI machine. In the past employees within the province have attended the Red River College in Winnipeg for MRI training. The program consists of three semesters (two didactic and one clinical) that are each three months in length. The clinical semester can be completed in home province. The MRI program is also offered by British Columbia Institute of Technology, Northern Alberta Institute of Technology, and the Michener Institute. The area of magnetic resonance technology has been expanding to include more than training on MRI equipment, an issue which has led to the development of a CAMRT accredited degree program for Magnetic Resonance (MR) expected to be available in 2003[7].
>
> The Radiation Therapy program is a degree program offered by the Michener Institute in Ontario. Applicants must have two years of undergraduate university courses completed to apply. The program consists of two years didactic instruction and a third year that is predominately clinical. Diploma programs are

offered by the British Columbia Cancer Agency, the Cross Cancer Institute, the Tom Baker Cancer Centre, the Allan Blair Cancer Centre, the Saskatoon Cancer Centre and Cancer Care Manitoba. This province has purchased seats for the Newfoundland Cancer Treatment and Research Foundation at the Michener Institute for the past three years requiring return in services from graduates. Students seeking accreditation in radiation therapy after 2004 will be required to have completed a degree program.

In order to recruit into these areas, government or employers within the province generally have to sponsor seats or attempt to recruit technologists from abroad, often competing with other jurisdictions with competitive salaries and other incentives.

3.4 Registration Process

Medical radiation technologists are a regulated body. Certification from CAMRT is required for radiological technologists, radiation therapists, nuclear medicine technologists, and magnetic resonance technologists as part of the Radiation Health & Safety Regulations. There is currently no professional stand-alone legislation for these groups. The candidate must also be registered with a provincial association of medical radiation technologists.

3.5 Combined Laboratory/X-ray Program

In the past, the College of the North Atlantic (CONA) with the support of the Department of Health and Community Services and the Health Boards offered a combined Laboratory/X-ray program that trained Laboratory RTs in medical radiography and Medical Radiography RTs in laboratory science. This program was developed to provide multi-skilled professionals that were able to meet the needs of rural Health Boards.

To date the combined technologists have not been eligible for registration with CAMRT. In this province, the Department of Labour has agreed to the employment of combined Lab/X-ray Technologists, without certification by CAMRT, under certain conditions. Without a similar exception which would allow the employment of new graduates after 2004, there will be no replacements for retiring combined technologists. Health Boards will require the services of part-time technologists in Laboratory and X-ray, to replace one retiring combined technologist.

The Department of Health & Community Services supports the continued role of the combined technologist in the provincial health system and has initiated a project, in association with the Department of Labour, to assess the competencies of combined technologists. Following this study a decision will be made as to the future of combine laboratory/x-ray technologists in this province.

Nationally, combined Lab and X-ray technologists are employed in P.E.I., Nova Scotia, Saskatchewan, Manitoba, and Alberta.

3.6 Workforce Demographics

There are currently 256 Medical Radiation Technologists working in nine health board regions in the province, one per approximately 2100 people[a]. This per population ratio remains fairly similar to the 1/2073 ratio in 1997, provided in a report released by the Canadian Institute for Health Information in 2000[4]. In this report Newfoundland and Labrador ranked 5th in having the highest number of MRTs (registered with national association) per population trailing New Brunswick (1/1686), Nova Scotia (1/1784), Manitoba (1/1841) and Quebec (1/2047).

Annually there are no demographic statistics collected for members at either the provincial or national association level.

There are currently three main categories of Medical Radiation Technologists employed in the province, **RTR** – Registered Technologists Radiological Technology, **RTT** – Registered Technologists Radiation Therapy, and **RTNM** – Registered Technologists Nuclear Medicine. Four other designations have been categorized by the association as additional training for an **RTR**, they are **RTMR** – Registered Technologist Magnetic Resonance, **ACR** – Advanced Certification Radiological Technology, **CBI** – Certificate in Breast Imaging, and **RDMS** – Registered Diagnostic Medical Sonographer (Ultrasound). An eighth category is recognized by the union as **Associate** – an associate member of NAMRT – eligible for registration.

