A National White Paper (2025–2035)

Canada's Nuclear Medicine Technologist Workforce Crisis

An Evidence-Based Analysis of Workforce Distribution, Demographic Pressures, Service Impacts, and National Strategies to Stabilize Nuclear Medicine Services in Canada

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Executive Summary

Nuclear medicine is a specialized field of diagnostic imaging and targeted therapy that uses small amounts of radioactive materials, called radiopharmaceuticals, to analyze how organs and tissue's function. Unlike CT or MRI, which produce structural images, nuclear medicine provides images of biological processes such as blood flow, metabolism, and the spread of cancer. These procedures support essential clinical decisions in oncology, cardiology, neurology, and endocrinology, and are central to modern precision medicine. Nuclear medicine also includes therapeutic procedures such as radioiodine treatments and emerging radiotheranostic therapies that target cancer cells directly.

Nuclear medicine follows a structured workflow that depends on highly trained technologists at every step. Radiopharmaceuticals arrive daily from licensed suppliers, and technologists prepare and measure each dose in accordance with strict radiation safety regulations. They administer the dose, position the patient, acquire the images using SPECT or PET systems, and ensure quality control before the physician interprets the study. Any staffing disruption affects this entire chain. When 1 technologist is absent, radiopharmaceuticals cannot be prepared on time, cameras must be down booked, schedules must be delayed, and waitlists expand. Because nuclear medicine relies on small teams and highly specialized competencies, staffing shortages immediately translate into reduced access to diagnostic and therapeutic procedures.

Canada is facing a critical shortage of nuclear medicine technologists that is now affecting diagnostic capacity, therapeutic readiness, and access to essential health services. Canada's nuclear medicine workforce is small, highly specialized, and unevenly distributed across jurisdictions. Nuclear medicine supports high-priority clinical pathways, yet Canada lacks a coordinated national mechanism to monitor or sustain the technologist workforce. Workforce aging, limited program capacity, and increasing clinical complexity have combined to create a structural gap between supply and demand. This gap is now visible in multiple provinces and is affecting the delivery of SPECT, SPECT/CT, PET, and radiopharmaceutical therapy services.

More than 20% of Canadian technologists are aged 50 or older, and a significant proportion is expected to retire before 2030. Canada has 5 accredited programs that collectively graduate approximately 50-70 technologists per year. This output is insufficient to maintain provincial service capacity or to support the expansion of PET and theranostic programs. Provinces without training programs depend entirely on limited seats in other jurisdictions, which increases long-term vulnerability in Saskatchewan, Manitoba, New Brunswick, Newfoundland and Labrador, and Prince Edward Island.

The distribution of technologists across provinces is uneven. Ontario and Québec employ more than 50% of the national workforce. Several provinces operate nuclear medicine departments staffed by only 3 to 6 technologists. In these settings, the departure of 1 individual can reduce capacity by more than 20% and can trigger immediate service interruptions. Larger provinces also face sustained vacancies that prevent PET scanners from operating at the intended throughput. These pressures reduce access to oncology staging, bone scans, SPECT, and SPECT/CT perfusion studies, and hybrid imaging.

Working conditions and compensation reinforce these shortages. Wage variation between provinces encourages technologists to relocate to higher-paying regions. Job posting analytics show prolonged vacancies in New Brunswick, Alberta, and Ontario. Increased workload intensity, expanded responsibilities, and limited staffing buffers contribute to burnout, early retirement, and attrition. Technologists across several provinces report elevated clinical complexity, reduced time for patient support, and limited development opportunities, all of which affect retention and service stability.

Service impacts are now evident across the country. Departments report reduced scanning days, downbooked SPECT and PET systems, and increasing wait times for oncology, cardiac, and chronic disease imaging. When technologist staffing is insufficient, cancer treatment planning is delayed, myocardial perfusion studies are postponed, and radiopharmaceutical therapy programs cannot scale. These delays affect diagnostic accuracy, slow clinical pathways, and create widening inequities in access to timely care. These pressures disproportionately affect rural, remote, and Indigenous communities where nuclear medicine services depend on small teams, limited redundancy, and long travel distances for essential care.

The situation in New Brunswick demonstrates the scale of system-level risk. Misclassification and wage misalignment have contributed to workforce erosion, recruitment failure, and loss of service capacity. Departments report unsustainable workloads, operational instability, and expanding waitlists across multiple sites. Without intervention, certain regions may lose access to nuclear medicine entirely. This scenario shows how structural pressures can escalate into service collapse when underlying workforce issues remain unaddressed. Without coordinated intervention, several jurisdictions face the risk of sustained service degradation as retirements accelerate, clinical demand grows, and PET and theranostic programs expand.

Canada is projected to graduate fewer technologists between 2025 and 2030 than the number expected to retire. This will create a net workforce contraction during a period of rising PET demand, theranostics expansion, and population aging. Without coordinated action, provinces will face increasing difficulty maintaining safe, timely access to nuclear medicine.

This White Paper presents a coordinated national strategy to stabilize and rebuild the nuclear medicine workforce. Priority measures include expanding training capacity and clinical placements, improving retention and working conditions, reducing interprovincial wage disparities, and strengthening mobility across regulatory jurisdictions. Ensuring federal–provincial alignment and structured collaboration will be essential to maintaining safe, timely, and equitable access to nuclear medicine services across the country as clinical demand accelerates over the next decade.

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Disclaimer

This White Paper contains information compiled from multiple datasets, regulatory sources, provincial submissions, institutional records, and stakeholder inputs. Due to the volume, diversity, and technical nature of the material, certain data points, definitions, and contextual elements may be repeated in different sections. These repetitions are deliberate. They ensure that each section remains complete and interpretable on its own, including when consulted independently by decision-makers or used in isolation for policy, planning, or operational purposes.

The analyses, projections, and interpretations presented in this document reflect the information available at the time of writing. Every effort has been made to ensure accuracy and consistency; however, variations in provincial reporting practices, regulatory frameworks, and data availability may result in differences between sources. The content should therefore be interpreted within its methodological limits and with an understanding of the constraints associated with national workforce data.

Some provinces and institutions publish multiple versions of the same data, including alternative wage grids, classification structures, all-inclusive hourly rates, or employer-specific adjustments. As a result, figures available in local documents or online sources may differ from the standardized values used in this White Paper. Where variations exist, the analysis relies on nationally harmonized datasets or on the primary sources referenced, in order to ensure consistency across jurisdictions.

This document is intended to support evidence-informed decision-making and does not replace formal regulatory, governmental, or institutional policies. The Canadian Association of Nuclear Medicine (CANM) and the author assume no liability for decisions or actions taken based on the use of this material outside its intended context.

Introduction and National Context

Chapter

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Chapter 1: Introduction and National Context:

1.1 Purpose of the White Paper:

The purpose of this White Paper is to provide a clear and evidence-based understanding of the nuclear medicine technologist (NMT) workforce shortage in Canada and to present this issue as a national human resources challenge that directly affects patient care, cancer pathways, diagnostic accuracy, and the sustainability of nuclear medicine services. This document was commissioned to support health system leaders, professional associations, educational institutions, policymakers, and regulatory bodies in making informed decisions about workforce planning and investment in nuclear medicine. The intent is to establish a shared reference point for all stakeholders responsible for delivering, regulating, educating, and funding nuclear medicine services across the nation.

Nuclear medicine technologists (NMTs) perform advanced diagnostic and therapeutic procedures using radioactive materials, specialized scanners, radiopharmaceutical preparation areas, and carefully regulated clinical protocols. Their expertise is fundamental to the functioning of nuclear medicine departments. Despite this essential role, Canada has not maintained a coordinated national strategy to monitor the size, age, and distribution of the nuclear medicine technologist workforce. As a result, growing shortages in many regions are now limiting access to imaging and therapeutic services. This White Paper aims to provide clarity about the scope of this shortage, the structural causes behind it, and the consequences for patients and the health system.

The purpose of this document is also to compile and integrate the existing disparate evidence. Canada benefits from multiple sources of information, including the Canadian Association of Medical Radiation Technologists (CAMRT), the Canadian Institute for Health Information (CIHI), labour market projections from the Government of Canada, academic studies, provincial regulatory bodies, and internal data from health authorities. However, these sources have historically been fragmented, produced at different times, and focused on subsets of the medical imaging workforce. Nuclear medicine technologists are often grouped within the broader category of medical radiation technologists (MRTs), which can obscure the specific needs of this smaller profession. The White Paper, therefore, consolidates the available information into a comprehensive national overview.

The final purpose of the White Paper is to support practical action. Health systems across Canada are experiencing a rising demand for nuclear medicine procedures, including the expansion of positron emission tomography (PET) for oncology and cardiology, the growth of theranostics, and an increased use of molecular imaging in the management of chronic diseases. At the same time, training capacity has remained limited and has not kept pace with retirements, or population needs. The document therefore outlines a forward-looking analysis of the workforce trajectory, identifies structural bottlenecks, and proposes strategic directions to support workforce stabilization between 2025 and 2035. By providing this analysis, the White Paper serves as a tool for planning, coordination, and policy development at the provincial and federal levels.

1.2 Importance of Nuclear Medicine Technologists:

Nuclear medicine technologists (NMTs) play a crucial role in delivering molecular imaging and radiopharmaceutical therapies in Canada. They perform complex diagnostic and therapeutic procedures that rely on precision, patient safety, and advanced technical expertise. Their responsibilities include preparing and administering radiopharmaceuticals, operating gamma cameras, single-photon emission computed tomography (SPECT), SPECT/computed tomography (SPECT/CT), and PET/computed tomography (PET/CT) systems, performing daily and weekly quality control procedures, applying radiation safety principles, and ensuring the accuracy of images used for clinical decision-making. These tasks require technical competence and clinical judgment, since imaging quality and diagnostic reliability depend heavily on proper patient preparation, correct tracer administration, protocol optimization, and recognition of artefacts during or after acquisition (CAMRT, 2023).

The range of clinical services provided by nuclear medicine technologists extends across multiple specialties. In oncology, molecular imaging supports the complete diagnostic and treatment pathway, including staging, assessment of metastatic disease, evaluation of therapeutic response, and long-term surveillance. PET imaging has become increasingly important in cancer care, with the Canadian Agency for Drugs and Technologies in Health (CADTH) reporting continued growth in PET utilization between 2015 and 2023 as more indications were approved and more scanners were added across provinces (CADTH, 2023). SPECT and SPECT/CT continue to support essential diagnostic pathways in orthopedics, cardiology, endocrinology, and infection imaging. These examinations require precise execution and adherence to standardized protocols, responsibilities that fall directly on technologists. If the staffing of skilled technologists is inadequate, the reliability and consistency of these exams will be compromised.

Therapeutic nuclear medicine has also undergone significant expansion. Health Canada has approved radiopharmaceutical therapies for thyroid disease, palliative treatment of bone metastases, neuroendocrine tumors, and metastatic prostate cancer (Novartis Canada, 2022). These therapies require technologists to manage complex radiation safety protocols, verify dosing, prepare and handle radiopharmaceuticals, and support multidisciplinary teams during the delivery of therapy. As new radioligand therapies (RLTs) enter clinical practice, the demand for technologists trained in both diagnostic and therapeutic nuclear medicine has increased faster than the supply of the workforce. According to national labour projections, the demand for nuclear medicine services is expected to continue rising due to cancer incidence, population ageing, and broader use of molecular imaging in chronic disease management (Government of Canada Job Bank, 2024).

Nuclear medicine technologists also play a crucial role in quality assurance and radiation safety, which are essential for maintaining accreditation and regulatory compliance. Nuclear medicine operates within a tightly regulated environment. Technologists are responsible for maintaining radiation exposure records, ensuring that imaging equipment meets performance standards, managing radioactive waste, adhering to licensing requirements, and documenting procedures in accordance with regulatory guidelines. These responsibilities are essential for protecting patients, staff, and the public, and they are integral to the safe operation of nuclear medicine departments (CIHI, 2023). Without trained technologists, departments cannot meet the minimum regulatory requirements necessary to operate.

Beyond technical responsibilities, nuclear medicine technologists provide essential patient care. Many individuals who undergo nuclear medicine procedures are living with cancer, cardiac disease, neurological conditions, or chronic illnesses that contribute to anxiety and uncertainty. Technologists are responsible for preparing patients for exams, explaining procedures, addressing concerns, and ensuring patient comfort during long or complex imaging sessions. Effective communication improves patient cooperation, which in turn improves image quality and diagnostic accuracy. Surveys across MRT professions have noted that increased workload and staffing shortages place additional pressure on technologists, affecting not only throughput but also the patient experience (CAMRT, 2023).

The importance of nuclear medicine technologists within the Canadian health system has grown as diagnostic imaging volumes have increased. Between 2010 and 2020, imaging volumes rose across modalities, with computed tomography (CT) scans increasing by approximately 1.3 million exams per year and magnetic resonance imaging (MRI) by 0.9 million, driven by demographic changes and expanded indications (CIHI, 2023). Although these figures do not directly represent nuclear medicine, they demonstrate the broader trend of rising imaging needs. CADTH's 2022–2023 survey found that staffing levels in imaging did not keep pace with increasing procedure volumes and that shortages of qualified staff contributed to extended wait times and service disruptions (CADTH, 2023). Nuclear medicine reflects the same national trend. In several provinces, technologist shortages have contributed to reduced operating hours, increased overtime, and lower departmental throughput, all of which affect access to care.

Nuclear medicine technologists also contribute to the operational continuity of imaging departments. Daily quality control of imaging systems, management of radiopharmaceutical inventory, troubleshooting of equipment, and coordination with radiopharmacies are among the tasks required to maintain functional nuclear medicine services. When staffing levels are insufficient, these operational responsibilities can be compromised, leading to increased risks of delays, rescheduled examinations, or reduced diagnostic accuracy. Reports from multiple provinces describe situations in which vacancies have led to scanners running fewer hours, appointments being deferred, or departments struggling to maintain full-service schedules (Health Sciences Association of BC, 2023; Saskatchewan Health Authority, 2024).

Nuclear medicine technologists play a crucial role in the national expansion of precision medicine. Molecular imaging provides insights into disease biology that cannot be obtained from anatomical imaging. PET imaging guides targeted therapies, evaluates therapeutic response, and support individualized treatment planning. SPECT continues to serve as a functional imaging modality where PET is not yet widely available. As provinces invest in new PET scanners, new radiopharmaceutical production sites, and new theranostics clinics, a stable and adequately sized technologist workforce is required to operationalize these services. Without sufficient technologists, capital investments cannot be fully utilized, and service expansions intended to improve cancer and chronic disease outcomes cannot be implemented at the necessary scale.

Nuclear medicine technologists (NMT) are key elements, essential to the functioning of nuclear medicine departments and to the broader healthcare system. Their expertise spans diagnostics, therapy, safety, quality assurance, and patient care. They support high-stakes clinical pathways, contribute directly to patient outcomes, and are essential for the PET/CT of new molecular imaging technologies. Ensuring adequate staffing is therefore critical for maintaining access to timely and accurate diagnostics and for supporting Canada's clinical and strategic objectives in oncology, chronic disease management, and precision medicine.

1.3 Nuclear Medicine in the Canadian Health System:

Nuclear medicine is a vital component of the Canadian healthcare system. It supports diagnostic accuracy, guides treatment decisions, and contributes to the management of chronic and acute conditions across oncology, cardiology, endocrinology, neurology, orthopedics, and emergency medicine. The field provides functional and molecular information that cannot be obtained from anatomical imaging alone. As a result, nuclear medicine plays a unique role in understanding disease processes, detecting early pathology, and evaluating therapeutic responses. Over the past decade, the clinical use of nuclear medicine has expanded due to increased indications for PET imaging, a rising incidence of chronic diseases, and the development of new radiopharmaceuticals (CADTH, 2023).

Diagnostic nuclear medicine enables early detection and comprehensive evaluation of disease. In oncology, bone scans, SPECT studies, and PET imaging support staging, detection of metastases, treatment planning, and monitoring of therapeutic efficacy. CADTH reported that PET imaging increased across Canada between 2015 and 2023 as provinces added new scanners and as more indications were approved for public coverage (CADTH, 2023). SPECT and SPECT/CT remain core diagnostic tools for cardiac perfusion studies, thyroid evaluation, infection imaging, and musculoskeletal assessments. These procedures rely on precise radiopharmaceutical preparation, adherence to standardized imaging protocols, and high-quality image acquisition, responsibilities carried out by nuclear medicine technologists.

Therapeutic nuclear medicine has also expanded. Health Canada's approval of radioligand therapies, including Lutetium 177-based treatments for neuroendocrine tumors and metastatic prostate cancer, has increased clinical demand for technologists trained in radiopharmacy and therapeutic workflows (Novartis Canada, 2022). These therapies involve complex preparation, strict radiation safety procedures, and multidisciplinary coordination. As the number of eligible patients increases, the availability of skilled technologists becomes a limiting factor in implementing these therapies at full capacity.

The importance of nuclear medicine also relates to its role within Canada's diagnostic infrastructure. Health system performance depends on timely access to imaging, and diagnostic capacity has been under pressure for years. CIHI reported substantial increases in CT and MRI volumes between 2010 and 2020, with CT growing by approximately 1.3 million exams and MRI by about 0.9 million annually (CIHI, 2023). Although these modalities differ from nuclear medicine, they reflect a broader national trend of increasing diagnostic demand. Nuclear medicine follows a similar trajectory. CADTH's 2022–2023 survey found that staffing levels in imaging did not keep pace with rising procedure volumes, and shortages contributed to extended wait times and temporary service reductions in multiple jurisdictions (CADTH, 2023). This is consistent with provincial reports indicating that technologist shortages have limited camera operating hours, reduced throughput, and increased reliance on overtime in nuclear medicine departments (Health Sciences Association of BC, 2023; Saskatchewan Health Authority, 2024).

Nuclear medicine is also governed by regulatory and safety frameworks that require consistent oversight by technologists. Departments must comply with federal and provincial regulations governing the use of radioactive materials, radiation exposure limits, licensing, quality control activities, documentation, and waste management. These requirements are essential for patient and staff safety and form part of the accreditation standards for nuclear medicine facilities. Compliance depends on the presence of trained technologists who understand radiation protection, radiopharmaceutical handling, and equipment safety standards (CIHI, 2023). Without sufficient technologists, facilities cannot operate within mandated safety requirements, which directly affects service availability.

Nuclear medicine plays a significant role in precision medicine and individualized care. Molecular imaging provides biological and metabolic information that supports informed decisions for targeted therapy. PET imaging plays a significant role in evaluating therapeutic response, identifying residual disease, and determining suitability for advanced treatments. SPECT continues to provide functional imaging options in regions where PET is not yet widely available or funded. These capabilities are increasingly important as cancer incidence rises and as provinces expand their precision oncology strategies (CADTH, 2023). Provinces investing in new PET scanners, radiopharmaceutical production facilities, and theranostics clinics require a corresponding increase in staffing for technologists. Without adequate staffing, capital investments cannot be fully utilized, and access to new technologies becomes constrained.

Nuclear medicine services are also essential for smaller provinces and rural areas, which face unique challenges in maintaining access to specialized diagnostic services. Reports from several provinces indicate that when even one technologist position remains unfilled, nuclear medicine services may be reduced or suspended, particularly in small hospitals or single-camera sites (Saskatchewan Health Authority, 2024). Atlantic provinces and British Columbia have reported instances in which limited staffing has contributed to slower access to diagnostic testing and reduced departmental operating hours (Health Sciences Association of BC, 2023). These limitations affect patient flow, prolong diagnostic timelines, and create inequities in access to imaging across regions.

Nuclear medicine plays a crucial role in the Canadian healthcare system by providing diagnostic accuracy, supporting informed therapeutic decision-making, contributing to safety and regulatory compliance, and facilitating the PET/CT of emerging molecular imaging technologies. Its integration into oncology, cardiology, chronic disease management, and precision medicine underscores its strategic value. The functioning of nuclear medicine, including the implementation of future innovations, depends directly on the availability of a qualified workforce of nuclear medicine technologists. The following section provides a detailed "analysis" of the workforce trajectory over the past decade, as well as the emerging national gap between technologist supply and clinical demand.

1.4 Canada's 10-Year Workforce Trajectory (2015–2025):

Canada's nuclear medicine technologist workforce has experienced a decade of stagnation and gradual decline, despite increased demand for diagnostics and therapies across all provinces. The available evidence suggests that the supply of technologists has not kept pace with demographic changes, cancer incidence, and the expanding use of molecular imaging. Instead, workforce numbers have remained flat or decreased in several jurisdictions. This 10-year trajectory has created a widening gap between the number of technologists available, and the level of service required to meet clinical needs.

National indicators from the broader medical radiation technologist workforce provide the first signal of this trend. In 2020, Canada had approximately 25,500 medical radiation technologists, including radiological technologists, MRI technologists, radiation therapists, and nuclear medicine technologists (CIHI, 2020). Nuclear medicine technologists represent approximately 7% of this group, corresponding to an estimated national workforce of 1842 technologists (CAMRT, 2024). Evidence contained in provincial regulatory data indicates that this number has not increased significantly since 2015. The Government of Canada's labour market projections further reinforce this observation by identifying nuclear medicine technologists as facing a significant risk of labour shortage for the 2024-2033 period (Government of Canada Job Bank, 2024).

Ontario provides the clearest dataset illustrating the decline in the workforce. In 2015, Ontario had 724 active nuclear medicine technologists registered with the provincial regulator. By 2023, this number had decreased to 648, representing a 10% reduction (CMRITO, 2023). Because Ontario represents a significant share of Canada's nuclear medicine technologists, this decline has national implications. During the same period, growth was observed in PET and SPECT imaging volumes across Canada, leading to an increased demand for technologist labour (CADTH, 2023). The decline in Ontario's workforce, therefore, reflects a national supply-demand imbalance that has intensified over time.

Several provinces reported similarly constrained workforce trends. Québec is estimated to employ 498 nuclear medicine technologists (CAMRT,2025); however, this number has not expanded in line with rising clinical volumes, new PET installations, and the growth of theranostics. British Columbia has one of the smallest nuclear medicine workforces in the country, with an estimated 30 to 40 technologists across the entire province (Health Sciences Association of BC, 2023). This low number is significant because BC simultaneously experienced increases in oncology referrals, PET demand, and the introduction of new molecular therapy programs. Reports from BC Cancer and the Health Sciences Association of BC noted that shortages contributed to reduced operating hours, increased overtime, and delays for diagnostic imaging (Health Sciences Association of BC, 2023).

The Prairie provinces faced stability challenges driven by small workforce sizes. Saskatchewan employs approximately 25 to 30 technologists. In a 2024 labour market review, the Saskatchewan Health Authority reported 26 full-time nuclear medicine technologist positions, three part-time positions, and two vacancies (Saskatchewan Health Authority, 2024). The small size of the provincial workforce means that even a single retirement or departure can have a significant impact on service continuity. Manitoba has a similarly small workforce, estimated at 20 to 25 technologists, with nearly all services concentrated in Winnipeg. Both provinces rely heavily on the Southern Alberta Institute of Technology (SAIT) for training seats, restricting their ability to replenish the workforce locally (SAIT, 2024).

Atlantic Canada has reported persistent constraints throughout the decade. Nova Scotia and New Brunswick operate with tiny nuclear medicine technologist teams that have been under sustained pressure due to retirements and recruitment challenges. Newfoundland and Labrador have approximately 10 to 12 technologists, and service delivery has been affected when positions remain unfilled for extended periods. Prince Edward Island (PEI) has only 1 full time NMT running an entire Nuclear Medicine department by himself. This situation leads to PEI being forced to relies on NB and NS to provide thed services required. This regional fragility has led to an increased reliance on interprovincial travel for patient care in provinces lacking local capacity.

Demographic trends further illustrate why workforce capacity did not keep pace with clinical demand. In 2023, more than 20% of nuclear medicine technologists in Canada were aged 50 or older, with a median retirement age of around 61 (Government of Canada Job Bank, 2024). Research on the medical imaging workforce has shown that many technologists entered the field in the 1980s and 1990s and are now approaching retirement, 16.7% of the current workforce is currently eligible for retirement (CAMRT, 2025) creating a demographic cliff across the profession (Manogaran et al., 2023). Similar patterns were documented in related diagnostic professions. For example, the Canadian Society of Medical Laboratory Science noted that by 2020, half of laboratory technologists would be eligible to retire, which would disproportionately affect smaller regions (Pocius, 2024). These demographic shifts are relevant to nuclear medicine because they reflect a national trend in specialized health professions where retirements are occurring faster than training programs can replace them.

Training capacity did not expand during this period. Canada has only five accredited nuclear medicine technologist programs: British Columbia Institute of Technology (BCIT) in British Columbia, Southern Alberta Institute of Technology (SAIT) in Alberta, the Michener Institute in Ontario, Collège Ahuntsic in Québec, and Dalhousie University in Nova Scotia. Their combined annual output typically ranges from 50 to 70 graduates per year. This number does not offset retirements, nor does it support increased service needs associated with PET expansion and new therapies (CAMRT, 2023). Program data show that Québec certified only seventeen new technologists in 2023, despite having 20 available training seats, illustrating challenges with enrolment rather than capacity (Ordre des technologues en imagerie médicale, en radio-oncologie et en électrophysiologie médicale du Québec [OTIMROEPMQ], 2023). British Columbia graduates fewer than ten technologists annually, while Dalhousie typically graduates five to eight students per year. SAIT graduates approximately 20 technologists annually, including seats reserved for Saskatchewan and Manitoba (SAIT, 2024). This training output remained essentially unchanged from 2015 to 2025.

Vacancy pressures intensified during the COVID period and persisted into 2025. CAMRT reported that vacancy durations increased and that imaging departments faced growing difficulty recruiting technologists across modalities (CAMRT, 2023). Nuclear medicine technologist vacancies mirrored these trends, with several provinces reporting that even a single vacancy had a substantial impact on diagnostic throughput and departmental capacity. Reports from British Columbia, Saskatchewan, and Atlantic Canada highlighted cases where staffing shortages contributed to reduced operating hours or temporary service interruptions (Health Sciences Association of BC, 2023; Saskatchewan Health Authority, 2024).

The 10-year period between 2015 and 2025 demonstrates a clear national pattern: declining workforce numbers in some provinces, stagnation in others, an aging workforce with significant retirement eligibility, limited training output, and growing clinical demand. Canada's nuclear medicine technologist workforce did not expand in line with population needs or technological growth, resulting in a structurally insufficient supply. This context provides the foundation for understanding the national 5-year projection that follows.

1.5 National 5-Year Workforce Projection (2025–2030):

Canada is expected to experience a significant widening of the nuclear medicine technologist workforce gap between 2025 and 2030. The demographic profile of the profession, combined with persistent vacancy pressures, limited training output, and rising clinical demand, indicates that the country will not have sufficient technologist capacity to maintain service levels without targeted interventions. The following projection integrates the available national and provincial evidence contained in regulatory reports, labour market forecasts, and workforce data collected across provinces.

Retirements represent the most significant factor influencing workforce decline over the next five years. National labour market projections indicate that nuclear medicine technologists will face a significant shortage risk from 2024 to 2033, primarily driven by retirements and slower-than-required workforce replacement (Government of Canada Job Bank, 2024). In 2023, more than 20% of technologists were already aged 50 or older, with a median retirement age of approximately 61. This means a substantial portion of the existing workforce will reach retirement eligibility before 2030. Even conservative modeling suggests that current class sizes across Canada cannot offset the number of technologists expected to exit the profession over this period.

Training output will remain insufficient to stabilize the workforce. Canada's five nuclear medicine technologist programs typically graduate between 50 and 70 students per year with an expected 60 graduating in 2025 (CAMRT, 2025), with limited room for expansion in the short term due to faculty shortages, clinical placement constraints, and program capacity limits (CAMRT, 2023). SAIT graduates approximately 20 students annually, including students from Saskatchewan and Manitoba, while Dalhousie graduates between five and eight. British Columbia graduates fewer than ten technologists per year. Ontario and Québec generate modest cohorts that do not keep pace with their provincial demand. Québec certified only seventeen technologists in 2023 despite having 20 available training seats (OTIMROEPMQ, 2023). Without a significant increase in student enrolment or the establishment of new programs, Canada will continue to graduate fewer technologists than the number leaving the workforce each year.

The demand for nuclear medicine services is expected to continue rising through 2030. CADTH reported steady increases in PET imaging volumes between 2015 and 2023 as more indications received public coverage and as provinces installed additional scanners (CADTH, 2023). This growth is expected to continue as cancer incidence increases, and PET becomes increasingly integrated into oncology, cardiology, and neurology. Therapeutic nuclear medicine will also expand. Radioligand therapies (RLT) approved for neuroendocrine tumors and metastatic prostate cancer will require greater technologist involvement as more patients become eligible for treatment. Provinces investing in new PET installations, new cyclotron or radiopharmacy capacity, and new theranostics clinics will require additional technologist staffing to operationalize these services. Without adequate staffing, provinces may not be able to utilize planned imaging capacity or introduce new therapy programs at the intended scale.

Vacancy pressures, already elevated during the pandemic period, are expected to remain high or increase through 2030. CAMRT reported that vacancy durations increased in imaging departments and that many employers faced challenges recruiting technologists (CAMRT, 2023). British Columbia, Saskatchewan, and Atlantic Canada have documented cases where vacancies resulted in reduced operating hours or temporary service interruptions (Health Sciences Association of BC, 2023;

Saskatchewan Health Authority, 2024). These vulnerabilities will intensify as the number of retirements accumulates. Smaller provinces, which operate with fewer technologists overall, will be disproportionately affected, as the loss of even one technologist represents a significant portion of their available staffing capacity.

Population ageing will further contribute to demand growth. CIHI reported sustained increases in CT and MRI volumes across modalities, with CT and MRI growing by millions of exams during the past decade (CIHI, 2023). Although nuclear medicine volumes are smaller, they follow a similar trend, particularly with PET. As Canada's population continues to age and the prevalence of chronic diseases increases, molecular imaging will remain a vital diagnostic tool. Cancer incidence is expected to increase steadily, which will further increase the demand for bone scans, SPECT/CT studies, and PET imaging. This trend adds pressure to a system already constrained by workforce shortages.

Regional disparities will widen if current trends continue. Provinces that already have a limited supply of technologists, such as British Columbia, Saskatchewan, Manitoba, and the Atlantic region, will face greater service fragility. For example, Saskatchewan has 26 full-time technologists and three part-time technologists, with two vacancies reported in 2024. Any additional retirements or resignations in these provinces could result in reduced scanner capacity, fewer clinic days, or longer waiting times (Saskatchewan Health Authority, 2024). In Québec, where PET expansion is ongoing, the supply of technologists is not keeping pace with the increased demand for oncologic imaging. Ontario's projected retirements and declining workforce trend since 2015 also indicate that shortages will intensify without intervention (CMRITO, 2023).

By 2030, the national technologist shortfall is expected to be substantial. Based on current trends, Canada is expected to graduate fewer technologists annually than the number anticipated to retire, resulting in a net workforce contraction. At the same time, PET expansion, PET/CT of new radiopharmaceutical therapies, and increased imaging demand across oncology and chronic disease pathways will require additional staffing. Without coordinated national strategies to expand training capacity, support mobility, and retain experienced technologists, provinces will face increasing difficulty maintaining nuclear medicine services. Delays in diagnosis, reduced access to PET and SPECT imaging, and slower PET/CT of new therapies are likely to worsen if the workforce gap continues to widen.

Canada's nuclear medicine technologist workforce is projected to decline between 2025 and 2030 based on retirements, limited training output, and rising clinical demand. This contraction will occur in parallel with increased reliance on molecular imaging and radiopharmaceutical therapy. The result is a widening national workforce gap that will influence diagnostic capacity, cancer care pathways, and service delivery across multiple provinces. Section 1.6 discusses the implications of this trend for patient care and the performance of the health system.

1.6 Why the Shortage Matters for Patient Care:

The shortage of nuclear medicine technologists has direct and measurable consequences for patient care across Canada. Nuclear medicine supports diagnosis, staging, treatment planning, and therapeutic monitoring for many high-priority clinical pathways. When technologist staffing is insufficient, diagnostic capacity decreases, wait times increase, and access to essential imaging and treatments becomes restricted. These effects are not theoretical. They have been documented across provinces and reflected in national data on imaging wait times, workforce pressures, and vacancy patterns (CIHI, 2023; CAMRT, 2023). The shortage, therefore, affects the quality, timeliness, and equity of care.

Delays in nuclear medicine imaging can immediately impact cancer pathways. Bone scans, SPECT/CT studies, and PET imaging are integral to staging cancers such as breast, prostate, lung, and lymphoma. CADTH reported that PET imaging volumes increased consistently between 2015 and 2023 due to expanded indications and investment in new scanners (CADTH, 2023). When technologist availability is inadequate, PET scanners cannot operate at full capacity, and patients may experience longer wait times for staging or restaging exams. These delays affect treatment planning, eligibility for surgery or systemic therapy, and the ability to evaluate therapeutic response. In oncology, delayed staging often postpones treatment, which can reduce treatment effectiveness and increase the emotional burden on patients and families.

Nuclear medicine technologist shortages also affect cardiovascular diagnostics. Myocardial perfusion imaging is a standard tool for evaluating coronary artery disease, risk stratification, and making therapeutic decisions. SPECT and SPECT/CT perfusion studies require precise acquisition and technologist expertise to ensure diagnostic accuracy. In provinces reporting limited staffing, some nuclear cardiology services have reported reduced operating hours or increased reliance on overtime to maintain capacity (Health Sciences Association of BC, 2023). When imaging is delayed, clinicians may rely on less sensitive diagnostic alternatives or defer decisions about intervention, which can affect patient outcomes.

Therapeutic nuclear medicine is also affected by staffing shortages. Radiopharmaceutical therapies for thyroid disease, neuroendocrine tumors, and metastatic prostate cancer require trained technologists to handle radiopharmaceuticals, prepare treatment rooms, verify dosing, coordinate with multidisciplinary teams, and support radiation safety procedures. As more patients become eligible for radioligand therapies, staffing shortages may delay or limit access to treatment. Several jurisdictions have reported challenges scaling up therapeutic programs because technologist staffing did not increase at the same pace as patient demand and new therapy approvals (Novartis Canada, 2022; Saskatchewan Health Authority, 2024).

Reduced technologist availability also affects departmental operations, which in turn affects patient care. Nuclear medicine requires daily and weekly quality control procedures to ensure that imaging equipment operates within safe and accurate parameters. These tasks are time-sensitive and essential for producing diagnostic images that meet clinical standards. When staffing is insufficient, technologists must balance quality control, radiopharmaceutical preparation, image acquisition, and patient care responsibilities within limited working hours. Reports from British Columbia and Saskatchewan noted that staffing shortages resulted in reduced operating hours, slower throughput, and, in some cases, temporary disruption of nuclear medicine services (Health Sciences Association of BC, 2023; Saskatchewan Health Authority, 2024). Service reductions have a cascading effect on referrals, scheduling, and downstream clinical decisions.

Smaller provinces and regions with single-camera sites are most severely affected. In jurisdictions with only a handful of technologists, the absence of even one staff member due to retirement, illness, or vacancy can significantly reduce provincial imaging capacity. New Brunswick, Nova Scotia, Manitoba, and Saskatchewan noted that local shortages have resulted in longer wait times, reduced clinic days, and limited ability to meet regional demand (Section 2 WIP). In extreme cases, hospitals may suspend services temporarily until a qualified technologist becomes available. These disruptions compromise access to equity and force some patients to travel long distances to receive necessary imaging or therapy.

Patients also experience non-quantifiable impacts related to anxiety, uncertainty, and delays in receiving critical information about their health. Many individuals being investigated for cancer or cardiac disease experience significant distress while waiting for diagnostic results. Nuclear medicine technologists play a significant role in providing reassurance, guidance, and support during procedures. When departments operate under staffing shortages, technologists face increased workloads and time pressures, which can limit the time available for patient communication and support. CAMRT reported that increased workload and staffing pressures contributed to stress and burnout among imaging professionals, which may affect both patient experience and workforce retention (CAMRT, 2023).

Finally, staffing shortages affect the introduction of new technologies and therapies. Canada is expanding its PET and theranostics capacity in multiple provinces, and new cyclotron and radiopharmacy facilities are being planned or commissioned. These investments cannot be fully utilized without adequate staffing of technologists. Insufficient personnel may prevent new scanners from operating at intended capacity or delay the opening of new therapeutic programs. This limits the effectiveness of capital investments and slows provincial efforts to improve cancer and chronic disease outcomes.

The shortage of nuclear medicine technologists affects patient care by reducing diagnostic capacity, delaying access to essential imaging and therapy, compromising service quality, and creating inequities between regions. These effects have implications for cancer pathways, cardiovascular care, chronic disease management, and the integration of new technologies. Ensuring adequate staffing is therefore fundamental for maintaining timely and equitable access to high-quality nuclear medicine services across Canada.

1.7 Structure of the White Paper:

This White Paper is structured to provide a comprehensive, evidence-based, and policy-relevant analysis of the nuclear medicine technologist workforce shortage in Canada. Its organization reflects the progression required to move from context to diagnosis, to underlying causes, and finally to actionable solutions. The document integrates provincial workforce data, regulatory information, institutional training output, job posting analytics, demographic indicators, and insights collected through interviews, surveys, and professional engagement. This structure supports federal and provincial leaders, regulators, educational institutions, and clinical organizations in understanding both the scale of the issue and the strategic options available to address it.

The first section establishes the foundation for the White Paper. It outlines the role and importance of nuclear medicine technologists, presents the 10-year workforce trajectory, provides a national projection to 2030, and describes the direct consequences of staffing shortages for patient care and service delivery. This section sets the strategic context and frames the urgency of the national workforce challenge.

The second section provides a detailed overview of workforce distribution. It examines the number of nuclear medicine technologists in each province, highlighting regional disparities and identifying areas where service fragility is most pronounced. This section draws on regulatory records, staffing data, and departmental information to present a clear national picture of supply, demand, and geographic imbalance.

The third section analyzes the structural causes of the shortage. It examines demographic pressures, the age distribution of the workforce, limited training capacity, workload and burnout, regulatory fragmentation, and mobility barriers. The analysis reflects evidence from national labour projections, professional association reports, and provincial operational findings.

The fourth section reviews the regulatory environment governing the profession. It explains the differences between regulated and unregulated jurisdictions, assesses licensing and credentialing requirements, examines the mobility challenges created by provincial variations, and discusses how the regulatory structure affects recruitment, retention, and service stability nationwide.

The fifth section presents an in-depth assessment of the education and training system. It examines program capacity, admission patterns, graduation volumes, clinical placement challenges, and barriers to expansion. It incorporates program-specific data from BCIT, SAIT, the Michener Institute, Collège Ahuntsic, and Dalhousie University, and analyzes student motivations, mobility intentions, and awareness of the profession.

