Social Sector Metrics Inc. and Health Intelligence Inc.

FINAL REPORT, January 31, 2012
submitted to
the Nova Scotia Department of Health and Wellness

Physician Resource Planning

A Recommended Model and Implementation Framework

Acknowledgement

The Consultant acknowledges the many groups and individuals who have so willingly provided time, insight, and expertise to the project. Contributions were substantial from all stakeholder constituencies and, in particular, the medical profession, governance authorities, professional bodies, and individual representatives. The Nova Scotia Department of Health and Wellness (DHW), the Provincial Health Programs, District Health Authorities (DHA), Izaak Walton Killam Health Centre (IWK), Doctors Nova Scotia (DNS), Dalhousie Faculty of Medicine (DFM), and College of Physicians and Surgeons of Nova Scotia (CPSNS) have each provided extensive time, insight, and information throughout the course of the project.

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KEY DEFINITIONS

The following terms used in this document have the meanings described below.

1. **Alternative Payment Plan (APP) -** Type of compensation for physicians who are not paid on a fee-for-service basis but are salaried, sessional, or hired on service contract. These physicians submit claims (shadow billings) for administrative purposes only.

2. **Full-Time Academic –** Appointment status is full-time; typically, these are salaried positions with Dalhousie Faculty of Medicine with the ranks of Professor, Associate Professor, or Assistant Professor.

3. **Full-time Equivalency (FTE) –** Consultants followed the Health Canada definition of an FTE (i.e., "Canadian Institute for Health Information (CIHI)" methodology) with modification as noted in 'd', 'e', and 'f' below. This methodology is the national standard in the public health sector for converting physician earnings to FTE. The details of this method are as follows:

   a) All payments (fee-for-service (fee-for-service), block funded, salary, third party, on-call, sessional, etc. totalling $634 million in 2009/10) to each uniquely identified (Provincial ID number) physician within each functional specialty (e.g., General Practice, Nephrologist, etc.), during a one year period (2009/10), were rank ordered, smallest to largest. Physicians are sorted into percentiles. The 40th and 60th percentiles are computed as follows:

      o (# of physicians within the group) x (0.4) = 40th percentile physician
      o (# of physicians within the group) x (0.6) = 60th percentile physician

   b) FTE assignment is made using the following procedure:

      o Any ranked physician > 40th percentile, and < 60th percentile is assigned a value of 1.0 FTE.
      o Any ranked physician (i.e., "physician X") < 40th percentile is assigned an FTE equal to:
         ▪ *($ value of payment to physician X) divided by ($ value of payment to 40th percentile physician)*
      o Any ranked physician (i.e., physician Y)> 60th percentile is assigned an FTE equal to:
         ▪ *1 + (log of $ value of payment to physician Y) / ($ value of 60th percentile)*

   c) The methodology creates some compression in the range above the 60th percentile, but avoids assignment of extreme values (e.g., 4.0 FTE) to very high earning physicians.

Consultant modifications to CIHI Methodology

   d) Non-fee-for-service Payments: Nova Scotia payments and FTE calculations included non-fee-for-service payments, e.g., alternate funding/block-funded payments; CIHI inter-provincial fee-for-service data do not. CIHI does, however, report aggregated non-fee-for-service payments at a specialty group level by province. The Consultant modification is as follows:

      o Gross non-fee-for-service payments by specialty group, as reported to CIHI, were converted to FTE equivalents. This was done by applying province-specific specialty specific mean gross fee-for-service billing rates as reported to CIHI (by specialty) to the non-fee-for-service payments that are reported by CIHI at a specialty level. Nova Scotia

data did not require such a refinement as the Consultants were working from complete payment data. The result is a more realistic estimation of total FTEs.

e) Where a functional specialty had a provincial count of less than twenty, the Consultant examined additional parameters to assess individual FTE status. Examples of other parameters included whether the physician had a full-time position at Dalhousie Faculty of Medicine, whether corroborating information (e.g., departmental interviews) indicated work status, and whether grey literature from within the province indicated status. By necessity, this added step increased the length of the process.

f) Individuals aged seventy years or older in 2011 have been removed from the FTE calculations on the assumption they will not be actively practising beyond the first year of the ten-year forecast beginning in 2012. There will be exceptions to this rule; however, in the interests of methodological consistency, the rule has been applied uniformly.

4. **Independent and Dependent Variables –** These terms distinguish between two types of quantities being considered, separating them into those available at the start of a process and those being created by it, where the latter (dependent variables) are dependent on the former (independent variables). The independent variable is typically the variable representing the value being manipulated or changed and the dependent variable is the observed result of the independent variable being manipulated. For example, with respect to PRP, the independent variable of physician inter-provincial migration can influence the dependent variable of future supply of general practitioners.

5. **Licensed and Functional Specialty –** Licensed and functional specialties are as reported by the College of Physicians and Surgeons of Nova Scotia as of May, 2011 and tracked by Department of Health and Wellness in the Physician Human Resource Database (PHReD). The functional specialty, in almost all cases, is the same as the licensed specialty. For Canadian trained physicians, the licensed specialty is determined by certification by the Royal College of Physicians and Surgeons or the College of Family Physicians of Canada. In a few cases, e.g., a General Practitioner (GP) working solely in the Emergency Department, the functional specialty may differ from the licensed specialty, but this only occurs when the variation is confirmed by the DHA or IWK. Where a physician is licensed in more than one specialty, e.g., emergency medicine and critical care medicine, the CPSNS will notify the Department of Health and Wellness of the predominant clinical practice.