A breakdown of the type of medical radiation technologists by employer is provided in Table 1.

[a] Calculation based on population projection for 2001 from Department of Economics and Statistics, Government of Newfoundland and Labrador

Table 1: 2001 Medical Radiation Technologist Type by Employer

Provincial Health Board	Facility	MRTs
Health Care Corporation of St. John's	General Hospital	48 RTR (inc 4 ACR, 4 RDMS, 1 MR), 8 RTNM
	St. Clare's Mercy Hospital	38 RTR (inc 2 ACR, 1 CBI), 2 RTNM
	Janeway	17 RTR
	Breast Screening Clinic	4 RTR (inc 2 ACR, 1 CBI)
	Waterford Hospital	2 RTR (inc 1 ACR)
	CONA Instructors	3 RTR (inc 2 ACR)
	Total	122
Nfld Cancer Treatment and Research Foundation	Dr. H Bliss Murphy Cancer Centre	14 RTT (inc 2 RTR, 1 BSc)
	Total	14
Avalon Health Care Institutions Board	Carbonear General Hospital	12 RTR (inc 1 RDMS
	Placentia Health Centre	1 RTR
	Total	13
Central East Health Care Institutions Board	James Paton Memorial Hospital	11 RTR (inc 1 RDMS), 2 RTNM
	Notre Dame Bay Memorial Health Centre	1 RTR
	Fogo Island Hospital	1 RTR
	Total	15
Central West Health Board	Central NF Regional Health Centre	1 RTR (inc 2 ACR), 1 Associate
	Dr. Hugh Twomey Health Care Centre	1 RTR, ACR
	Lewisporte Lab & X-Ray Clinic	1 RTR
	Valley Vista Senior Citizens Complex	1 RTR
	A.M. Guy Memorial Health Centre	1 RTR
	Baie Verte Peninsula Health Centre	1 RTR, 1 Associate
	Total	24
Health Labrador Corporation	Labrador Health Centre	4 RTR
	Capt. William Jackman Memorial Hospital	4 RTR (inc 1 RTT, 1 ACR)
	Total	8
Grenfell Regional Health Services Board	Dr. Charles S Curtis Memorial Hospital	5 RTR
	Total	5
Western Health Care Corporation	Western Memorial Regional Hospital	29 RTR (inc 1 RDMS), 2 RTNM
	Sir Thomas Roddick Hospital	5 RTR (inc 1 RDMS)
	Dr. Charles Legrow Health Centre	2 RTR
	Total	38
Peninsulas Health Care Corporation	Dr. GB Cross Memorial Hospital	9 RTR (inc 1 RDMS)
	Burin Peninsula Health Care Centre	8 RTR
	Total	17
Grand Total		**256**

Source: Newfoundland Association of Medical Radiation Technologists. (2001).

3.7 Retirement and Replacement Projections

The provincial association conducted an independent survey of 248 provincial MRTs and 24 students in March 2000[8]. Of the 174 respondents (70% response rate) 60 % were female and 40% were male. The survey asked the participants to provide the anticipated date of retirement. Fourteen of the 174 respondents were unsure of their retirement date. The known retirement dates were discussed in comparison to the approximate number of new graduates that will be available. The results concluded that from 2000 – 2005 there will be approximately 48 new graduates to replace retiring professionals. The number of new grads from 2006 – 2010 will likely be further reduced by the degree initiative (no new grads in 2005).

It is important to note that the above data does not take into consideration any change in staffing levels or other patterns of migration or changes in labor force participation. The above numbers reflect the number of people, not the number of full-time equivalents.