The sixth section examines compensation and economic factors. It analyzes provincial salary structures, step progression, interprovincial disparities, recruitment challenges, and the relationship between compensation and workforce mobility. It integrates job posting analytics and employment trends to illustrate where the labour market signals are strongest.

The seventh section evaluates the consequences of the shortage for diagnostic accuracy, therapeutic capacity, service continuity, and equity of access. It outlines the operational, clinical, and patient-level impacts reported across provinces, demonstrating how shortages affect cancer care pathways, cardiovascular diagnostics, chronic disease management, and the PET/CT of emerging technologies.

The eighth section presents strategic options and recommendations to stabilize and strengthen the workforce between 2025 and 2035. It proposes short-term, medium-term, and long-term measures across education, regulation, compensation, mobility, retention, and federal-provincial coordination. These recommendations are directly grounded in the evidence developed throughout the report.

The final section consolidates the findings and presents the implications for the Canadian health system. It includes a curated set of statements collected through interviews, survey responses, and stakeholder outreach. These statements provide direct insights from nuclear medicine technologists, students, program leaders, and clinical managers, highlighting the human and operational realities underlying the national workforce data. This final section emphasizes the importance of coordinated leadership, sustained investment, and strategic alignment across provinces to ensure that nuclear medicine services remain accessible, effective, and resilient.

Provincial Distribution of the Nuclear Medicine Technologist Workforce

Chapter

2

Chapter 2: Provincial Distribution of the Nuclear Medicine Technologist Workforce

2.1 National Workforce Overview:

Canada's nuclear medicine technologist workforce is small, geographically uneven, and concentrated in a limited number of provinces. Based on aggregated provincial regulatory counts and available workforce reports, 1842 technologists (CAMRT, 2025) currently practice across the country. Ontario remains the largest jurisdiction, with 638 registered technologists in 2024 (CAMRT, 2025). Québec follows with 498 technologists spread across major hospitals, cancer centres, and teaching institutions (Ordre des technologues en imagerie médicale, en radio-oncologie et en électrophysiologie médicale du Québec [OTIMROEPMQ], 2023 ; Collège Ahuntsic, 2025). Together, Ontario and Québec employ more than half of the national workforce.

This national landscape exists within the broader context of the medical radiation technologist profession. CIHI reported that more than 25,500 MRTs were working in Canada between 2019 and 2023, reflecting the scale and diversity of imaging and therapeutic services nationally (Canadian Institute for Health Information [CIHI], 2025). Nuclear medicine technologists represent a small subset of this group, reflecting the specialized nature of the discipline and the concentration of services within hospital-based imaging departments.

Provincial distribution patterns highlight notable differences. British Columbia maintains a steady nuclear medicine technologist workforce? with an estimated 180 technologists for 5.3 million residents. The Health Sciences Association of British Columbia reported ongoing staffing pressures in diagnostic imaging, including nuclear medicine (Health Sciences Association of British Columbia, 2025; Gamage, 2025). Alberta employs an estimated 293 technologists and maintains one of the most competitive compensation structures in the country for imaging professionals, with a median MRT hourly rate of $44.61 (Alberta Learning Information Service, 2025). Job Bank labour market reporting confirms that unemployment among Alberta's MRT workforce remains low (Job Bank, Government of Canada, 2024).

The Prairie provinces operate with smaller nuclear medicine teams and do not host local training programs. Saskatchewan employs 52 technologists, and its 2024 Market Supplement Review identified 26 full-time positions, 3 part-time positions, and 2 vacancies (Saskatchewan Market Supplement Review Committee, 2024). CUPE reported that several diagnostic imaging services across Saskatchewan were operating at 42% to 68% of their budgeted staffing levels in 2023 (Canadian Union of Public Employees [CUPE], 2023). Manitoba employs 52 technologists, nearly all of whom are based in Winnipeg, and relies on a training arrangement in which Manitoba students complete didactic education at SAIT before returning to the province for clinical placement (Shared Health & University of Winnipeg, 2020).

Atlantic Canada has some of the smallest nuclear medicine teams in the country, despite supporting one of Canada's 5 accredited training programs. Dalhousie University graduates 6 to 8 technologists annually to serve the provinces of Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador (Dalhousie University, 2024). New Brunswick has been described in media reports as experiencing a "historic shortage" of medical imaging technologists, including those in nuclear medicine (Country94 News, 2023). Newfoundland and Labrador employ 26 technologists. At the same time, Prince Edward Island only has Nuclear Medicine department in Charlottetown that employs 1 full time Nuclear Medicine technologist. This is forcing PEI department to rely on referral pathways to out-of-province departments (NS and NB) for essential diagnostics such as bone scans, myocardial perfusion imaging, and thyroid studies.

Northern Canada does not employ nuclear medicine technologists and lacks nuclear medicine departments. Patients in Yukon, the Northwest Territories, and Nunavut must travel to British Columbia, Alberta, Manitoba, or Ontario for PET, SPECT, or radiopharmaceutical therapy. These interprovincial referral pathways contribute to regional disparities in access and add demand pressures to imaging departments in receiving provinces.

Training capacity remains limited nationally. Canada has only 5 accredited nuclear medicine technologist programs: BCIT, SAIT, the Michener Institute, Collège Ahuntsic, and Dalhousie University. Together, these institutions graduate approximately 50 to 70 technologists each year (Canadian Association of Medical Radiation Technologists [CAMRT], 2023). Output varies considerably by program. BCIT typically graduates fewer than 10 technologists annually, while SAIT's cohort is shared with Saskatchewan and Manitoba under interprovincial agreements. In Québec, 17 technologists passed the provincial certification examination in 2023 (OTIMROEPMQ, 2023). Taken together, national and provincial data show that Canada's nuclear medicine technologist workforce is relatively small and unevenly distributed across provinces. These descriptive patterns establish the baseline conditions for the provincial analyses presented in this section, while the underlying factors influencing these distribution trends are examined in Section 3.

Number of Nuclear Medicine Technologists in Canada (2023–2024)

Source: CAMRT – Session 2 Slide Deck, CANM Halifax 2025 - Annual Conference

Province / Territory	2023	2024
British Columbia*	180*	180*
Alberta	288	293
Saskatchewan	52	52
Manitoba	51	52
Ontario	649	638
Québec	497	498
New Brunswick	36	33**
Nova Scotia	65	63
Prince Edward Island	5	5
Newfoundland & Labrador	27	26
Yukon	–	–
Northwest Territories	–	–
Nunavut	–	–
National Total	**1850***	**1842***

Note 1: *BC count remains approximate due to limited provincial reporting.

Note 2: **NB Regulatory College of MRT has 33 NMT as of November 2025.

2.2 Ontario and Québec (Largest Provincial Workforces):

Ontario and Québec form the largest and most structurally developed nuclear medicine ecosystems in Canada. Their combined workforce, training capacity, and institutional networks anchor the national diagnostic infrastructure and serve as reference points for provincial service planning. Both provinces operate multiple tertiary-care centres, house the majority of PET/CT installations in Canada, and maintain the most comprehensive distribution of nuclear medicine departments across urban and regional settings.

Ontario:

Ontario maintains the largest nuclear medicine technologist workforce in the country, with 638 registered technologists in 2024 (CAMRT,2024). Nuclear medicine services are distributed across more than 70 hospital sites, including large academic institutions such as the University Health Network, The Ottawa Hospital, London Health Sciences Centre, Hamilton Health Sciences, and Sunnybrook Health Sciences Centre. These centres support high-volume SPECT/CT, PET/CT, and radiopharmaceutical therapy programs, and frequently act as referral hubs for surrounding regions.

Multiple regions within Ontario maintain their own nuclear medicine networks. The Greater Toronto Area hosts the largest concentration of technologists, with substantial departmental teams operating within multi-site hospital corporations. Outside the GTA, substantial nuclear medicine capacity exists in Ottawa, Hamilton, London, Kingston, Sudbury, Thunder Bay, and Windsor. Smaller regional hospitals also maintain SPECT or SPECT/CT capability, creating one of the most extensive geographic footprints for nuclear medicine in Canada.

Ontario continues to expand PET capacity. CADTH's Canadian Medical Imaging Inventory reported consistent growth in PET installations between 2015 and 2023, with Ontario contributing a significant proportion of the national PET volume (CADTH, 2023). PET centres are distributed across Toronto, Ottawa, Hamilton, London, and select regional hospitals, supporting oncology, neurology, and cardiology programs.

Ontario relies on the Michener Institute as its sole accredited program for training nuclear medicine technologists. Michener provides a large portion of Canada's NMT graduates and plays a central role in workforce renewal. Students complete clinical placements across the province's extensive hospital network, providing exposure to PET/CT, SPECT/CT, and advanced radiopharmaceutical handling. Job Bank reporting identifies Ontario as a primary employment market for MRTs, reflecting the size and complexity of its imaging infrastructure (Job Bank, Government of Canada, 2024).

Québec:

Québec maintains the second-largest nuclear medicine technologist workforce in Canada, with 498 technologists practicing across a province-wide network of hospital centres, cancer institutes, and regional imaging departments (Ordre des technologues en imagerie médicale, en radio-oncologie et en électrophysiologie médicale du Québec [OTIMROEPMQ], 2023; CAMRT,2025). Nuclear medicine services are primarily concentrated in the Montreal and Québec City regions, but additional departments operate in Sherbrooke, Gatineau, Saguenay, Trois-Rivières, Laval, Rimouski, and other regional centres.

Québec's institutional network comprises major teaching hospitals, including the Centre hospitalier de l'Université de Montréal (CHUM), the McGill University Health Centre (MUHC), the Centre hospitalier universitaire de Québec (CHU de Québec – Université Laval), and CIUSSS-affiliated regional hospitals. These centres support extensive SPECT/CT and PET/CT services, including multiple provincial PET centres integrated into oncology and cardiology care pathways. PET services are offered in Montreal, Québec City, Sherbrooke, and select regional centres, reflecting one of the most developed PET infrastructures in the country.

Québec's training pathway is anchored at Collège Ahuntsic, the province's accredited program for nuclear medicine technologists. The program admitted 11 qualified applicants for 20 seats in the 2025 cycle (Collège Ahuntsic, 2025). Provincial certification is administered through OTIMROEPMQ, which reported 17 successful candidates in 2023. Graduates enter a system with significant geographic distribution, providing clinical placement opportunities in large academic centres as well as regional facilities.

Québec's workforce operates within a unified provincial regulatory framework that defines professional scopes of practice and ensures consistency in credentialing across public institutions. Job Bank wage reporting indicates that compensation ranges for MRTs vary across Canada, with Québec positioned below several western provinces but maintaining internal consistency across imaging disciplines (Job Bank, Government of Canada, 2024).

Ontario and Québec anchor Canada's nuclear medicine capacity through their workforce size, concentration of PET and SPECT/CT infrastructure, and established training programs. Their institutional networks support a breadth of diagnostic and therapeutic services unmatched elsewhere in the country. These provinces provide essential clinical volume, training capacity, and geographic coverage that shape the national workforce landscape and form the foundation for understanding differences observed across mid-sized and smaller provinces in subsequent sections.

2.3 British Columbia and Alberta (Mid-Sized Provincial Workforces):

British Columbia and Alberta represent Canada's two mid-sized nuclear medicine technologist workforces. Although larger than those of the Prairie and Atlantic provinces, both jurisdictions operate with staffing levels that must support the expansion of diagnostic and therapeutic infrastructures, including multi-site SPECT/CT and PET/CT programs. Their service geography, institutional networks, and training availability shape nuclear medicine capacity across Western Canada.

British Columbia

British Columbia maintains a steady nuclear medicine technologist workforce. Provincial reporting estimates that 180 technologists support a population of more than 5.3 million residents (Health Sciences Association of British Columbia [HSA BC], 2025). This corresponds to approximately 1 NMT per 29,444 residents. Nuclear medicine services are distributed across major centers in Vancouver, Victoria, Surrey, Kelowna, and Prince George, with additional departments located within regional hospital networks. The system comprises both academic centers and community-based departments, resulting in a broad distribution of SPECT and SPECT/CT capabilities across the Lower Mainland and Vancouver Island.

The highest concentration of nuclear medicine capacity is located within the Vancouver Coastal Health and Fraser Health regions. Vancouver General Hospital, St. Paul's Hospital, Surrey Memorial Hospital, and Royal Columbian Hospital maintain significant SPECT/CT operations and function as referral hubs for cardiac, oncologic, and neurologic imaging. On Vancouver Island, Royal Jubilee Hospital and Nanaimo Regional General Hospital operate nuclear medicine departments with SPECT/CT access. Interior Health delivers services in Kelowna and Kamloops, and Northern Health maintains limited capacity for nuclear medicine and related imaging modalities.

BC Cancer's provincial network plays a significant role in shaping nuclear medicine activity. BC Cancer centers in Vancouver, Surrey, Victoria, Kelowna, and Prince George operate PET/CT scanners that support oncology pathways. CADTH's 2024 Medical Imaging Inventory confirms multiple PET/CT installations within BC Cancer centers across all five sites, reflecting one of the most geographically distributed oncology imaging networks in Canada (Canadian Agency for Drugs and Technologies in Health [CADTH], 2024). CADTH also documented consistent national growth in PET utilization since 2015, with British Columbia making a significant contribution to this trend (CADTH, 2023).

Training capacity in British Columbia is provided through the British Columbia Institute of Technology, the province's accredited program for nuclear medicine technologists. BCIT typically graduates fewer than 10 technologists per year (Canadian Association of Medical Radiation Technologists [CAMRT], 2023). Clinical placements take place at major centers throughout the Lower Mainland and on Vancouver Island, providing exposure to SPECT/CT, PET/CT, radiopharmaceutical handling, and regional service models.

Job Bank data indicate that British Columbia is part of a broader Western Canadian job market for medical imaging technologists, with consistent employment availability across various imaging disciplines (Job Bank, Government of Canada, 2024). The province's geographic distribution of nuclear medicine services, combined with its PET and cancer-care infrastructure, requires staffing coverage across both urban and regional sites.

Alberta

Alberta’s workforce is composed of 293 nuclear medicine technologists (CAMRT, 2025), positioning it as one of Canada's biggest “mid” sized workforces. Services are distributed across major hospitals in Edmonton and Calgary, with additional capacity in Lethbridge, Red Deer, Medicine Hat, and Grande Prairie. Alberta Health Services operates multi-site hospital networks in both cities, each supporting large nuclear medicine departments with advanced imaging programs.

In Edmonton, the University of Alberta Hospital, the Cross Cancer Institute, and the Royal Alexandra Hospital provide extensive SPECT/CT and PET/CT capacity. In Calgary, Foothills Medical Centre, South Health Campus, the Peter Lougheed Centre, and the Tom Baker Cancer Centre operate high-volume nuclear medicine programs. CADTH reporting identifies Alberta as a key contributor to national PET utilization trends, with provincial PET/CT scanners supporting oncology, cardiology, neurology, and selected research pathways (CADTH, 2023).

Training capacity in Alberta is centered at the Southern Alberta Institute of Technology, the province's accredited program for nuclear medicine technologists. SAIT graduates a cohort of students each year, including learners from Saskatchewan and Manitoba through interprovincial education agreements (Shared Health and University of Winnipeg, 2020). Clinical placements take place across AHS sites in Edmonton and Calgary, exposing students to PET/CT, SPECT/CT, radiopharmaceutical production, and clinical oncology imaging.

Job Bank reporting confirms that Alberta maintains a robust employment market for medical imaging technologists, consistent with the size and complexity of its provincial imaging infrastructure (Job Bank, Government of Canada, 2024). The distribution of nuclear medicine capacity across large cities and regional centers positions Alberta as a key contributor to nuclear medicine services in Western Canada.

British Columbia and Alberta together employ approximately 470+ nuclear medicine technologists. This workforce represents a mid-range national cluster located between the larger eastern provinces and the smaller Prairie and Atlantic jurisdictions. Their institutional networks, regional PET programs, and training capacity at BCIT and SAIT make them central components of Western Canada's nuclear medicine landscape. Their geographic distribution and service structures form an essential part of the national framework examined in the subsequent sections.

2.4 Saskatchewan, Manitoba, New Brunswick, and Nova Scotia: (Provinces with Limited Capacity)

Saskatchewan, Manitoba, New Brunswick, and Nova Scotia represent four of the smallest nuclear medicine workforces in Canada. These provinces operate with limited staffing redundancy, narrow training pathways, and regional service models that rely heavily on a small number of technologists. Although each province maintains essential SPECT/CT capacity, the size and distribution of its workforce create unique structural characteristics within Canada's nuclear medicine landscape.

Saskatchewan:

Saskatchewan's workforce was composed of 52 nuclear medicine technologists in 2024 (CAMRT, 2025), one of the biggest from the smallest provincial workforces in the country. It is important to note that available workforce data for Saskatchewan are often incomplete or of limited quality. For example, the Saskatchewan Market Supplement Review identified 26 full-time NMT positions, 3 part-time positions, and 2 vacancies in 2024 (Saskatchewan Market Supplement Review Committee, 2024). Nuclear medicine services are concentrated in Regina and Saskatoon, with additional capacity distributed across smaller sites within the province's integrated health regions. Most departments operate with single or limited multi-technologist teams, reflecting service volumes and regional population structures.

Diagnostic imaging staffing across Saskatchewan has been documented as highly constrained. CUPE reported in 2023 that several imaging departments across the province were operating between 42% and 68% of their budgeted staffing levels, affecting multiple imaging disciplines, including nuclear medicine (Canadian Union of Public Employees [CUPE], 2023). Nuclear medicine capacity is therefore anchored in a small set of referral centers, with patients in rural and northern communities relying on

Regina and Saskatoon for access to SPECT/CT procedures such as bone scans, myocardial perfusion imaging, renal studies, and thyroid imaging.

Saskatchewan does not operate a provincial nuclear medicine training program. Students pursue didactic training through the Southern Alberta Institute of Technology, with clinical placements taking place either in Alberta or through provincial arrangements in Saskatchewan. Although SAIT maintains limited annual seats for Saskatchewan learners, graduate inflow remains modest relative to provincial needs (Shared Health and University of Winnipeg, 2020). Workforce renewal is therefore closely tied to external programs rather than local education infrastructure.

Manitoba:

Manitoba workforce totals 52 nuclear medicine technologists, nearly all of whom are based in Winnipeg. This creates a single urban hub responsible for delivering the full range of nuclear medicine services, including SPECT/CT, cardiology imaging, and oncologic staging. Smaller communities across Manitoba rely on referral pathways to Winnipeg facilities for nuclear medicine procedures, resulting in a centralized model of service delivery throughout the province.

Manitoba's training model is delivered through a joint arrangement, in which Manitoba students complete didactic instruction at the Southern Alberta Institute of Technology, followed by clinical training within Manitoba's health facilities, including Shared Health and the University of Winnipeg (Shared Health and University of Winnipeg, 2020). The agreement secures 3 seats per year for Manitoba learners, though the number of graduates who ultimately enter the provincial workforce varies depending on recruitment processes and regional preferences. Manitoba's nuclear medicine departments offer placements primarily within Winnipeg's major hospital centers, including Health Sciences Centre and St. Boniface Hospital.

Job Bank reporting identifies Manitoba as part of a national context in which medical radiation technologists remain in high demand, with provincial wage structures noted as comparable to those in Saskatchewan but lower than those in several western provinces (Job Bank, Government of Canada, 2024). Nuclear medicine capacity in Manitoba reflects its centralized service model, with scheduling and procedural volumes aligned to the staffing levels available within Winnipeg's major diagnostic centers.

New Brunswick:

New Brunswick maintains one of Canada's smallest nuclear medicine workforces, 33 according to New Brunswick Regulatory College of MRT (2025), with staffing levels distributed across Horizon Health Network and Vitalité Health Network. Public reporting has described the province as experiencing a "historic shortage" of medical imaging technologists, including those in nuclear medicine (Country94 News, 2023). Nuclear medicine services are primarily delivered through hospitals in Moncton, Saint John, and Fredericton, which support SPECT/CT capabilities within their respective regional catchment areas.

New Brunswick has no local nuclear medicine training program. The province relies entirely on Dalhousie University graduates to supply new technologists for Horizon and Vitalité facilities. Dalhousie's annual graduating cohort of 6 to 8 technologists must support 4 provinces across Atlantic

Canada, including Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador (Dalhousie University, 2024). New Brunswick, therefore, receives only a portion of the region's graduates each year, reflecting the shared distribution of training capacity across the Atlantic region.

Job Bank reporting indicates that medical imaging professionals in New Brunswick earn wages that are lower than those in Nova Scotia and significantly lower than those in western provinces (Job Bank, Government of Canada, 2024). Nuclear medicine service delivery across the province relies on small departmental teams that operate within two separate health networks. Hospitals in Moncton, Saint John, Fredericton, Bathurst and Edmundston provide the majority of nuclear medicine access for residents throughout the province.

Nova Scotia:

Nova Scotia's workforce is composed of 63 nuclear medicine technologists (CAMRT, 2025) and serves as the training hub for the Atlantic region. Dalhousie University operates the region's accredited nuclear medicine technologist program, graduating 6 to 8 technologists annually (Dalhousie University, 2024). Although Nova Scotia hosts the training program, graduates are distributed across multiple provinces, including New Brunswick, Prince Edward Island, and Newfoundland and Labrador, reflecting the regional role of Dalhousie within Atlantic Canada's health workforce.

Most of Nova Scotia's nuclear medicine capacity is located at the QEII Health Sciences Centre in Halifax, which maintains SPECT/CT and PET/CT services for the province and provides oncologic and cardiology imaging for regional pathways. Additional nuclear medicine services are available in Sydney and at selected regional hospital centers. The Halifax-based PET/CT center serves as the primary referral site for advanced imaging across the Maritime provinces, supporting provincial oncology and neurology imaging programs.

Job Bank reporting indicates that Nova Scotia offers medical imaging wages that are higher than those of New Brunswick but lower than those of Ontario and western Canada (Job Bank, Government of Canada, 2024). The province maintains a service distribution model in which Halifax functions as the central hub for advanced imaging procedures, while regional hospitals maintain SPECT capacity aligned with local demand.

Saskatchewan, Manitoba, New Brunswick, and Nova Scotia together employ an estimated **202** nuclear medicine technologists. Their staffing levels, geographic distribution, centralized or dual-network structures, and reliance on limited training capacity position them as four of the most resource-constrained nuclear medicine environments in Canada. Their descriptive profiles provide critical context for understanding the structural conditions that shape provincial capacity nationwide and form the foundation for the national comparison presented in the following section.

2.5 Newfoundland and Labrador and Prince Edward Island (Micro-Capacity Provinces):

Newfoundland and Labrador, as well as Prince Edward Island, represent the smallest nuclear medicine workforces in Canada and occupy a unique position within the national health system. Their geographic isolation, population distribution, and reliance on referral-based imaging models establish them as the micro-capacity provinces in the national workforce landscape. Nuclear medicine services in these provinces operate with minimal local staffing, concentrated departmental structures, and significant interprovincial linkages for advanced imaging and clinical support.

Newfoundland and Labrador:

Newfoundland and Labrador employs 26 nuclear medicine technologists (CAMRT, 2025), making it one of the least staffed provinces in Canada. Nuclear medicine services are primarily located within major facilities in St. John's. The Health Sciences Centre serves as the central provincial hub for nuclear medicine, offering SPECT and SPECT/CT imaging for oncology, cardiology, endocrinology, nephrology, and general diagnostic purposes. Additional service is provided within the Eastern Health regional hospitals that support SPECT imaging, with procedures aligned to local capacity and patient distribution.

St. John's hosts the province's most comprehensive nuclear medicine infrastructure through an integrated academic and clinical network associated with Memorial University's Faculty of Medicine. Clinical placements and professional development activities for technologists are coordinated through these hospitals, with exposure to radiopharmaceutical handling, cardiac imaging protocols, and general nuclear medicine workflows. Outside the Avalon Peninsula, communities rely on coordinated referral pathways that channel patients to St. John's for nuclear medicine studies that cannot be performed locally.

Travel distances and population dispersal significantly shape service distribution. Patients from Labrador and from rural areas of the island frequently require air or long-distance ground travel to access nuclear medicine procedures. This configuration is consistent with provincial geography and the concentration of tertiary-care facilities within St. John's.

Training capacity for nuclear medicine technologists in Newfoundland and Labrador is limited to external programs. The province does not offer an accredited NMT program and relies entirely on graduates from Dalhousie University in Nova Scotia. Dalhousie produces **6 to 8** technologists annually, who must be distributed among four provinces in Atlantic Canada (Dalhousie University, 2024). Newfoundland and Labrador receives a small share of these graduates each year, reflecting both the limited number of available positions and the shared nature of the Atlantic health workforce pipeline.

Job Bank reporting indicates that the wage ranges for medical radiation technologists in Newfoundland and Labrador are lower than those in western provinces and slightly below those in larger eastern provinces (Job Bank, Government of Canada, 2024). These ranges reflect the broader provincial compensation structure within the public health system. Nuclear medicine capacity in St. John's must align with both the staffing available and the diagnostic volumes associated with oncology and cardiology services at the province's major urban hospitals.

Prince Edward Island:

Prince Edward Island maintains the smallest nuclear medicine workforce in Canada. Depending on staffing conditions and recruitment cycles, the province employs 5 nuclear medicine technologists (CAMRT, 2025) but only 1 NMT full time. PEI does have a SPECT/CT but is unable to support the demands. As a result, nuclear medicine imaging is accessed through out-of-province referral pathways.

Patients from PEI travel primarily to Nova Scotia or New Brunswick to obtain nuclear medicine procedures such as bone scans, renal scintigraphy, thyroid uptake studies, hepatobiliary imaging, and myocardial perfusion imaging. The Queen Elizabeth Hospital in Charlottetown coordinates referrals to regional centers based on modality requirements and procedural availability. The province maintains logistical and administrative frameworks to support patient travel for essential diagnostic imaging, with coordination occurring between provincial health services and receiving hospital networks.

The absence of a local training pathway reinforces PEI's position within Atlantic Canada's shared workforce ecosystem. Dalhousie University remains the region's only accredited nuclear medicine technologist program, and its 6 to 8 annual graduates must meet the combined needs of four provinces (Dalhousie University, 2024). Given PEI's minimal number of available positions, the province receives only a very small share of the region's graduate output. Recruitment is typically based on temporary vacancies, short-term needs, or specific project-based service arrangements.

Job Bank reporting reveals that MRT wage ranges in PEI are lower than those in Nova Scotia and significantly lower than those in the western provinces (Job Bank, Government of Canada, 2024). Nuclear medicine access is therefore supported primarily through interprovincial service relationships. This model enables the province to provide medically necessary imaging in accordance with its population size, geographic scale, and available health infrastructure.

Service Structure and Regional Integration: Newfoundland and Labrador, as well as Prince Edward Island, share similar service characteristics shaped by geographic realities and population size. Both provinces operate within provincial health authority structures that centralize decision-making and service planning. In Newfoundland and Labrador, nuclear medicine is integrated within Eastern Health's diagnostic imaging framework. In PEI, nuclear medicine referrals are coordinated through Health PEI and directed to regional centers in neighboring provinces.

Their imaging service models illustrate a unique form of regional integration within Canada's nuclear medicine landscape. The larger Atlantic provinces, primarily Nova Scotia and New Brunswick, support access to nuclear medicine for PEI residents. Newfoundland and Labrador maintains localized capacity within St. John's but depends on structured referral pathways for patients in remote and rural communities. PET access for both provinces is obtained outside the province, with Nova Scotia serving as the Maritime PET hub through the QEII Health Sciences Centre (CADTH, 2023).

Together, Newfoundland and Labrador and Prince Edward Island employ 31 nuclear medicine technologists. This places them at the smallest end of the national distribution. Their reliance on external training pathways, centralized hospital infrastructure, and interprovincial service relationships reflects the geographic and demographic realities of Atlantic Canada. Their service profiles provide important context for understanding national workforce distribution patterns and the interdependencies that characterize nuclear medicine services across the nation. These characteristics form the foundation for the national comparison presented in the following section.

2.6 National Trends, Workforce Density, and Interprovincial Comparison:

Canada's nuclear medicine technologist workforce displays a set of national patterns that shape access to diagnostic imaging, interprovincial service distribution, and readiness for emerging therapeutic and molecular imaging technologies. The provincial analyses presented in Sections 2.1 to 2.5 reveal significant variation in workforce size, density, training availability, and local service structures. These descriptive elements provide a foundation for understanding the national landscape within which nuclear medicine services operate.

Across Canada, an estimated 1,200 to 1,500 nuclear medicine technologists are employed. This corresponds to a national density of approximately 30 to 38 technologists per million residents, based on population estimates and provincial workforce distributions. Workforce density varies widely across provinces. Ontario and Québec maintain staffing levels that support extensive hospital networks and multiple nuclear medicine departments. Alberta demonstrates moderate capacity centered around Calgary and Edmonton. British Columbia has a relatively low density of technologists compared to its population. The Prairie and Atlantic provinces maintain small to very small workforces, with Newfoundland and Labrador and Prince Edward Island positioned at the micro-capacity end of the national distribution.

These differences in density reflect the geographic distribution of nuclear medicine services across urban centers, regional hospitals, and northern or rural communities. Larger provinces with multiple tertiary-care institutions maintain broad access to SPECT/CT and, in many cases, PET/CT services. In contrast, smaller provinces operate with few or a single nuclear medicine departments that support the entire provincial population. Northern Canada does not maintain nuclear medicine services and relies entirely on interprovincial referral pathways to British Columbia, Alberta, Manitoba, or Ontario.

National training capacity represents another important descriptive trend. Canada maintains only 5 accredited nuclear medicine technologist programs: BCIT in British Columbia, SAIT in Alberta, the Michener Institute in Ontario, Collège Ahuntsic in Québec, and Dalhousie University in Nova Scotia. Combined, these programs graduate approximately 50 to 70 technologists each year (Canadian Association of Medical Radiation Technologists [CAMRT], 2023). The distribution of graduates is uneven across provinces. Dalhousie's 6 to 8 graduates serve 4 provinces in Atlantic Canada. SAIT's output is distributed among Alberta, Saskatchewan, and Manitoba through interprovincial agreements (Shared Health and University of Winnipeg, 2020). BCIT graduates fewer than 10 technologists annually, while Collège Ahuntsic and Michener support larger provincial systems in Québec and Ontario.

PET/CT distribution provides additional insight into national imaging capacity. CADTH's Canadian Medical Imaging Inventory documented consistent growth in PET installations between 2015 and 2023, with Ontario, Québec, Alberta, and British Columbia operating multiple PET centers (Canadian Agency for Drugs and Technologies in Health [CADTH], 2023). Nova Scotia hosts the primary PET center for the Maritime provinces through the QEII Health Sciences Centre. Saskatchewan, Manitoba, Newfoundland and Labrador rely on out-of-province pathways for PET access, and Prince Edward Island has no in-province nuclear medicine capacity. These distribution patterns illustrate regional variability in access to advanced imaging services.

Wage structures and employment patterns reported by Job Bank demonstrate consistent job availability for medical imaging technologists across most provinces (Job Bank, Government of Canada, 2024). Larger provinces maintain broader hiring pools, while smaller provinces report narrower staffing baselines that mirror their workforce size and institutional capacity. Compensation ranges vary by region, influenced by population size, provincial compensation frameworks, and institutional structures. Although these differences are not analyzed in Section 2, they are explored in later sections addressing workforce drivers.

Taken together, these descriptive national patterns outline the structural characteristics of Canada's nuclear medicine technologist workforce. The distribution of technologists, density of services, location of specialized imaging centers, availability of training programs, and regional service models all contribute to the landscape within which provinces operate. These elements define the baseline conditions for understanding the factors that contribute to workforce sustainability across Canada. The underlying drivers behind these patterns are examined in Section **3**.

Demographic Pressures and Workforce Sustainability

Chapter

3

Chapter 3: Demographic Pressures and Workforce Sustainability

3.1 Aging Workforce:

The age structure of Canada's nuclear medicine technologist workforce is one of the most significant factors contributing to the national shortage of nuclear medicine technologists. While Section 2 presented the distribution of technologists across provinces, aging clarifies why current staffing levels cannot be sustained over the next decade. The demographic profile of nuclear medicine technologists reflects a broader global trend in imaging and therapeutic professions, where aging workforces are entering a high-retirement period with limited replacement capacity (World Health Organization, 2023). In Canada, this pattern is particularly pronounced within nuclear medicine due to the profession's small workforce size and the concentration of senior technologists in many departments.

National datasets indicate that between 2019 and 2023, more than 20% of medical radiation technologists were aged 55 or older, and approximately 12% were aged 60 or older (Canadian Institute for Health Information [CIHI], 2024). Nuclear medicine technologists follow the same age curve, according to provincial workforce reports, with many departments reporting a high proportion of late-career technologists. In several provinces, including Ontario, Québec, Alberta, and Nova Scotia, NMT teams comprise a substantial cohort of technologists with over 20 years of service. In smaller jurisdictions, this concentration is even more pronounced. Provinces with fewer than fifteen nuclear medicine technologists, such as Newfoundland and Labrador or Prince Edward Island, face the possibility that one or two retirements may remove a significant share of the workforce.

The impact of aging is intensified by the extremely low unemployment rate within the nuclear medicine and imaging professions. Job Bank reporting indicates that the unemployment rate for medical radiation technologists is approximately 1.5%, meaning that there is almost no reserve labour force available to replace upcoming retirements (Job Bank, Government of Canada, 2025). As a result, retirements translate directly into vacancies. In provinces such as Saskatchewan, Manitoba, New Brunswick, and Newfoundland and Labrador, each vacancy represents between 5 and 10% of total nuclear medicine staffing, creating immediate pressure on scheduling, modality coverage, and continuity of services.

Retirement-driven attrition is further magnified by limited training output. Canada's five accredited nuclear medicine programs collectively graduate 50 to 70 technologists per year. CIHI and CAR projections indicate that the number of technologists leaving the medical imaging workforce will exceed the number of incoming graduates for several years (CIHI, 2024; Canadian Association of Radiologists [CAR], 2025). In nuclear medicine specifically, provincial training inflow remains significantly below the level required for replacement. Provinces without training programs, such as Saskatchewan, Manitoba, New Brunswick, Newfoundland and Labrador, and Prince Edward Island, are dependent on the limited number of seats allocated at SAIT or the small graduating cohort from Dalhousie University. For these provinces, aging compounds the structural limitations already present in the workforce pipeline.

Aging also affects the operational and educational capacity of nuclear medicine departments. Senior technologists bear a substantial share of responsibilities, including clinical placements, PET/CT onboarding, radiopharmaceutical preparation, advanced imaging procedures, and internal training. As experienced staff retire, departments lose both operational capacity and the internal expertise required to train new graduates. The Canadian Association of Medical Radiation Technologists noted that multiple clinical sites across imaging disciplines have trouble sustaining adequate placement capacity because senior technologists have limited availability to supervise students and mentor novice practitioners (Canadian Association of Medical Radiation Technologists [CAMRT], 2023). This challenge is particularly pronounced in nuclear medicine, where small team sizes make it difficult to dedicate protected time for teaching and learning. The reduced availability of high-quality clinical placements can influence whether new graduates choose to practice in smaller provinces, thereby further affecting the geographic distribution.

The demographic concentration of nuclear medicine technologists also increases the likelihood of clustered retirements. In provinces where a high proportion of technologists are within the same age bracket, departures may occur within a short period. This can temporarily reduce service volumes, limit modality coverage, and increase reliance on casual or agency staffing. Larger provinces may mitigate some of these pressures by redistributing workloads across multi-site networks. Smaller provinces and single-site departments lack this flexibility, making them more vulnerable to abrupt declines in staffing.

Aging, therefore, represents a central structural driver of the nuclear medicine technologist shortage. Retirements are expected to increase over the next several years, and replacement capacity remains insufficient to maintain workforce stability. When combined with rising imaging demand and the absence of reserve labour, this demographic profile significantly contributes to the national shortage. The following section examines how training system constraints intensify these demographic pressures and limit Canada's ability to maintain or expand nuclear medicine services.

3.2 Training Bottlenecks:

Training capacity represents one of the most restrictive structural drivers of the nuclear medicine technologist shortage in Canada. The national education system produces too few graduates to meet replacement demand, and training infrastructure is concentrated in a small number of provinces. These structural limitations have remained essentially unchanged for over a decade, despite the growing demand for nuclear medicine services and an increase in clinical complexity. The resulting bottlenecks affect every stage of workforce renewal, from admissions and didactic capacity to clinical placements and provincial distribution.

Canada maintains only 5 accredited nuclear medicine technologist programs: the British Columbia Institute of Technology, the Southern Alberta Institute of Technology, the Michener Institute, Collège Ahuntsic, and Dalhousie University. Combined, these programs graduate 50 to 70 technologists annually, a number that falls below the required level to sustain the national workforce size, given expected retirements, the expansion of PET/CT usage, and growth in radiopharmaceutical therapy (Canadian Association of Medical Radiation Technologists [CAMRT], 2023). CIHI reporting indicates that the broader medical imaging workforce is entering a period where retirements will exceed entry-level supply, reinforcing the pressure placed on nuclear medicine programs (Canadian Institute for Health Information [CIHI], 2024).

The geographic concentration of NMT programs limits access for several provinces. Saskatchewan, Manitoba, New Brunswick, Newfoundland and Labrador, and Prince Edward Island do not have in-province programs. Saskatchewan and Manitoba rely on an interprovincial agreement with the Southern Alberta Institute of Technology, which allocates a small number of seats to out-of-province applicants (Shared Health and University of Winnipeg, 2020). Dalhousie University's program produces 6 to 8 graduates annually to serve four Atlantic provinces. These dependencies reduce provincial control over admissions, seat allocation, and training volumes, making it difficult for smaller provinces to plan workforce renewal based on projected retirements.

Admission trends add further constraints. Several programs report difficulty filling available seats. Collège Ahuntsic admitted 11 qualified applicants for 20 available seats in its 2025 cycle, leaving almost half of the cohort unfilled (Collège Ahuntsic, 2025). Low application numbers reduce potential graduate output and signal declining interest in the profession among prospective students. Provinces with limited geographic proximity to training programs, such as Newfoundland and Labrador and Prince Edward Island, face additional barriers because prospective students must relocate for up to two years, often at a significant personal cost.

Clinical placement capacity further restricts the expansion of training. Nuclear medicine programs require students to complete extended clinical rotations in hospital departments that already operate with small teams and limited redundancy. CAMRT reports that multiple clinical training sites across imaging disciplines have trouble sustaining placement availability because experienced technologists have limited time to supervise students in departments that already face workload pressure (Canadian Association of Medical Radiation Technologists [CAMRT], 2023). In nuclear medicine, the impact is more substantial because the workforce is smaller and the scope of supervised practice is highly specialized. Sites with only a few technologists cannot easily accommodate multiple students without affecting throughput, procedural scheduling, or radiopharmaceutical workflow.