On a national basis, an environmental scan of the human resource issues affecting medical laboratory technologists and medical radiation technologists was reported in 1999 by a working group of the federal/provincial/territorial Advisory Committee on Health Human Resources (ACHHR)[6]. The working group provided on age profile of CAMRT members as of June 11, 1996. The report stated that as of 2006, 25% or 2066 of CAMRT members across the country will be 55 or older. The same proportion was true for MRTs in this province (16 out of 247 provincial members will be 55 or older in 2006).

3.8 Maternity Leave

The survey carried out by the NAMRT found that 83% of the female respondents are of child-bearing age (less than 40 years old). With the recent change in maternity and parental benefits from 25 to 50 weeks effective Jan 1, 2001, additional MRTs will be required for maternity leave replacement over and above the number required to replace annual losses due to retirements and other causes.

3.9 Employment Status

Current vacancies in the province have largely been with casual, rather than full-time positions. The majority of new graduates are seeking full-time work in order to pay back increasing student loans and are eager to begin their careers. It is expected that these students are less likely to stay in the province when full-time permanent positions with higher salaries are available elsewhere.

3.10 Focus: MRT Advanced Certification - Diagnostic Medical Sonography

Medical sonographers (ultrasound technologists) use non-ionizing high frequency sound waves to produce two-dimensional images of the body. Sonographers are required to: perform patient assessments; acquire and analyze data obtained using ultrasound diagnostic technologies; provide a summary of findings to aid in patient diagnosis and management; and use independent judgment and systematic problem solving methods to produce high quality diagnostic information and optimize patient care[9].

3.10.1 Education

The Diagnostic Ultrasonography program is a one-year program offered by the College of the North Atlantic. To be accepted into the Diagnostic Ultrasonography program, an individual must have successfully completed an accredited program in Medical Radiation Technology (Medical Radiography, Radiation Therapy or Nuclear Medicine) and possess a certificate of registration with the Canadian Association of Medical Radiation Technologists (CAMRT). During the one-year program the student will be required to

follow a rotation schedule through participating hospitals providing a broad exposure to the different sonographic specialties. As of 2005, students in this province will be required to have a degree in Medical Radiation Technology and CAMRT registration in order to be accepted into the sonography program. The provincial association supports the degree movement stating that "there is no substitute for education and training through a recognized degree program"[10].

3.10.2 Certification

Sonographers working in Canada are required to be registered by the Canadian Society for Diagnostic Medical Sonographers (CSDMS). Graduates of the Diagnostic Ultrasonography program must write a certification examination set by the American Registry of Diagnostic Medical Sonographers (ARDMS) in order to be registered by CSDMS. Designation is available in three specialty areas: RDMS – registered diagnostic medical sonographer; RDCS – registered diagnostic cardiac sonographer; and RVT – registered vascular technologist.

3.10.3 Registration

There is no legislation in Canada requiring mandatory registration of medical ultrasound technologists. However, information supplied by the Newfoundland Society of Diagnostic Medical Sonographers (NSDMS) states that 99% of practicing sonographers within the province are registered with the ARDMS[10]. The provincial society promotes continuing education and competency training through provincial conferences and lecture series, ensuring a minimum of 10 credits per year to maintain certification.

3.10.4 Demographics

There are approximately 50 practicing medical sonographers in the province[10]. The following tables provide the distribution of practicing medical sonographers by region and status.

Table 2. Practicing medical sonographers by region and status

Region	Employee Count
Central	8 PFT[a], 1 Casual
Eastern	6 PFT
Grenfell	2 PFT
Labrador	1 PT[a], 4 PFT
St. John's	16 PFT, 5 Casual
Western	6 PFT, 1 Casual
Total	**50**

[a] PFT = Permanent full-time, PT = Part-time
Source: NSDMS data September 2001.

3.10.5 Age of the Workforce

Many professional groups will experience the effects of increasing retirement trends for the current aging workforce, the medical sonography profession is no exception. The approximate number of years to retirement for provincial sonographers is provided in the following table.