Program scalability is also limited by laboratory, equipment, and radiopharmacy requirements. Nuclear medicine curricula require access to functional gamma cameras, SPECT/CT systems, radiopharmaceutical preparation spaces, and trained radiation safety personnel. These elements create infrastructure and cost thresholds that make it challenging to expand seat numbers or open new programs. Smaller jurisdictions often lack these academic and clinical resources, making regional training expansion unlikely without significant investment.

The combined effects of low seat numbers, geographic concentration, clinical placement limits, and restricted program scalability create a supply pipeline that cannot keep pace with demographic attrition. Provinces without training programs consistently receive a low share of new graduates, while provinces with programs must allocate seats to multiple jurisdictions under interprovincial agreements. National supply remains stagnant despite rising demand for PET/CT, expanded oncologic imaging, and increasing clinical trial activity associated with novel radiopharmaceutical therapies.

Training bottlenecks, therefore, represent a central structural cause of the nuclear medicine technologist shortage. Limited admissions, constrained placement capacity, and concentrated educational infrastructure result in a reduced number of new technologists entering the workforce each year. These constraints also reinforce geographic inequities in workforce distribution and limit Canada's ability to respond to demographic pressures described in Section 3.1. The following section examines how recruitment constraints further intensify these challenges across provinces.

3.3 Recruitment Constraints:

Recruitment constraints significantly restrict the ability of provinces to attract nuclear medicine technologists and fill existing vacancies. Although the national workforce is already limited by low training output, recruitment challenges determine how effectively provinces can compete for the small number of graduates and experienced technologists available. Wage differences, geographic factors, professional mobility patterns, and labour market saturation combine to create a recruitment environment in which some provinces consistently succeed. In contrast, others face persistent vacancies despite ongoing efforts.

A defining feature of nuclear medicine recruitment is the scarcity of a readily available labour pool. Job Bank reporting identifies an unemployment rate of approximately 1.5% for medical radiation technologists, indicating that nearly all qualified staff are already employed (Job Bank, Government of Canada, 2025). Provinces, therefore, compete for the same small number of candidates each year. Competition is primarily influenced by wage structures, which vary significantly across Canada and directly shape applicants' decisions.

Analysis of detailed provincial salary grids reveals substantial wage differentials between provinces. Manitoba offers among the highest nuclear medicine wages in the country, with Step 1 reaching $50.39/h, Step 2 reaching $51.90/h, and Step 3 reaching $53.45/h. In contrast, New Brunswick's NBUPPE grid offers an average Step 1 at 26.50$/h, Step 2 at $27.76/h, and Step 3 at $29.10/h. This creates a difference of more than $24 per hour between the highest and lowest provincial salary levels. These differences significantly impact mobility among new graduates and experienced technologists, who often opt to practice in provinces offering higher compensation and expanded career opportunities.

These wage differentials are explored in full analytical detail in Section 6, which presents a comprehensive comparison of provincial salary structures.

Similar patterns are observed across Atlantic and Western Canada. Newfoundland and Labrador offers Step 1 at $36.33/h. These values remain significantly below British Columbia, where Step 1 reaches $41.47/h, Step 2 reaches $43.80, and Step 3 reaches $45.77/h. Alberta maintains rates of $37.16/h for Step 1, $39.11/h for Step 2, and $40.41/h for Step 3, which are competitive relative to many provinces outside the West. These wage differentials influence recruitment outcomes because technologists entering the profession may gain between $10 and $20 per hour simply by accepting a position in a high-wage province rather than a lower-wage jurisdiction.

Geography further shapes recruitment difficulty. Provinces such as Saskatchewan, Manitoba, New Brunswick, Newfoundland and Labrador, and Prince Edward Island face persistent barriers related to distance from major metropolitan centers, smaller teams, and limited modality diversity. Saskatchewan offers Step 1 wages as low as $37.96/h, which remain below those available in Alberta or British Columbia. Even when wages are competitive, geographic isolation, smaller departmental structures, and limited access to PET/CT scans reduce the attractiveness of roles for applicants who have trained in larger hospitals or academic settings.

The mobility of individuals between imaging disciplines also influences recruitment. Technologists with exposure to CT, MRI, or general imaging may opt to pursue positions in modalities that offer more openings, higher wages, or more predictable scheduling. CAMRT reports that technologists often move between imaging areas based on vacancy availability and work conditions, which reduces the pool of candidates who actively pursue nuclear medicine positions (Canadian Association of Medical Radiation Technologists [CAMRT], 2023). Because nuclear medicine departments have fewer positions and operate with smaller teams, even one or two technologists shifting to another modality can affect recruitment momentum.

Career pathway differences also create disparities in recruitment success. Larger provinces, such as Ontario, Québec, Alberta, and British Columbia, provide opportunities to work in tertiary centers, access PET/CT, and participate in radiopharmaceutical therapy programs. In smaller provinces, career pathways may be narrower, professional development opportunities may be more limited, and team sizes may be too small to support specialization. These factors influence applicant choices, particularly for technologists seeking experience with advanced modalities or responsibilities in radiopharmacy.

International recruitment of nuclear medicine technologists remains limited due to regulatory and credentialing requirements. Nuclear medicine programs vary internationally in structure, scope of practice, and radiopharmacy content, and Canadian employers often face challenges verifying equivalency. As a result, international inflows support only a small portion of recruitment needs, leaving provinces reliant on domestic supply, even as the number of qualified candidates remains insufficient.

Together, these recruitment constraints intensify the challenges created by training bottlenecks and demographic pressures. Wage differentials of up to $20/h, geographic disparities, competitive labour markets, and limited international pathways reduce the ability of many provinces to recruit technologists when vacancies arise. These factors contribute to prolonged vacancy periods and uneven distribution of the workforce across Canada. The following section examines how retention pressures further constrain workforce stability and interact with recruitment challenges to reinforce the national shortage.

3.4 Retention and Burnout:

Retention pressures significantly contribute to the nuclear medicine technologist shortage by reducing workforce stability and accelerating turnover across provinces. While recruitment challenges limit the inflow of new technologists, retention determines how long technologists remain in the profession and how frequently departments experience staffing disruptions. Burnout, workload intensity, limited redundancy, modality expansion, and regional service configurations all shape retention outcomes and influence whether technologists remain in their positions or choose to leave for other roles, other provinces, or other imaging disciplines.

Nuclear medicine technologists frequently work in departments with tiny teams. Many provinces operate single-site or dual-site nuclear medicine programs, where teams may consist of five technologists or fewer. In provinces such as Newfoundland and Labrador, Prince Edward Island, New Brunswick, Saskatchewan, and Manitoba, the departure of one technologist can result in a reduction of staffing by between 5% and 10%, and in some cases, even more. Small team sizes create high workload concentration, limited scheduling flexibility, and minimal coverage for sick leave, vacation, or professional development. These conditions place pressure on remaining staff, increasing the risk of burnout and reducing overall retention.

Burnout is influenced by procedural complexity and increasing clinical demands. Nuclear medicine technologists support a range of diagnostic and therapeutic services that require sustained attention to radiopharmaceutical handling, patient preparation, imaging acquisition, and radiation safety procedures. PET/CT growth and the introduction of emerging radiopharmaceutical therapies have expanded technologist responsibilities without proportional increases in staffing. CADTH reporting confirms significant national growth in PET volumes between 2015 and 2023, which has increased procedural workloads and placed additional pressure on nuclear medicine departments (Canadian Agency for Drugs and Technologies in Health [CADTH], 2023). This expansion requires technologists to manage more complex workflows and, in many cases, perform tasks that were not part of standard practice a decade ago.

Limited redundancy also affects retention. Departments with few technologists cannot easily accommodate sustained increases in workload, nor can they provide consistent opportunities for rest, rotation, or relief. When departments experience vacancies, remaining technologists often assume extended responsibilities, longer shifts, and higher procedural volumes. These work conditions reduce job satisfaction and increase the likelihood that technologists will leave for positions in larger centers or other imaging modalities. CAMRT notes that workload intensity is a significant factor influencing technologist mobility across imaging professions, and that burnout contributes to movement between modalities over time (Canadian Association of Medical Radiation Technologists [CAMRT], 2023).

Geography further influences retention. Technologists working in rural or isolated regions may face limited access to professional support, continuing education, and opportunities for advancement. In provinces such as Newfoundland and Labrador, New Brunswick, Saskatchewan, and Manitoba, nuclear medicine services are concentrated in a small number of hospitals. Technologists in these areas may feel professionally isolated or may perceive limited future career growth, leading them to relocate to provinces with larger departments, PET programs, or radiopharmacy services. Larger provinces offer expanded roles, onsite radiopharmacy laboratories, multi-site networks, and exposure to advanced modalities, which support stronger retention compared with provinces operating smaller programs.

Compensation differences also interact with retention. Provinces that offer wages below national averages experience higher turnover as technologists leave for jurisdictions with stronger wage scales or higher ceilings. Salary data presented in Section 7 show substantial differences between provinces. These differences create ongoing retention pressure in lower-wage regions. An article from Canadaian HR from 2024 state that "Nine out of ten (93¨%) employees are open to leaving their current organization for a salary increase of 10% or more. », retention becomes significantly more difficult for smaller and lower-wage jurisdictions.

Retention is further affected by limited opportunities for specialization and career progression. Nuclear medicine technologists who seek expanded practice, PET expertise, radiopharmacy responsibilities, or leadership roles often have more opportunities in provinces such as Ontario, Québec, Alberta, and British Columbia than in smaller provinces. This uneven distribution of advancement pathways encourages technologists to relocate, contributing to turnover in provinces with limited career growth opportunities.

Finally, retention is influenced by the cumulative impact of recruitment gaps, training limitations, and demographic pressures. When vacancies remain unfilled, remaining technologists must maintain service volumes with reduced staffing, which accelerates burnout and increases the risk of turnover.

As outlined in Sections 3.1 and 3.2, retirements and low graduate numbers already limit provincial capacity. Retention pressures, therefore, interact with these factors to amplify shortages and create cycles of recurring vacancies.

Retention and burnout represent a central structural cause of the nuclear medicine technologist shortage, as they reduce workforce stability and accelerate turnover in a field that already faces a limited inflow and high replacement demand. The following section examines how wage disparities further influence mobility and recruitment across provinces, contributing to lasting workforce imbalances.

3.5 Wage Disparities:

Wage disparities across Canada represent a fundamental structural factor driving the shortage of nuclear medicine technologists. While Section 3.3 showed how specific hourly wage differences influence recruitment outcomes, the broader wage structure creates provincial advantages and disadvantages that extend beyond individual hiring cycles. Provinces differ not only in starting wages but also in wage progression speed, ceiling levels, grid compression, and alignment with cost of living. These structural elements shape long-term workforce stability and contribute to persistent interprovincial imbalances.

Across provinces, wage grids show significant variability in both entry-level compensation and upper-step ceilings. As demonstrated in Section 3.3, wage differentials of more than $10 to $20 per hour exist between the highest- and lowest-paying jurisdictions. Section 6 provides a detailed comparison of these salary grids. These differences are not limited to initial compensation. Some provinces offer rapid step progression and comparatively high wage ceilings, while others maintain slow progression and narrower salary ranges. Provinces with narrow wage spreads may see technologists reach the top of their wage grid early in their career, limiting long-term financial growth and reducing incentives to remain in that jurisdiction.

Wage grid compression affects retention by reducing the financial differentiation between junior and senior technologists. In provinces where top-step wages remain close to mid-career wages, technologists may feel that their expertise, supervision responsibilities, and workload intensity are not adequately compensated. In nuclear medicine departments with small team sizes and high procedural complexity, compression can reduce the perceived value of experience and encourage technologists to relocate to provinces offering stronger financial recognition of seniority.

Geographic wage parity also shapes mobility patterns. Provinces offering higher wages relative to their cost of living can attract technologists even when absolute wages are not the highest nationally. Conversely, provinces where wages have not kept pace with rising housing or transportation costs may experience increased turnover. This dynamic is evident in several regions, where technologists report that wage competitiveness does not align with regional affordability, influencing long-term retention decisions and contributing to mobility toward provinces with more favorable economic conditions.

Wage disparities also interact with the availability of advanced practice opportunities. Provinces that offer PET/CT, radiopharmaceutical therapy, or research-based nuclear medicine roles often maintain higher wage ranges that reflect the increased complexity and training requirements associated with these modalities. Technologists seeking advanced practice experience may consider positions in jurisdictions that offer both higher compensation and a broader clinical scope. These combined incentives intensify mobility and contribute to uneven workforce distribution.

Differences in provincial compensation frameworks influence how technologists evaluate long-term career pathways. Provinces with limited wage growth or low ceiling values experience more frequent turnover, as technologists seek compensation that aligns with national benchmarks or regional averages. Wage disparities also affect the flow of technologists between similar provinces. For example, provinces offering mid-range wages may lose staff to jurisdictions that provide modestly higher wages but significantly stronger career progression or larger departmental structures.

Wage structures, therefore, represent more than a recruitment determinant. They create enduring patterns of workforce movement, shape provincial retention outcomes, and contribute to long-term workforce inequities. These disparities also interact with the demographic pressures described in Section 3.1, the training bottlenecks outlined in Section 3.2, and the retention challenges discussed in Section 3.4, amplifying the effects of each factor.

The full provincial wage grids, including step progression, ceiling values, and regional differentials, are presented in Section 7. These detailed comparisons demonstrate how wage structures perpetuate systemic imbalances within the Canadian nuclear medicine technologist workforce. The following section examines how mobility, credentialing, and scope of practice frameworks further shape workforce distribution and contribute to the national shortage of healthcare professionals.

3.6 Regulatory and Mobility Barriers:

Regulatory and mobility barriers represent one of the most significant structural causes of the nuclear medicine technologist shortage in Canada. Although technologists' complete comparable educational programs and meet national certification standards, provincial regulatory frameworks interpret these standards differently, apply distinct recognition pathways, and impose additional provincial conditions that slow or restrict mobility. These inconsistencies limit the ability of provinces to recruit from one another, prolong vacancy duration, and undermine the capacity of smaller jurisdictions to stabilize their workforces. The Canadian Association of Medical Radiation Technologists (CAMRT) serves as the national certifying authority and de facto co-regulator for nuclear medicine technology; however, its national standards are not uniformly recognized or operationalized across provinces. This fragmentation produces avoidable delays, regulatory bottlenecks, and persistent workforce imbalances.

Ontario and Québec maintain fully independent regulatory colleges for medical imaging technologists. The College of Medical Radiation and Imaging Technologists of Ontario requires CAMRT certification, registration fees, jurisprudence review, and verification of Canadian training or equivalency before practice (CMRITO, 2023). The Ordre des technologues en imagerie médicale, en radio-oncologie et en électrophysiologie médicale du Québec imposes additional requirements, including French language proficiency as mandated by provincial law, a mandatory examination, and reserved acts defined in statute (OTIMROEPMQ, 2023). Québec's regulatory conditions significantly restrict inbound mobility. The province requires technologists to demonstrate compliance with Québec-specific professional standards that differ from those applied in other provinces, resulting in longer onboarding timelines for technologists arriving from outside Québec. Recent data highlight the impact of these barriers.

Applications to the Québec certification exam have decreased by 38%, the number of technologists has declined by 20%, and 45% of the workforce is over 45 years old, with 30% over 50 years old. The province currently reports 60 active vacancies, placing sustained pressure on service continuity.

Nova Scotia regulates nuclear medicine technologists through the Nova Scotia College of Medical Imaging and Radiation Therapy Professionals. The NSCMIRTP employs a multi-stage registration process that necessitates CAMRT certification, credential verification, currency assessments, continuing competence documentation, and, in some instances, supervised practice. The College also operates an Interdisciplinary Authorization Process that allows nuclear medicine technologists to perform hybrid imaging tasks only after obtaining formal board approval and completing documented assessments. These processes support professional accountability but extend mobility timelines for applicants entering the province. They also create inconsistencies with provinces where PET/CT or SPECT/CT hybrid competencies are recognized directly through CAMRT certification.

Several provinces, including Manitoba, Saskatchewan, New Brunswick, Newfoundland and Labrador, and Prince Edward Island, do not maintain independent MRT regulatory colleges. In these jurisdictions, nuclear medicine technologists rely on employer-based credential assessment or professional association membership, neither of which guarantees automatic reciprocity with other provinces. The absence of a standardized regulatory framework limits mobility because each employer must independently verify credentials, review clinical experience, and assess practical competencies. This process frequently requires several weeks or months, during which positions remain vacant, and workload intensifies for existing staff. Provinces without colleges are therefore disproportionately affected by regulatory delays, despite having the highest vacancy sensitivity and the smallest workforce baselines in the country.

CAMRT's role as a national co-regulator introduces additional mobility constraints. CAMRT administers the national certification examination, determines eligibility requirements for entry to practice, defines the national nuclear medicine competency profile, and assesses equivalency for internationally educated technologists. Provinces rely on CAMRT certification to validate entry-to-practice competencies, yet provincial regulators and employers apply CAMRT standards inconsistently. Some jurisdictions accept CAMRT certification as a full qualification for PET/CT, radiopharmacy tasks, and radiation safety procedures. Others require supplementary training, additional workplace assessments, or hybrid authorization processes. This variation reduces the effectiveness of CAMRT's national certification system as a harmonizing mechanism and discourages technologists from relocating when additional provincial requirements create uncertainty or delay.

Differences in PET/CT and radiopharmaceutical therapy recognition further restrict mobility. CADTH highlights significant variation in PET implementation across Canada, including differences in staffing models, workflow structures, and competency expectations (CADTH, 2023). Nuclear medicine technologists trained and experienced in PET/CT in one province may not be granted immediate authorization to perform the same responsibilities in another. This inconsistency affects both inbound and outbound mobility. Provinces with emerging PET programs often struggle to recruit technologists from PET-established jurisdictions because the destination province cannot guarantee immediate recognition of advanced competencies. As a result, PET and theranostic expansion are slowed in smaller provinces that depend heavily on external recruitment.

International mobility remains severely restricted. CAMRT's assessment process for internationally educated medical radiation technologists includes credential validation, competency assessment, exam preparation, and supervised practice requirements. CAMRT has documented substantial barriers for internationally educated applicants entering the Canadian workforce, with credentialing timelines extending significantly longer than those for domestically trained technologists. Since several provinces rely entirely on CAMRT to determine readiness for practice, delays at the national assessment stage directly translate into prolonged vacancies at the provincial level.

Regulatory fragmentation interacts with geography and workforce size to produce disproportionate effects. Large provinces with well-resourced regulatory colleges, such as Ontario and Alberta, can integrate incoming technologists more efficiently. Smaller provinces face compounding challenges because they rely on employer-based assessment, have fewer administrative resources, and operate small departments where each vacancy reduces capacity by 5 to 10% or more. These provinces urgently require mobility solutions but remain the most affected by the inconsistent application of national credentials and the absence of a unified regulatory pathway.

Regulatory and mobility barriers, therefore, constitute a central structural cause of the shortage of nuclear medicine technologists. Fragmented licensing systems restrict labour movement, create prolonged onboarding delays, reduce access to PET and radiopharmaceutical therapy competencies, and prevent provinces from leveraging the national supply of qualified technologists. The interaction of these barriers with demographic trends, training limitations, and wage disparities reinforces systemic inequities across the Canadian nuclear medicine workforce. The following section examines how private-sector competition and parallel labour markets interact with these regulatory conditions to further affect workforce sustainability.

3.7 Private-Sector Competition and Workforce Attrition:

Private-sector recruitment has become an increasingly important factor shaping the sustainability of Canada’s nuclear medicine technologist workforce. Although hospitals remain the primary employers of NMTs, the expansion of radiopharmaceutical production, molecular imaging services, and the medical device industry has created a growing labour market competing for the same small pool of qualified professionals. This competition is occurring at a time when national supply is already constrained, with CIHI reporting persistent shortages across imaging professions and a rising proportion of technologists nearing retirement age (Canadian Institute for Health Information, 2025). The combination of limited training output, increasing clinical demand, and expanding industry opportunities has created structural pressure on public departments.

Private employers offer working conditions that differ significantly from those in hospital environments. Industry roles often provide stable schedules, reduced physical workload, and opportunities for specialization in research, radiopharmaceutical production, or technical development. For technologists working in departments characterized by chronic understaffing and high workload intensity, these roles may appear more sustainable. CAMRT has documented that burnout and workload pressures are widespread among MRTs, noting that rising patient volumes and staffing shortfalls contribute to emotional strain and reduced retention (CAMRT, 2023). These same pressures make the private sector an attractive pathway for technologists seeking improved well-being.

The implications for public service delivery are considerable. When experienced technologists migrate to industry positions, hospitals lose essential expertise in radiopharmaceutical handling, PET and SPECT protocol optimization, and the commissioning of new technologies. This loss of institutional knowledge is particularly destabilizing for provinces with small workforces, where each technologist accounts for a significant share of total capacity. Saskatchewan's Market Supplement Review Committee reported similar concerns, emphasizing that competition for skilled technologists increases recruitment challenges in regions with limited staffing baselines (Saskatchewan MSRC, 2024). These dynamics are consistent across multiple provinces and contribute to a cycle in which clinical workload rises as staff depart, further accelerating attrition.

Private-sector roles also influence career trajectories early in the professional lifecycle. New graduates entering a workforce marked by high vacancy rates may perceive industry roles as more predictable or better aligned with long-term career planning. As training programs struggle to expand capacity, the diversion of newly qualified technologists into non-clinical roles reduces the public system's ability to offset retirements or support the expansion of PET and therapeutic services.

Recognizing private-sector competition as a structural driver does not imply that industry participation is undesirable. Industry contributes to innovation, supports research, and plays a vital role in the broader nuclear medicine ecosystem. However, without coordinated workforce planning, parallel labour markets can unintentionally weaken public-sector stability. A balanced approach acknowledges these dynamics and integrates them into long-term strategies to strengthen retention, maintain service continuity, and ensure equitable access to nuclear medicine across Canada.

During the Q&A session at Session 2 of the CANM 2025 Annual Scientific Conference in Halifax, several participants emphasized that the national shortage of Nuclear Medicine Technologists extends beyond the clinical system. Industry attendees highlighted that camera manufacturers, software developers, radiopharmaceutical producers, and theranostic companies rely heavily on experienced technologists to support workflow design, protocol development, equipment testing, and quality assurance. These non-clinical roles draw from the same limited workforce and require significant clinical experience. Without coordinated planning, both clinical departments and industry innovators will continue to compete for the same shrinking pool of technologists, reinforcing the urgency of a unified national workforce strategy.

Evolution of Nuclear Medicine Practice – Hybrid Imaging and Theranostics

Chapter

4

Chapter 4: Evolution of Nuclear Medicine Practice: Hybrid Imaging and Theranostics

RLT and Theranostic 101:

Radioligand therapy, often called RLT, is an emerging targeted cancer treatment that combines a diagnostic tracer and a therapeutic molecule into a single approach. This concept is referred to as théranostic. The diagnostic scan first identifies where receptors or cancer cells are located in the body, and the paired therapeutic molecule then delivers radiation directly to those same cells. This model improves precision and reduces exposure to healthy tissues. As provinces expand PET imaging and new tracers enter the clinical pathway, theranostics is becoming one of the fastest-growing domains in oncology. This shift is already visible across Canada and is described in the CANM educational video "Vue sur la RLT au Québec", which illustrates how radioligand therapies will rapidly increase clinical demand in the coming years.

This evolution represents a structural change in nuclear medicine. Radioligand therapies require additional preparation steps, advanced radiation safety procedures, coordinated workflows with oncology teams, and expanded responsibilities for Nuclear Medicine Technologists. Each therapy session involves dose handling, contamination control, patient monitoring, and hybrid imaging before and after treatment. As a result, the introduction of theranostics increases workload and cannot be absorbed without adequate staffing, training capacity, and departmental support. The rapid growth of RLT and theranostics programs across Canada, therefore, acts as a catalyst, amplifying existing workforce pressures and exposing the gaps documented in the previous sections.

4.1 Theranostics and Emerging Care Models:

Theranostics is reshaping nuclear medicine practice in Canada and redefining the skill requirements for nuclear medicine technologists. The integration of diagnostic and therapeutic radiopharmaceuticals, combined with the rapid expansion of PET-based precision oncology, has created a new care model that requires advanced imaging competencies, radiopharmaceutical handling knowledge, radiation safety expertise, and coordinated patient management across multiple treatment episodes. While theranostics represents one of the most promising developments in oncology and personalized medicine, it also places substantial pressure on an already fragile nuclear medicine workforce. Provinces that cannot staff baseline nuclear medicine services face significant barriers to implementing or sustaining theranostic programs. Theranostics combines molecular imaging with targeted radiopharmaceutical therapy. PET imaging is used to identify molecular targets, quantify disease burden, and determine eligibility for treatment. Therapeutic radiopharmaceuticals are then administered to deliver targeted radiation to cancer cells. This model requires technologists who possess specialized knowledge of PET physics, radiopharmaceutical preparation, radiation safety, patient monitoring, and the operation of hybrid imaging systems. CADTH's national assessments indicate that PET capacity has expanded steadily between 2015 and 2023 in response to the growing use of prostate-specific membrane antigen imaging, neuroendocrine tumor staging, and precision oncology applications (CADTH, 2023). These diagnostic expansions directly increase the demand for technologists capable of operating PET systems and supporting therapy planning. Radiopharmaceutical therapies add new responsibilities that extend beyond traditional diagnostic workflows.

Therapies require pre-treatment imaging, radiation safety screening, patient preparation protocols, controlled administration environments, post-treatment monitoring, and structured follow-up imaging. Nuclear medicine technologists play a central role in these processes. They are responsible for coordinating treatment-day workflow, preventing contamination, implementing patient isolation procedures, and ensuring the safe handling of high-activity radiopharmaceuticals. These tasks require advanced training, strict adherence to regulatory standards, and the ability to manage prolonged patient interactions associated with therapeutic care. Emerging care models also increase procedural complexity and workload intensity. Unlike diagnostic imaging, which follows predictable volume cycles, theranostic programs require prolonged time commitments per patient, multi-step pathways, and coordination with oncology, medical physics, pharmacy, and radiation safety teams. These workflows reduce throughput capacity and require staffing levels that exceed current provincial baselines. Several provinces operate with five technologists or fewer, making it difficult to sustain multi-hour therapy sessions while also maintaining diagnostic schedules.

Provinces with small nuclear medicine teams face challenges in implementing therapy programs because they lack the redundancy to absorb increased workloads without compromising access to diagnostic services. Theranostics also requires a workforce that can adapt to evolving regulatory and practice standards. Radiopharmaceutical therapies involve controlled substances that are subject to federal and provincial regulatory oversight. Health Canada requires strict compliance with radioisotope preparation, handling, and disposal standards, while provincial radiation safety frameworks establish requirements for shielding, exposure monitoring, and control of contamination. Nuclear medicine technologists must be trained to operate within these regulatory conditions and to manage both imaging and therapeutic tasks in accordance with clinical safety protocols. PET-based theranostics intensifies demand for technologists with hybrid imaging expertise. CADTH notes that PET deployment varies significantly across Canada, with differences in scanner availability, workflow design, and provincial access models (CADTH, 2023). Provinces with limited PET infrastructure face significant barriers to implementing therapy programs because technologists must be proficient in PET imaging before they can support radiopharmaceutical therapy workflows. Provinces that already have trouble recruiting PET-trained technologists cannot expand into advanced therapeutic care without addressing underlying workforce shortages. Theranostics also requires technologists with strong radiopharmacy competencies.

Radiopharmaceutical therapies involve high-activity isotopes that must be prepared, assayed, transported, and administered in accordance with strict regulatory procedures. Administering therapeutic doses requires advanced technical proficiency and a thorough understanding of dose calibration, contamination risks, biological elimination patterns, and radiation protection measures. Nuclear medicine technologists in many provinces do not currently receive training in therapeutic radiopharmacy during their education or clinical placements, resulting in skill gaps that limit their implementation capacity. The evolution toward theranostic care models, therefore, represents a significant shift in nuclear medicine practice, one that demands advanced competencies, increased staffing, additional regulatory oversight, and greater departmental resilience. Provinces that already struggle with recruitment, retention, and regulatory delays face heightened barriers to adopting or scaling theranostic programs. Without sufficient technologist capacity and training, provinces risk experiencing widening disparities in access to precision oncology and radiopharmaceutical therapy. The next section examines the specific workforce competencies required to support theranostic care.

It identifies the skill gaps that must be addressed to ensure national readiness for these emerging treatment pathways.

4.2 PET/CT Capacity and Provincial Readiness for Theranostics:

Canada's PET/CT and radiopharmaceutical therapy expansion is progressing, but expansion remains uneven across provinces due to persistent nuclear medicine technologist shortages, limited PET capacity, and variable readiness of clinical sites. Radiopharmaceutical therapies such as Lutetium-177 PSMA (Pluvicto) and Lutetium-177 DOTATATE received Health Canada approval beginning in 2022, contributing to increased clinical demand for PET-based precision oncology (Health Canada, 2022). CADTH reports that national PET imaging volumes have increased every year between 2015 and 2023, driven by cancer staging, therapy planning, and new molecular targeting indications (CADTH, 2023). Despite growing clinical need, the availability of trained technologists remains the principal limiting factor for PET/CT.

Ontario is among the earliest adopters due to its concentration of PET facilities. CIHI data indicate that Ontario operates approximately 40% of Canada's PET/CT scanners, primarily clustered in Toronto, Ottawa, and Hamilton (CIHI, 2023). Several Ontario hospitals have introduced radiopharmaceutical therapy programs; however, technologist shortages have slowed the expansion of these programs. CMRITO's workforce reports show that Ontario had 648 active nuclear medicine technologists in 2023, down from 749 in 2013, representing a 13% decline over 10 years, despite rising procedural volumes (CMRITO, 2023). As a result, hospitals often reassign technologists from diagnostic rotations to support therapy days, which reduces PET and SPECT throughput and lengthens wait times. These staffing constraints limit the number of therapy sessions that can be safely supported each week.

British Columbia has implemented radiopharmaceutical therapies through BC Cancer, but provincial workforce limitations remain significant. The Health Sciences Association of BC reports that BCIT's nuclear medicine program accepts up to 16 students per year, yet typically graduates only 6 to 12 due to attrition, resulting in far fewer technologists than are required to sustain both diagnostic and therapeutic operations (HSA BC, 2024). CADTH also notes that British Columbia's PET scanner distribution is heavily centralized, with fewer units per capita than Ontario or Québec, contributing to geographic disparities in access (CADTH, 2023). These workforce and infrastructure constraints limit the capacity to expand therapy services beyond major urban centres.

Québec has launched radiopharmaceutical therapies at major hospitals in Montreal and Québec City, yet provincial workforce fragility has slowed broader PET/CT. The OTIMROEPMQ reported that only seventeen new nuclear medicine technologists joined the workforce in 2023, despite growing demand for PET imaging and targeted therapies (OTIMROEPMQ, 2023). Smaller regions, such as Outaouais, Saguenay, and Eastern Québec, face limited availability of technologists, which restricts their ability to implement multi-hour therapeutic workflows that require stable baseline diagnostic staffing. Consequently, services remain centralized, forcing many patients to travel long distances for treatment.

Alberta has initiated therapy programs in Calgary and Edmonton, supported by PET infrastructure and SAIT's nuclear medicine program. SAIT admits approximately 20 students annually, including reserved seats for Saskatchewan and Manitoba, and typically graduates fifteen to eighteen technologists per year (SAIT, 2024). However, interprovincial student allocations mean that only a portion of graduates remain in Alberta, limiting the province's capacity to scale theranostics without external recruitment. Nova Scotia faces similar constraints. Dalhousie University graduates only six to eight technologists annually, a number insufficient to support provincial expansion beyond a small number of therapy days (Dalhousie University, 2024).

Provinces at earlier stages of readiness face structural barriers. New Brunswick, Newfoundland and Labrador, Saskatchewan, and Manitoba have limited PET availability and insufficient staffing of technologists to support radiopharmaceutical therapy programs. CIHI reports that several of these provinces operate only one PET scanner each or rely on out-of-province access, making therapy implementation operationally challenging (CIHI, 2023). Provincial readiness assessments consistently identify nuclear medicine technologist shortages as the primary barrier to adopting Health Canada-approved therapies, even when oncologists and medical physicists are prepared to support new treatment pathways.

Canada's early PET/CT experience demonstrates strong clinical interest but also reveals systemic workforce barriers that restrict equitable national access to precision oncology. PET imaging demand has increased faster than the supply of technologists for over a decade, and the capacity to expand radiopharmaceutical therapies remains constrained by staffing limitations, education bottlenecks, and uneven provincial infrastructure. A brief example from the Ottawa Hospital illustrates how some early adopter centres have piloted local adaptations to sustain initial implementation, although detailed analysis is presented in Section 4.6.

Today, technologist availability is the principal rate-limiting factor shaping Canada's national theranostic PET/CT curve. Without coordinated workforce planning, targeted investments in education and staffing, and improved distribution of PET resources, provinces will continue to experience variable timelines for adopting radiopharmaceutical therapies. The following section examines the specific workforce implications associated with implementing and scaling these therapeutic pathways.

4.3 Workforce Implications for Theranostics:

Theranostics introduces a fundamentally different staffing profile for nuclear medicine departments. Unlike traditional diagnostic imaging, radiopharmaceutical therapy requires more intensive technologist involvement, greater procedural complexity, longer patient interactions, and enhanced regulatory compliance. As Health Canada approvals expand and clinical demand increases, Canada's nuclear medicine workforce must support a multi-step therapeutic model that significantly exceeds the staffing requirements of conventional SPECT and PET imaging. This shift has significant implications for workforce planning, training, and regulatory oversight across all provinces.

Radiopharmaceutical therapy requires nuclear medicine technologists to manage several critical tasks that are not part of standard diagnostic workflows. These responsibilities include coordinating treatment days, performing radiation safety screenings, implementing patient isolation procedures, preparing therapy rooms, preventing contamination, handling high-activity radiopharmaceuticals, and conducting structured post-treatment monitoring. CADTH notes that each therapeutic dose requires dedicated PET imaging for eligibility assessment, dosimetry, and follow-up, thereby increasing the demand for technologists with PET proficiency, as well as hybrid imaging expertise (CADTH, 2023). This creates a dual-demand model in which technologists must simultaneously support rising diagnostic volumes and multi-hour therapy appointments.

Theranostic workflows reduce departmental throughput and increase the need for staffing redundancy. CIHI reports that provinces with limited technologist capacity experience delays in implementing Health Canada-approved therapies because technologists cannot be reassigned from diagnostic rotations without compromising wait times (CIHI, 2023). A single therapy session can require several hours of uninterrupted technologist coverage, during which that technologist is removed from PET and SPECT operations. As a result, departments must increase staffing above diagnostic baselines to maintain service continuity. Provinces operating with five technologists or fewer cannot accommodate therapy workflows without reducing diagnostic access or extending waitlists.

The shift toward theranostics also increases the need for technologists with advanced radiopharmacy competencies. Therapeutic isotopes, such as Lutetium-177, require strict adherence to radiation protection procedures, specialized dose calibration, and effective contamination control. OTIMROEPMQ and CMRITO regulatory frameworks require technologists performing therapeutic tasks to demonstrate advanced competency in radiopharmaceutical handling, exposure monitoring, and therapeutic room safety protocols (OTIMROEPMQ, 2023; CMRITO, 2023). However, most Canadian training programs currently provide limited exposure to therapeutic radiopharmacy during clinical placements, resulting in skill gaps that impede departmental readiness.

The introduction of theranostics also increases interdisciplinary workload coordination. Radiopharmaceutical therapy requires synchronized workflows involving nuclear medicine, oncology, medical physics, pharmacy, radiation safety, and scheduling departments. Technologists must manage complex patient flows across multiple visits, coordinate with oncology teams regarding treatment eligibility, and communicate radiation safety instructions clearly to patients and caregivers. These expanded responsibilities increase cognitive workload and contribute to a higher risk of burnout in departments already experiencing staffing shortages, consistent with national trends identified by CAMRT (2023).

Theranostic expansion will also intensify workforce inequities across provinces. Provinces with higher PET capacity, such as Ontario and Québec, are better positioned to support the PET/CT of therapy, although staffing shortages still limit growth. Provinces with limited PET availability and small technologist cohorts, such as New Brunswick, Prince Edward Island, Saskatchewan, and Manitoba, face significantly higher barriers to access. CIHI data indicate that the distribution of PET scanners and nuclear medicine staffing varies significantly across Canada, creating structural disadvantages for smaller provinces seeking to implement therapeutic programs (CIHI, 2023). Without targeted investments, these disparities will widen as therapeutic demand increases.

The workforce implications of theranostics, therefore, extend far beyond the introduction of a new treatment modality. They represent a structural shift in nuclear medicine practice that increases training requirements, staff time commitments, interdisciplinary coordination, and regulatory complexity. Health Canada approvals for new radiopharmaceuticals will continue to expand clinical demand, yet Canada currently lacks the technologist capacity required to scale these therapies nationally. This mismatch between therapeutic readiness and workforce availability is now one of the principal barriers to equitable PET/CT across provinces.

A national workforce strategy is required to address these implications. Such a strategy must consider staffing redundancy requirements, PET capacity, skill gaps in radiopharmacy and hybrid imaging, as well as the expanded scope of technologist responsibilities under provincial regulations. Without coordinated planning, provinces will continue to face inconsistent implementation timelines and unequal access to precision oncology. The following section examines the education and training gaps that are currently limiting Canada's ability to prepare technologists for the competencies required in theranostic care.

4.4 Education and Training Gaps:

Canada's current education and training ecosystem is not adequately structured to meet the workforce competencies required for theranostic care. Although national competency standards for nuclear medicine technology outline foundational knowledge in imaging, radiopharmaceuticals, and radiation safety, most accredited programs provide limited exposure to therapeutic radiopharmaceutical handling, hybrid PET workflows, and interprofessional coordination required for modern theranostic pathways. This gap between educational preparation and clinical demand is now one of the primary barriers to national readiness for radiopharmaceutical therapy.

Across all accredited programs, approximately 55 Canadian-educated technologists pass the national certification exam each year, a figure that has remained essentially unchanged for over a decade, despite rising PET and therapy demand (CAMRT, 2024). As shown in Section 5, British Columbia, Alberta, Ontario, Québec, and Nova Scotia each operate a single program. Annual outputs remain small, with BCIT graduating roughly 6 to 12 students per year, SAIT graduating 15 to 18, Collège Ahuntsic graduating 10 to 17, Michener graduating 12 to 15, and Dalhousie graduating 6 to 8. These cohorts were designed for a diagnostic era of practice. As a result, graduates enter the workforce well-prepared for conventional SPECT imaging but underexposed to competencies required for Lutetium-based therapies, PET-guided oncology pathways, and emerging theranostic protocols.

Several critical competency gaps are evident across programs. First, most students receive minimal hands-on experience with the handling of therapeutic radiopharmaceuticals. Therapies such as Lutetium-177 PSMA and Lutetium-177 DOTATATE require strict adherence to dose calibration, contamination control, and radiation protection procedures. OTIMROEPMQ and CMRITO regulatory frameworks expect technologists performing therapeutic tasks to demonstrate advanced competency in therapeutic radiopharmaceutical handling, exposure monitoring, and treatment-room safety protocols (OTIMROEPMQ, 2023; CMRITO, 2023). However, such training is not uniformly available during clinical placements. The limited provincial PET capacity further restricts opportunities for students to gain experience with hybrid imaging systems, which are central to therapy eligibility assessment and follow-up imaging (CIHI, 2023).

Second, clinical placement sites have a limited ability to support therapy workflow training. Radiopharmaceutical therapy is conducted in a small number of hospitals that manage complex interdisciplinary workflows involving oncology, medical physics, pharmacy, radiation safety, and scheduling. These specialized environments often lack the staffing redundancy required to supervise students safely during therapy days. CADTH's national review identifies this scarcity of clinical placement capacity as a core structural barrier preventing education programs from scaling to support therapeutic competencies (CADTH, 2023).

Third, programs face faculty and resource constraints. Many institutions lack instructors with direct clinical experience in theranostics, particularly outside major urban centres. BCIT, SAIT, Ahuntsic, and Dalhousie have initiated internal discussions on curriculum adaptation, yet faculty shortages and limited access to therapeutic equipment restrict their ability to integrate advanced content. Curriculum redesign requires collaboration with hospitals that perform radiopharmaceutical therapies; however, many hospitals currently lack the necessary staffing stability to assume additional supervisory and training responsibilities.

Fourth, there is no national standard for theranostic education in Canada. Each program determines its own level of PET and therapy-related content, leading to significant variability in student exposure. While the Michener Institute has begun integrating enhanced PET and theranostic modules into its curriculum, similar adaptations have not yet been implemented consistently nationwide. CAMRT's existing competency profiles outline foundational expectations but do not include the detailed technical and procedural skill sets required to support emerging therapy programs at scale. Without coordinated national guidance, technologist readiness will continue to vary widely across provinces.

These gaps create downstream operational challenges. Hospitals frequently report that new graduates require extensive on-the-job training before they can support therapy workflows, adding pressure to already overextended nuclear medicine teams (CMRITO, 2023). Provinces with small technologist cohorts face slower PET/CT timelines because they cannot rapidly upskill staff without compromising diagnostic service delivery. Regions with limited PET infrastructure are at even greater risk, since their technologists may have little or no exposure to PET systems during training, despite PET being essential for all therapy eligibility assessments.

Canada's education and training gaps, therefore, represent a structural barrier to equitable access to radiopharmaceutical therapy. The country cannot scale theranostics without addressing curriculum limitations, clinical placement shortages, and the absence of national competency standards specific to therapeutic nuclear medicine. These challenges require coordinated action across ministries, regulators, academic institutions, and hospitals. The following section examines the policy and regulatory considerations that will shape Canada's ability to establish a consistent, safe, and scalable national model for theranostic PET/CT.

4.5 Policy and Regulatory Considerations:

The expansion of theranostics in Canada requires a regulatory and policy environment that supports safe practice, consistent competency expectations, and sufficient technologist capacity across provinces. Current regulatory frameworks were designed for an era dominated by diagnostic SPECT and PET imaging, and do not yet fully reflect the procedural, safety, and interdisciplinary requirements associated with therapeutic radiopharmaceuticals. As a result, provinces face variability in the interpretation of the scope of practice, training expectations, and implementation timelines. These inconsistencies create operational uncertainty for hospitals and contribute to unequal access to radiopharmaceutical therapy across Canada.

Health Canada plays a central role in the authorization and oversight of therapeutic radiopharmaceuticals. Agents such as Lutetium-177 PSMA and Lutetium-177 DOTATATE received federal approval beginning in 2022, triggering new regulatory requirements related to procurement, storage, dose calibration, contamination control, and radiation protection (Health Canada, 2022). These federal requirements impose additional responsibilities on nuclear medicine technologists, who must handle therapeutic radiopharmaceuticals in accordance with strict national standards and site-specific radiation safety policies. However, Health Canada approval does not automatically ensure provincial workforce readiness. Provinces must interpret federal requirements and integrate them into local regulatory frameworks, leading to variation in practice expectations.

Provincial regulatory bodies define the scope of practice boundaries for nuclear medicine technologists and establish compliance expectations for therapeutic procedures. CMRITO and OTIMROEPMQ outline competency requirements related to radiopharmaceutical preparation, radiation protection, and hybrid imaging operation, but their current standards do not include nationally harmonized expectations for therapeutic radiopharmaceutical handling (CMRITO, 2023; OTIMROEPMQ, 2023). This creates variability in how hospitals interpret permissible tasks, supervision requirements, and competency thresholds. In some provinces, technologists receive formal recognition for advanced therapeutic competencies, while in others these expectations are determined internally by hospitals without consistent provincial guidance.

The policy landscape also affects staffing models. Theranostic workflows require sustained technologist availability for multi-hour treatment sessions, enhanced radiation safety protocols, and multi-disciplinary coordination. CIHI and CADTH note that these requirements increase operational complexity and must be reflected in staffing standards, workload measurement tools, and departmental safety audits (CIHI, 2023; CADTH, 2023). However, no provincial jurisdiction has established formal minimum staffing ratios for radiopharmaceutical therapy, leaving hospitals to determine independently how many technologists are required to support safe delivery of therapy. This contributes to inconsistent practice across provinces and creates risk for departments operating with limited personnel.

Workplace policy also affects the ability of departments to prepare for theranostics. Union agreements, position classifications, and compensation structures were established before the emergence of advanced therapeutic pathways. CAMRT reports that technologists in high-complexity modalities experience higher burnout rates and greater workload pressures, factors exacerbated by staffing shortages and increased procedural complexity associated with therapy (CAMRT, 2023). Without updates to staffing policies and compensation frameworks, hospitals may face challenges in recruiting and retaining technologists with advanced therapeutic competencies, which limits their ability to adopt new treatment pathways.

Regulatory fragmentation impacts education as well. Training programs cannot align curricula with national therapeutic expectations when competencies vary across provinces. The lack of a unified national competency framework for theranostics prevents consistent curriculum development, contributes to uneven clinical placement availability, and delays the integration of therapeutic radiopharmaceutical handling into academic programs. This gap reinforces regional disparities and slows the development of a workforce capable of supporting national PET/CT.

To support safe, scalable, and equitable expansion of radiopharmaceutical therapy, Canada requires cohesive policy and regulatory alignment. Key needs include harmonized competency standards for therapeutic radiopharmaceutical handling, clear provincial guidance on permissible tasks and supervision, updated staffing expectations that reflect the complexity of therapy workflow, and coordinated collaboration among Health Canada, regulators, ministries, and academic institutions. The following section presents specific case studies that illustrate how Canadian and international centres have adapted their policy, staffing, and operational frameworks to support theranostic readiness.

4.6 Case Study: The Ottawa Hospital – Workforce Adaptation in a Theranostic Environment

Disclaimer: The information in this case study is based on operational insights and observations from an ongoing initiative at The Ottawa Hospital. Specific program details, internal procedures, and performance indicators are not publicly accessible and may evolve as the initiative continues to develop. The content reflects the best available information at the time of writing and is intended to illustrate real-world examples of workforce adaptation in a theranostic environment. It should not be interpreted as an official policy statement, regulatory position, or finalized operational model of The Ottawa Hospital.

Background:

The Ottawa Hospital is one of Canada's leading centres in the early PET/CT of PET-based theranostics. As an academic tertiary institution performing Lutetium-177 DOTATATE and Lutetium-177 PSMA therapies, the hospital must sustain complex therapeutic workflows while navigating persistent shortages of certified nuclear medicine technologists. These shortages reflect broader provincial trends in Ontario, where the number of CMRITO-registered nuclear medicine technologists has not kept pace with the rising demand for PET and the expansion of oncological imaging pathways. Staff shortages at the hospital resulted in recurring risks of camera closures, longer wait times, and interruptions to PET and SPECT schedules. These vulnerabilities became more pronounced as the hospital prepared for the expansion of its PET Centre of Excellence, which is expected to increase procedure volumes and necessitate the hiring of an additional three to six technologists to maintain safe operations. In the absence of immediate workforce availability, the hospital developed a structured cross-training model to preserve nuclear medicine operations while supporting the delivery of new therapeutic services.

Rationales and Workforce Pressures:

The decision to implement a cross-training initiative emerged from the convergence of operational instability, rising clinical complexity, and increasing patient demand. Multi-hour therapeutic procedures require continuous technologist presence, temporarily removing skilled staff from diagnostic rotations and reducing availability for high-volume PET imaging. At the same time, PET demand was rising due to the increased use of molecular imaging for determining therapy eligibility, staging, and assessing response. Reliance on nuclear medicine students transitioning directly into full-time roles offered some relief yet did not provide consistent workforce stability. Without intervention, the hospital risked interruptions in service continuity, prolonged waitlists, and delays in therapy delivery. Cross-training was therefore introduced as a structured method of integrating supportive personnel into safe, well-defined roles that protected technologist capacity for regulated tasks.

Training Design and Competency Pathways:

The hospital's training model is grounded in a competency-based framework aligned with CMRITO standards of knowledge, skill, and judgment. The Professional Lead for Nuclear Medicine designed a detailed competency map that distinguished between supportive functions and controlled acts, which are restricted to certified technologists. Recruitment occurred through a two-month internal expression-of-interest process open to licensed radiologic technologists and registered practical nurses. Selected candidates then participated in a six-month structured training sequence, with advancement tied to demonstrated competency.

Training began with foundational tasks including patient preparation, identity verification, mobility assistance, and application of ALARA principles. Trainees were introduced to routine operations such as simple SPECT acquisitions, C-14 gastric and breath studies, and supervised exposure to quality control procedures, including flood uniformity checks and background counts. Trainees observed dose calibrator quality control processes but did not manipulate radiopharmaceuticals. As competency increased, trainees were introduced to therapy-day support functions, including preparation of controlled-access rooms, verification of pre-treatment safety screening, contamination monitoring with survey instruments, and structured post-therapy room decontamination procedures in accordance with institutional radiation protection policies.

Trainees were strictly prohibited from performing controlled acts under Ontario legislation. They did not draw, measure, or administer radiopharmaceuticals; did not calibrate or handle hot-lab equipment; did not conduct dosimetry; and did not independently operate hybrid PET/CT systems—all supportive tasks required documented sign-off by certified nuclear medicine technologists. The Radiation Safety Officer provided structured training on exposure control, contamination identification, personal dosimetry, and waste segregation. Trainees also obtained Transportation of Dangerous Goods certification in accordance with federal regulations.

Regulatory and Safety Oversight:

The cross-training initiative operates within a comprehensive regulatory and safety oversight framework consistent with CMRITO standards, Health Canada regulations, and the hospital's CNSC-aligned radiation protection program. Each supportive task was mapped directly against Ontario's scope-of-practice legislation to ensure that controlled acts remained the responsibility of certified technologists. Required safety procedures, including independent verification of imaging parameters, quality control results, and contamination sweeps, were consistently performed by technologists.

Therapy rooms used for Lutetium-177 administration are managed as controlled-access radiation zones with mandatory personal dosimetry, restricted entry, and documented environmental monitoring using survey instruments. Cross-trained staff perform only low-risk tasks consistent with ALARA principles and must adhere to strict supervision requirements. The hospital embeds structured checklists and documentation workflows into the daily routine to ensure standardization, safety, and accountability. This governance structure ensures that operational flexibility does not compromise patient safety, radiation protection, or regulatory compliance.

Operational Impact:

The cross-training model produced significant operational benefits. The introduction of supportive staff reduced the frequency of camera closures and preserved diagnostic capacity during periods of technologist absence. Waitlists for C-14 studies improved as supportive personnel assumed routine preparatory tasks. Certified technologists were able to remain focused on their regulated responsibilities, including PET imaging, therapeutic radiopharmaceutical handling, hybrid imaging operations, and dosimetry coordination. The initiative also generated a new professional development pathway, as several cross-trained staff expressed interest in pursuing full nuclear medicine certification, contributing to long-term workforce sustainability.

Barriers and Systemic Risks:

The implementation of the model revealed several systemic challenges. Technologists expressed concerns related to previous cross-training attempts that lacked clear task boundaries, resulting in apprehension about potential role drift. Union considerations also emerged, particularly related to job classification, workload distribution, and the preservation of professional identity. The absence of standardized provincial guidance from CMRITO on supportive roles within theranostic environments created variability in expectations and increased the supervisory burden on senior technologists responsible for competency validation. These challenges highlight the limitations of relying on local adaptation without broader regulatory alignment.

Scalability and Policy Implications:

The Ottawa Hospital case study demonstrates both the potential and the limitations of cross-training as a local adaptation to technologist shortages. While the model effectively stabilizes operations, enhances workflow resilience, and improves diagnostic continuity, it cannot replace the need for increased training capacity and a larger cohort of certified nuclear medicine technologists in Ontario. Scaling this approach across the province requires standardized regulatory guidance for supportive roles, harmonized competency frameworks, and alignment with CMRITO oversight requirements. Sustainable national expansion of theranostics will also require strengthened workforce planning, increased educational output, and updated staffing policies that reflect the complexity of therapeutic radiopharmaceutical delivery. The Ottawa Hospital experience provides concrete, operational evidence of the systemic gaps described throughout Section 4, reinforcing the need for coordinated provincial and national policy action.

Impacts of the Shortage on Service Delivery and Patient Access

Chapter

5

Chapter 5: Impacts of the Shortage on Service Delivery and Patient Access

5.1 Wait Times:

Wait times for nuclear medicine services have increased across Canada, and available evidence suggests that these delays are closely tied to staffing levels for nuclear medicine technologists. Nuclear medicine departments rely on small teams of specialized technologists whose competencies are required for every step of the imaging workflow, from radiopharmaceutical preparation to camera operation and image acquisition. When one NMT position is vacant or unfilled, departments must reduce camera hours, limit daily schedules, and defer nonurgent examinations. These constraints extend wait times for PET and SPECT imaging even when equipment, infrastructure, and clinical demand are fully supported within the public system. Wait times in nuclear medicine, therefore, reflect a workforce limitation, not a systemic failure, and improve when NMT staffing meets operational requirements.

The Canadian Institute for Health Information reports that diagnostic imaging wait times have remained above pre-pandemic levels, with staffing shortages identified as a key factor affecting throughput in multiple modalities (Canadian Institute for Health Information, 2025). Although CIHI's reporting covers CT and MRI in greater detail, CADTH's Canadian Medical Imaging Inventory confirms that insufficient staffing across medical imaging, including nuclear medicine technologists, reduces the number of scans that can be performed and contributes to sustained wait times (CADTH, 2024). These national findings reflect the reality that nuclear medicine departments cannot maintain full diagnostic capacity without adequate NMT availability.

Diagnostic backlogs:

NMT shortages directly produce diagnostic backlogs for core SPECT procedures. Common studies such as bone scans, myocardial perfusion imaging, renal function assessments, thyroid uptake tests, and lung perfusion imaging all require the presence of a certified technologist for radiopharmaceutical handling, patient preparation, camera setup, and acquisition. When staffing is insufficient, the number of available daily exam slots decreases, creating delays across both outpatient and inpatient pathways.

CAMRT workforce surveys indicate that vacancy rates across MRT disciplines remain between 8% and 15% nationally, including positions in nuclear medicine (Canadian Association of Medical Radiation Technologists, 2023; CAMRT, 2025). In departments with 3 to 5 NMTs, the loss of one technologist can reduce scanning capacity by 20% to 30%, as the remaining staff must prioritize urgent or inpatient care. Diagnostic backlogs accumulate rapidly under these conditions. The Canadian Association of Radiologists highlights that system-wide diagnostic delays contribute to later-stage diagnoses, increased emergency visits, and higher downstream costs for the health system (Canadian Association of Radiologists, 2025a; Canadian Association of Radiologists, 2025b). In nuclear medicine, these effects manifest when insufficient NMT staffing results in reduced functional access to time-sensitive exams.

PET access pressure:

PET imaging faces significant pressure due to the rapid growth in demand and the need for technologists with advanced hybrid imaging competencies. CADTH reports that approximately 156,320 publicly funded PET/CT exams were performed in 2022-2023, representing an 18% increase since 2019-2020, with oncology accounting for roughly two-thirds of the activity (CADTH, 2024). The supply of technologists has not grown at a similar rate. CADTH's national assessment of PET availability identifies shortages of PET-experienced NMTs as a limiting factor in several provinces, even where PET equipment is available and funded (CADTH, 2023).

PET throughput depends on NMT availability to manage radiotracer scheduling, radiation safety, quality control, and image acquisition. PET units often operate with 4 to 6 NMTs. A single vacancy or leave of absence reduces daily case capacity because hybrid imaging tasks cannot be redistributed among non-PET staff. As a result, PET wait lists lengthen even when scanners are underutilized. CADTH's jurisdictional comparisons show considerable variation in PET access across provinces, with staffing shortages contributing to reduced throughput in several centers (CADTH, 2024). The increasing clinical reliance on PET for staging, restaging, and treatment planning, therefore, makes NMT availability a critical determinant of patient access.

Theranostic timing requirements:

Theranostic care pathways require timely PET imaging for therapy eligibility and for ongoing treatment assessment. For therapies such as Lutetium-177 prostate-specific membrane antigen and Lutetium-177 DOTATATE, PET scans must be completed within specific clinical windows to ensure accurate staging and target expression. CADTH emphasizes that PET/CT is essential to determining patient suitability and to planning radiopharmaceutical therapy (CADTH, 2023). When PET appointment availability is limited due to NMT shortages, therapy initiation may be delayed or must be rescheduled, which affects treatment sequencing and care coordination.

Theranostic administration days depend on the presence of NMT for radiopharmaceutical verification, contamination control, patient isolation procedures, radiation monitoring, and post-therapy imaging. Insufficient staffing forces departments to reduce the frequency of therapy days or limit the number of patients treated per session. These constraints extend treatment timelines, reduce program redundancy, and limit expansion to new patient groups. Since NMTs support both diagnostic and therapeutic tasks, workforce shortages create a single point of vulnerability in theranostic delivery.

Provincial and territorial variations:

Wait-time pressures vary across Canada, depending on technologist density, training capacity, and geographic distribution. CADTH's provincial overview highlights wide variation in the availability of medical imaging staff, including NMTs, across jurisdictions (CADTH, 2024). Provinces with small technologist teams, such as Prince Edward Island, New Brunswick, and Newfoundland and Labrador, experience significant vulnerability because a single vacancy can reduce diagnostic throughput for an entire region.

In Western and Northern regions, service centralization affects wait times. Rural and remote communities depend on referral centers for nuclear medicine imaging. NMT shortages in these hubs have direct consequences on imaging timelines for geographically dispersed populations. When technologist staffing falls, imaging availability becomes intermittent, and patients may need to travel longer distances or face repeated rescheduling.

In Ontario and Québec, PET and SPECT capacity differs between academic centers and smaller hospitals. Health system reports from Ontario Health and provincial regulators confirm that NMT staffing shortages exacerbate local wait-time variation, particularly in departments that have limited access to PET-trained technologists or rely on temporary staffing to meet baseline schedules.

Equity and access implications:

NMT-related wait times produce measurable equity implications. When departments reduce operating hours or restrict appointment availability due to staffing constraints, patients in smaller provinces, rural regions, and northern communities experience disproportionately longer waits. The Canadian Association of Radiologists underscores that delayed imaging imposes costs on patients, including increased time away from work and reduced quality of life during prolonged diagnostic uncertainty (Canadian Association of Radiologists, 2025a). These impacts are magnified when local nuclear medicine capacity is limited by technologist availability instead of equipment.

CAMRT and provincial regulators note that recruitment challenges are most significant in smaller jurisdictions and in areas with limited exposure to advanced procedures such as PET/CT and theranostics (Canadian Association of Medical Radiation Technologists, 2023; Ordre des technologues en imagerie médicale, en radio-oncologie et en électrophysiologie médicale du Québec, 2023). Without an increased NMT supply, regional differences in wait times will persist, resulting in uneven access to essential imaging within a public health system that aims to deliver equitable care across provinces.

Wait times in nuclear medicine are a direct consequence of the availability of nuclear medicine technologists. National and provincial evidence indicates that PET and SPECT exam volumes have increased more rapidly than NMT supply, that staffing shortages limit throughput even when equipment is available, and that departments with sufficient NMT staffing maintain more stable diagnostic timelines (Canadian Institute for Health Information, 2025; CADTH, 2024). These delays are not evidence of public system inefficiency but rather reflect the reliance on a specialized workforce with limited redundancy. Strengthening NMT recruitment, training capacity, and retention is crucial for maintaining timely access to nuclear medicine and supporting the expansion of theranostic services. The following subsection examines how NMT shortages contribute to temporary service reductions and departmental closures across Canada.

5.2 Service Closures:

Service closures represent one of the most immediate and visible consequences of the nuclear medicine technologist shortage in Canada. Because most nuclear medicine departments operate with small, highly specialized teams, even a single vacancy, extended leave, or unplanned absence can reduce staffing below the minimum required to keep cameras operational. When this occurs, departments are forced to cancel clinics, reduce scanning days, consolidate services to fewer sites, or suspend nuclear medicine access entirely for defined periods. These disruptions occur despite the availability of equipment, budgets, and patient demand, demonstrating that NMT availability is the primary operational determinant of service continuity in nuclear medicine.

CADTH's 2024 Canadian Medical Imaging Inventory identifies human resources as a core constraint limiting hospitals' ability to fully utilize medical imaging equipment across modalities (CADTH, 2024). In nuclear medicine, where camera operation cannot proceed without a certified technologist, these constraints translate directly into temporary closures. CAMRT workforce data reinforce this trend, noting that unfilled MRT positions, including those in nuclear medicine, lead to service interruptions in both small and mid-sized departments, particularly when staffing redundancies are limited (Canadian Association of Medical Radiation Technologists, 2023; CAMRT, 2025). The combined evidence shows that service closures are not the result of capital limitations but are directly tied to the availability of NMTs capable of fulfilling regulated responsibilities.

Reduced scanning days and partial shutdowns:

The most common form of service closure is the reduction in weekly scanning days. Hospitals across multiple provinces report that nuclear medicine schedules are routinely adjusted when an NMT vacancy persists or when staffing falls below baseline coverage due to illness or parental leave. In these circumstances, departments prioritize urgent and inpatient cases, while outpatient and elective examinations are postponed. The Ontario Auditor General has documented that constrained staffing in diagnostic imaging directly contributes to reduced operating hours and intermittent closures in high-demand modalities (Office of the Auditor General of Ontario, 2023). These system-wide findings apply directly to nuclear medicine, where staffing pools are smaller and therefore more sensitive to workforce fluctuations.

Partial shutdowns also occur when nuclear medicine departments are unable to maintain the minimum number of technologists required to operate multiple cameras. Hospitals may choose to close one camera while directing limited staff to operate another, reducing overall throughput and extending wait times for all exam types. The consequences can be severe in smaller departments with only 1 or 2 cameras, where a single staff shortage can reduce daily capacity by 50% or more.

Full-service suspensions:

In smaller provinces and northern or rural regions, NMT shortages have led to the temporary suspension of nuclear medicine services. These events occur most frequently in jurisdictions with tiny technologist teams. Health workforce reports from Atlantic Canada indicate that local nuclear medicine services have occasionally been unavailable due to staffing shortages, requiring patients to travel to regional centers for imaging (Government of New Brunswick, 2024; Nova Scotia Health, 2023). Prince

Edward Island and Newfoundland and Labrador remain particularly vulnerable because their nuclear medicine programs operate with limited staff, often fewer than 7 NMTs. When vacancies arise, regional hospitals may be unable to sustain any nuclear medicine activity until new staff are recruited or until temporary technologists can be contracted.

In Western and Northern Canada, similar patterns emerge when recruitment challenges prevent departments from maintaining their baseline staffing levels. CADTH's jurisdictional comparisons note that several provinces rely on temporary or locum technologists to maintain minimum service levels and that gaps in staffing can lead to episodic service availability (CADTH, 2024). These intermittent closures affect diagnostic continuity and increase travel requirements for rural and remote populations.

Impact on PET and hybrid imaging services:

PET services are susceptible to NMT shortages because PET units require technologists with specialized competencies in radiotracer handling, hybrid imaging workflows, and strict radiation safety protocols. CADTH identifies shortages of PET-experienced NMTs across multiple provinces as a limiting factor in PET throughput (CADTH, 2023). When PET technologists are unavailable, PET units may be forced to reduce the number of scanning days or suspend specific indications.

Some provinces operate only 1 PET/CT unit. In these settings, a single vacancy, illness, or extended leave can cause PET capacity to temporarily drop to zero. This results in immediate delays in oncologic staging, restaging, and treatment planning, which can alter clinical timelines for patients whose care depends on PET imaging.

Theranostic service disruptions:

Theranostic programs require intensive NMT involvement for radiopharmaceutical preparation, patient isolation procedures, radiation safety, and post-therapy monitoring. When NMT staffing is insufficient, therapy clinics must reduce the frequency of sessions, operate with fewer patient slots, or cancel sessions entirely. CADTH's assessments of emerging theranostic therapies note that staffing shortages are a central barrier to provincial PET/CT and expansion (CADTH, 2023). Even major centers report that the ability to maintain consistent therapy days is contingent on the stability of NMT teams.

Inconsistency in therapy-day staffing can disrupt treatment continuity for patients receiving multi-cycle radiopharmaceutical therapy. Delays between cycles may necessitate reassessment or repeat imaging, thereby increasing the workload and reducing overall program efficiency.

Regional inequities created by closures:

Temporary closures amplify existing inequities in access between large urban centers and smaller jurisdictions. Provinces with small NMT teams have a limited ability to backfill absences and must cancel clinics when staffing levels fall. Patients in these provinces face longer wait times, increased travel costs, and greater disruption to care planning. The Canadian Association of Radiologists notes that unplanned service interruptions in medical imaging contribute to inequitable access and disproportionately burden populations with fewer local resources (Canadian Association of Radiologists, 2025).

In nuclear medicine, these inequities are directly driven by the availability of NMT. Departments with stable staffing maintain consistent services, while those with chronic vacancies experience repeated closures that disrupt diagnostic and therapeutic care pathways.

Service closures in nuclear medicine are a direct consequence of shortages of nuclear medicine technologists. Evidence from CADTH, CAMRT, provincial health authorities, and auditor general reports indicates that staffing constraints limit operating hours, result in partial and complete service suspensions, and restrict access to PET and theranostic programs. These closures are not the result of equipment limitations or system inefficiencies but reflect the essential role of NMTs in enabling continuous diagnostic and therapeutic care. Addressing NMT availability is therefore necessary to maintain service continuity and reduce regional inequities across Canada.

5.3 Downstream Effects:

Nuclear medicine technologist shortages not only affect diagnostic timelines and service continuity but also impact patient care and hospital operations. They create broader system-wide consequences that influence oncology, cardiology, surgical planning, inpatient flow, emergency care, hospital bed utilization, and overall clinical decision-making. Nuclear medicine acts as a pivotal diagnostic and therapeutic enabler across multiple specialties, and disruptions in NMT staffing propagate through interconnected care pathways. These downstream effects are not abstract system pressures but measurable operational and clinical consequences of insufficient technologist availability.

Impact on oncology pathways:

Oncology is the area where NMT shortages generate the most significant downstream effects. PET/CT and SPECT imaging support cancer staging, treatment selection, response assessment, and restaging. CADTH reports that PET imaging activity increased by 18% between 2019 and 2020, and again between 2022 and 2023, with oncology representing approximately 66% of all PET exams (CADTH, 2024). When NMT staffing limits PET or SPECT throughput, oncologists face delays in confirming tumor extent, assessing progression, or determining suitability for chemotherapy, immunotherapy, surgery, or radiation therapy.

Cancer Care Ontario emphasizes that timely access to PET is crucial for accurate staging, as delays can alter treatment sequencing for conditions such as lung cancer, lymphoma, and gastrointestinal malignancies (Cancer Care Ontario, 2023). In departments with limited NMT staffing, PET appointment availability decreases, and staging scans may be delayed by days or weeks. These delays extend the time between referral and treatment initiation, which has downstream implications for tumor progression, intensity of required therapy, and patient survival probabilities. Even modest delays can shift oncology management from curative intent to disease control, underscoring the systemic impact of NMT shortages on cancer care.

Consequences for cardiac and vascular care:

Cardiology is similarly sensitive to the capacity of nuclear medicine. Myocardial perfusion imaging is a cornerstone of coronary artery disease risk assessment, and reduced NMT staffing directly translates to postponements in these scans. The Canadian Cardiovascular Society notes that delays in functional cardiac assessment increase the likelihood of emergency presentations and hospital admissions, as patients with underlying ischemia remain undiagnosed longer (Canadian Cardiovascular Society, 2023). When nuclear medicine departments reduce scanning days due to insufficient NMT coverage, outpatient stress imaging is often the first service to be deferred.

Longer waits for nuclear cardiology exams affect medication adjustments, surgical planning, and catheterization prioritization. Cardiologists may be forced to rely on surrogate markers or proceed with limited diagnostic information. In some cases, delayed perfusion imaging results in missed opportunities for early intervention, contributing to higher downstream costs associated with acute care utilization. These clinical and financial impacts arise directly from NMT shortages that restrict nuclear cardiology capacity.

Implications for surgical planning and inpatient flow:

Many surgical specialties depend on nuclear medicine imaging for preoperative evaluation, including sentinel lymph node mapping, renal function testing, and parathyroid localization. When NMT staffing limits the availability of these studies, surgical schedules become more volatile. The Office of the Auditor General of Ontario reports that delays in diagnostic imaging contribute to postponed surgeries and longer inpatient stays (Office of the Auditor General of Ontario, 2023). In nuclear medicine, these effects are amplified in departments where imaging capacity depends on small teams of technologists.

When nuclear medicine studies are delayed, surgical slots may be canceled or filled with lower-priority cases, reducing operating room efficiency. Postoperative imaging required for complications or follow-up may also be impacted. Delays in nuclear imaging contribute to longer lengths of stay, which in turn place additional pressure on hospital bed occupancy, particularly in tertiary care centers. These downstream impacts originate directly from the availability of NMTs who support essential preoperative and postoperative diagnostics.

Effects on emergency departments and acute care:

Emergency departments rely on nuclear medicine for select time-sensitive examinations, such as pulmonary embolism imaging via ventilation perfusion studies, gastrointestinal bleeding localization, and urgent bone scans for suspected infection or fracture. When NMT staffing is insufficient to operate cameras consistently, emergency departments face difficulty accessing nuclear medicine services within clinically recommended timelines. CIHI's analysis of diagnostic imaging access notes that emergency care is disproportionately affected when imaging services face staffing limitations (Canadian Institute for Health Information, 2025).

As a result, patients may undergo alternative imaging that is less sensitive or more invasive, or they may remain in emergency beds for extended periods while awaiting nuclear medicine access. These delays contribute to overcrowding, prolonged wait-room times, and increased utilization of the alternate level of care. The downstream effect is not a shift in clinical demand but a direct consequence of insufficient technologists to support timely imaging.

Theranostic delays and care pathway disruptions:

Radiopharmaceutical therapy programs are particularly vulnerable to downstream disruption because they require coordinated NMT involvement before, during, and after treatment. Eligibility imaging performed via PET must align with therapy scheduling, and delays caused by NMT shortages disrupt this alignment. CADTH emphasizes the importance of timely PET assessment for radioligand therapy planning, noting that bottlenecks in PET capacity impact access to treatment (CADTH, 2023). When a therapy session is postponed due to staffing constraints, patients may require updated imaging, rescheduling across multiple departments, and additional clinical assessments.

Each delay generates additional workload for oncology teams, nuclear medicine physicians, and pharmacists. Departments may also need to discard expired radiopharmaceutical doses that cannot be used due to cancelled therapy clinics, resulting in avoidable system waste. These downstream consequences arise directly from insufficient NMT staffing rather than from equipment or infrastructure limitations.

Increased reliance on substitute pathways and repeated testing:

When nuclear medicine access is disrupted, clinicians may shift patients toward alternative imaging modalities such as CT, MRI, or ultrasound. These alternatives may be less sensitive, less specific, or more costly, and can contribute to further congestion in other parts of the diagnostic system. CADTH and CAR both note that such shifts increase system pressure and may lead to repeated testing when nuclear medicine exams are eventually performed to confirm or clarify earlier findings (Canadian Association of Radiologists, 2025; CADTH, 2024).

Repeated testing increases costs and lengthens diagnostic pathways. This is an avoidable consequence that stems from staffing shortages, which limit functional capacity in nuclear medicine, rather than from clinical necessity.

Downstream effects of nuclear medicine technologist shortages extend far beyond the imaging department. Oncology, cardiology, surgery, emergency care, and theranostic programs all rely on timely nuclear medicine diagnostics and therapeutics, and disruptions in NMT staffing propagate throughout the system. Canadian evidence from CIHI, CADTH, provincial health authorities, and national medical associations shows clear links between NMT shortages, delayed diagnostics, postponed treatments, increased emergency presentations, disrupted surgical workflows, and higher downstream utilization of hospital resources. These system-wide consequences underscore that NMT staffing is not only an operational issue but a central determinant of continuity, efficiency, and safety across multiple clinical pathways.

5.4 System Costs:

The shortage of nuclear medicine technologists results in measurable and well-documented system costs across Canadian healthcare services. These costs arise through overtime pressures, reliance on temporary staffing, reduced utilization of high-value PET and SPECT equipment, increased diagnostic inefficiencies, and extended care episodes tied to delayed imaging. Evidence from CADTH, CIHI, CAMRT, CAR, and provincial oversight bodies confirms that these financial pressures are rooted in workforce shortages, not equipment limitations or system structure.

Over time, burnout and staffing strain:

The CAMRT reports vacancy rates of 8% to 15% across MRT disciplines, including nuclear medicine technologists, and identifies sustained workforce shortages as a driver of increased overtime and reduced productivity (Canadian Association of Medical Radiation Technologists, 2023; CAMRT, 2025). CIHI notes that shortages in diagnostic imaging staff directly contribute to higher personnel costs through overtime, sick leave, and turnover, which increase operational expenditures and reduce continuity (Canadian Institute for Health Information, 2025).

Provincial auditors have also identified staffing strain as a recurring financial pressure. In Ontario, the Auditor General reported that diagnostic imaging departments operate with elevated overtime usage during staffing shortages, resulting in increased overall personnel spending (Office of the Auditor General of Ontario, 2023). These findings are particularly relevant to nuclear medicine departments, where small technologist teams often require overtime coverage to maintain essential services.

Dependence on temporary staffing:

Several provinces have publicly acknowledged that staffing shortages in diagnostic imaging, including nuclear medicine, result in an increased reliance on temporary or agency technologists. Health authorities in New Brunswick, Nova Scotia, and Manitoba report that temporary staffing is more expensive than permanent hiring and contributes to budget pressures during periods of workforce instability (Government of New Brunswick, 2024; Nova Scotia Health, 2023; Shared Health Manitoba, 2024).

Although specific dollar amounts are not published for NMTs, provincial financial reports consistently describe agency staffing as a cost-inflating measure used only when regular staffing models cannot be sustained.

Underutilization of PET and SPECT capital investments:

Canada has invested heavily in PET/CT, SPECT/CT, and SPECT imaging infrastructure. PET/CT procurement costs reported in provincial tender documents typically range between $2.5 million and $4 million, depending on model and configuration, while SPECT/CT units generally range between $1 million and $2 million. According to the Canadian Medical Imaging Inventory (CMII), Canada currently operates 60 PET-CT units (including 6 private), 331 SPECT-CT units (including 11 private), and 210 SPECT units (including 36 private) across all provinces (CADTH, 2023). Despite these significant capital investments, many departments across Canada cannot run these cameras at full capacity. Persistent technologist shortages, insufficient staffing redundancy, and increased workload pressures limit operating hours, reduce throughput, and contribute to prolonged wait times, particularly in jurisdictions with growing PET and theranostic demand.However, CADTH also reports that staffing shortages prevent some sites from operating PET/CT scanners at full throughput, despite increasing demand for oncologic PET imaging (CADTH, 2024). Underutilization of PET and SPECT equipment results in a reduced return on investment, as operating costs (including service contracts, quality control, radiation monitoring, and facility overhead) remain constant even when fewer studies are performed. The Detailed table regarding the National Inventory can be found at the end of the report as Appendix A5.

The Canadian Association of Radiologists identifies such underuse of advanced imaging equipment as a recurring system inefficiency linked to workforce shortages rather than technological limitations (Canadian Association of Radiologists, 2025).

Diagnostic inefficiencies and repeat imaging:

CADTH's Canadian Medical Imaging Inventory identifies repeat imaging and diagnostic substitution as system-level inefficiencies that arise when nuclear medicine exams cannot be performed within clinically required timelines (CADTH, 2024). When NMT staffing limits PET or SPECT access, clinicians may rely on alternative modalities such as CT or MRI even when nuclear medicine is the preferred or more accurate test.

The Canadian Association of Radiologists reports that diagnostic delays and forced modality substitutions lead to increased resource utilization, prolonged clinical pathways, and repeated investigations, resulting in additional system costs across ambulatory, emergency, and inpatient care (Canadian Association of Radiologists, 2025). While dollar figures are not provided, the national evidence consistently frames repeat imaging and inefficient diagnostic sequencing as avoidable expenditures driven by insufficient staffing.

Extended care episodes and delayed treatment initiation:

Delays in nuclear medicine imaging extend patient care episodes and increase downstream resource utilization. Cancer Care Ontario emphasizes that delayed PET imaging can alter treatment sequencing, generate additional interim testing, and require repeated specialist assessments (Cancer Care Ontario, 2023). CIHI similarly notes that prolonged diagnostic processes contribute to longer inpatient stays, higher use of diagnostic services, and increased hospital resource consumption across multiple care pathways (Canadian Institute for Health Information, 2025).

The Auditor General of Ontario also found that delays in diagnostic imaging contributed to surgical postponements, extended preoperative care, and increased inpatient bed use (Office of the Auditor General of Ontario, 2023). These system costs arise directly from limited diagnostic capacity, linked to workforce shortages, rather than from equipment limitations.