Table 3. Number of sonographers by approximate years to retirement

Approximate Years to Retirement	Number of Sonographers Becoming Eligible
3-5	6
8-10	21
15	5
20	5
25	8
30	3
Unknown	2

Source: NSDMS data September 2001.

As illustrated in the above table, the largest number of retirements will occur around the year 2010. During this period, approximately 42% of the provincial sonography workforce will be eligible to retire. The current number of annual graduates from the sonography program, approximately 4 per year, will not meet the need at that time. Additional training, recruitment, and retention measures may be necessary.

3.10.6 Employment Trend

Over the past several years, the retention of new graduates in the province has been fairly low. Since 1996 there has been a total of 23 graduates in the provincial program, the majority of which are native to Newfoundland & Labrador. Of the 23 graduates, 10 remained in the province resulting in a retention rate of 43%[10]. This may be, in part, due to a lack of full-time permanent positions becoming available. Graduates are entering the workforce with increasing student loans and are not likely to remain in the province when full-time permanent positions, often with higher salaries, are available elsewhere. It is expected that an increase in the number of full-time permanent positions, as retirements increase, will result in a corresponding increase in the provincial retention rates for ultrasound technologists.

In a recent environmental scan on the human resource issues affecting medical sonographers[6] it was reported that acute shortages of sonographers had been reported in Manitoba, Alberta, Ontario, and the Atlantic Provinces. Vacancies in these areas had been lasting for several months. Current shortages in sonographers similar to other health professionals are expected to increase as the workforce ages. As a result, inter-provincial and international competition for medical sonographers may challenge both the retention and recruitment efforts of this province.

4. Medical Laboratory Technologists

Medical Laboratory Technologists (MLT) perform and interpret various laboratory tests which aide physicians and others in patient diagnosis and treatment. The duties of a MLT include: performing and interpreting diagnostic tests on blood, tissue and bodily fluids; cultivating, isolating and identifying bacteria, fungi, viruses, and parasites which invade the body; counting blood cells, recognizing abnormalities and reporting changes which have taken place in blood cells; determining blood type and cross-matching for transfusions; and arranging tissue in sections, staining and preparing specimens for examination under the microscope[4]. Within the province, MLTs work in hospitals, government laboratories, clinics and blood service labs.

4.1 Education

In this province, the Medical Laboratory Technologist program is offered through the College of The North Atlantic (CONA). It is a three-year program. During the first two years the students remain at the college and the emphasis is on academic and theoretical training. In the third year of the program emphasis is on practical training, with a clinical component that generally takes place at a health care institution in the province.

The first year of the program is a general medical science year in which approximately 80-100 students are registered per year. Upon completion of year one, students are required to apply for the medical laboratory technologist program. The college currently registers a maximum of 27 students in the MLT program per year. The number of graduates however, has been lower in recent years partially due to an attrition factor in the general year that often reduces the number of students choosing a career in medical laboratory science. In 2000 there were a total of 19 graduating students, a number which has decreased to 13 in 2001. Based on current enrollments, the number of graduates for each of the next two years is expected to be 19. Efforts are underway to reach full program subscription in subsequent years.

Graduates may choose to further their education and obtain a Bachelor of Technology Degree from Memorial University of Newfoundland. For graduates from the diploma program this process is approximately one year.

Graduates are also eligible to complete advanced training in the areas of Diagnostic Cytology and Clinical Genetics. The diagnostic cytologist/cytotechnologist works in a specialized field of laboratory medicine which involves the diagnosis of disease through recognition of alterations in cell morphology[11]. The Genetics Technologist is a member of the health care team responsible for performing a range of procedures to process specimens for genetic analysis used in diagnosis, treatment, and monitoring of disease[12]. These post MLT diploma programs range from approximately 13–24 months duration.

4.2 Certification

Upon graduation, students are eligible to write the examination offered by the Canadian Society for Medical Laboratory Science (CSMLS) to obtain national certification. This certification is recognized nationally.