Radiopharmaceutical waste and operational losses:

Radiopharmaceuticals require precise timing and have short half-lives. Nova Scotia Health reports that inconsistent nuclear medicine operating days contribute to radiopharmaceutical waste when doses expire due to last-minute cancellations or insufficient staffing to support scheduled clinics (Nova Scotia Health, 2023). CADTH highlights the same risk in theranostic programs, where therapy doses require coordinated preparation and can be wasted if staffing shortages disrupt treatment days (CADTH, 2023).

Although national financial totals are not published, Canadian health authorities consistently recognize radiopharmaceutical waste as a cost associated with staffing-driven interruptions.

System costs associated with the nuclear medicine technologist shortage include overtime expenditures, reliance on temporary staffing, underutilization of multi-million-dollar PET and SPECT assets, repeated imaging, delayed treatment planning, and radiopharmaceutical waste. CIHI, CADTH, CAR, CAMRT, and provincial oversight bodies have documented all these costs. These inefficiencies are not caused by equipment shortages or structural issues within the public system but arise directly from the limited availability of the specialized workforce required to operate nuclear medicine services. Strengthening the NMT workforce is essential for cost-effective, efficient, and sustainable delivery of nuclear medicine across Canada.

5.5 Clinical Impact and Risk to Patient Outcomes:

The shortage of nuclear medicine technologists creates measurable clinical risks for Canadian patients. Nuclear medicine studies play a critical role in the diagnosis, staging, and monitoring of oncologic, cardiac, and complex medical conditions. When NMT staffing falls below operational requirements, diagnostic delays and reduced service availability directly affect patient safety, timely treatment, and health outcomes. Canadian evidence from CADTH, CIHI, CAR, Cancer Care Ontario, and provincial oversight bodies demonstrates that insufficient technologist capacity has a direct and negative impact on patient care pathways across multiple specialties.

Delayed diagnosis and disease progression:

Diagnostic delays caused by NMT shortages increase the risk of disease progression before appropriate treatment is initiated. CADTH emphasizes that PET imaging is essential for accurate staging in cancers such as lung cancer, lymphoma, and prostate cancer, and delays can alter clinical decision-making (CADTH, 2023). Cancer Care Ontario similarly notes that delayed access to PET can result in patients entering treatment without complete staging information or receiving treatment sequences that no longer reflect optimal care pathways (Cancer Care Ontario, 2023).

CIHI reports that diagnostic delays contribute to more advanced disease presentations and increased use of high-intensity health services, including unscheduled emergency care (Canadian Institute for Health Information, 2025). These findings are particularly relevant to nuclear medicine, where PET and SPECT imaging play a crucial role in early detection and clinical risk stratification.

Impact on oncology treatment outcomes:

In oncology, the timing of PET imaging influences treatment sequencing, eligibility for targeted therapies, and assessment of treatment response. When NMT shortages extend wait times for PET/CT or SPECT studies, clinicians may lack critical information for determining surgical candidacy, initiating systemic therapies, or evaluating disease progression.

The Canadian Association of Radiologists notes that delayed diagnostics contribute to patients receiving treatment later in their disease trajectory, which is associated with poorer outcomes, more complex interventions, and reduced quality of life (Canadian Association of Radiologists, 2025). For radiopharmaceutical therapies, CADTH emphasizes that timely diagnostic imaging is necessary for both eligibility assessment and treatment monitoring. Insufficient NMT capacity, therefore, creates delays that may influence whether patients remain eligible for innovative therapies such as radioligand treatments.

Risks in cardiac care:

Nuclear cardiology studies such as myocardial perfusion imaging identify ischemia, guide revascularization decisions, and stratify risk in patients with suspected coronary artery disease. The Canadian Cardiovascular Society emphasizes that delayed functional imaging increases the risk of emergency presentations and acute cardiac events because underlying ischemia remains unrecognized for a more extended period (Canadian Cardiovascular Society, 2023). When NMT shortages reduce the availability of cardiac nuclear medicine services, patients may continue to experience symptoms without appropriate assessment, contributing to avoidable hospitalizations and delays in definitive care.

Clinical consequences of incomplete or substituted imaging:

When nuclear medicine access is restricted, clinicians may rely on alternative imaging modalities that do not provide equivalent diagnostic value. CADTH reports that diagnostic substitution can lead to incomplete assessments, lower sensitivity for specific indications, and the need for repeated testing (CADTH, 2024). The Canadian Association of Radiologists similarly notes that forced substitution increases the risk of missed findings or delayed confirmation of clinically significant pathology (Canadian Association of Radiologists, 2025).

Partial or delayed diagnostic information affects treatment accuracy. For example, incomplete SPECT perfusion imaging may result in less precise cardiac risk stratification, while delayed bone scans can postpone identification of metastatic disease. These gaps in clinical information have a direct impact on patient outcomes.

Disruption of theranostic treatment pathways:

Theranostic programs require precise coordination between diagnostic imaging, radiopharmaceutical preparation, therapy administration, and post-treatment monitoring. CADTH highlights that staffing limitations pose a significant barrier to the delivery of radiopharmaceutical therapies in Canada, with consequences for treatment timeliness and continuity (CADTH, 2023).

When NMT shortages disrupt PET imaging or therapy day staffing, treatment cycles may be postponed. In radioligand therapy, delays between cycles can require reassessment, repeat PET imaging, or adjustments to treatment plans. These disruptions increase patient anxiety, prolong symptom burden, and may reduce therapeutic effectiveness. Patients receiving multi-cycle therapies are particularly vulnerable to these scheduling instabilities.

Increased patient burden and reduced quality of life:

Delayed or inconsistent access to nuclear medicine services creates logistical, emotional, and physical burdens for patients. CAR notes that prolonged diagnostic uncertainty contributes to anxiety, disrupted daily functioning, and diminished overall quality of life (Canadian Association of Radiologists, 2025). Patients in smaller provinces or rural regions face additional travel and accommodation requirements when local nuclear medicine services are closed or have reduced availability due to staffing shortages.

These burdens compound clinical risks. Without timely imaging, patients may experience worsening symptoms, require repeated healthcare visits, or face increased difficulty securing necessary follow-up appointments. All these outcomes reflect the direct effect of insufficient NMT staffing on patient well-being.

Nuclear medicine technologist shortages pose significant clinical risks across oncology, cardiology, and complex diagnostic areas. Delayed imaging contributes to disease progression, reduced treatment accuracy, increased emergency presentations, disrupted theranostic pathways, and greater patient burden. Canadian evidence demonstrates that these risks are not the result of systemic inefficiency or equipment limitations but rather arise directly from the insufficient availability of the specialized workforce required to perform nuclear medicine studies. Strengthening NMT staffing is therefore essential to protecting patient safety, ensuring accurate diagnoses, and supporting timely access to life-saving treatments across Canada.

5.6 Recruitment Pressure on Students and the Education Pipeline:

Recruitment pressures on students and new graduates represent an emerging challenge for the nuclear medicine education system. With only five accredited programs producing approximately 50 to 70 graduates per year (CAMRT, 2023), the education pipeline is already insufficient to meet national demand. As clinical departments face increasing shortages, students carry significant expectations as future contributors to provincial capacity. At the same time, private-sector employers have intensified recruitment efforts directed at students during or shortly after their training.

Educational institutions report that students encounter early exposure to non-clinical career opportunities through guest presentations, professional events, and informal networks. While engagement between industry and students can enrich learning, it can also redirect graduates away from public hospitals at a time when clinical staffing needs are growing. National labour projections from the Canadian Occupational Projection System indicate that MRT professions will continue to face a substantial risk of shortage through 2033, with job openings exceeding the number of expected job seekers (COPS, 2025). When early recruitment draws graduates into private-sector roles, public hospitals lose critical entry-level capacity needed to maintain and expand nuclear medicine services.

During the Q&A period at the CANM 2025 Annual Scientific Conference in Halifax, several participants noted that technologists frequently transition into advanced non-clinical roles after gaining substantial clinical experience. These roles include radiation safety, cyclotron operations, radiopharmaceutical production, vendor applications, and technical support for imaging software and equipment. These pathways are integral to Canada’s nuclear medicine ecosystem and depend on a strong clinical foundation. As the profession evolves, educational programs must prepare graduates for both clinical practice and the broader range of technical and industry-based opportunities.

Students completing clinical placements often observe high workload intensity, staffing shortages, and limited redundancy in nuclear medicine departments. These experiences shape perceptions of hospital practice and influence early career decisions. CAMRT has identified working conditions and emotional strain as significant challenges affecting MRT retention (CAMRT, 2023). When students associate clinical roles with burnout or instability, alternative pathways in research, radiopharmaceuticals, or technical applications may appear more sustainable. This dynamic undermines provinces' ability to benefit from training investments and makes it more challenging to stabilize the workforce.

Education representatives participating in the Q&A session in Halifax noted that graduate tracking remains limited. Although exit surveys are part of accreditation requirements, participation rates average around 10%. This leaves educators and regulators without reliable insight into early-career mobility or retention patterns. Improving graduate follow-up mechanisms will strengthen national workforce forecasting and clarify how many new technologists remain in clinical roles, transition to industry positions, or leave the profession.

Moreover, student recruitment pressure interacts with broader challenges in program expansion. Colleges and universities face difficulties in increasing seat capacity due to limited clinical placement availability and resource constraints. If graduates increasingly transition to non-clinical roles, the return on educational investment diminishes, and the public system becomes more vulnerable to retirements and unexpected vacancies. This risk is especially pronounced in provinces relying on a single nuclear medicine department or a small number of technologists.

Industry engagement within training programs offers valuable opportunities for students to develop technical expertise, explore diverse career pathways, and contribute to innovation. However, a balanced workforce strategy requires that these opportunities complement rather than compete with the clinical pipeline. Strengthening program capacity, improving working conditions in clinical environments, and establishing shared recruitment principles can ensure that educational pathways align with the health system's needs while continuing to support collaboration with industry partners.

Building Canada's Future NMT Workforce: Education and Program Capacity

Chapter

6

Chapter 6: Building Canada’s Future NMT Workforce: Education and Program Capacity

6.1 Program Overview:

Canada's Nuclear Medicine Technology (NMT) education system rests on a very narrow foundation. As of 2025, the country operates 5 fully accredited NMT programs serving a population of more than 40 million people. Together, these programs produce only 50 to 70 new Nuclear Medicine Technologists per year, a number that is consistently below national replacement needs. All programs are accredited through Accreditation Canada's EQual framework and are structured to prepare graduates for the CAMRT national certification examination (Accreditation Canada, 2024).

A 6th program, jointly developed by Mohawk College and McMaster University, is currently in development. Its module-based structure will expand Ontario's training capacity and support future readiness in PET, hybrid imaging, and radiopharmaceutical therapy.

Because these 5 accredited programs form the entire national entry-to-practice pipeline, their capacity, structure, and geographic distribution directly shape Canada's ability to maintain nuclear medicine services, expand PET access, and deploy theranostics. The following profiles present the key indicators and detailed context for each program.

British Columbia Institute of Technology (BCIT)

- Credential: 24-month diploma, EQual accredited, CAMRT-aligned
- Capacity: 16 seats per year; typical graduation 6 to 10 technologists
- Regional role: Only NMT program in British Columbia, with variable PET exposure

BCIT delivers British Columbia's only NMT program. This 24-month diploma integrates applied coursework, simulation-based laboratory training, and clinical placements across the province (BCIT, 2024). The curriculum aligns with CAMRT competency requirements and includes radiopharmacy, SPECT and SPECT/CT imaging, radiation protection, patient care, and quality control.

Clinical education occurs across multiple hospitals, primarily in the Lower Mainland. PET/CT exposure varies because British Columbia maintains a limited number of PET centers (HSA BC, 2025). Therapeutic nuclear medicine exposure depends on site readiness and staffing.

As the province's exclusive NMT pipeline, BCIT's limited output directly impacts British Columbia's PET/CT capacity and readiness for theranostics.

Sources: BCIT 2024 Program Guide; HSA BC 2025 Workforce Summary; Accreditation Canada 2024; CAMRT 2024 Competency Profile.

Southern Alberta Institute of Technology (SAIT)

- **Credential:** 2-year diploma, EQual accredited, CAMRT-aligned
- **Capacity:** Approximately 20 seats; 15 to 18 annual graduates
- **Regional role:** Main NMT pipeline for Alberta, Saskatchewan, and Manitoba

SAIT offers a 2-year NMT diploma, serving Alberta, as well as Saskatchewan and Manitoba, which do not operate their own NMT programs (SAIT, 2024). The curriculum aligns with CAMRT national competencies and includes SPECT, SPECT/CT, PET/CT, radiopharmacy, radiation biology, hybrid imaging, and clinical patient management.

Clinical placements primarily occur in Calgary and Edmonton, with additional rotations coordinated for students from Saskatchewan and Manitoba. Alberta's PET distribution provides more substantial PET exposure compared to many other provinces.

SAIT's annual output of 15 to 18 graduates is essential for maintaining Prairie workforce stability and supporting PET/CT growth across 3 provinces.

Sources: SAIT 2024 Academic Calendar; Alberta Health 2024 PET Planning Report; Accreditation Canada 2024; CAMRT 2024 Competency Profile.

Michener Institute of Education at UHN and University of Toronto

- **Credential:** 3-year combined BSc and advanced diploma, CAMRT-aligned
- **Capacity:** 12 to 18 seats; 12 to 15 graduates
- **Regional role:** Ontario's only accredited NMT program and PET training hub

Michener offers Ontario's only accredited NMT program through a 3-year integrated structure with the University of Toronto. The curriculum aligns with CAMRT competencies and includes radiopharmaceutical sciences, PET/CT, SPECT/CT, hybrid imaging workflows, radiation safety, and research literacy (Michener Institute, 2024).

Clinical placements occur in Ontario's largest academic hospitals and cancer centers, offering comprehensive exposure to PET/CT, oncology, and cardiology imaging, as well as radiopharmaceutical therapy.

As the sole NMT pipeline for Canada's most populous province, Michener's annual output consistently falls short of meeting provincial demand, particularly as PET and theranostics programs expand.

Sources: Michener Institute 2024 Program Handbook; UHN 2024 Imaging Education Overview; Accreditation Canada 2024; CAMRT 2024 Competency Profile.

Collège Ahuntsic and Cégep de Sainte-Foy (Québec)

• Credential: 3-year DEC, EQual-accredited, CAMRT-aligned

• Capacity: 20 seats across 2 campuses; 10 to 17 graduates

• Regional role: Québec's primary NMT pipeline with uneven PET access

Collège Ahuntsic has trained Québec's NMT workforce for more than 20 years. The program expanded in 2025 with a new cohort at Cégep de Sainte-Foy (Collège Ahuntsic, 2024). The 3-year curriculum aligns with CAMRT competencies and includes SPECT and SPECT/CT, radiopharmacy, radiation physics, patient care, and Québec regulatory requirements. Graduates must also complete the OTIMROEPMQ registration exam.

Clinical placements occur across Montréal and Québec City. PET/CT exposure varies because PET units remain concentrated in major centers, and theranostics exposure depends on local implementation.

The expansion to 20 seats supports regional needs, although initial Sainte-Foy admissions did not fill all seats, indicating low awareness of NMT careers.

Sources: Collège Ahuntsic 2024 Program Outline; OTIMROEPMQ 2023 Entry-to-Practice Standards; Accreditation Canada 2024; CAMRT 2024 Competency Profile.

Dalhousie University

• Credential: 4-year Bachelor of Health Science, CAMRT-aligned

• Capacity: Cohorts of 6 to 8 students

• Regional role: Sole NMT pipeline for Atlantic Canada

Dalhousie operates Atlantic Canada's only NMT program. The 4-year Bachelor of Health Science integrates foundational sciences, professional coursework, and clinical placements across Nova Scotia, New Brunswick, and Newfoundland and Labrador (Dalhousie University, 2024). The curriculum aligns with CAMRT competencies and includes radiopharmacy, SPECT imaging, radiation protection, applied research, and introductory PET content.

Regional PET capacity remains limited, resulting in variable exposure to advanced molecular imaging.

Dalhousie's small output contributes to ongoing staffing vulnerability across the Atlantic provinces.

Sources: Dalhousie University 2024 Academic Calendar; Nova Scotia Health 2024 Imaging Profile; Accreditation Canada 2024; CAMRT 2024 Competency Profile.

Emerging Program: Mohawk College and McMaster University

• Credential: Module-based applied degree or diploma (in development)

• Capacity: Expected to expand Ontario's output once launched

• Regional role: Future second NMT pipeline for Ontario

The Mohawk–McMaster NMT program is currently under development and is expected to become Canada's sixth accredited NMT program once approved. The module-based structure is aligned with CAMRT competency profiles and will include radiopharmacy, PET/CT, hybrid imaging, dosimetry, and therapeutic nuclear medicine.

Clinical training will be integrated with Hamilton Health Sciences and regional PET centers. The program is expected to alleviate structural pressure on Ontario's workforce pipeline and support the expansion of PET/CT and theranostics.

Sources: Mohawk College 2024 Planning Brief; McMaster University Health Sciences 2024 Strategic Update; Accreditation Canada 2024; CAMRT 2024 Competency Profile.

6.2 Program Capacities:

Canada's Nuclear Medicine Technology (NMT) training capacity remains critically insufficient relative to current and projected workforce needs. Across the 5 accredited programs, national graduate output remains limited to **approximately 50 to 70 technologists per year**, a level that cannot sustain baseline replacement requirements, much less support the expanding demands associated with PET growth and the introduction of radiopharmaceutical therapies (CAMRT, 2024). Workforce modelling presented in earlier sections indicates that Canada requires a **30% increase in new graduates** over the next several years to maintain existing service levels as retirements accelerate and new diagnostic and therapeutic modalities come online (Accreditation Canada, 2024).

Seat allocations, fill rates, and clinical placement availability differ significantly across regions. As a result, national training output is not only low but unevenly distributed, creating significant mismatches between educational capacity and provincial workforce demand.

British Columbia Institute of Technology (BCIT)

BCIT admits 16 students annually but typically graduates only 6 to 10 technologists per year, a consequence of normal attrition combined with constraints on clinical placement availability within the province (BCIT, 2024). As of 2025, only two PET centres are operating in British Columbia resulting in minimal opportunities for PET/CT rotations, which restricts the number of students who can be exposed to advanced imaging (HSA BC, 2025).

British Columbia's workforce modelling indicates a requirement for at least 12 to 15 new technologists annually over the next five years to offset retirements and support the expansion of PET. BCIT's current output meets less than half of projected needs, positioning the province at high risk of sustained shortages and delayed implementation of PET and therapeutic radiopharmaceuticals (CAMRT, 2024).

Southern Alberta Institute of Technology (SAIT)

SAIT maintains one of the largest NMT intakes in Canada, admitting approximately 20 students and graduating 15 to 18 per year (SAIT, 2024). However, its training influence extends beyond provincial borders, as both Saskatchewan and Manitoba rely entirely on SAIT for new NMT graduates. Combined, these three provinces require 25 to 30 technologists annually to support population growth, PET expansion, and the replacement of retiring staff (Alberta Health, 2024).

SAIT's current output meets only 50 to 60% of the combined Prairie workforce's needs even under stable conditions. Because a single institution supports the entire region, any reduction in instructor availability, seat capacity, or clinical placements can generate rapid multi-provincial shortages. This structural fragility is expected to intensify as Alberta and Saskatchewan increase PET installations and Manitoba moves toward expanded radiopharmaceutical services.

Michener Institute of Education at UHN and University of Toronto

Michener's intake ranges from 12 to 18 students annually, with graduating cohorts of 12 to 15 technologists (Michener Institute, 2024). Despite consistently high demand for admission, the program's expansion is limited by clinical placement capacity within Ontario's major academic hospitals. PET and theranostics units operate at maximum throughput, leaving little room for additional learners (UHN, 2024).

Ontario's projected requirement, based on population growth, service expansion, and anticipated retirements, is 20 to 25 new technologists per year. Michener's current output supplies only half of the province's near-term needs. This deficiency has national implications: Ontario is a central hub for PET and radiopharmaceutical therapy, and shortages in this province directly affect interprovincial mobility, recruitment, and service expansion across Canada (CAMRT, 2024).

Collège Ahuntsic and Cégep de Sainte-Foy (Québec)

Québec expanded its NMT training capacity to 20 seats in 2025, with 10 seats allocated to Collège Ahuntsic and 10 seats to Cégep de Sainte-Foy (Collège Ahuntsic, 2024). However, the Sainte-Foy program did not fill all available seats in its inaugural admission cycle, reflecting regional disparities in awareness of NMT as a career path. Graduation output across both campuses remains between 10 and 17 technologists annually.

Workforce projections indicate that Québec requires **20 to 25 new technologists per year** to stabilize staffing in major centres and support the expansion of PET and theranostics outside Montréal and Québec City (OTIMROEPMQ, 2023). Despite the recent increase in seat availability, Québec's total graduate output still falls short of projected needs. Without targeted support to improve applicant recruitment and clinical placement availability, training expansion will not translate into meaningful increases in graduate numbers (CAMRT, 2024).

Dalhousie University

Dalhousie admits 6 to 8 students annually and typically graduates the same number, making it the smallest NMT program in the country (Dalhousie University, 2024). The entire Atlantic region depends exclusively on Dalhousie for technologist supply, yet existing PET infrastructure remains limited, restricting student exposure to hybrid imaging and therapeutic procedures (Nova Scotia Health, 2024).

Based on population needs and projected PET expansion in Nova Scotia and New Brunswick, regional demand is expected to rise to **10 to 12 graduates per year**. Dalhousie currently meets **only half** of this requirement, placing the region at risk of prolonged staffing deficits as modernization efforts accelerate.

Emerging Program: Mohawk College and McMaster University

The developing Mohawk–McMaster program is Canada's most important upcoming investment in NMT training capacity. Although final seat numbers have not been announced, early planning indicates a scalable, modular program aligned with CAMRT competency requirements (Mohawk College, 2024).

Ontario alone requires an increase from its current 12 to 15 graduates to **20 to 25 graduates annually**. The new Mohawk–McMaster program is expected to address a significant portion of this gap. Integration with McMaster's radiopharmaceutical research infrastructure and the Hamilton Health Sciences network is designed to strengthen training capacity for PET and therapeutic radiopharmaceuticals (McMaster Health Sciences, 2024). Once operational, the program could supply the single most significant capacity increase in Canada's NMT training system.

6.3 Alignment Between Education and Evolving Clinical Practice:

Although Canada's Nuclear Medicine Technology (NMT) programs continue to provide strong foundational preparation in conventional nuclear medicine, they no longer reflect the evolving realities of modern clinical practice. The rapid expansion of PET/CT, the growth of radiopharmaceutical therapies, and the increasing integration of quantitative imaging and dosimetry have fundamentally reshaped the expectations placed on technologists. However, education systems have not kept pace with these shifts, creating a widening gap between graduate preparation and real-world practice requirements (CAMRT, 2024; Accreditation Canada, 2024).

Survey findings confirm this misalignment. Multiple respondents reported that their training provided limited or no clinical exposure to PET/CT, despite the modality's central role in imaging for oncology, neurology, and cardiology. PET was often described as primarily theoretical, with hands-on rotations available only at select clinical sites and often dependent on geographic proximity to major centres (CANM Survey, 2025). This gap is especially evident in provinces where PET infrastructure remains limited, notably British Columbia and Atlantic Canada, where technologists frequently indicated that they had not encountered PET workflows during their training (BCIT, 2024; Nova Scotia Health, 2024). Programs situated near large academic hospitals, such as Michener and SAIT, offer more substantial PET exposure; however, even these opportunities fall short of the growing expectations of modern PET practice (Michener Institute, 2024; SAIT, 2024).

Theranostics illustrates an even greater educational gap. Respondents overwhelmingly reported that therapeutic radiopharmaceuticals were not meaningfully incorporated into their formal education and that they learned therapy workflows entirely through workplace-based experience. Many described their initial therapy encounters as stressful or overwhelming due to a lack of preparation for patient management protocols, radiation protection requirements for high-activity compounds, and coordination with oncology teams (CANM Survey, 2025). These experiences underscore the absence of structured therapeutic curricula despite the rapid expansion of therapies for prostate cancer, neuroendocrine tumours, and other indications.

Quantitative PET imaging and dosimetry also represent areas where educational preparation remains limited. Respondents noted gaps in training related to standardized uptake value harmonization, scanner calibration, motion correction, and basic principles of personalized dosimetry. These competencies are increasingly essential for advanced molecular imaging and therapeutic planning, yet they remain peripheral in current curricula due to limited faculty expertise, constrained clinical placement capacity, and the absence of nationally standardized training expectations (UHN, 2024; CAMRT, 2024).

Survey feedback also highlighted substantial inequities in clinical exposure across Canada. Technologists trained in PET-rich provinces reported feeling significantly more prepared for complex imaging roles than those trained in PET-limited jurisdictions. This geographic disparity results in graduates who meet identical accreditation requirements yet enter the workforce with markedly different levels of readiness. Several respondents noted that they required extended onboarding, additional training, or relocation to access PET or therapy experience, placing additional strain on departments already facing staffing shortages (CANM Survey, 2025).

The scarcity of clinical placements further limits the ability of programs to modernize their curricula. PET and therapy units often operate at full capacity and lack the staffing flexibility to accommodate students without compromising service delivery. Many respondents described situations in which clinical departments declined student placements due to workload pressures, staff shortages, or insufficient availability of preceptors. This reinforces findings from Section 6.2: without expanded clinical training capacity, educational institutions cannot meaningfully integrate PET or theranostics into experiential learning rotations.

Faculty constraints contribute to these challenges. Respondents noted that programs struggle to recruit instructors with up-to-date experience in PET or radiopharmaceutical therapy, as many advanced practitioners remain in clinical practice due to workforce shortages. This limits the depth and currency of advanced instruction, especially in hybrid imaging, therapy workflows, and quantitative imaging. Respondents frequently described curricula as "strong in SPECT but limited in PET," reflecting a widening gap between academic capacity and clinical advancement (CANM Survey, 2025).

Regulatory and accreditation frameworks further complicate the process of curricular modernization. The CAMRT entry-to-practice profile remains weighted toward traditional nuclear medicine and has not fully incorporated competencies related to dosimetry, PET optimization, or radiopharmaceutical therapy (CAMRT, 2024). Educational programs, therefore, lack a standardized national mandate to integrate these competencies. Accreditation cycles add additional delays, as major curricular revisions require multi-year review and approval processes across multiple governance bodies (Accreditation Canada, 2024). Provincial differences in scopes of practice, as outlined in Section 5, add further complexity for program directors seeking to align training with national expectations.

Survey respondents consistently highlighted the impact of these educational gaps on clinical operations and the well-being of the workforce. Many described experiencing significant anxiety or stress during their early months of practice due to limited preparation in high-complexity modalities. Others noted that new graduates required extensive shadowing, additional supervision, or months of on-the-job learning before achieving complete competence, adding to the burden of departments already facing staffing shortages. Several respondents also reflected that insufficient preparation in therapy or advanced PET contributed to slower onboarding processes, reduced clinical efficiency, and increased pressure on senior staff (CANM Survey, 2025).

Taken together, these findings demonstrate a systemic misalignment between NMT education and the realities of contemporary molecular imaging and therapy practice. Graduates emerge with strong foundational knowledge in nuclear medicine but remain underprepared for the modalities driving current and future service expansion. Without updated competency frameworks, expanded PET and therapy training capacity, and nationally coordinated curricular modernization, this misalignment will continue to contribute to workforce strain, onboarding delays, and regional inequities in access to advanced imaging services across Canada.

6.4 Structural, Operational and Regulatory (SOR) Barriers:

Canada's capacity to train Nuclear Medicine Technologists is constrained by a set of structural, operational, and regulatory barriers (SOR) that limit both the quantity and quality of NMT education. These barriers, which span faculty availability, clinical placement shortages, institutional constraints, and outdated competency frameworks, prevent educational programs from scaling, modernizing, or preparing graduates for the demands of contemporary hybrid imaging and radiopharmaceutical therapies. The accumulation of these barriers creates a system in which training capacity remains fixed while clinical demand continues to rise, reinforcing the workforce pressures described in earlier sections.

One of the most significant barriers is the limited availability of qualified faculty and preceptors. Institutions reported difficulty recruiting instructors with current PET or radiopharmaceutical therapy experience, as many advanced practitioners remain in clinical practice due to staffing shortages (BCIT, 2024; Michener Institute, 2024). Survey feedback reinforces this challenge. Respondents noted that instructors were often highly competent in conventional nuclear medicine but had limited practical experience in PET or therapy workflows, which made it difficult for them to provide students with comprehensive, up-to-date instruction (CANM Survey, 2025). The lack of faculty with advanced imaging expertise restricts the ability of programs to integrate new modalities, update curricula, or expand simulation and laboratory-based training.

Clinical placement scarcity constitutes the second significant barrier. PET and therapy units operate at high throughput, with limited staff capacity to supervise learners without compromising service delivery. Several respondents described situations in which their departments were unable to accept students due to workload pressures, insufficient staffing, or competing operational demands (CANM Survey, 2025). This situation is especially acute in provinces with minimal PET infrastructure. British Columbia, Québec outside the major centres, and Atlantic Canada have insufficient PET capacity to support consistent, high-quality PET rotations. As a result, programs in these regions must rely on theoretical instruction or brief observational experiences rather than hands-on training (BCIT, 2024; Nova Scotia Health, 2024).

Institutional constraints also hinder the expansion of NMT programs. Colleges and universities must allocate resources among multiple health programs, many of which have larger enrollments and higher institutional priority. Imaging laboratories and radiopharmacy facilities are costly to expand or modernize, and programs often lack the space or equipment to accommodate additional students. These constraints limit the ability of programs to increase seat capacity even when provincial workforce needs are clearly documented. In Québec, for example, the expansion to 20 seats across two campuses was not matched by sufficient increases in clinical placement availability, resulting in unfilled seats and limited overall output (Collège Ahuntsic, 2024). This highlights a recurring problem: increasing admission numbers does not translate into higher graduation rates if downstream resources are insufficient.

Accreditation and regulatory frameworks present additional barriers. Accreditation Canada's EQual system is crucial for ensuring national consistency; however, its multi-year approval cycles can slow curricular updates and hinder the integration of emerging competencies (Accreditation Canada, 2024). Similarly, the CAMRT entry-to-practice profile, while foundational, has not yet fully incorporated competencies related to theranostics, quantitative PET, personalized dosimetry, or hybrid imaging optimization (CAMRT, 2024). Without updated national competency expectations, educational programs lack a formal basis for modernizing their curricula to reflect current clinical practice. This regulatory lag contributes directly to the educational–practice gap detailed in Section 6.3.

Survey findings also highlight the practical consequences of these regulatory and institutional barriers. Many respondents reported spending significant time after graduation learning PET protocols, therapy workflows, or hybrid imaging practices that were not covered during their training. Several described the first months of their practice as unusually stressful due to the amount of on-the-job learning required, particularly in PET or therapy units (CANM Survey, 2025). This extended onboarding period increases workload for experienced technologists, reduces clinical efficiency, and compounds burnout in already strained departments.

Geographic inequities represent another systemic barrier. Students trained in regions without PET centers or therapy programs graduate with less exposure to advanced modalities than those in PET-rich provinces. This reinforces national disparities: technologists entering the workforce in Atlantic Canada or British Columbia often require more extensive onboarding than those hired in Ontario or Alberta. Survey respondents in PET-limited provinces frequently noted that “they felt "behind" their peers” trained elsewhere when they entered PET or therapy roles, even though all graduates meet the same accreditation and certification requirements (CANM Survey, 2025). Such inequities also restrict mobility; technologists may be theoretically qualified to work in advanced settings but lack the practical experience required to transition smoothly into PET or therapy roles in other provinces.

Finally, the increasing complexity of the clinical environment has outpaced available institutional supports for curricular modernization. Program leaders across the country acknowledge the need to integrate PET, hybrid imaging, therapy workflows, and quantitative imaging into foundational training. However, they face persistent limitations in faculty capacity, clinical placement availability, and regulatory alignment. Without national standards for PET and theranostics education, programs remain dependent on local resources and the availability of clinical partners, perpetuating the mismatches between training and practice described throughout this chapter.

Taken together, these barriers form a mutually reinforcing system that limits Canada's ability to expand or modernize NMT education. Insufficient faculty constrained clinical placements, regulatory lag, resource limitations, and geographic inequities prevent programs from increasing cohort sizes or integrating emerging clinical practices. Addressing these barriers is essential not only for improving graduate readiness but for ensuring that Canada can sustain and scale PET, hybrid imaging, and therapeutic radiopharmaceutical services over the coming decade.

6.5 International Models:

Examining international models of Nuclear Medicine Technology education reveals that Canada is falling behind global standards in curriculum modernization, clinical training integration, national governance, and readiness for PET and radiopharmaceutical therapy. While Canadian programs maintain high-quality foundational training, other jurisdictions have adopted more flexible, multi-pathway, and clinically integrated approaches that better reflect the rapid evolution of molecular imaging. These international models highlight systemic gaps in Canada's current approach and suggest structural reforms that could enhance future workforce capacity.

Germany offers one of the most advanced models of integrated nuclear medicine education. Technologists are trained through a combination of academic coursework and apprenticeship-style clinical immersion, which ensures continuous exposure to hybrid imaging, radiopharmacy, and therapeutic radiopharmaceuticals throughout their program. PET/CT and therapy are core components of German training rather than optional or dependent on local clinical availability. The integration of radiopharmacy and dosimetry at the foundational level positions graduates to enter PET and therapy environments with significantly less onboarding than their Canadian counterparts (Deutsches Krankenhausinstitut, 2023). This model demonstrates the effectiveness of embedding advanced modalities into entry-level training frameworks rather than treating them as post-graduation competencies.

The United Kingdom provides another example of a structured, multi-pathway system. Nuclear medicine technologists may pursue traditional academic routes or apprenticeship-based degrees that balance paid clinical employment with academic progression. PET and therapeutic radiopharmaceuticals are explicitly required components of accredited UK programs, and all students must complete rotations in PET/CT as part of their professional preparation (Society of Radiographers, 2024). National placement coordination ensures that geographic inequities are reduced, enabling students from PET-limited regions to complete rotations in larger centres. This reduces regional skill disparities, a persistent challenge in Canada where PET-limited provinces produce graduates with less exposure to advanced modalities (CANM Survey, 2025).

Australia has adopted a model that blends university-based training with compulsory clinical placements supported by coordinated national guidelines. Australian programs incorporate PET/CT, SPECT/CT, radiopharmaceutical therapy, and quantitative imaging into core curricula, reflecting the country's early PET/CT of theranostics in both public and private sectors (Australian Society of Medical Imaging and Radiation Therapy, 2024). National competency frameworks mandate standardized PET and therapy competencies for entry-to-practice technologists. This alignment between education, regulation, and clinical practice stands in contrast to Canada, where national competency profiles have not yet been fully updated to reflect current clinical demands (CAMRT, 2024).

France provides a further example of structured integration between clinical services and education. Nuclear medicine technologists in this field undergo a nationally standardized curriculum that includes extended rotations in PET/CT and radiopharmaceutical therapy, supported by regional university hospitals and public imaging networks. Therapy units routinely accept students as part of national agreements, reducing the clinical placement bottlenecks that constrain Canadian programs. This ensures that all graduates, regardless of region, achieve a baseline exposure to high-complexity modalities. The French model also demonstrates the value of national coordination, as workforce planning and educational capacity are governed by interregional councils and linked directly to national health service needs (Ministère de la Santé, 2024).

Across these international models, several standard features stand out. First, most countries have adopted multi-pathway entry routes that combine academic training with structured clinical immersion, supporting both student learning and workforce stabilization. Second, PET and radiopharmaceutical therapy are universally recognized as core competencies rather than advanced or elective topics. Third, national coordination of clinical placements reduces regional inequities, ensuring consistent graduate readiness across all geographic areas. Fourth, dual training models that integrate apprenticeship and academic components help maintain alignment between education and rapidly evolving clinical requirements. Finally, nations such as Germany, the UK, and Australia maintain clear national standards for advanced competencies, including dosimetry, hybrid imaging optimization, and therapeutic patient management. These standards support consistent quality across institutions and facilitate curriculum modernization in ways that Canada has not yet achieved.

Comparing these models to the Canadian context highlights several areas where structural change may be required. Canada's reliance on conventional academic pathways, limited PET and therapy exposure, uneven provincial training capacity, and delayed integration of emerging competencies result in graduates who are technically strong but insufficiently prepared for modern practice. Survey feedback from Canadian technologists reinforces this gap, as respondents repeatedly emphasized the need for structured PET and therapy training, greater access to advanced clinical rotations, and national consistency in competency expectations (CANM Survey, 2025). International systems that combine national coordination, multi-pathway training, and mandatory PET and therapy requirements demonstrate approaches that could strengthen the Canadian training ecosystem and reduce the workforce strain identified in earlier sections.

While Canada's NMT programs maintain strong foundational competencies and high educational quality, international models demonstrate that more integrated, flexible, and clinically aligned training approaches are necessary to meet the demands of contemporary molecular imaging. These jurisdictions exemplify the benefits of national coordination, apprenticeship-based training, standardized PET and therapy competencies, and curriculum structures tailored to keep pace with rapid clinical advancements. Their experiences offer valuable insights for strengthening Canada's future NMT training capacity, improving graduate readiness, and ensuring national alignment with global best practices.

Compensation Structures and Their Impact on Workforce Stability

Chapter

7

Chapter 7: Compensation Structures and Their Impact on Workforce Stability

7.1 Provincial Salary Data (Average):

Disclaimer: *Step 1 corresponds to Year 1 of an NMT's career, Step 2 corresponds to Year 2, and Step 3 corresponds to Year 3. Some provinces have additional steps beyond Step 3, such as Québec, which can extend up to 18 years. However, focusing on Steps 1 to 3 allows for a consistent comparison across all provinces. All figures are expressed in Canadian dollars per hour ($/h). The detailed provincial compensation tables referenced in this section are presented in Appendix A.*

Methodological Note: *The compensation figures used in this analysis are taken directly from the "CAMRT Salary Scale - June 2025" and from the provincial collective agreement references used by CAMRT to compile that dataset. Several provinces publish more than one wage structure, including base wage scales, all-inclusive rates that incorporate premiums, and employer-specific variations. These alternative tables may present different values than those shown here. For the purpose of consistent national comparison, only the standardized base wage scales used by CAMRT have been incorporated into this analysis.*

Breakdown per province:

- In Manitoba, NMTs under the MGEU and MAHCP agreements earn $50.39/h in Year 1, $51.90/h in Year 2, and $53.45/h in Year 3, with a 3-year average of $51.91/h). Manitoba has the highest Step 3 rate in the nation.
  (CAMRT, 2025; MGEU, 2023–2027; MAHCP, 2018–2024)

- In the Northwest Territories, NMTs under UNW agreements earn $48.21/h, $49.60/h, and $51.02/h, with a 3-year average of $49.61/h.
  (CAMRT, 2025; GNWT, 2022–2023)

- In the Yukon, NMTs under PSAC agreements earn $43.07/h, $44.79/h, and $46.58/h, with a 3-year average of $44.81/h.
  (CAMRT, 2025; YU2, 2022–2025)

- In British Columbia, NMTs under HSPBA agreements earn $41.71/h, $43.80/h, and $45.77/h, with a 3-year average of $43.76/h.
  (CAMRT, 2025; HSPBA, 2022–2025)

- In Ontario, Step 1 is $39.30/h, Step 2 $40.84/h, Step 3 $42.36/h, with a 3-year average of $40.83/h
  (CAMRT, 2025; OHA, 2022–2025; ONA, 2022–2025).