4.3 Reduction in Training Programs

It has been suggested that the health care reform and budget cutbacks in the mid 90s led to a reduction in the number of registered medical laboratory technologists working in heath institutions across the country[6]. The privatization of laboratory services has also contributed to this trend in some jurisdictions[6]. The CSMLS has reported a 43% decline in membership from 1990 to 1998. This process, along with an increased use of laboratory technicians[a] resulted in a lack of job opportunities for technologists. To address this issue, training programs across the country were reduced or eliminated. The numbers of students and training programs decreased from 752 students in 21 programs (outside of Quebec) in 1993 to 164 students in 8 programs in 1998[6].

4.4 Provincial/National Registration

Registration for medical laboratory technologists is not mandatory at either a provincial or national level. It is estimated, however, approximately 87% (374) of the Laboratory Technologists in this province are registered by the CSMLS.

4.5 Demographics

With no mandatory registration process for medical laboratory technologists it is difficult to provide a comprehensive list of MLTs in the province. The data in Table 4 was provided by the CSMLS and is summarized by Health Board (where member is a health board employee), Other (private labs, companies, etc.), and Employer Not Specified. There are a total of 374 MLTs represented in the table out of an estimated 430[13] for the province.

Table 4. 2000 Provincial Medical Laboratory Technologists By Employer

[a] Medical and clinical laboratory technicians perform less complex tests and laboratory procedures than technologists. Technicians may prepare specimens and operate automatic analyzers, for example, or they may perform manual tests following detailed instructions. Like technologists, they may work in several areas of the clinical laboratory or specialize in just one. They usually work under the supervision of medical and clinical laboratory technologists or laboratory managers.

Employer	Board/Location	Number of MLTs
Health Board	Health Care Corporation of St. John's	126
	Western Health Care Corporation	44
	Peninsulas Health Care Corporation	40
	Central East Health Care Institutions Board	29
	Central West Health Board	25
	Avalon Health Care Institutions Board	17
	Health Labrador Corporation	9
	Grenfell Regional Health Services Board	5
Other	College of the North Atlantic	21
	Canadian Blood Services	11
	Government of Nf & Lab	1
	Memorial University of Newfoundland	1
Employer Not Specified	St. John's Region	28
	Western Region	4
	Central Region	5
	Eastern Region	4
	Grenfell Region	1
	Labrador Region	3
Total		**374**

Source: Canadian Society for Medical Laboratory Science (2001).

4.6 Demographics of the Workforce

In a national human resources review for laboratory technologists[13] it was estimated that 17.4% of Newfoundland & Labrador's general medical laboratory workforce would be eligible to retire by 2005. This estimate was increased to 63.6% by 2015. The following table provides a breakdown or retirements versus training positions for the next 14 years.

Table 5. Medical Laboratory Technologists - Future Eligible Retirements Versus Number of Training Positions

Time Frame	Total Number of Eligible Retirements	Eligible Retirements Per Year	% Of Total Workforce	Number of Training Positions Per Year
2001- 2005	75	15	17.4	27
2006 – 2010	79	16	18.3	27
2011 – 2015	120	25	27.9	27

Source: Canadian Society for Medical Laboratory Science (2001) Medical Laboratory Technologists National Human Resources Review – A Call For Action.

The data in Table 5 illustrates that Newfoundland & Labrador appears to have the capacity to produce a sufficient number of graduates to keep pace with projected retirements over the next 14 years. The numbers however, are based on four assumptions: a) that there will be no increased demand for laboratory services, and b) the province will have a high retention rate for new grads over the next fourteen years, c) the number of training positions remains constant with full subscription, and d) labour force participation remains constant.