- In Saskatchewan, Step 1 is $37.96/h, Step 2 $39.31/h, Step 3 $40.67/h, with a 3-year average of $39.32/h.
  (CAMRT, 2025; SAHO, 2022–2023; SAHO, 2018–2024)

- In Alberta, Step 1 is $37.86/h, Step 2 $39.11/h, Step 3 $40.41/h, with a 3-year average of $39.12/h.
  (CAMRT, 2025; HSAA, 2020–2024).

- In Newfoundland & Labrador, Step 1 is $36.33/h, Step 2 $37.77/h, Step 3 $39.30/h, with a *three-year average of $37.80/h (CAMRT, 2025; NAPE, 2022–2026).*

- In New Brunswick, Step 1 is $26.50/h, Step 2 $27.76/h, Step 3 $29.10/h, with a 3-year average of $27.78/h.
  (CAMRT, 2025; NB1, 2022–2026).

- In Nova Scotia, Step 1 is $35.08/h, Step 2 $36.66/h, Step 3 $38.18/h, with a 3-year average of $36.64/h.
  (CAMRT, 2025; NS1, 2022–2026)

- In Prince Edward Island, Step 1 is $34.00/h, Step 2 $35.27/h, Step 3 $36.82/h, with a 3-year average of $35.36/h.
  (CAMRT, 2025; PE1, 2022–2026)

- In Québec, Step 1 is $28.99/h, Step 2 $30.08/h, Step 3 $31.23/h, with a 3-year average of $30.10/h.
  (CAMRT, 2025; APTS, 2024–2028)

The Step 3 average salary disparity between Manitoba (highest) and New Brunswick (lowest) can be calculated as follows:

($53.45 – 29.10$) ÷ $29.10 × 100 = 83.67%

7.2 Interprovincial Wage Gaps and Workforce Mobility Patterns:

Interprovincial wage disparities create one of the clearest structural drivers of mobility within Canada's nuclear medicine workforce. Although personal preferences, family circumstances, and professional development opportunities influence individual decisions, salary positioning remains the earliest and most consistent factor shaping technologists' consideration of relocation. Wage differences alter lifetime earning potential, influence where graduates seek employment and determine whether experienced technologists remain in their home province or relocate to jurisdictions offering higher compensation. These mobility flows generate regional workforce imbalances that reinforce shortages and complicate long-term planning for PET, SPECT/CT, and theranostic services. This subsection maps these patterns using Step 3 values from Section 7.1 and four survey statements.

Wage Clusters and the Incentive Structure for Mobility:

To ensure complete consistency with Section 7.1, wage clusters are defined strictly according to Step 3 hourly rates:

High-wage cluster Average (Step 3 ≥ $45/h)

- Manitoba: $53.45/h
- Northwest Territories: $51.02/h
- Yukon: $46.58/h
- British Columbia: $45.77/h

Upper-mid wage cluster Average (Step 3: $40–45/h)

- Ontario: $42.36/h
- Saskatchewan: $40.67/h
- Alberta: $40.41/h
- Newfoundland & Labrador: $39.30/h *(borderline but included due to proximity)*

Low-wage cluster Average (Step 3 < $40/h)

- Nova Scotia: $38.18/h
- Prince Edward Island: $36.82/h
- Québec: $31.23/h
- New Brunswick: $27.78/h

The difference between the highest and lowest Step 3 wages reaches 83.67%, representing a substantial internal spread for a regulated health technology profession. Because salary progression compounds over time, early-career wage differentials have a significant impact on lifetime earnings. As a result, wage disparities create clear incentive structures that align closely with observed mobility outcomes.

Mobility Dynamics in Low-Wage Provinces:

Low-wage provinces experience the strongest outward mobility pressures. Technologists in New Brunswick, Nova Scotia, Prince Edward Island, and Québec face compensation levels that lag behind national medians and do not consistently reflect the complexity of hybrid imaging, radiopharmaceutical handling, or therapeutic duties.

One respondent from New Brunswick, a Nuclear Medicine Technologist 2 with 16 years of experience operating SPECT/CT, PET/CT, gamma camera systems, and bone densitometry, explained that they are "paid lower than nurses and only slightly higher than our admins," illustrating a perception of wage compression that directly influences relocation considerations (Nuclear Medicine Technologist 2, 16 years, SPECT/CT, PET/CT, gamma camera, bone density, New Brunswick).

A technologist from Newfoundland and Labrador, a Registered Technologist with 17 years of experience in Nuclear Medicine, CTIC, and PET/CT, described how "our compensation has not kept pace with inflation and our true buying power now is less than it was ten years ago," adding that responsibilities have become "more complicated, more stressful and less financially rewarding than it was in 2015" (Registered Technologist, 17 years, Nuclear Medicine, CTIC, PET/CT, Newfoundland and Labrador).

These experiences reflect broader trends: low-wage provinces face sustained outflows of early-career technologists and gradual losses of experienced staff after years of wage stagnation. Limited inflow compounds the problem, as technologists in mid- and high-wage jurisdictions rarely consider relocating to lower-paying provinces.

Mobility Dynamics in Mid-Wage Provinces:

Alberta and Saskatchewan offer moderate wage levels, but face mobility pressures driven by a disconnect between compensation and rising professional expectations. The expansion of PET, the normalization of SPECT/CT, and the introduction of radiotheranostics require greater skill, interdisciplinary coordination, and expertise in radiation safety.

An NM/CT technologist in Alberta with 9 years of experience noted that they "get paid the same as general X-ray and it is absurd for the work that we do to still be on the same pay scale," pointing to wage structures that have not evolved alongside practice expansion (NM/CT Technologist, 9 years, Alberta).

In Saskatchewan, a Nuclear Medicine Technologist with 15 years of experience in SPECT/CT and therapies reported that "we are demanded to increase our workload, provide more therapies, and increase our duties and radiation exposure, all while our staffing is shrinking," highlighting frustrations that contribute to outward mobility (Nuclear Medicine Technologist, 15 years, Saskatchewan).

Mid-wage provinces often attract graduates from low-wage Atlantic provinces but subsequently lose experienced staff to higher-wage regions when increased duties are not met with proportional wage adjustments.

Selective Mobility in High-Wage Provinces:

High-wage provinces attract early-career technologists seeking financial stability, exposure to PET/CT technology, and opportunities in high-volume or academic settings. Manitoba's Step 3 wage of **$53.45/h** offers the most substantial financial incentive nationally. British Columbia and Ontario attract technologists seeking advanced technologies and professional growth opportunities.

However, high wages do not guarantee retention. Manitoba faces challenges related to geography and climate. British Columbia experiences retention issues linked to housing affordability in major cities. Ontario faces similar cost-of-living constraints.

As a result, high-wage provinces experience strategic inflows rather than uniform migration.

Mapping Interprovincial Mobility Flows:

When wage clusters are mapped against workforce behavior, a clear set of mobility patterns emerges:

- Low-wage provinces experience sustained outward mobility toward higher-paying jurisdictions.
- Mid-wage provinces receive some inflow from Atlantic Canada but lose experienced technologists to the high-wage cluster.
- High-wage provinces attract early-career technologists but experience moderated retention due to cost-of-living or geographic factors.
- Northern territories offer very high wages, but there is a limited inflow due to remoteness and lifestyle considerations.

These flows shape the national distribution of the workforce and influence where PET expertise, SPECT/CT proficiency, and radiotheranostic capacity accumulate.

Workforce Instability Resulting from Wage-Driven Mobility:

Wage-driven mobility contributes to a fragmented national workforce. Low-wage provinces face persistent vacancies, reduced staff tenure, and limited ability to expand or sustain imaging and therapy programs. Mid-wage provinces face volatility tied to workload expectations and compensation alignment. High-wage provinces accumulate expertise but experience retention challenges in high-cost regions.

These patterns reinforce inequities in access to PET, SPECT/CT, and radiotheranostic services, and underscore the need for coordinated strategies to stabilize the national workforce.

Wage differences across provinces create clear and measurable patterns of mobility in the nuclear medicine workforce. Low-wage provinces experience sustained outward mobility, mid-wage provinces face selective outward mobility tied to expanded duties, and high-wage provinces attract talent but face moderated retention challenges. These mobility flows exacerbate inequities in access to advanced imaging and theranostic services, underscoring the need for coordinated retention and recruitment strategies to address this issue. Section 7.3 expands on this analysis by examining how working conditions further shape retention and long-term workforce sustainability.

7.3 Working Conditions:

Working conditions in nuclear medicine have become a central determinant of retention, morale, and long-term workforce stability across Canada. While wages influence mobility decisions, the day-to-day reality inside departments shapes whether technologists can sustain their careers, continue to work safely, and remain motivated to support expanding provincial imaging needs. Survey responses collected across six provinces reveal a consistent pattern. Departments face rising workload intensity, chronic staffing shortages, increasing clinical and emotional complexity, and a lack of institutional mechanisms that match the evolving demands of hybrid imaging, theranostics, and growing patient volumes. These pressures interact and compound one another, creating structural conditions that technologists describe as unsustainable.

The following subsections examine the key dimensions of working conditions that influence retention and morale. Each subsection integrates evidence from the national survey and illustrates how the current environment affects workforce stability.

Workload intensity and role expansion:

Nuclear medicine technologists are responsible for an increasingly broad portfolio of activities that require expertise across imaging, radiopharmacy, patient management, regulatory compliance, and interdisciplinary coordination. As SPECT and PET platforms evolve toward hybrid SPECT/CT or PET/CT systems, technologists must integrate CT acquisition, image fusion, and advanced reconstruction into their daily workflow. The introduction of radiotheranostics adds another layer of clinical responsibility, involving patient preparation, radiation safety, coordination with oncology teams, and post-therapy monitoring. These expanded responsibilities require uninterrupted cognitive focus and generate cumulative physical and emotional fatigue.

Survey evidence indicates that rising exam volumes are not followed by proportional increases in staffing, forcing technologists to assume workloads that were previously divided among larger teams. In Newfoundland and Labrador, a technologist reported that their department has been operating at only one-third of its normal staffing level for extended periods, noting that it has been "33% staffed for the past 8 to 9 months, with no end in sight. Workload is higher than ever for just one person." - *Nuclear Medicine Technologist, SPECT or CT, Newfoundland and Labrador.*

Similar patterns are described in New Brunswick, where a senior technologist with nearly four decades of experience indicated that the department is operating with five technologists fewer than required, while sustaining long waitlists, overbooking, and continuous pressure to accelerate throughput. They described the environment as "extremely poor in all regards. Overworked and understaffed (5 technologists short) has created a stressful, unhappy, and toxic work environment." - *Nuclear Medicine Technologist, 38 years, SPECT or CT and BMD, New Brunswick.*

These accounts indicate a widening gap between the complexity of nuclear medicine procedures and the resources available in many departments. As imaging pathways evolve and therapeutic activity increases, the absence of adequate staffing creates repeated scenarios where technologists must choose between maintaining throughput and preserving their own capacity to recover. This dynamic erodes morale and creates conditions where even highly experienced professionals begin to question the sustainability of their roles.

Staffing levels, scheduling pressures, and the limits of operational resilience:

Staffing shortages directly contribute to unpredictable scheduling, missed breaks, extended shifts, and limited access to vacation and professional development. When daily operations rely on minimal staffing, a single sick call can destabilize an entire schedule, forcing technologists to absorb unplanned workloads in real-time. This reactive operating model reduces work-life balance and leaves departments with little capacity to absorb future growth in PET or theranostic programs.

Survey results from Nova Scotia describe a setting where chronic understaffing has become a normalized condition. One technologist explained that the department relies on forced overtime, missed breaks, and repeated vacation denials to maintain service, noting that "forced OT in the form of missed breaks and staying past shift end. Vacation denials. No recognition of the struggle of burnout. We are short 3 FT technologists, but our workload is even higher than it was when we had a full staff." - *Nuclear Medicine Technologist, SPECT or CT, PET or CT, theranostics, Nova Scotia.*

These conditions reflect a broader trend in Canadian imaging departments. Scheduling pressure compounds in environments where the number of technologists is insufficient to support full rotation coverage, cross-training, backup capacity for hybrid imaging, or relief for sick calls. Some departments attempt to adjust by down booking cameras or delaying non-urgent exams, but this creates longer waitlists and additional pressure on the remaining technologists.

In Ontario, one team lead described the operational consequences of these conditions. The respondent noted that the workload is affected not only by staffing shortages but also by limited clerical support and inconsistent leadership attention, stating that "workload, poor clerical support. They have EAP, but you need strong leadership that addresses how you can change workload." - *Team Lead and RSO, 21 years, SPECT or CT, Ontario.*

This pattern illustrates that staffing issues are not limited to the number of technologists. Administrative support, timely scheduling adjustments, and operational responsiveness are central components of a functioning nuclear medicine service. Without these structures, technologists absorb secondary tasks that amplify their workload and reduce their capacity for patient-facing care.

Occupational risks, emotional strain, and the burden of clinical complexity:

Working conditions involve more than just the workload alone. Nuclear medicine technologists face consistent exposure to open radiation sources, frequent handling of radiopharmaceuticals, and compliance with radiation safety protocols that must be followed without interruption. The introduction of therapies increases radiation burden and adds responsibilities that extend beyond the technical execution of imaging. When staffing is insufficient, these tasks are often divided among fewer technologists, which raises the risk of fatigue-related errors and erodes the sense of safety that is essential for retaining experienced professionals.

Survey results highlight that emotional strain is also a major contributor to deteriorating working conditions. A technologist from Alberta with twenty years of experience in PET or CT imaging described simultaneous increases in patient volume, behavioral challenges, and technical complexity. They reported that "staffing decreases, and workload increases. The quality of techs hired is subpar, and most are unable to keep up with fast-paced working conditions." - *PET or CT Technologist, 20 years, SPECT or CT, PET or CT, CT, Alberta.*

British Columbia survey results reinforce this pattern. A senior PET or CT technologist emphasized that the cumulative effects of staffing shortages and insufficient support have shifted departmental culture away from patient-centred care, explaining that "staffing shortage, low morale, not feeling heard or supported by the employer. Focus no longer on patient care." - *PET or CT Technologist, 27 years, British Columbia.*

These observations suggest that emotional strain is no longer a secondary consequence of workload, but a primary factor shaping technologists' experience. When morale declines and staff feel disconnected from leadership, retention becomes increasingly fragile, especially in departments where imaging needs continue to grow.

Administrative burden, institutional support, and operational constraints:

Beyond clinical responsibilities, nuclear medicine technologists manage a wide range of administrative tasks. These include protocol preparation, equipment quality control, radiopharmaceutical documentation, coordination with porters and clerical teams, and communication with referring physicians. In well-staffed environments, these responsibilities are distributed across the team and supported by adequate clerical and administrative personnel. In understaffed environments, technologists must complete these tasks while sustaining full clinical workloads.

Survey evidence indicates that institutional support mechanisms are perceived as insufficient. Although employee assistance programs exist in many departments, technologists consistently report that these services do not address the root causes of burnout. Respondents expressed that meaningful support requires adequate staffing, improved scheduling flexibility, and tangible mechanisms to reduce workplace pressures.

Some departments face operational risks that extend beyond burnout. In Prince Edward Island, one senior technologist warned that continued staffing shortages and high workload could lead to a collapse of provincial nuclear medicine services, stating that "we are at the precipice of a complete department shutdown if we continue on our current trajectory. This would eliminate the service for the entire province." - *Nuclear Medicine Coordinator, RTNM and RTMR, 16 years, SPECT or CT and MRI, Prince Edward Island.*

This demonstrates that working conditions have implications far beyond staff morale. When staffing levels fall below the minimum threshold needed to maintain service, entire communities lose access to essential diagnostic testing and therapeutic services, including cardiac perfusion imaging, PET staging for oncology, and radioiodine therapy.

Effects on retention and morale:

Working conditions directly influence whether technologists choose to remain in their departments, remain in the profession, or seek employment in other provinces. The combination of high workload limited institutional support, emotional strain, and chronic understaffing creates a form of moral injury where technologists feel unable to practice safely or sustain the level of patient care they consider appropriate.

In New Brunswick, one technologist described this phenomenon clearly, stating that they are "being short-staffed, feeling invisible to the government, and there is no support because there is no one to hire. Literally no one." - *Nuclear Medicine Technologist, 16 years, SPECT or CT, PET or CT, bone density, New Brunswick.*

When technologists perceive that their concerns are not recognized and that institutions lack the capacity or will to address underlying issues, retention becomes fragile. Some experienced staff members reduce their hours, avoid additional responsibilities, or leave for less demanding roles in other imaging modalities or unrelated sectors. New graduates may hesitate to take positions in departments where working conditions appear unsustainable, which exacerbates existing shortages and increases operational vulnerability.

These dynamics align directly with the mobility patterns described in Section 7.2. Provinces with challenging working conditions, limited staffing, and restricted institutional support experience higher turnover and greater outward mobility, especially when combined with wage gaps that favour other jurisdictions. The cumulative impact is a cycle of instability that undermines long-term workforce planning and reduces the ability of departments to expand services in response to population needs, PET growth, or the introduction of new therapies.

Working conditions are a central driver of workforce sustainability in nuclear medicine across Canada. Survey evidence from six provinces demonstrates consistent patterns of high workload intensity, chronic understaffing, emotional strain, insufficient institutional support, and operational fragility. These pressures weaken morale and directly influence retention, creating a workforce environment that is increasingly difficult to stabilize. In several provinces, the conditions described risk compromising service delivery, delaying access to critical imaging and therapeutic procedures, and intensifying regional disparities in nuclear medicine capacity.

Working conditions and wages operate together to shape workforce stability. The pressures described in this section intensify mobility patterns outlined in Section 7.2, particularly in provinces where challenging working environments coincide with lower compensation. In these settings, technologists face both increased workload demands and reduced financial incentives to remain, accelerating turnover and weakening recruitment efforts. Conversely, even provinces with higher wages report instability when staffing, scheduling, and operational support do not keep pace with growing clinical complexity. The interaction between wages and working conditions, therefore, represents a central determinant of retention and must be assessed jointly to understand the dynamics of the provincial workforce.

7.4: New Brunswick Case: Workforce Collapse, Misclassification, and System-Level Risk:

Disclaimer: All quotations and statements in this section originate from survey responses collected by the CANM in 2025. The respondents have been anonymized to protect them from any retaliatory actions.

Structural Workforce Erosion and the Breaking Point of a Small Profession:

New Brunswick provides the most fully documented and severe example of nuclear medicine workforce destabilization in Canada. While all provinces face challenges related to aging staff, complex imaging demands, and rising theranostic workloads, New Brunswick's situation is distinguished by the convergence of long-term understaffing, wage stagnation, inequities in job classification, and the absence of a provincial training pipeline. The province's nuclear medicine workforce, numbering only a few dozen technologists across six Nuclear Medicine departments (Saint John, Moncton Hospital, Georges-Dumont, Fredericton, Bathurst, Edmundston), is collapsing under the weight of systemic neglect. Technologists describe a "breaking point," a term repeated across survey responses throughout 2024 and 2025. One respondent wrote, "Staffing levels have never been so low. We are short every single day. When someone calls in sick, there is no replacement. We are expected to finish everything anyway." This sentiment captures the daily reality of a profession operating far beyond safe capacity. This aligns with New Brunswick's rapidly aging and growing population, which continues to drive demand for PET/CT and SPECT imaging.

The scale of workforce erosion is extreme in the province's two PET/CT centres: Saint John Regional Hospital and the Dr. Georges-L.-Dumont Hospital in Moncton. The Saint John Regional Hospital (SJRH), historically one of the province's busiest nuclear medicine sites, requires approximately 9.5 full-time Nuclear Medicine Technologists (NMTs) to operate its hybrid SPECT/CT systems, PET/CT facilities, radiopharmacy functions, and bone densitometry operations. As of 2025, only 4.5 full-time technologists remain, supported intermittently by two retired technologists working three days a week. One of these retirees, Kelly Maloney, who previously worked across Newfoundland, Nova Scotia, and New Brunswick, returned to the department with her husband to help stabilize operations. Her testimony reflects a profound deterioration: "Since arriving, three technologists have gone out on indefinite stress leave and another retired two years early due to the stressful conditions." She also reports that one technologist was reassigned to another department "due to stress," leaving the department unable to fill longstanding vacancies. Her words echoed across dozens of anonymized survey responses describing exhaustion, anxiety, and a sense of hopelessness.

The Dr. Georges-L.-Dumont Hospital is experiencing a similar collapse. As of late 2025, only four full-time technologists remain to operate both Nuclear Medicine and PET/CT services. Despite offering a $ 20,000 signing bonus, three full-time vacancies received zero applicants, and a single sick call is sufficient to force the closure of the entire department for the day. Georges-Dumont is the province's second PET/CT hub and is essential to provincial oncology imaging capacity.

This widespread emotional strain is not limited to SJRH. Across Moncton and Fredericton, technologists report feeling demoralized and questioning their future in the profession. One respondent wrote, "I cannot encourage young people to enter this profession anymore. We are grossly underpaid, overwhelmed, and ignored. I am actively looking for a way out." Another technologist with 38 years of experience described watching younger colleagues "struggle to make it through the day" and expressed doubt that "many will make it to retirement."

New Brunswick's NMT workforce is not experiencing isolated burnout. It is experiencing a system-wide moral injury, the erosion of professional identity due to prolonged exposure to unsafe, undervalued working conditions. Technologists describe losing faith in the system, feeling invisible to decision-makers, and witnessing patient care decline as waiting times rise. One survey respondent wrote, "Patients are suffering because we cannot keep up. Our bone scan wait list is over a year. PET demand is rising, but we have fewer people each month." This narrative aligns with the province's demographic reality: an aging population, increasing cancer incidence, and the rapid expansion of theranostic programs requiring specialized NMT expertise. Between 2020 and 2023, technologists at the Dr. Georges-L.-Dumont Hospital submitted monthly letters to the Premier, Minister of Health, and multiple MLAs warning of the growing workforce crisis and classification concerns.

The return of retirees to frontline clinical roles underscores the severity of the crisis. Maloney describes witnessing "exhaustion and demoralization" each time she enters the department. Another retired technologist assisting casually explained that on many days in 2024, "only two or three technologists were available to run both PET and nuclear medicine." These accounts are not anecdotal outliers but consistent, repeated patterns across the province. New Brunswick is currently operating nuclear medicine services on a foundation that is structurally unsustainable and at imminent risk of collapse.

The Impact of Misclassification and Wage Injustice:

The release of New Brunswick's Joint Job Evaluation Study (JJES) in September 2024 marked a turning point in the province's nuclear medicine crisis. The JJES assigned Nuclear Medicine Technologists to Pay Band 4, grouping them with ophthalmic photographers and cardiology technologists. At the same time, every other Medical Radiation Technology (MRT) profession was placed at higher band levels. Diagnostic imaging technologists, sonographers, medical laboratory technologists, and radiation therapists were placed above nuclear medicine, and Magnetic Resonance Imaging (MRI) technologists were assigned Pay Band 6.

The decision, reconfirmed in November 2025 despite extensive appeals. The fact they were told that they did not have the qualifications/education of an MRT is described by NMTs as a profound blow to their professional identity. While supervisors cannot be directly quoted, multiple leaders across New Brunswick have reported that the JJES outcome has "deepened an already critical morale crisis" and signaled that the province "does not understand or value the complexity of nuclear medicine." The wage differential is severe: radiation therapists earn approximately 11.95 $ more per hour than NMTs, and MRI technologists earn approximately 4.61 $ more per hour. These disparities exist despite nuclear medicine technologists functioning as Nuclear Energy Workers, preparing and administering radioactive materials, performing complex hybrid imaging, and maintaining compliance with federal radiation safety regulations. Nuclear medicine technologists also carry therapeutic responsibilities in radiopharmaceutical therapy, which were not properly weighted in the JJES scoring.

Anonymized survey responses describe a sense of betrayal and humiliation. One technologist wrote, "Our pay band was lowered below every other MRT. We are the lowest paid NMTs in Canada. Why would anyone come here?" Another respondent stated, "Management has degraded the nuclear medicine profession by lowering our pay band. I do not feel valued at all." Numerous technologists expressed anger that the evaluation process allegedly assumed that nuclear medicine technologists "do not require the training of a medical radiation technologist," an error repeatedly referenced in survey responses and reported as a contributing factor to the misclassification.

The emotional impact of the JJES decision is evident in the raw testimonies. A technologist with nearly three decades of experience wrote, "We have sent letters for years. We have filled in every form they asked for. Last week, they told us again that we are worth nothing. I feel like nothing." Another wrote, "The decision has broken us. We are ready to walk out." These statements reflect a level of moral injury rarely seen in other MRT professions and underscore the unique psychological burden placed on New Brunswick's nuclear medicine workforce.

The JJES outcome also has long-term implications for workforce sustainability. Wage suppression reduces recruitment competitiveness, especially against neighboring Nova Scotia, where technologists earn roughly $ 5 more per hour and receive signing bonuses up to $ 30,000 plus relocation support. Survey respondents repeatedly warned that upcoming Dalhousie graduates from New Brunswick "will not return" without wage parity or incentives. Supervisors report similar concerns, noting that two locally based Dalhousie students graduating in 2026 and 2027 are already being targeted by out-of-province recruiters.

The misclassification decision fundamentally undermines the province's ability to rebuild its workforce. It signals that the nuclear medicine profession, despite its complexity and radiation risks, is valued less than all other MRT roles. For a profession already operating at half strength, the impact is catastrophic.

Wage inequity is not simply a financial issue; it is a structural force that accelerates attrition, discourages trainees, and destabilizes the province's long-term capacity to provide essential diagnostic and therapeutic services.

Operational Breakdown in Saint John and Moncton:

Operational strain has reached unsustainable levels across New Brunswick, but it is most visible in the two PET/CT centres, particularly in Saint John. The Saint John Regional Hospital not only functions as a primary diagnostic centre but also carries a growing PET/CT workload and is expected to integrate additional tracers and theranostic protocols. Yet the department is operating with fewer than half its required technologists. Anonymized survey responses describe daily operations as "chaotic," "dangerously understaffed," and "held together by the goodwill of exhausted technologists." One technologist wrote, "We work six days a week sometimes. We skip breaks. We run through our shifts with no downtime. We do overtime every week. It never gets better." Another stated, "The more we try to get ahead, the further behind we feel."

Waitlists reflect the operational collapse. Nonurgent bone scans now exceed one year, an interval that respondents describe as "unacceptable and unsafe." PET/CT delays are similarly severe, particularly for oncology patients. Survey respondents report that physicians call the department daily to request expedites for cancer staging or restaging, yet the department lacks the staff to increase throughput. One technologist wrote, "We have carte blanche to schedule overtime to reduce waitlists, but it makes no difference anymore. There are too many patients and not enough of us." The Georges-Dumont Hospital faces identical operational strain. A team of four technologists runs PET and Nuclear Medicine services, and the department reports that planned theranostic therapy cannot be launched until staffing levels improve.

The Saint John department's layout exacerbates the challenge. Several respondents noted that PET and nuclear medicine are located in separate spaces within the hospital, requiring technologists to move between departments despite staffing shortages. One respondent wrote, "Our space was poorly planned. It is inconvenient and unsafe for sick patients. It adds to our day and wears us down." Another noted that radiation safety responsibilities, including daily quality control and CNSC compliance requirements, fall heavily on a department that can barely staff its core imaging services.

Moncton faces similar pressures, though the pattern differs slightly. While staffing levels are less extreme than in Saint John, the erosion of morale following the JJES decision has compounded existing workload issues. Anonymized supervisory insights describe a department where technologists "struggle emotionally" with the knowledge that they were placed below every other MRT profession. Anonymized survey respondents report burnout levels "off the charts." Several reported returning from stress leave only to find that conditions had worsened. One wrote, "I came back from a five-month stress leave. Nothing had improved. I do not think I can stay."

A common theme across both regions is the fear of being unable to maintain safe practice standards as theranostic programs expand. Technologists repeatedly referenced the rise in radiation exposure since the introduction of PET/CT in New Brunswick. One respondent wrote, "My TLD readings have tripled. We are asked to do more without recognition or protection." Another stated, "We refuse to start new theranostics unless we get paid appropriately. We will not take on more radiation exposure for Band 4 wages." Departments recognize the importance of expanding theranostic services for cancer patients, but technologists describe a workforce physically and emotionally pushed past its limits.

Workforce Collapse and Expanding Waitlists in Bathurst

The situation at the Hôpital régional Chaleur in Bathurst illustrates how sustained understaffing, delayed equipment renewal, and recruitment failure converge into a level of operational instability that cannot be maintained. The Nuclear Medicine department requires 5 technologists on the floor each day to operate safely. For the last 2 years, the department has functioned with only 3 full-time technologists, a gap that has persisted despite posting 2 permanent positions continuously with no applicants. This structural shortfall forces the department to run 2 gamma cameras at full capacity with staffing levels intended for barely half that workload, and any delay, emergency add-on, or procedural complication can only be absorbed through overtime.

The operational strain is visible in every aspect of the clinical day. The supervisor reports that there is not a single week without multiple overtime entries. Staff regularly work extended shifts simply to prevent waitlists from growing beyond what oncologists consider acceptable. In one recent week, the supervisor documented working 9 hours, 12 hours, 12 hours, 12 hours, and 8 hours. These workloads illustrate how routine practice has shifted from sustainable schedules to chronic compensatory overwork.

To fill basic support roles, the X-ray department now provides an X-ray technologist each morning to manage patient preparation tasks such as IV insertion, changing rooms, and procedural setup. This cross-departmental assistance, while essential for maintaining flow, reflects the degree to which Bathurst has exhausted its internal capacity. The department hopes to secure a licensed practical nurse to formalize this support, yet this depends on approvals that have not been granted.

Bathurst is also affected by significant equipment challenges. The department is designed to operate 3 gamma cameras, but one of its SPECT/CT systems was broken beyond repair approximately 5 years ago. A replacement camera was purchased in July 2024, but as of November 2025, Management has not communicated where the new camera will be installed or provided a renovation timeline. Even once installed, current staffing levels do not allow for its full use. As a result, Bathurst remains unable to restore its intended imaging capacity.

Waitlists have risen to levels that technologists describe as unmanageable. When the current supervisor assumed the role in December 2022, Bathurst had 444 patients waiting for nuclear medicine procedures and 1,117 waiting for bone density. By November 2025, these lists had grown to 1,111 patients for nuclear medicine and 2,966 for bone density. Oncology bone scans became so delayed that oncologists raised formal concerns. In response, the department implemented a temporary measure to stop booking nonurgent nuclear medicine procedures in order to stabilize oncology throughput. More than 1 year later, this measure is still in place. Some nonurgent studies, including HIDA and gastric emptying procedures, have been waiting since 2023.

Despite these constraints, technologists continue to absorb the workload to protect patient care. Their willingness to work extended hours illustrates both their dedication and the severity of the system's reliance on unsustainable labour. A locum technologist briefly expressed interest in joining the department, yet accepted a position elsewhere, reflecting the competitive disadvantage New Brunswick faces within the national labour market.

The Bathurst crisis demonstrates how workforce shortages, equipment deficits, and delayed capital planning produce compounding effects that weaken diagnostic access, extend wait times, and intensify moral distress among staff. It also shows how small Nuclear Medicine departments, operating without redundancy, face disproportionately high risk when vacancies cannot be filled. Bathurst reflects a broader pattern across New Brunswick, where persistent understaffing and unresolved infrastructure needs are undermining the province's ability to sustain nuclear medicine services.

Burnout, Moral impact, and the Human Cost of System Failure:

The human impact of New Brunswick's nuclear medicine crisis is visible in every testimony collected for this White Paper. Technologists describe chronic exhaustion, compassion fatigue, hopelessness, and, in many cases an explicit desire to leave the field. One wrote, "I am not telling young people to take the course anymore. We desperately need help, but the government does not see our worth." Another wrote, "I love my job. I love my patients. But after 23 years, this is the worst I have ever seen. We are falling apart."

Several respondents described crying before work, feeling anxious on the drive to the hospital, and experiencing physical symptoms of burnout. One wrote, "I came back from stress leave and felt the same dread within a week." Another wrote, "The environment has become toxic. Nobody listens. We feel invisible." Emotional exhaustion is compounded by structural injustice: technologists repeatedly reference being paid "almost the same as admins," earning "far less than nurses" despite IV and therapy responsibilities, and being placed in a lower pay band "than every other MRT."

Moral injury is another defining feature of the crisis. Technologists express deep distress over being unable to provide timely care, particularly for oncology patients. One wrote, "People's cancers are progressing while they wait. We cannot keep up. It kills us emotionally." Another wrote, "We want to treat patients faster. We want to do more PET. But we cannot break ourselves any further." The gap between professional standards and the reality of daily practice creates emotional strain that cannot be resolved without structural change.

A particularly painful theme across testimonies is the perception of invisibility. Many respondents wrote that the public does not know nuclear medicine exists, that leadership does not understand the profession, and that governments do not see the complexity and risk inherent to the role. One technologist wrote, "Patients think we are nurses if we are women and doctors if we are men. Nobody knows what nuclear medicine is." Another wrote, "We are Nuclear Energy Workers. We give radioactive materials. We do hybrid imaging. We do therapies. And the province put us in Band 4."

These narratives reveal not just burnout, but a profound loss of professional identity and self-worth. Technologists who once expressed pride in their profession now describe feeling shame and discouragement. One veteran wrote, "When I was a new technologist, I was almost paid like a nurse. Now I am nothing." Another wrote, "I show up every day, but mentally I do not know how much longer I can do this." These testimonies illustrate a workforce in distress, attempting to protect patient care while absorbing the consequences of structural neglect.

Loss of Training Pipeline and Recruitment Failure:

New Brunswick's inability to rebuild its nuclear medicine workforce is directly tied to the closure of the NBCC Saint John Nuclear Medicine program in 2017–2018. It is important to understand that this program was a partnership between University of New Brunswick (SJ) and NBCC making it a 4-year Bachelor of Health Science degree.

Survey respondents identify this closure as the moment the workforce began to decline. Without a local training pipeline, New Brunswick relies entirely on external recruitment, primarily from Dalhousie University. However, Dalhousie offers only limited provincial seats, and survey respondents report that the program's cost, combined with higher wages elsewhere, discourages graduates from returning.

One respondent wrote, "We have one Dal seat per year. One. That does nothing for the crisis we have today." Another wrote, "Dal is excellent, but it is expensive. Students have debt. Why would they return to NB for lower wages?" Supervisory insights reinforce this concern. Two Dalhousie students in clinical rotation at Saint John are expected to graduate in 2026 and 2027. While supervisors hope to retain them, respondents believe they will be drawn to Nova Scotia or other provinces offering higher wages and substantial signing bonuses.

The absence of a training pipeline also limits opportunities for continuing education and advanced practice roles. Several respondents noted that they cannot attend conferences due to staffing shortages, cannot pursue certifications in PET, CT, or theranostics due to financial constraints or lack of institutional support, and cannot maintain hybrid practice competencies due to workload and scheduling pressures. One wrote, "No one has gone to a conference in six years. We are too short staffed." Another wrote, "I wanted to do more training, but we are so short that if I trained in MRI, I would get pulled there and NM would be even worse."

This lack of educational and career development opportunities further undermines recruitment and retention. Younger technologists report feeling trapped in roles with no advancement potential. One wrote, "I love nuclear medicine, but there is no future here. No way to move up. No support for training." Another wrote, "There are no casuals, no replacements, no pipeline. It is like they let the profession die." Without a structured training pathway, competitive wages, and retention incentives, New Brunswick faces a future where its nuclear medicine workforce continues to shrink as retirements accelerate.

Risk to Patient Care and Theranostic Capacity:

The implications of New Brunswick's nuclear medicine workforce crisis extend beyond staffing and morale. They directly threaten patient access to essential diagnostic and therapeutic services. Oncology care is particularly affected, as PET/CT is central to staging, restaging, and monitoring treatment response. Long waitlists delay diagnosis and treatment planning, contributing to poorer health outcomes. One technologist wrote, "We see cancers getting worse because we cannot scan on time. Patients suffer. It breaks our hearts."

New Brunswick is also one of the few provinces, alongside Prince Edward Island, that currently do not offer Ga-68 PET or Lu-177 therapies. Survey respondents and supervisory insights confirm that staffing shortages are the primary barrier. Departments cannot expand services when they cannot staff existing ones safely. One technologist wrote, "We will not start new theranostics unless staffing improves. We cannot take on more radiation exposure with Band 4 wages." Another wrote, "We want to provide these treatments. But without more technologists, it is unsafe." The Georges-Dumont Hospital explicitly reports that upcoming theranostic therapy for liver cancer cannot be launched due to insufficient technologist staffing.

Radiation safety obligations add further complexity. Daily quality control, CNSC compliance, contamination prevention, and therapy protocols require time, expertise, and staffing levels that New Brunswick departments do not currently possess. Several respondents noted that radiation exposure levels have increased significantly over the past decade due to the expansion of PET and hybrid imaging. One wrote, "Our exposure has tripled. We are more at risk now, and they lowered our pay band."

Without intervention, New Brunswick risks losing the capacity to sustain nuclear medicine services altogether. Survey respondents repeatedly expressed fear that departments will close entirely within the next decade. One wrote, "I see my department closing in the near future. There is no one left to continue the work." Another wrote, "We have not hired a new technologist since 2018. Everyone is leaving or retiring. What happens when the last of us are gone?" These testimonies illustrate a system on the verge of collapse, with consequences that extend far beyond staff well-being to the heart of patient care in the province.

Conclusion: A Province at the Brink of Losing a Critical Profession:

New Brunswick's nuclear medicine crisis is not theoretical or emerging. It is fully visible, fully documented, and already causing measurable harm to patients, technologists, and the provincial health system. Departments are operating with half their required staffing, retirees have returned out of necessity, technologists are on stress leave at unprecedented levels, and misclassification decisions have inflicted deep emotional injury on a workforce already burdened by radiation risks, hybrid imaging complexities, and a rising tide of theranostic responsibilities.

Anonymized survey respondents describe despair, exhaustion, and a loss of hope. Retired technologists working casually report witnessing "exhaustion and demoralization" each day. Supervisory insights confirm that technologists are leaving the profession, students are unlikely to return to New Brunswick after graduation, and waitlists for essential oncology imaging now exceed one year. Without immediate and decisive action, correcting classification, improving wages, reinstating a training pathway, and providing retention incentives, New Brunswick faces the imminent risk of losing its nuclear medicine workforce entirely. This case study demonstrates not only the severity of the crisis but also the urgency of intervention. New Brunswick stands at a turning point. The decisions made in the coming months will determine whether nuclear medicine in the province can be stabilized and rebuilt, or whether services will continue to erode until they can no longer meet the needs of patients who depend on them.

7.5 Union Agreements:

Collective bargaining agreements play a central role in defining wage structures, step progressions, classification categories, and working conditions for nuclear medicine technologists across Canada. Because nuclear medicine is integrated within broader medical radiation technologist bargaining units in most provinces, union agreements often shape salary outcomes and job classifications for the profession more directly than provincial labour ministries or individual employers. The result is a landscape where wage-setting mechanisms, market adjustments, reclassification processes, and negotiation cycles vary significantly across provinces. These contractual differences reinforce the disparity patterns documented in Section 7.1 and influence both mobility and retention trends presented in Sections 7.2 and 7.3.

Union agreements serve as the foundation upon which public sector nuclear medicine wages are built. They establish step structures that determine progression from entry-level positions to experienced technologist levels and define whether advanced practice roles, hybrid imaging responsibilities, radiopharmacy duties, or theranostic procedures are recognized within compensation frameworks. In many provinces, nuclear medicine technologists report that collective agreements have not kept pace with the profession's evolution. As hybrid imaging, PET, and theranostics expand, wage scales linked to earlier scopes of practice increasingly diverge from the demands of modern nuclear medicine.

Union agreements as determinants of wage structure:

Across Canada, nuclear medicine technologists are covered by a range of unions, including provincial chapters of CUPE, OPSEU, NSGEU, HSAA, SEIU, HGEU, and other regional entities. These unions negotiate multi-year agreements that specify annual increases, cost-of-living adjustments, and step-based wage progression. In many provinces, MRT bargaining units' aggregate radiography, MRI, radiation therapy, and nuclear medicine into unified classifications. While this model supports collective bargaining strength, it can result in wage structures that reflect the needs of the majority modality rather than the specific clinical and safety requirements of nuclear medicine.

As Section 7.1 demonstrated, wage disparities between provinces are significant, with Step 3 rates ranging from approximately $53 in Manitoba to approximately $31 in Québec. These gaps persist broadly because bargaining strategies, political environments, and union leverage differ across jurisdictions. Unions in resource-rich or higher-cost regions often secure more substantial wage settlements, while provinces facing budgetary constraints or low vacancy pressures negotiate more modest adjustments. Nuclear medicine technologists, therefore, experience wage progression that is partly determined by provincial economic conditions and partly shaped by the priorities of their bargaining units.

In several provinces, wage structures include classification systems that differentiate technologists by training or modality. However, nuclear medicine technologists consistently report that these classifications do not fully capture the complexity of their work. The absence of specific premiums or differentiated pay scales for PET, radiopharmacy, or theranostic procedures means that the unique responsibilities within nuclear medicine may not be adequately recognized. This misalignment between classification systems and practice reality contributes to dissatisfaction and affects retention, especially when technologists compare their compensation to that of other imaging modalities or neighboring provinces.

Provincial variability in negotiation outcomes:

The impact of union agreements varies widely across Canada. In provinces such as Manitoba, the Northwest Territories, British Columbia, and parts of Alberta, union negotiations have historically produced relatively strong wage settlements compared to other jurisdictions. These agreements contribute to the higher wages documented in Steps 1 through 3 in Section 7.1 and partially explain why these provinces attract technologists despite challenges related to geography, workload, or cost of living.

In contrast, provinces such as New Brunswick, Saskatchewan, and Québec have experienced protracted negotiation cycles, reclassification disputes, or wage adjustments that did not keep pace with changes in the scope of practice. The following statement from New Brunswick illustrates the consequences of these negotiation outcomes. A technologist with extensive experience described the results of two consecutive job studies, noting that "low morale and hopelessness after two sequential job studies done by our provincial government. The last one left us in a lower pay band than all other MRTs. A union and an association cannot help or won't. Multiple letters of support from Health Authorities and doctors did not help. Department of Health and Treasury Board seems to be the problem." - *Nuclear Medicine Technologist or Clinical Supervisor, RSO, SPECT or CT, PET or CT, Bone Densitometry, New Brunswick.*

This experience highlights how union negotiations and government evaluations can influence wage structures, ultimately affecting technologists' sense of professional value. When job studies or reclassification efforts place nuclear medicine technologists in lower pay bands relative to other MRTs, it creates structural inequities that fuel dissatisfaction, accelerate outward mobility, and reduce the attractiveness of available positions.

Saskatchewan technologists report similar challenges. A clinical instructor and supervisor described sustained stagnation in contract negotiations, stating that they have been "working short-staffed, never getting a raise, and having to do the same work for years without a raise," noting that offers to address workload through booking down only increased wait lists without improving working conditions. - *NM Clinical Instructor and Supervisor, 16 years, SPECT or CT, PET or CT, Saskatchewan.*

Such experiences highlight the variability of bargaining outcomes and demonstrate that wages and conditions negotiated at the provincial level have direct consequences for local retention and morale.

Union agreements and working conditions:

While union agreements are primarily wage instruments, they also regulate working conditions through provisions related to hours of work, overtime compensation, call-back procedures, shift differentials, scheduling rules, and access to vacation. These contractual elements shape daily operations and determine whether departments can offer predictable schedules and adequate work-life balance. In provinces where collective agreements provide flexible scheduling, adequate staffing protections, or limits on mandatory overtime, technologists report greater stability and morale. In provinces where agreements lack such provisions or where staffing shortages make implementation impossible, technologists experience higher levels of fatigue and stress.

Union agreements also influence the degree to which nuclear medicine technologists can refuse unsafe assignments, request schedule modifications, or seek support for heavy caseloads. However, several respondents noted that existing agreements often fail to capture the complexity of modern nuclear medicine practice. When workloads increase due to PET expansion or the introduction of radiotheranostics, collective agreements may not contain mechanisms that allow rapid adjustments to staffing models or compensation structures. Technologists in multiple provinces noted that staffing decisions and schedule management often fall outside the scope of what union agreements can address directly, particularly in situations where systemic shortages limit operational flexibility.

Recent trends in bargaining negotiations:

A review of recent negotiations across Canada reveals several trends affecting nuclear medicine technologists. Many provinces have adopted multi-year agreements with annual increases that remain below inflation, resulting in the long-term erosion of real wages. Cost-of-living adjustments are inconsistently included in agreements, leading to widening gaps between high-wage and low-wage provinces. In some jurisdictions, governments have opted for one-time retention or signing bonuses instead of structural wage increases, which temporarily offset recruitment pressure but do not correct underlying wage disparities.

Another trend is the uneven application of market adjustments. Some provinces have introduced targeted increases for MRI or CT technologists but have not extended equivalent adjustments to nuclear medicine, despite comparable clinical complexity and radiation responsibilities. This contributes to frustration among nuclear medicine technologists, who observe that other imaging modalities are receiving recognition for expanding their scopes of practice, while nuclear medicine classifications remain static.

Reclassification disputes have also emerged as a significant issue. In provinces like New Brunswick and Saskatchewan, job studies have resulted in technologists being placed in lower wage bands or experiencing long delays in wage corrections, which directly affects retention. Negotiations in other provinces show increasing tensions between budget constraints and workforce needs, with arbitration processes becoming more common as unions seek to address wage stagnation and workload issues.

These trends suggest that collective bargaining outcomes are not uniform and that the capacity of unions to secure improvements for nuclear medicine technologists varies depending on the provincial context, political climate, and the structure of bargaining units.

System-level consequences:

The role of union agreements in shaping wages and working conditions has system-wide implications. In provinces with weaker wage settlements or delayed reclassifications, nuclear medicine technologists may experience greater pressure to relocate, contributing to the interprovincial mobility described in Section 7.2. In provinces with challenging working conditions and union agreements that do not effectively safeguard scheduling or workload, the burnout pressures outlined in Section 7.3 intensify. Conversely, strong union agreements can mitigate some of the staffing and retention challenges by providing competitive wages, predictable scheduling, and precise mechanisms for addressing workload.

Collective agreements, therefore, serve as both protective instruments and potential sources of structural rigidity. Their impact depends on how well they align with the evolving demands of nuclear medicine practice and whether they can adapt quickly enough to reflect changes in scope, technology, and patient volumes. As provinces expand PET capacity and introduce new radiotheranostic programs, the ability of union agreements to support recruitment and retention will become increasingly important. Stable and responsive bargaining frameworks will be essential to maintaining equitable access to nuclear medicine services across Canada.

7.6 Consequences of Workforce Loss to Industry and Service Disruption:

The transition of nuclear medicine technologists from public hospitals to private-sector roles contributes to service disruptions that affect patient care across Canada. Nuclear medicine departments depend on small, specialized teams. When technologists depart, especially those with expertise in PET/CT, radiopharmaceutical preparation, or advanced SPECT applications, departments often cannot maintain full operating capacity. This results in reduced camera hours, extended wait lists, and delayed access to essential diagnostic services.

CIHI's workforce data shows that imaging professions already operate with constrained staffing baselines, particularly in provinces with smaller populations or limited academic infrastructure (CIHI, 2025). In these jurisdictions, the migration of even one technologist can significantly reduce service availability. Saskatchewan's Market Supplement Review Committee highlighted that recruitment and retention challenges are intensified by labour competition and may lead to service gaps that disproportionately affect smaller centres (Saskatchewan MSRC, 2024). These findings align with patterns observed in multiple provinces where technologist departures have forced departments to modify schedules or postpone the commissioning of new technologies.

Service disruption has direct clinical implications. Nuclear medicine plays a critical role in oncology staging, cardiac diagnostics, and chronic disease management. Delays in bone scans, perfusion studies, or PET imaging can postpone treatment decisions and create uncertainty for patients undergoing evaluation for cancer or cardiac conditions. CAMRT has documented that workload pressures and staffing shortages affect imaging professionals' ability to provide timely care (CAMRT, 2023). As technologists leave for industry roles, these pressures intensify, further compromising access.

Workforce loss to the industry also affects long-term service development. PET expansion, radiotheranostics, and new hybrid imaging technologies require stable staffing levels and technical expertise. Departments with high turnover may be unable to conduct training, implement new protocols, or maintain quality assurance programs. This slows the integration of new imaging modalities and widens the gap between provinces that can sustain expansion and those that struggle due to staffing constraints.

These consequences occur in a context where national training capacity is limited, and an aging population increases demand for complex imaging. When the public system loses technologists to non-clinical roles, the imbalance between population needs and service capacity deepens. Recognizing this dynamic is essential for designing policies that strengthen retention and mitigate the risk of service disruption.

National Workforce Stabilization Strategy (2025-2035)

Chapter

8

Chapter 8: National Workforce Stabilization Strategy (2025–2035)

8.1 Competitive Compensation and Reduction of Provincial Wage Gaps:

Provincial wage disparities remain one of the strongest structural determinants of workforce instability in nuclear medicine. As shown in Section 7.1, Step 3 hourly wages range from $53.45 in Manitoba to $29.10 in New Brunswick. This represents a national spread of almost 84%. These differences influence mobility decisions, retention patterns, and the ability of provinces to sustain PET, SPECT, and theranostic services.

Compensation is a primary factor shaping early career mobility. Technologists in low-wage provinces consistently compare provincial wage scales before accepting or declining positions. Survey respondents reported wage compression relative to other imaging professions. They noted that compensation no longer reflects the technical and safety requirements of hybrid imaging, radiopharmaceutical preparation, radiation protection, and therapy-related duties. These conditions accelerate outward mobility toward higher-paying jurisdictions.

Mid-wage provinces face instability when increased workload complexity is not matched by compensation progression. PET growth, SPECT or CT integration, and theranostic responsibilities require advanced skills, but wage structures remain tied to earlier scopes of practice. As a result, technologists in these provinces frequently migrate to regions with better alignment between duties and compensation.

High-wage provinces attract graduates but face retention pressures due to high costs of living or geographic barriers. Wage strength improves recruitment but does not guarantee long-term stability without supportive working conditions.

Reducing wage disparities requires coordinated action in 3 areas:

1. Provinces must narrow the most significant gaps to reduce persistent outward mobility from low-wage regions.
2. Classification structures must be updated so that compensation reflects the competencies required in contemporary nuclear medicine practice.
3. Targeted incentives such as retention premiums, rural or remote bonuses, and adjustments for PET and therapy responsibilities can support stabilization where shortages are most severe.

Competitive and coherent wage structures are essential for maintaining a stable national workforce and preventing widening inequities in access to PET and radiopharmaceutical therapies.

8.2 Improved Working Conditions and Staffing Stability:

Working conditions are a primary determinant of retention, morale, and long-term workforce stability in nuclear medicine. As demonstrated in Section 7.3, technologists across multiple provinces report high workload intensity, staffing shortages, limited scheduling flexibility, and rising emotional strain. These pressures are amplified by the expansion of PET, SPECT, and CT integration, as well as new radiopharmaceutical therapies. Without improvements in workplace conditions, wage adjustments alone cannot stabilize the workforce.

Staffing instability directly affects daily operations. When departments operate with minimal staffing, a single absence can reduce camera availability, extend wait lists, and increase the burden on remaining technologists. Survey respondents described missed breaks, prolonged shifts, denied vacation requests, and difficulty maintaining safe practice standards. Several departments reported functioning with 30% to 50% of required staffing, creating sustained operational fragility.

Workload intensity continues to increase as imaging procedures become more complex. Hybrid imaging requires technologists to manage CT acquisition, image fusion, dose optimization, and quantitative analysis. Radiopharmaceutical therapies entail responsibilities in radiation protection, patient management, room preparation, contamination control, and post-therapy monitoring. These tasks require uninterrupted concentration and lead to cumulative fatigue when staffing levels are insufficient.

Improved working conditions require strategic action in 4 areas:

1. Baseline staffing stability must be restored so departments can maintain full schedules without relying on continuous overtime or crisis-driven scheduling.
2. Predictable scheduling models must ensure protected breaks, equitable workload distribution, and reliable access to vacation and training.
3. Supportive operational structures such as adequate clerical staff, streamlined protocols, and defined responsibilities can reduce administrative burden and reinforce clinical focus.
4. Protected education and professional development time is essential to maintain safety and keep pace with PET, SPECT, or CT, and therapeutic practice requirements.

Strengthening working conditions is essential for retaining experienced technologists, supporting new graduates, and ensuring the safe delivery of diagnostic and therapeutic services. Stability at the departmental level creates the foundation required for PET expansion, theranostic readiness, and equitable access to nuclear medicine across Canada.

8.3 Expansion and Modernization of Education and Training Capacity:

Canada's nuclear medicine workforce cannot be stabilized without a significant expansion and modernization of national training capacity. As demonstrated in Sections 6.1 and 6.2, the country graduates only 50 to 70 technologists per year across five accredited programs, a level far below national replacement requirements and insufficient to sustain growth in PET, hybrid imaging, and radiopharmaceutical therapies. Training capacity is structurally limited by seat availability, clinical placement shortages, faculty constraints, and competency frameworks that do not reflect contemporary imaging and therapy practice.

Modernization is essential for three reasons. First, PET is now a central component of oncologic imaging, yet several programs offer minimal hands-on PET exposure due to restricted placement availability. Second, radiopharmaceutical therapies require specialized competencies that remain largely absent from entry-to-practice training, resulting in extended onboarding requirements for clinical departments. Third, hybrid imaging and quantitative PET have become standard in both diagnostic and therapeutic pathways, but many graduates report limited exposure to these modalities during their education.

Expanding capacity and modernizing curricula require coordinated investment and shared responsibility across educational institutions, governments, and industry in 4 areas:

1. Increased student seat capacity supported by targeted funding from provincial and federal governments to meet growing workforce needs. Provinces without NMT programs must benefit from interprovincial seat-purchase agreements to avoid long-term workforce erosion.
2. Strengthening clinical placement availability across PET, SPECT, or CT, radiopharmacy, and therapy sites. Government and industry partners must contribute funding for preceptor support, protected supervision time, and dedicated training environments that do not compromise service delivery.
3. Modernized curricula aligned with contemporary practice, requiring updated competency profiles and coordinated input from regulators, clinical leaders, and educational experts.
4. Investment in faculty recruitment and infrastructure, including simulation laboratories, radiopharmacy training facilities, and hybrid imaging technology. Governments, industry partners, and academic institutions should jointly fund these upgrades to ensure national readiness.

Training capacity cannot grow without direct government investment, committed participation from clinical sites, and structured collaboration with industry. Expanding and modernizing education is a national priority because it forms the foundation of PET readiness, theranostic adoption, and equitable access to nuclear medicine across Canada. Without a larger and better-prepared workforce, provinces will remain unable to sustain baseline operations or meet future clinical demand.

8.4 Enhanced Workforce Mobility and Regulatory Alignment:

Interprovincial mobility is essential for stabilizing Canada's nuclear medicine workforce, as demonstrated in Section 7.2; compensation differences, working conditions, and geographic factors all influence where technologists choose to work. However, regulatory processes also shape mobility and can either support or hinder the redistribution of personnel between provinces. Modernizing these processes is necessary to ensure that Canada can respond to workforce shortages, maintain service continuity, and implement PET and radiopharmaceutical therapies across all jurisdictions.

Regulatory frameworks currently differ across provinces in terminology, documentation requirements, timelines, and expectations related to entry-to-practice and competency recognition. These inconsistencies slow mobility and create administrative barriers for technologists seeking to relocate. Survey respondents noted delays ranging from several weeks to several months, even when moving between provinces with similar scopes of practice. In regions experiencing chronic shortages, such delays directly affect access to care and increase operational strain.

Enhanced regulatory alignment requires actions in 4 areas:

1. Streamlined licensure pathways that reduce administrative delays, simplify documentation, and support efficient recognition of credentials for technologists relocating between provinces.
2. Harmonized competency expectations that reflect contemporary nuclear medicine practice, including PET, hybrid imaging, and radiopharmaceutical therapies, so that mobility decisions are based on workforce needs rather than regulatory inconsistencies.
3. Coordinated collaboration between regulators to share information, align processes where possible, and establish consistent expectations for practice readiness.
4. Integrated mobility mechanisms that allow technologists to respond rapidly to acute shortages, temporary service interruptions, or PET and therapy expansion needs without compromising patient safety.

Regulators play an essential role in protecting the public, but they also contribute directly to national workforce planning. Modernized mobility pathways allow provinces with limited training capacity or chronic vacancies to recruit more effectively. They also support early-career technologists seeking opportunities to gain PET or radiopharmaceutical therapy experience in higher-volume centres before returning to their home provinces.

Enhanced regulatory alignment strengthens equity across Canada. It reduces the administrative barriers that intensify workforce disparities and creates a more coherent national labour market, enabling technologists to move efficiently in response to clinical demand. Streamlined, coordinated, and practice-aligned regulatory processes are essential for sustaining imaging and therapy services and for supporting the long-term goals of the national workforce strategy.

8.5 National Workforce Data and Intelligence Infrastructure:

Canada lacks a unified workforce and wait-time intelligence system capable of supporting national planning for nuclear medicine. As demonstrated in Sections 2, 3, and 5, the absence of consistent, transparent, and timely datasets prevents planners from accurately evaluating staffing deficits, predicting retirements, tracking mobility, or measuring the clinical impact of delayed exams. Current data systems are fragmented across regulators, educational institutions, health authorities, and clinical programs, resulting in incomplete visibility of the NMT workforce and inconsistent reporting of PET or SPECT wait times.

A national data infrastructure must address 5 essential gaps:

1. Accurate measurement of workforce size and distribution, including the number of full-time, part-time, casual, and non-clinical NMTs working in radiopharmacy, research, industry, and regulatory roles. Section 2 demonstrated that incomplete datasets obscure actual shortages and complicate recruitment planning.
2. Retirement forecasting and demographic modelling aligned with the age profiles described in Section 3. Canada requires a real-time mechanism to predict retirement waves and quantify future replacement needs.
3. Comprehensive visibility into clinical service volumes, including PET or CT, SPECT or CT, bone densitometry, and emerging radiopharmaceutical therapy. Section 4 highlighted that rapid modality expansion cannot be planned for without accurate activity data.
4. Consistent, publicly available wait-time reporting for PET, SPECT, and therapy services. Section 5 demonstrated that national visibility into wait times is inconsistent, hindering evidence-based investment decisions.
5. Integration of workforce mobility and attrition tracking, aligned with the trends documented in Section 7.2 and Section 7.6. Canada requires the ability to quantify interprovincial flows, departures to industry, and the conditions that accelerate turnover.

To close these gaps, Canada requires a coordinated data architecture supported by regulatory bodies, provincial health systems, professional associations, and industry partners. This system must define standardized data elements, reporting schedules, and transparent publication requirements, similar to those of other national health datasets. It must also include a structured interface for educational institutions to report annual enrolment, seat availability, graduation rates, and placement capacity, supporting the training expansion needs described in Section 6.

A national workforce data and intelligence infrastructure must fulfil three functions.

1. Planning: Provide governments with reliable indicators to forecast staffing needs, evaluate the adequacy of current training capacity, and support strategic expansion of PET and radiopharmaceutical therapy.
2. Accountability: Enable measurable tracking of progress in workforce stabilization, training expansion, and retention outcomes across provinces.
3. Equity: Allow Canadians to access consistent information on wait times and service availability regardless of provincial jurisdiction.

A nationally coordinated workforce intelligence system is essential for a profession as highly specialized and strategically crucial as nuclear medicine. The absence of unified datasets makes it difficult to assess risk, anticipate shortages, or design targeted interventions. A coordinated national platform enables Canada to transition from reactive management to evidence-driven planning, ensuring that PET, SPECT, or CT, and radiopharmaceutical therapy services remain accessible and sustainable across all provinces.

8.6 Establishment of the National Coalition for Nuclear Medicine Council (NCNMC):

The creation of the National Coalition for Nuclear Medicine Council represents the most significant structural advancement for the profession in more than two decades. As demonstrated throughout Sections 2 to 7, Canada's nuclear medicine workforce challenges are systemic, multi-jurisdictional, and interconnected. They cannot be addressed through isolated provincial initiatives or short-term interventions. A national governance mechanism is required to coordinate efforts, maintain continuity, and ensure that training, regulation, service delivery, and workforce planning evolve together rather than in parallel.

The NCNMC, now incorporated as a federal not-for-profit body, provides this governance foundation. It brings together regulators, educators, clinical leaders, professional associations, and industry partners within a single structure that can guide long-term planning and implementation. Its mandate includes strengthening the workforce, supporting interprovincial mobility, promoting innovation in diagnostic and therapeutic technologies, coordinating national data reforms, and ensuring equitable access to PET, SPECT, or CT, and radiopharmaceutical therapy across all provinces and territories.

Four structural findings from earlier sections directly support the need for this governance mechanism:

1. Provincial workforce fragility, as evidenced in Sections 2 and 3, requires coordinated national planning to ensure that smaller provinces and regions with limited training capacity are not left behind.
2. Rapid practice evolution, outlined in Section 4, demands alignment between regulatory bodies, educational institutions, and clinical programs to integrate hybrid imaging, PET, and radiopharmaceutical therapies into national training and competency frameworks.
3. Operational pressure and service instability, described in Sections 5 and 7, require unified workforce strategies that can respond to shortages, support retention, and coordinate relief for departments experiencing critical deficits.
4. Fragmented data systems, as detailed in Section 8.5, must be replaced by a nationally coordinated intelligence platform overseen by a central governance body that maintains quality, transparency, and accountability.

The NCNMC is uniquely positioned to address these needs. It can unify stakeholders who historically operated independently, streamline planning timelines, and provide structured oversight of national initiatives that require long-term consistency. This includes monitoring provincial implementation of PET expansion, standardizing mobility pathways, supporting modernized training capacity, and ensuring that workforce stabilization remains aligned with patient access and clinical quality.

To fulfil this role, the NCNMC requires sustained involvement from provincial governments, federal partners, regulators, educational institutions, and industry. Its governance model must ensure continuity, stable representation, and the authority to make evidence-based recommendations on workforce and service planning. As nuclear medicine evolves and radiopharmaceutical therapies expand, Canada will require an institution capable of coordinating investments, aligning priorities, and monitoring progress across jurisdictions.

The establishment of the NCNMC marks the transition from fragmented provincial responses to a coordinated national approach. It positions Canada to stabilize its Nuclear Medicine Technologist workforce, modernize training, support mobility, build national data systems, and ensure equitable access to advanced diagnostic and therapeutic services. Strengthening the NCNMC as the permanent governance mechanism is essential to realizing this strategy and sustaining the future of nuclear medicine across Canada.

Final National Recommendations

Final national recommendations

Endorsed by the Multi-Stakeholder Panel from Session 2: Technologist Workforce Shortage - CANM 2025 Annual Scientific Conference, Halifax

The recommendations presented below represent the unified national position of nuclear medicine regulators, educators, clinicians, industry partners, and professional associations who contributed to Session 2 of the 2025 CANM Annual Scientific Conference. Their contributions confirmed that the structural pressures outlined in the previous sections are experienced consistently in every province and across all operational settings.

Together, these recommendations establish a coordinated national course of action. They address immediate operational needs, reinforce system stability, and provide the foundation for a sustained governance and planning framework that supports the long-term development of molecular imaging and theranostics in Canada. They are also fully aligned with the creation of the National Coalition for Nuclear Medicine Council, now incorporated as a federal not-for-profit organization, which will serve as the national governance body responsible for guiding, monitoring, and reporting on the implementation of these recommendations.

Recommendation 1

Expansion of Training Capacity as a National Priority:

Canada must significantly increase the number of Nuclear Medicine Technologists trained each year to sustain diagnostic and therapeutic nuclear medicine services over the next decade. Current graduation volumes fall well below replacement levels and do not meet the needs generated by retirements, population growth, and the expansion of PET, SPECT, and radiopharmaceutical therapy. Provinces rely on small, highly specialized teams, and any further decline in the education pipeline will directly undermine cancer care pathways, cardiology diagnostics, and access to emerging therapeutics. Governments should jointly support a structured expansion of training capacity through increased student seats, modernized simulation laboratories, strengthened radiopharmacy teaching environments, and improved availability of clinical placements across all regions. Provinces without local programs should have guaranteed access to stable, interprovincial seat-purchase agreements that allow their workforce to develop at a rate consistent with service demand. A coordinated national approach to education expansion is essential to maintain continuity of care, avoid service interruptions, and ensure that all Canadians continue to benefit from timely, high-quality nuclear medicine services.

Recommendation 2

Creation of a Coordinated National Intelligence and Data Governance Platform for Nuclear Medicine Workforce and Service Access

Canada requires a coordinated national intelligence system that creates and maintains structured communication channels between federal and provincial ministries, regulators, health authorities, educational institutions, professional associations, employers, and clinical departments. The current fragmentation of nuclear medicine information across these actors prevents accurate forecasting, limits coordinated planning and restricts the ability of governments and institutions to stabilize the workforce or guide PET and SPECT service development. With federal support, the Canadian Association of Nuclear Medicine (CANM), acting through the National Coalition for Nuclear Medicine Council (NCNMC), should lead the development, implementation, and maintenance of a national data platform designed to consolidate and align workforce indicators, mobility patterns, training capacity, vacancy durations, and operational wait times. Establishing this system would provide all stakeholders with consistent national indicators, reinforce evidence-based decision making, and give ministries, institutions, and clinical departments the visibility required to anticipate risks, guide investments, and ensure equitable access to nuclear medicine services across Canada.

Recommendation 3

Harmonization and Modernization of Provincial Regulatory Frameworks to Align Licensing Standards and Strengthen Interprovincial Mobility

Canada must adopt a coordinated approach to regulatory harmonization so that nuclear medicine technologists can move efficiently between provinces in response to workforce needs. Provinces currently maintain different licensing requirements, documentation processes, and recognition pathways, which complicate interprovincial mobility and weaken recruitment efforts in jurisdictions with limited training capacity. Each province should adapt its regulatory framework to align core competency expectations and simplify mobility procedures so that technologists can obtain licensure in a predictable and timely manner. Regulatory bodies must lead this process by collaborating on common standards, coordinated documentation requirements, and modernized pathways that reflect the profession's shared clinical competencies. Ministries should support and mandate this work to ensure that regulatory harmonization becomes a national priority. Strengthening regulatory alignment is essential to improving mobility, stabilizing provincial workforces, and ensuring consistent access to nuclear medicine services across Canada.

Recommendation 4

National Standards for Safe and Sustainable Nuclear Medicine Staffing

Canada must establish national staffing standards that reflect the operational complexity and clinical responsibilities of contemporary nuclear medicine services. Persistent understaffing has reduced operating hours, increased overtime, contributed to burnout, and limited departments' ability to operate PET and SPECT services safely and in parallel. Provinces currently rely on varied staffing approaches that do not account for hybrid imaging requirements, radiopharmaceutical preparation, daily quality control, therapeutic workflows, and the volume of examinations performed per scanner. With governmental support, the Canadian Association of Nuclear Medicine (CANM) should develop evidence-based staffing benchmarks defining the minimum number of technologists required to ensure the safe, consistent, and sustainable delivery of nuclear medicine services across all jurisdictions. Adopting these standards would help protect patient safety, strengthen recruitment and retention, reduce turnover, and provide ministries with a clear operational reference for planning, funding, and monitoring service performance nationwide.

Recommendation 5

National Monitoring of Emerging Innovations in Nuclear Medicine

Canada should establish a structured national monitoring process to evaluate emerging industry-led innovations that may influence staffing models, workflow organization, radiopharmaceutical production, and clinical integration in the coming years. These initiatives remain at an early stage and require systematic observation before any coordinated alignment or adoption is considered. The Canadian Association of Nuclear Medicine (CANM), acting through the National Coalition for Nuclear Medicine Council (NCNMC), should coordinate this monitoring effort by assessing the relevance, feasibility, and safety of new approaches in collaboration with clinical leaders, provincial regulators, and health authorities, and by providing periodic reports to federal and provincial ministries to support long-term workforce planning. As the NCNMC progresses through its development phase, it will provide an emerging platform for structured national collaboration and can progressively integrate this monitoring function as its mandate, participation, and operational capacity mature. A measured and nationally coordinated monitoring process would help identify credible innovations, reduce the risk of premature implementation, and ensure that future decisions support national workforce stabilization and the sustainable development of nuclear medicine services across Canada.

Endorsement page

The undersigned affirm that these Final National Recommendations represent a unified national consensus and endorse their PET/CT as Canada's coordinated national strategy for stabilizing and strengthening the Nuclear Medicine Technologist workforce.

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- **Mina Bechai**

Founder and Chief Executive Officer (CEO)
INITIO Medical Group

Statements from the workforce:

The following statements have been anonymized, consolidated, and edited solely for clarity. Personal identifiers have been removed to protect respondents from any potential professional repercussions. These statements reflect authentic testimony from professionals working within the nuclear medicine field across all provinces of Canada.

- « Professional burnout is exacerbated by increasing our workload and departures with no incoming new staff but plenty more exams. »
  NMT (CTIC, PET/CT, SPECT/CT, BMD, DEXA), 17 years, Newfoundland and Labrador

- « Staff shortages combined with increasing demand for imaging have created a bottleneck. There is a lack of support within the institution to address this increasing issue. »
  Medical Imaging Healthcare Consultant (former NMT/PET/CT), 7.5 years, New Brunswick

- « I would say we are still not a well-understood expertise. Sadly, our own provincial government repeatedly refers to us as "technicians." »
  Nuclear Medicine Cardiology Technologist (SPECT), 41 years, Alberta

- « Attentes élevées de l'employeur sans reconnaissance de notre valeur et de notre travail. »
  Technologue en médecine nucléaire, Québec

- « The overall workload is becoming unmanageable, especially with the added responsibilities of hybrid imaging and complex scans. »
  NMT (PET/CT, SPECT/CT, CT), New Brunswick

- « We don't see the end of the tunnel. They want to add theranostics, but we are already underwater. Management does not understand what we do and all the responsibilities that come with it. »
  Radiation Safety Officer and PET Supervisor (SPECT/CT, PET/CT), 23 years, New Brunswick

- « Lack of staff mainly. While management has been very good with trying to get us a break, there are no plans to help support the issue. »
  NMT (SPECT/CT), Newfoundland and Labrador

- « Je me sens comme si je travaillais dans une usine : les patients sont devenus des numéros et nous avons perdu du temps par patient pour maximiser la productivité. »
  Technologue en médecine nucléaire (SPECT-CT, PET-CT), 13 ans, Québec

- « Low staffing, imbalance, workload, aging equipment, lack of recognition, and lack of monetary compensation. »
  MRT(N) (SPECT/CT, PET/CT), 26 years, Ontario

- « Thank goodness for the retirees who are on the casual list. »
  NMT (gamma cameras, SPECT/CT, theranostic including I-131, radium, Pluvicto), British Columbia

- « Constant upheaval, changes in operations, understaffing, and a patient load that seems never-ending. »
  Manager (SPECT/CT, gamma cameras, PET/CT), 17 years, Newfoundland & Labrador

- « Too much to do, too little staff to do it, and insufficient compensation. »
  NMT (SPECT/CT, PET), 29 years, Nova Scotia

- « Staffing shortage, low morale, not feeling heard or supported by the employer. The focus is no longer on patient care. »
  NMT (PET/CT), 27 years, British Columbia

- « We do not have enough staff to support normal operations. We are constantly forced to turn down bookings because staff keep leaving or taking stress leaves. »
  NMT (SPECT/CT, PET/CT), Saskatoon, Saskatchewan

- « Le manque de technologues nous frappe de plein fouet : la charge de travail augmente sans cesse et plusieurs quittent le métier parce que nous ne sommes pas assez rémunérés au Québec. »
  Technologue en médecine nucléaire (SPECT-CT, PET-CT), 5 ans, Québec

- « Mistakes by administrative staff or doctors affect how we are able to deliver patient care, combined with heavy workloads. »
  Senior NMT and Radiation Safety Officer (SPECT, SPECT/CT, CT), 4.5 years, Alberta

- « Workload keeps increasing with less staff. Low morale and hopelessness. Very frustrated and hopeless. Multiple mental health leaves. »
  NMT and Clinical Supervisor, Radiation Safety Officer (SPECT/CT, PET/CT, bone densitometry), New Brunswick

- « Workload, lack of support from management, and no real sustainable change. »
  Charge NMT (SPECT/CT), 29 years, Ontario

- « Not being valued, outdated equipment. »
  Technologist (SPECT/CT, PET/CT), British Columbia

- « Not enough experienced staff, lack of strong leadership, very few voices advocating for NMTs, and overall low morale leading to a toxic workplace. »
  NMT (SPECT/CT), British Columbia

- « The amount of overlap expected between modalities in rural sites is unsafe. We are often completely alone, cross-covering multiple roles with no support. »
  NMT and MRI Technologist, 5 years, Nova Scotia

- « Absence de reconnaissance, mauvais salaire, blessures au travail parce qu'on n'a pas les ressources nécessaires. »
  Technologue en médecine nucléaire, Québec

- « Workload certainly contributes to burnout, but it is currently the feeling of being undervalued that has caused our burnout to skyrocket. »
  Nuclear Medicine Supervisor (SPECT/CT, CT, gamma cameras), 23 years, New Brunswick

- « Too many different computer systems to log into, and constant workflow pressure from radiologists instead of department-led supervision. »
  RTNM, MRT(N) (SPECT/CT), 37 years, Ontario

- « Current issues with the government of New Brunswick and our union, relating to the professional declassification of Nuclear Medicine technologists, have created a crisis in morale and retention. The New Brunswick Treasury Board has concluded that because our work is heavily regulated by the CNSC, we fall into the lowest category for decision-making. Regarding this declassification, our pay now falls far below neighboring provinces. Nuclear Medicine is a highly technical profession, and the lack of understanding from those who have control over our classification is appalling and demoralizing. Additional sources of stress include high patient volume, short staffing, equipment downtime… urgent cases… and delays in generator deliveries. »
  NMT (gamma cameras, SPECT/CT), 22+ years, New Brunswick

- « Understaffing and underappreciated by AHS and the government. We are not being paid what we are worth. »
  NMT (SPECT/CT, PET/CT), 3 months, Alberta

- « Les restrictions budgétaires limitent nos services pendant que les coûts des isotopes explosent, mais la médecine nucléaire reste peu comprise et peu reconnue, même si la demande pour le TEP/TDM et les thérapies théranostiques augmente rapidement. »
  Chef de service (SPECT/TDM, TEP/TDM), 35 ans, Québec

- « Inconsistent patient schedules, patient no-shows, and older technologists and physicians averse to change. »
  NMT (SPECT/CT, PET/CT), 27 years, Ontario

- « Not compensated enough for our level of expertise. We perform CT scanning and therapeutic procedures while getting paid less than almost every other modality. »
  NMT (PET/CT, SPECT/CT), 1 year; British Columbia

- « I think the quality of student graduating now is not as great as it has been in the past. Many are not learning as quickly and are missing foundational skills, which results in a large amount of mistakes. It is quite scary how bad they are at the job. »
  NMT (SPECT/CT, PET/CT, CT), Province Anonymized

- « Salaire ne suivant pas le coût de la vie, imposition de tâches supplémentaires, absence de reconnaissance, surcharge de travail due à la recherche au centre hospitalier où je travaille. »
  Coordonnateur technique en médecine nucléaire, 9 mois d'expérience, Québec

- « Lack of staff, overbooking, long wait lists and constant demand. Management is constantly asking us to find a solution, which is recruitment or retention of staff. »
  NMT (SPECT/CT, bone densitometry), 38 years, New Brunswick

- « Compensation is low. Wage package is outdated as based on years of education. And new procedures are on the job training therefore no increase in compensation. Risks associated with job are not seen as compensatory, it's part of the job. »
  RTNM (CT, bone density), British Columbia

- « Nous faisons de plus en plus de traitements théranostiques, assumons plus de tâches que jamais, mais recevons zéro reconnaissance : notre spécialité n’est même pas reconnue alors qu’elle exige plus de compétences et plus d’exposition. »
Technologue en médecine nucléaire (SPECT-CT, PET-CT), 4 ans, Québec

- « Workload and poor clerical support. Employee assistance programs are useless, and leadership does not address how to change workload expectations. »
Team Lead and Radiation Safety Officer (SPECT/CT), 21 years, Ontario