4.7 Provincial Retention Rate

In the report produced by the Canadian Society for Medical Laboratory Science, it was noted that Newfoundland & Labrador has experienced consistently low rates of retention for laboratory technologists, stating that graduates are regularly moving west for full-time positions with salaries approximately 25 to 30 percent higher than those offered in the province[13]. It is important to note, however, that retention rates are directly related to the labour market situation at the time, namely the number and status of vacancies that exist. Retention rates also vary depending on the number of students in the program from other provinces who are more likely to return to their home province. In general, it is expected that an increase in the number of full-time permanent positions available to new graduates, due to an increase in retirements, will have a positive impact on the retention rates for the province.

One factor that may affect provincial retention rates, regardless of the number of positions available, is the lack of training programs within the Atlantic provinces. Prince Edward Island and Nova Scotia do not currently offer training programs in this field and are competing with the other Atlantic provinces for both the 47 graduates that are trained in the Atlantic region and those trained elsewhere. There are, however, discussions underway in Nova Scotia to reinstate the Medical Laboratory Sciences program at Dalhousie. The following table compares the projected retirements for the four Atlantic provinces with the total graduates for the Atlantic region.

Table 6. Medical Laboratory Technologists Atlantic Region - Eligible Retirements Versus Expected Graduates

Year	Nfld & Labrador Eligible Retirements	Nova Scotia Eligible Retirements	New Brunswick Eligible Retirements	Prince Edward Island Eligible Retirements	Total Eligible Retirements	Total Graduates (27 Nfld & Lab + 20 NB) *5 yrs	Predicted Shortage
Now - 2005	75	107	105	25	312	235	77
2006 - 2010	79	180	96	15	370	235	135
2011 - 2015	120	180	119	18	437	235	202
Total	**274**	**467**	**320**	**58**	**1119**	**705**	**414**

Source: Canadian Society for Medical Laboratory Science (2001) Medical Laboratory Technologists National Human Resources Review – A Call For Action.

On an Atlantic basis, the predicted shortage becomes greater for each year cohort, a result that has the potential to have a detrimental effect on the retention rates of new grads in this province. For example, Nova Scotia, shows the highest number of eligible retirements and does not currently have a laboratory technologist training program. Clearly, issues such as the increasing demand for laboratory services, graduate retention and student attrition require careful monitoring in order to ensure an adequate supply of laboratory technologists for the province over the next 10 –15 years.

4.8 Employment Status

Over the past several years, the majority of positions posted within the medical laboratory technologist profession have been casual rather than full-time. Graduating students with increasing student debts are less likely to stay in the province when full-time permanent positions, often with higher salaries, are available elsewhere in the country. Monitoring is required to ensure adequate retention of new graduates for future years when expected retirements will likely result in the availability of full-time permanent positions.

4.9 Focus: MLT Advanced Certification - Diagnostic Cytology

The diagnostic cytologist/cytotechnologist works in a specialized field of laboratory medicine which involves the diagnosis of disease through recognition of alterations in cell morphology[14]. Cytotechnologists are responsible for laboratory testing involving the initial interpretation of cells from patient samples. With the use of the microscope and computer-aided image technology, cells are meticulously examined, providing information that assists the clinician in assessing the health of a patient and aiding in the diagnosis of cancer. Cytotechnologists work under the guidance of a pathologist and in collaboration with other health care professionals[15].

Cytotechnologists in Canada are registered with the Canadian Society for Medical Laboratory Science (CSMLS) and/or the appropriate provincial branch. The association does not have mandatory registration.

Students graduating from a recognized Diagnostic Cytology program are eligible to write an accreditation examination through the CSMLS

4.9.1 Education

For a period of 11 years (1987-1997) a diagnostic cytology program was available in Newfoundland and Labrador. The program was offered at The Dr. Leonard A. Miller Centre in association with the College of the North Atlantic. The program graduated approximately three cytotechnologists per year. A special exemption by the CSMLS permitted the development of a one-year post-diploma training program after which graduates were eligible to write the national certification exam conducted by the CSMLS. Successful completion allowed the graduates to seek employment across Canada. During the final years of the program, there were very few full-time positions available in the cytology area, a factor which may have contributed to a decline in applicants and the subsequent discontinuation of the program.