- « Underpaid, shortage of staff, long commute, long days, working extra days because there is no staff. Unwilling to cancel patients when short-staffed. »
PET/CT Technologist, British Columbia

- « There needs to be a training program outside the Toronto area. »
Lead NMT (SPECT/CT CZT), 33 years, Ontario

- « Current work environment is the worst I have worked in. People are overworked and many are suffering from compassion fatigue. »
NMT (PET/CT), Province Anonymized

- « Staff to workload ratio, undervalued by management. Equality among MRTs is lacking. A retention bonus reflecting radiation exposure is needed. »
NMT (PET/CT, SPECT/CT, bone density, gamma camera, MRI), 5 years, New Brunswick

- « Lack of recognition and appreciation. We are currently in the process of trying to figure out why we are not getting required results. »
Charge NMT and Radiation Safety Officer (SPECT/CT), 24 years, Ontario

- « Staff shortages, reduced breaks, and longer hours while being expected to maintain the same workload. It becomes a source of huge mental stress. »
NMT (PET/CT, SPECT/CT), Alberta

- « I would like to be given more opportunity to do things outside of patient-facing care. »
NMT (PET/CT, Nuclear Medicine), 6 months

- «In terms of frustration points, I’d say my coworkers, and being short-staffed while expected to operate at levels consistent with full staffing. »
Former NMT (SPECT/CT, PET/CT, CT), 20 years, British Columbia

- « Excessive workload, complaining from referring physicians on wait times, and zero time for education. Management keeps demanding more quality assurance with fewer staff. How is someone understaffed supposed to complete and attend these? »
NMT (CT), 12 years, Province Anonymized

- « I’d have to say that the workload and staffing shortage, and the equipment malfunctions are very frustrating »
NMT (SPECT/CT, PET/CT, MRI, PET/MRI, theranostics), 4 years, Ontario

- « Poor management, not paying enough, and no new recruits to hire. The constant overtime and doing more and more is burning everyone out. »
PET/CT Technologist, 4 years of experience, Saskatchewan

- « Manque de compétences des professionnels de la santé, manque de collaboration, manque d'implication, de motivation et de désir d'être meilleur. »
  Technologue en médecine nucléaire, 21 ans, Québec

- « Busy schedules, shift work, and working more than five days a week. The only support offered is optional weekend shifts. »
  NMT (SPECT/CT, PET/CT, CT), 2 years, Ontario

- « Management not listening, understaffed, working on call under poor conditions, and not lowering patient load to correlate with low staff. »
  N*MT (SPECT/CT), 4 years, Alberta*

- « Going unheard or stonewalled by management and being uninformed about changes to decision-making processes that affect workflow. I would like to see more transparency from management. »
  NMT (SPECT/CT, hybrid systems, CT), 3 years, Saskatchewan

- « Apathy, lack of communication, lack of radiologist-driven oversight, and lack of support services to stay current and engaged in our job. »
  NMT (hybrid imaging, SPECT/CT, CT), 23 years, British Columbia

- « People are overworked, silenced, and ignored. Even when we raise legitimate concerns, nothing changes. »
  NMT (general NM, SPECT/CT, PET/CT), 28 years, Province Anonymized

- « Constantly retraining due to staff loss or staff returning after long leaves. The workload causes staff to burn out and call in sick, making the problem worse. »
  NMT (SPECT/CT, DEXA, radiopharmacy), Saskatoon, Saskatchewan

- « Support from our management, union and government is nonexistent. The union negotiations are stalled, and it feels like we are talking to walls. »
  NMT (SPECT/CT, therapeutic procedures for thyroid cancer, prostate cancer, NET, radiopharmacy), 15 years, Saskatchewan

- « Manque de personnel, faire plus avec moins. »
  Technologue en médecine nucléaire, Québec

- « Not being able to lighten the workload when staff call in sick. Patients and exams are waiting, and knowing some of them will never get done. »
  NMT (PET/CT, SPECT/CT), New Brunswick

- « For theranostics to be implemented more widely, institutions need to ensure ease of access to implementation and ease of collaboration. »
  Owner and CEO, MRT(N) (SPECT/CT, BMD), 21 years, Ontario

- « Work–life balance. There is an expectation to do more with less, while providing limited direction and support. »
  Nuclear Medicine Coordinator, RTNM–RTMR (SPECT/CT, MRI), 16 years, Prince Edward Island

- « Worrying about patient safety, worrying about mistakes, worrying about being understaffed and still expected to do the same workload. The expectations are unrealistic. »
  NMT (PET/CT, SPECT/CT, CT), New Brunswick

- « The level of teamwork and patient care is inconsistent between sites. Some sites defer too much responsibility to NMTs. » *NMT (SPECT/CT, BMD), 24 years, Ontario*

- « Nous ne sommes pas considérés comme égaux avec les technologues en imagerie médicale. Le salaire demeure basé sur la radiologie et non sur la médecine nucléaire. »
  Technologue en médecine nucléaire, 30 ans, Québec

- « Management not filling positions, maternity leaves, medical leaves and retirements not being replaced. Most of the senior techs were removed and now everything feels unstable. »
  NMT (SPECT/CT, PET/CT), Alberta

- « En termes de frustration, je dirais les relations interpersonnelles, personnalités différentes des gens de l'équipe. »
  MD (SPECT/CT, PET/CT), 22 ans, Québec

- « Management and the lack of respect our field gets. Every other modality is receiving pay increases except nuclear medicine. »
  NMT (SPECT/CT, PET/CT, hybrid imaging), 11 years, Saskatchewan

- « We never have enough staff. We are always behind. It is mentally and physically draining every single day. »
  NMT (PET/CT, cardiac imaging), New Brunswick

- « Our diagnostic services continue to expand while demands on technologists grow, but wages and time available to do the work never increase. »
  NMT II (PET/CT, SPECT/CT, general nuclear medicine), 16 years, Alberta

- « We are given zero support, and they do not address it. »
  NMT, 21 years, Saskatchewan

- « Management priorities are to run our hospitals as a business rather than a healthcare facility. Quantity of care is placed over quality, and the welfare of current employees is not considered because of management’s inability to staff the departments. »
  NMT (SPECT/CT, CT, hybrid systems), 6 years, British Columbia

- « We are not at all adequately compensated for the complexity, expertise and risk associated with our work. We are the lowest paid MRTs in the province, have been denied market adjustments that all other modalities received, and NMTs in Saskatchewan are the lowest paid technologists in all of Western Canada. »
  NMT and PET/CT Supervisor, 18 years, Saskatchewan

- « Every day the workload is consistently high with essentially no time to catch up on the duties that were set aside for “when I have a moment.” Multi-tasking complex processes has become routine, which increases the chance of errors and pushes stress levels even higher. »
  RTNM (SPECT/CT), 40+ years, Manitoba

- « We've been working without a contract for years, with wages that don't reflect our training or responsibilities. We're severely short-staffed, morale is low, and it feels like we're stuck in the 1980s with outdated equipment and no recognition. »
  NMT (SPECT/CT, PET/CT, CT), 11 years, Saskatchewan

- « Theranostics is the wild west right now, with no standardized training, no oversight, high radiation exposure, and enormous responsibility placed on technologists without recognition, regulation, or proper support. »
  NMT (SPECT/CT, PET/CT, CT, Theranostics), 17 years, Alberta

- « We are always short-staffed and expected to do more each day with less time, while management refuses to increase pay or approve overtime; the stress is constant, and morale is very low. »
  NMT (SPECT/CT, PET/CT, CT/BMD), 4 years, Alberta

- « We are massively understaffed and underpaid for the amount of specialized work we do, from SPECT/CT and PET/CT to research and contrast CT, and the lack of recognition or wage adjustment is pushing technologists out of the profession. »
  NMT (SPECT/CT, PET/CT), 22 years, Ontario

- « The workload keeps increasing while staffing decreases, and we are expected to deliver more scans in less time with no recognition or compensation for the complexity and risk of our work, which is destroying morale. »
  MRT(N), CTIC(NM), 25 years, Ontario

- « We are undervalued and underpaid despite carrying the highest radiation exposure, operating hybrid cameras, doing research injections, and performing radiotherapies, while other modalities earn more with less risk. »
  NMT (Cardiac SPECT and PET/CT), 3 years, Ontario

- « Less staff, less equipment, and more patients have driven wait times to new highs and created a work environment where we are constantly stretched beyond capacity. »
  NMT (SPECT/CT, PET/CT), 20 years, Ontario

- « We are so short-staffed that we can barely cover vacations or sick leave, which leads to cancelled patient visits, long waitlists, burnout, and an ever-growing workload with almost no institutional support. »
  RTNM (SPECT/CT, BMD), 34 years, British Columbia

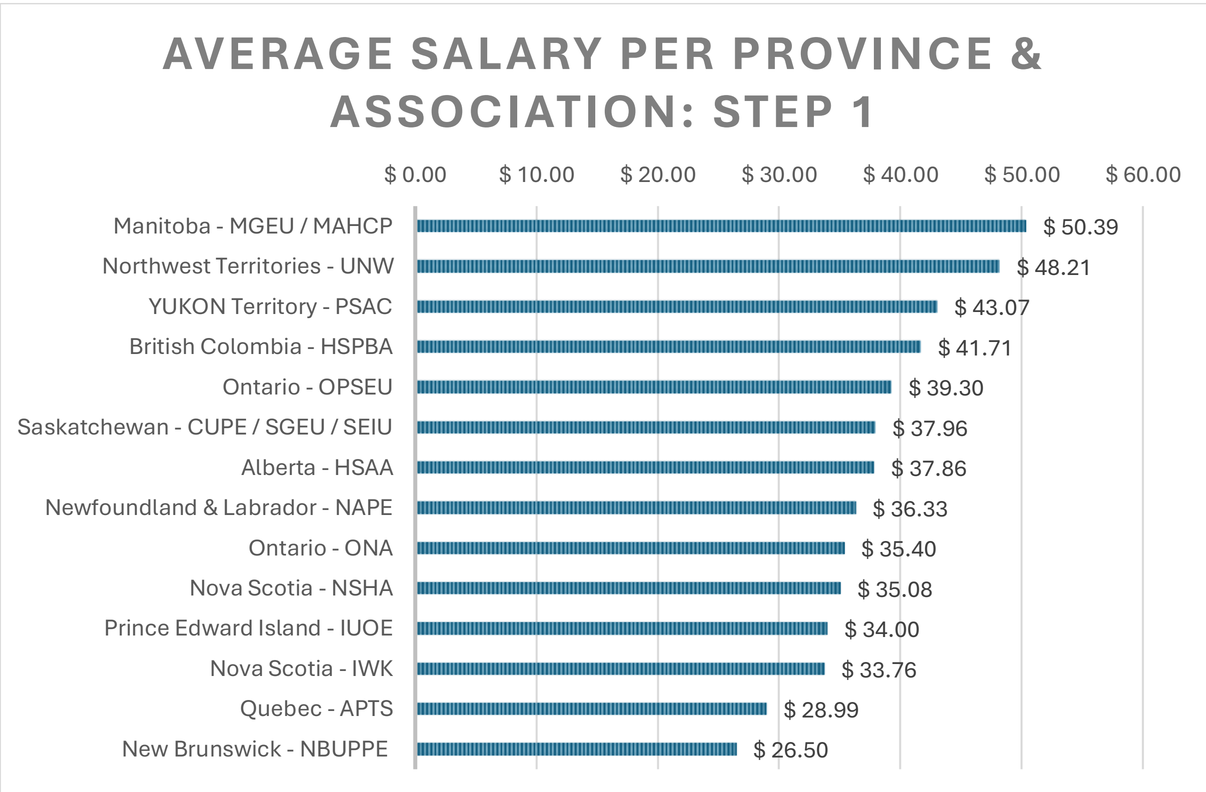
Appendices:

Appendix A1a:

Average Salary per Province & Association:	
Province	**Step 1 Only High to Low**
Manitoba - MGEU / MAHCP	*$50,39/h*
Northwest Territories - UNW	*$48,21/h*
YUKON Territory - PSAC	*$43,07/h*
British Colombia - HSPBA	*$41,71/h*
Ontario - OPSEU	*$39,30/h*
Saskatchewan - CUPE / SGEU / SEIU	*$37,96/h*
Alberta - HSAA	*$37,86/h*
Newfoundland & Labrador - NAPE	*$36,33/h*
Ontario - ONA	*$35,40/h*
Nova Scotia - NSHA	*$35,08/h*
Prince Edward Island - IUOE	*$34,00/h*
Nova Scotia - IWK	*$33,76/h*
Quebec - APTS	*$28,99/h*
New Brunswick - NBUPPE	*$26,50/h*
Mean	**$38,62**/h
Mediane	**$37,86**/h

Table 1: Average salary per province & association – Step 1 (high to low)

Appendix A1b:

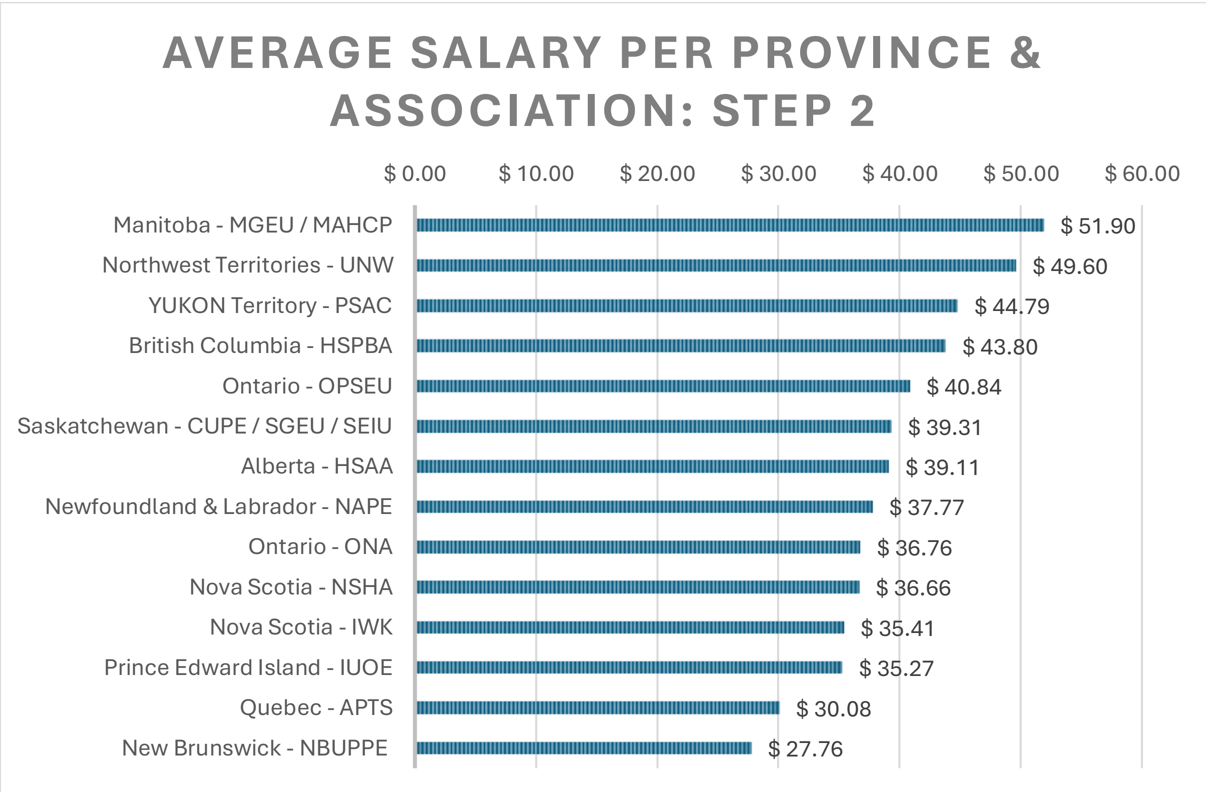


Appendix A2a:

Average Salary per Province & Association:	
Province	**Step 2 High to Low**
Manitoba - MGEU / MAHCP	*$51,90/h*
Northwest Territories - UNW	*$49,60/h*
YUKON Territory - PSAC	*$44,79/h*
British Columbia - HSPBA	*$43,80/h*
Ontario - OPSEU	*$40,84/h*
Saskatchewan - CUPE / SGEU / SEIU	*$39,31/h*
Alberta - HSAA	*$39,11/h*
Newfoundland & Labrador - NAPE	*$37,77/h*
Ontario - ONA	*$36,76/h*
Nova Scotia - NSHA	*$36,66/h*
Nova Scotia - IWK	*$35,41/h*
Prince Edward Island - IUOE	*$35,27/h*
Quebec - APTS	*$30,08/h*
New Brunswick - NBUPPE	*$27,76/h*
Mean	**$39,22**/*h*
Mediane	**$38,44**/*h*

Table 2: Average salary per province & association – Step 2 (high to low)

Appendix A2b:

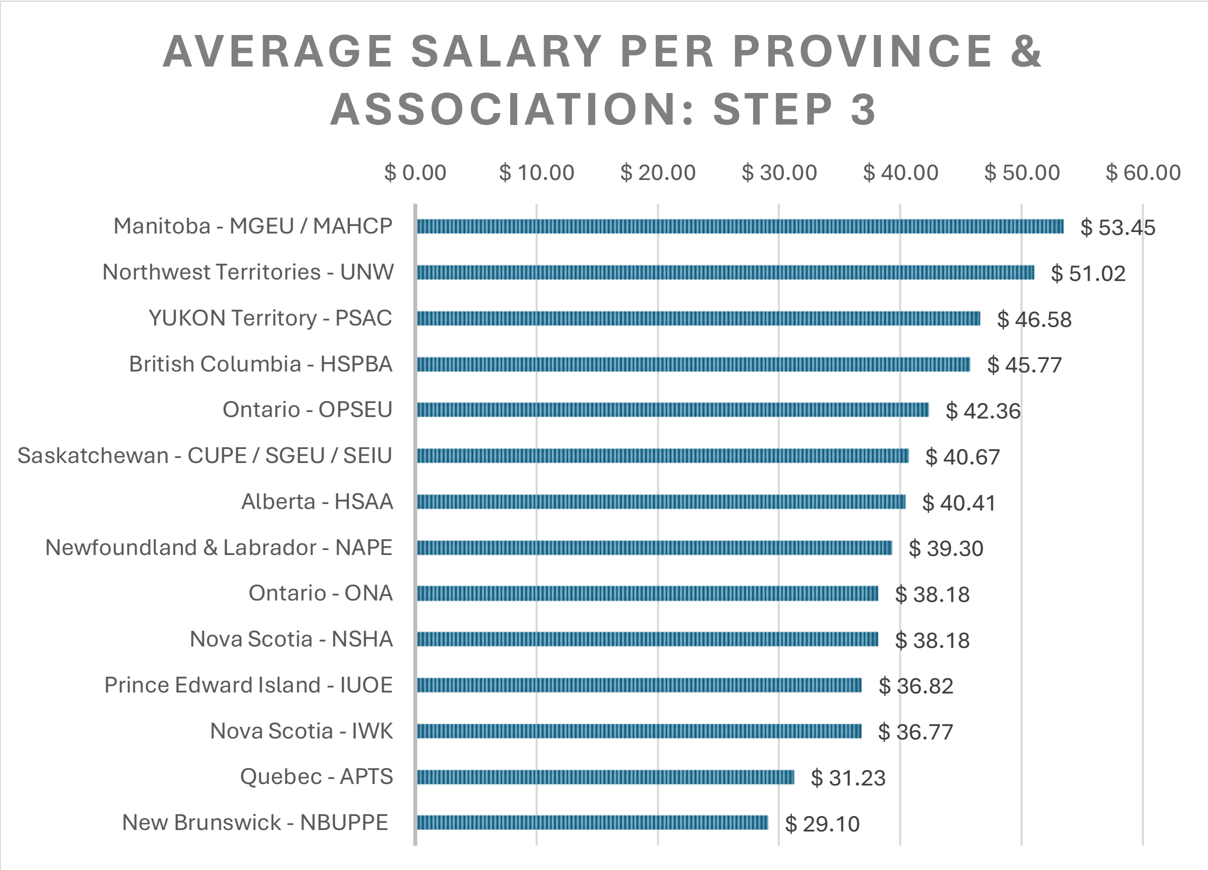


Appendix A3a:

Average Salary per Province & Association:	
Province	**Step 3 High to low**
Manitoba - MGEU / MAHCP	*$53,45/h*
Northwest Territories - UNW	*$51,02/h*
YUKON Territory - PSAC	*$46,58/h*
British Columbia - HSPBA	*$45,77/h*
Ontario - OPSEU	*$42,36/h*
Saskatchewan - CUPE / SGEU / SEIU	*$40,67/h*
Alberta - HSAA	*$40,41/h*
Newfoundland & Labrador - NAPE	*$39,30/h*
Ontario - ONA	*$38,18/h*
Nova Scotia - NSHA	*$38,18/h*
Prince Edward Island - IUOE	*$36,82/h*
Nova Scotia - IWK	*$36,77/h*
Quebec - APTS	*$31,23/h*
New Brunswick - NBUPPE	*$29,10/h*
Mean	**$40,70**/*h*
Mediane	**$39,86**/*h*

Table 3: Average salary per province & association – Step 3 (high to low)

Appendix A3b:

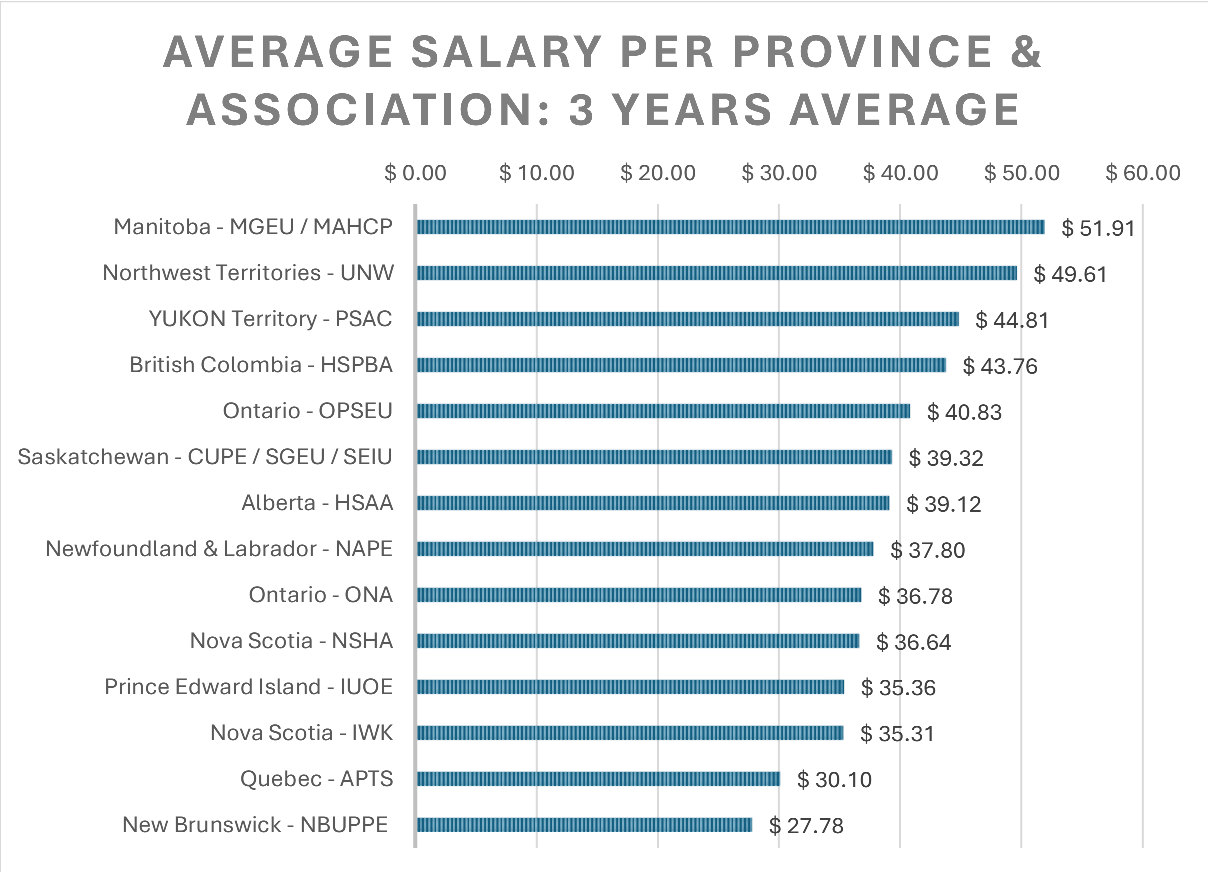


Appendix A4a:

Average Salary per Province & Association:	
Province	**Average over 3 years High to Low**
Manitoba - MGEU / MAHCP	*$51,91/h*
Northwest Territories - UNW	*$49,61/h*
YUKON Territory - PSAC	*$44,81/h*
British Colombia - HSPBA	*$43,76/h*
Ontario - OPSEU	*$40,83/h*
Saskatchewan - CUPE / SGEU / SEIU	*$39,32/h*
Alberta - HSAA	*$39,12/h*
Newfoundland & Labrador - NAPE	*$37,80/h*
Ontario - ONA	*$36,78/h*
Nova Scotia - NSHA	*$36,64/h*
Prince Edward Island - IUOE	*$35,36/h*
Nova Scotia - IWK	*$35,31/h*
Quebec - APTS	*$30,10/h*
New Brunswick - NBUPPE	*$27,78/h*
Mean	**$40,10**/*h*
Mediane	**$39,12**/*h*

Table 4: *Average salary per province & association – Over 3 years (high to low)*

Appendix A4b:



Appendix A5:

Province or territory	Total PET-CT units public / (private)	Total PET - MRI units public / (private)	Total SPECT-CT units public (private)	Total SPECT units (private)
Alberta	5 (0)	1 (0)	39 (11)	36 (27)
British Columbia	5 (1)	1 (0)	50 (0)	16 (0)
Manitoba	1 (0)	—	10 (0)	4 (0)
New Brunswick	2 (0)	—	8 (0)	6 (0)
Newfoundland and Labrador	1 (0)	—	8 (0)	1 (0)
Northwest Territories	—	—	—	—
Nova Scotia	1 (0)	1 (0)	9 (0)	7 (0)
Nunavut	—	—	—	NA
Ontario	20 (2)	4 (0)	92 (0)	102 (9)
Prince Edward Island	—	—	2 (0)	—
Quebec	24 (3)	—	107 (0)	32 (0)
Saskatchewan	1 (0)	—	6 (0)	6 (0)
Yukon	—	—	—	—
Canada Total	60 (6)	7 (0)	331 (11)	210 (36)

Table 5: National Inventory of PET, PET-MRI, SPECT-CT, and SPECT Units in Canada (2022–2023 CADTH)

Glossary of Terms and Acronyms:

A

- **Accreditation**: Formal recognition that a healthcare organization or training program meets established Canadian quality and safety standards.

- **Accreditation Canada**: National body responsible for evaluating and accrediting clinical programs, including diagnostic imaging and nuclear medicine.

- **Aging Workforce**: A demographic trend in which a large share of nuclear medicine technologists approach retirement age, creating system-level renewal pressures.

- **Ahuntsic (Collège Ahuntsic)**: Québec's accredited nuclear medicine technologist program responsible for didactic education and clinical placement coordination.

- **Alberta Health Services (AHS)**: Provincial health authority delivering nuclear medicine services across Alberta, including multi-site PET/CT and SPECT/CT operations.

- **Applicant-to-Seat Ratio**: Measure of program competitiveness comparing qualified applicants to available training positions.

- **Attrition**: Loss of technologists from the workforce due to retirement, leave, or career transition.

B

- **BMD (Bone Mineral Densitometry)**: Technique measuring bone density; performed in some provinces by MRT(N)-qualified personnel.

- **BC Cancer**: Provincial oncology network operating PET/CT centres across British Columbia.

- **BCIT (British Columbia Institute of Technology)**: Accredited nuclear medicine technologist training program for British Columbia.

- **Budgeted Staffing Level:** The number of FTE positions funded within an organization's staffing plan.

C

- **CADTH**: National health technology assessment agency evaluating diagnostic imaging assets, radiopharmaceuticals, and clinical adoption.

- **CAMRT**: National professional association representing MRTs and maintaining national certification standards.

- **Cancer Centre Network**: Provincial system of oncology hospitals offering advanced nuclear medicine services such as PET/CT and radiopharmaceutical therapy.

- **Cardiac Imaging**: Nuclear medicine procedures evaluating myocardial perfusion, function, or viability.

- **Certification Examination**: Provincial or national exam required for technologists to obtain practice licensure.

- **CIHI**: Federal agency collecting and reporting health workforce data, including MRT distribution.

- **Clinical Placement**: Supervised hospital-based practicum required for NMT training program completion.

- **Clinical Throughput**: Number of imaging or therapy procedures a department can safely deliver within operational constraints.

- **Computed Tomography (CT)**: X-ray-based imaging used in hybrid PET/CT and SPECT/CT systems for anatomical correlation.

- **CZT (Cadmium-Zinc-Telluride)**: Solid-state detector material used in high-resolution SPECT imaging systems.

- **CUPE**: Canadian union representing healthcare workers, including technologists in several provinces.

D

- **Dalhousie University**: Accredited Atlantic Canada NMT program serving NS, NB, PEI, and NL.

- **DEXA / DXA**: Dual-energy X-ray absorptiometry for bone mineral density assessment.

- **Diagnostic Bottleneck**: A capacity constraint caused by insufficient staff, equipment, or scheduling flexibility.

- **Diagnostic Imaging**: Umbrella term for CT, MRI, SPECT, PET, ultrasound, and radiography.

- **Didactic Training**: Classroom-based education preceding or concurrent with clinical rotations.

E

- **Equipment Downtime**: Period in which imaging equipment is unavailable, reducing service capacity and increasing wait times.

- **Equipment Lifecycle**: Expected operational lifespan of imaging technology, informing capital planning schedules.

- **Extended Scope Practice**: Authorized expansion of technologist duties beyond traditional imaging roles, subject to regulatory approval.

F

- **Functional Imaging**: Imaging that visualizes physiological activity rather than anatomical structures, primarily through SPECT and PET.

G

- **Gamma Camera**: Nuclear medicine imaging device used to detect gamma radiation for SPECT imaging.

- **Generator Delivery Delay**: Operational issue caused by late delivery of Mo-99/Tc-99m generators, affecting daily radiopharmacy workflows.

- **Geographic Maldistribution**: Uneven workforce distribution resulting in unequal access to nuclear medicine services.

- **Graduate Output**: Number of technologists successfully completing accredited programs each year.

H

- **Health Sciences Association of British Columbia (HSA BC)**: Union representing imaging professionals in British Columbia.

- **High-Reliability Department**: Clinical environment with efficient processes minimizing errors and maintaining consistent quality under pressure.

- **Horizon Health Network**: New Brunswick's Anglophone health authority responsible for nuclear medicine service delivery across multiple sites.

- **Hybrid Imaging**: Integration of functional and anatomical imaging modalities (e.g. PET/CT, SPECT/CT) into a single system.

I

- **Imaging Footprint**: Geographic distribution of nuclear medicine imaging capacity within a province or region.

- **Imaging Modality**: Specific type of diagnostic imaging technology used in clinical practice.

- **Injection-to-Imaging Time**: Time interval between radiopharmaceutical administration and image acquisition, critical to protocol standardization.

- **Interdisciplinary Workflow:** Team-based coordination involving technologists, radiologists, physicists, oncologists, and radiopharmacists.

- **Interprovincial Referral**: Arrangements in which patients travel to another province for imaging or therapy due to local capacity limitations.

- **Iodine-131 (I-131)**: Therapeutic radioisotope used primarily for thyroid cancer and hyperthyroidism.

L

- **Labour Force Participation**: Percentage of qualified technologists actively working in the field.
- **Labour Mobility**: Movement of technologists across provinces driven by wages, working conditions, or training pathways.
- **Licensing Examination**: Assessment required for provincial registration as an MRT or NMT.
- **Longitudinal Workforce Trend**: Multi-year pattern reflecting workforce growth, decline, or stability.
- **Lutetium-177 (Lu-177)**: Therapeutic isotope used in radioligand therapies for NETs and prostate cancer.

M

- **Manpower Planning**: Workforce planning process projecting future staffing needs and supply gaps.
- **Medical Radiation Technologist (MRT)**: Regulated health professionals in radiography, nuclear medicine, MRI, or radiation therapy.
- **Michener Institute**: Ontario's accredited NMT training program.
- **Molybdenum-99 (Mo-99)**: Parent isotope used to produce technetium-99m for routine diagnostic imaging.
- **Mobility Incentive**: Salary or benefit differential encouraging interprovincial technologist movement.
- **Multimodality Imaging**: Use of multiple imaging types in a patient's diagnostic pathway.
- **Multi-Site Network**: Hospital system operating multiple nuclear medicine locations.

N

- **National Total**: Aggregate number of technologists across all Canadian provinces and territories.
- **Neuroendocrine Tumour (NET)**: Tumour type commonly treated using Lu-177 radioligand therapy.
- **Non-Permanent Technologist**: Technologist employed on a casual, temporary, or part-time basis.
- **Nuclear Medicine**: Medical specialty using radiopharmaceuticals for functional imaging and targeted therapy.

- **Nuclear Medicine Technologist (NMT)**: MRT specializing in radiopharmaceutical handling, SPECT, PET, and therapeutic procedures.

- **Nuclear Medicine Therapy / Radiopharmaceutical Therapy**: Targeted therapeutic use of radioactive compounds for cancer treatment.

- **Nuclear Pharmacy / Radiopharmacy**: Preparation and quality control of radiopharmaceuticals within licensed environments.

O

- **Oncology Imaging**: Cancer-related diagnostic imaging using PET/CT and SPECT/CT for staging, assessment, and follow-up.

- **Operational Capacity**: Maximum service volume that can be delivered under existing staffing and equipment conditions.

- **OTIMROEPMQ**: Québec's regulatory college for imaging, radiotherapy, and electrophysiology technologists.

- **Overcapacity / Overbooking**: Scheduling beyond staffing capability, increasing delays and burnout.

P

- **PET (Positron Emission Tomography)**: Functional imaging technique using positron-emitting radioisotopes.

- **PET Hub**: Centralized provincial PET centre supporting regional service delivery.

- **PET/CT**: Hybrid imaging system combining metabolic PET imaging with CT anatomy.

- **Pluvicto**: Lu-177 PSMA-targeted radioligand therapy for prostate cancer.

- **Professional Declassification**: Downgrading of a regulated profession's classification, affecting compensation and recognition.

- **Protected Title**Regulated professional designation restricted to certified practitioners.

- **Provincial Health Authority**: Organization responsible for delivering hospital and imaging services within a province.

- **Provincial Referral Network**: Formal system enabling patients access to specialized imaging across health regions.

- **Provincial Workforce Modelling**: Forecasting process assessing provincial supply, demand, and distribution of technologists.

Q

- **Quality Assurance (QA)**: Standards and procedures ensuring imaging and radiopharmaceutical processes meet safety and performance requirements.
- **Quality Control (QC)**: Technical tests performed on radiopharmaceuticals or equipment before clinical use.
- **Quality Improvement (QI)**: Structured approach to optimizing departmental processes and outcomes.

R

- **Radiation Safety Officer (RSO)**: Designated individual ensuring compliance with CNSC radiation protection requirements.
- **Radioisotope**: Radioactive atom used in imaging or therapy.
- **Radioligand Therapy (RLT)**: Targeted molecular therapy delivering localized radiation to cancer cells.
- **Radiopharmaceutical**: Radioactive compound used for imaging or therapy.
- **Radiopharmaceutical Shortage**: Supply interruption of isotopes affecting diagnostic or therapeutic capacity.
- **Referral Burden**: Volume of patients directed to a particular site due to regional or provincial capacity limitations.
- **Remote Access Pathway**: Mechanism by which patients from rural or remote areas obtain advanced imaging at urban sites.

S

- **SAIT:** Accredited NMT training program serving Alberta, Saskatchewan, and Manitoba.
- **Scope of Practice:** Authorized clinical activities that technologists may perform under provincial regulations.
- **Seasonal Workforce Variation**: Fluctuations in staffing due to academic cycles, vacation, or leave.
- **Service Redistribution**: Reallocation of imaging volume across sites to manage capacity imbalances.
- **Single-Technologist Site**: Department staffed by a single technologist, increasing operational vulnerability.
- **SPECT (Single Photon Emission Computed Tomography)**: Gamma-based functional imaging technique used in cardiac, bone, and general nuclear medicine.
- **SPECT/CT**: Hybrid imaging combining SPECT with CT anatomy.

- **Step Progression**: Salary advancement structure linked to years of service.
- **Stress Leave**: Absence from work due to burnout or psychological strain.
- **Structural Shortage**: Persistent workforce deficit caused by limited training capacity or demographic shifts.
- **Technetium-99m (Tc-99m)**: Primary diagnostic isotope used in most routine nuclear medicine studies.
- **Technologist-to-Camera Ratio**: Indicator of staffing adequacy relative to imaging equipment capacity.
- **Tertiary Care Centre**: High-complexity hospital offering specialized diagnostics and therapies.
- **Theranostics**: Integrated diagnostic-therapeutic approach using matched radiopharmaceuticals.
- **Throughput Constraint**: Operational limitation restricting daily patient volumes.
- **Training Capacity**: Maximum number of students that accredited NMT programs can enroll.
- **Training Pipeline:** Pathway from admission to graduation and labour market entry.
- **Training Seat**: Educational position funded within an accredited program.
- **Turnaround Time**: Time required to complete a diagnostic or therapeutic cycle.

U

- **Understaffing**: Insufficient technologist availability to meet clinical demand.
- **Urban–Regional Distribution Model**: Pattern in which large metropolitan centres host major imaging capacity while regional sites operate with small teams.

V

- **Vacancy Duration**: Length of time a position remains unfilled.
- **Vacancy Rate**: Share of positions that are vacant relative to total budgeted roles.
- **Vertical Mobility**: Career progression from frontline practice to supervisory, advanced practice, or managerial roles.
- **Vitalité Health Network**: Francophone health authority in New Brunswick.

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- **Wait-Time Backlog**: Accumulated queue of delayed imaging or therapy due to staffing or equipment constraints.

- **Workforce Density**: Ratio of technologists to population.

- **Workforce Pipeline**: Flow of graduates entering practice relative to retirements and attrition.

- **Workforce Sustainability**: Capacity of the health system to maintain stable staffing over time.

- **Workflow Integration**: Coordination of radiopharmacy, imaging, reporting, and patient movement within nuclear medicine departments.

- **Workload Intensity**: Combined measurement of case volume, complexity, hybrid imaging, and radiopharmaceutical handling.

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