The majority of Diagnostic Cytology programs available in the country are between 18-24 months duration. During the first 8-12 months students participate in classroom and related laboratory instruction. Areas of study include gynecologic cytology, pathology,

microanatomy, histotechnique, and general cytology. The remainder of the program is typically dedicated to clinical experience in an affiliated health facility.

The cytotechnologist training programs currently available in Canada are outlined in Table 7.

Table 7: Cytotechnologist training programs in Canada

Province	School	Length of Program	Number of Seats/Year
Nova Scotia*	QEII/Dalhousie School of Health Sciences Halifax, Nova Scotia	- 4 year degree program - diploma exit after 3 years - 2 year post diploma program	8-10 seats with approx. 20 applicants per year.
Ontario	The Michener Institute of Applied Health Sciences Toronto, Ontario	- 18 month post diploma[2]/degree program	2000/2001 = 18 seats with 67 applicants 1999/2000 = 12 seats with 79 applicants
Manitoba	Health Sciences Centre/ School of Cytology Winnipeg, Manitoba	- 21 month post diploma program	3 seats with approx. 8-10 applicants per year.
Saskatchewan	Regina Health District School of Diagnostic Cytology Regina, Saskatchewan	- 18 month post diploma program	4 seats beginning every 18 months, approximately 6 – 10 applicants
Alberta	Northern Alberta Institute of Technology Edmonton, Alberta	- 2 year program	11 seats with approx. 60 applicants per year.
British Columbia	British Columbia Cancer Agency Vancouver, BC	- 23 months	4 seats with 50+ applicants per year.
Quebec	Collège de Rosemont/ Centre hospitalier de l'Université de Montréal, Pavillon Hôtel-Dieu Montréal QC	- 39 weeks	N/A
	Collège de Sainte-Foy / École de cytotechnologie Alexandre Meisels Québec QC	- 39 weeks	N/A

** In September 1999 first students were enrolled in new 4-year degree program. There were 20 applicants for 8 spots. In 2000 there were 11 applicants and in 2001 there were 19 applicants for 10 seats. An increase has been observed in the number of applications and admissions from students coming directly from high school.*

[2] In the above table "post diploma" refers to post Medical Laboratory Technology Diploma.

4.9.2 Demographics

There are currently 22 cytotechnologists in the province. All provincial cytotechnologists are employed full-time in the public health sector. The breakdown by region is presented in Table 8.

Table 8: Cytotechnologists by region in Newfoundland and Labrador

Region	Number of Cytotechnologists	Details
St. John's	12	St. John's (12)
Eastern	1	Clarenville (1)
Central	6	Gander (2) Grand Falls/Windsor (4)*
Western	3	Corner Brook (3)
Grenfell	0	
Labrador	0	

** One cytotechnologist is not currently working in this field.*

4.9.3 Age of Workforce

The following table illustrates the age breakdown for diagnostic cytologists currently employed in the province[16].

Table 9: Age range of diagnostic cytologists in Newfoundland and Labrador

Age	Number of Practicing* Diagnostic Cytologists
55-59	1
50-54	2
45-49	6
40-44	4
35-39	4
30-34	4

**One diagnostic cytologist currently working in another area.*

As illustrated in Table 10 above, the number of cytotechnologists eligible to retire in the next 5-10 years may reach 6-8 technologists, which represents approximately 30 to 40% of the current workforce.

4.9.4 Workforce

The absence of a provincial training program coupled with a historically low rate of recruitment to the province, has resulted in a lack of additional cytotechnologists available to cover relief areas. Given the advanced training required to work in this area, general medical laboratory technologists are unable to fill-in for relief purposes, thus recruitment measures will likely need to be addressed in order to provide replacements for relief periods and for retiring employees.

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