6. **Net (Export)/Import –** Physician resource planning at the DHA and local level requires examination of patterns of service utilization by local residents and those who commute to a community to receive care. This is also true of physicians who commute outside a primary location to other communities to deliver care. In physician resource plan vernacular, this pattern of commuting to access or to provide care is termed '(export)/import' of services. Net (Export) means the residents of a given DHA access more services outside their DHA than they do within it. Net Import means the opposite, providing more services within the DHA than are accessed outside it.

7. **Part-Time Academic –** Appointment status is 'part-time' or less than 50% of professional time such as a non-salaried academic appointment with Dalhousie Faculty of Medicine as a lecturer. Typically these are non-research clinical preceptor/teacher positions.

8. **Sentinel Services (Physician) –** Sentinel services represent a significant proportion of the workload for a particular specialty. These are "determined by true patient need and not likely influenced heavily by physician discretion". For example hip or knee replacements in orthopaedics, deliveries in obstetrics, cholecystectomies and mastectomies in general surgery, and cataract surgery in ophthalmology (Ontario: Expert Panel on Health Professional Human Resources, 2001).

INTRODUCTION

An Overview of Project Context, Purpose, Strategic Direction and Research Methodology

In its report Better Care Sooner, the Government of Nova Scotia committed to developing a physician resource plan. The Government of Nova Scotia Department of Health and Wellness engaged Social Sector Metrics Inc. in association with Health Intelligence Inc. (the 'Consultant') to design and deliver a plan that identifies the number, mix and distribution of physicians needed by the population over the next ten years.

The Consultant presents this report to the Government of Nova Scotia for consideration in managing its physician resources. The report provides a recommended model and implementation framework for physician resource planning for the province. The report and recommendations are evidence-based and forecast an appropriate, affordable, equitable, detailed description of need for physician resource planning for ten years (2012-2021). To ensure system-wide coordination and integration, the report and recommendations incorporate key health system policy and planning initiatives, such as collaborative care, into the physician resource plan. The report also incorporates international and national best practices while remaining relevant to the provincial and local needs of the province.

This Consultant report provides an evidence-based methodology and proposes a clear direction for physician resource needs of the population into the future. These have been purposely constructed in context of, and in alignment with, the broader health human resource and health system planning within the province.

1   GOVERNMENT OF NOVA SCOTIA – PROJECT PRINCIPLES

From the outset, the Department of Health and Wellness emphasized key principles to underpin the project. The physician resource plan must be:

- **Appropriate to population need**

  o Evidence-based markers of population need, e.g., growth, aging, mobility, gender, disease incidence/prevalence rates and morbidity and mortality rates

- **Affordable now and sustainable into the future**

  o Competitive relative to, and appropriate to, the economic base

- **Equitable across the geographic distribution of the population**

  o Local access to core services, referral access to added services

- **Preserve and enhance quality of care**

  o Acceptable, appropriate, accessible, efficient, effective, and safe

- **Supports appropriate access to needed services**

  o Local, regional, provincial, extra-provincial access
  o Standards and targets

- **Aligned with appropriate inter- and intra-professional, innovative, delivery models**

  o Collaborative models of care, role optimization of health professions

- **Designed in context of government and stakeholder strategic priorities and plans for the health system**
- **Appropriate to academic clinical mandate (education, teaching, research, leadership/administrative services)**

  o Consistent with approved mandate, strategic plan, defined goals, objectives, targets, and performance
  o Inclusive of education, teaching, research, leadership/administrative services

- **Inclusive of relevant determinants of current and future physician supply**

  o Age, gender, Canadian and provincial undergraduate and postgraduate medical education, international medical graduates, Canadians studying abroad

- **Predicated upon productive, sustainable, quality, benchmarked workload**

  o Full-time equivalency, sustainable call rota, sentinel equivalency, qualitative and quantitative metrics, protected time

2   CONTEXT

Health human resources, in most respects, ARE the health care system. Without question, technology, beds, and pharmaceuticals are vital to its functioning, but the quality of care received by the people it serves starts and ends with the quality of its health human resources.

Canada and Nova Scotia are fortunate to be served by a workforce of diverse health professionals that provide exemplary care. The panel opposite speaks to the importance of health human resource (HHR) planning at the Department of Health and Wellness. It is in this broader HHR context that physician resource planning occurs.

The Consultant has worked across Canada and internationally for many years in the field of health human resource planning and is acutely aware of not only the quality of the Canadian health care system but also its fragility in terms of affordability/sustainability, now and in the future. To this end, the Department of Health and Wellness has reiterated the critical importance of healthy living as a means to not only prevent illness, and raise quality of life, but also to advance the health care system towards the goal of greater affordability/sustainability.

- *"The vision of success for health human resource planning is to create a team of diverse health-care providers who are educated and supported to deliver safe, quality, and timely care to Nova Scotians.*

- *Nova Scotia proposes to determine the right number and right mix of health-care providers by focusing on population health needs and care delivery models. The determination of population health needs for the province will be the building blocks for its HHR Strategy", (Department of Health and Wellness-2010)*

Innovation in health system design and functioning is also central to achievement of this goal (e.g., role optimization of health human resources, efficient system-wide use of electronic health information, streamlined pathways for chronic disease management, and evidence-based quality management). Uniform across the leadership in Nova Scotia health care delivery is the fundamental belief that the system must continue to be proactive by constantly innovating. Innovation starts with its people, its most valuable resource. A physician resource plan cannot be done in isolation from the spectrum of health human resources. This is why the province's objective of being, *"…aligned with appropriate inter- and intra-professional, innovative, delivery models"* is central to the design of the recommended strategic framework and direction for physician resource planning. The framework and direction recommends accelerated province-wide implementation of collaborative primary care models and design and implementation of an innovative model for delivery of core primary and secondary care services across the province. Both initiatives are premised on a foundation of strong inter- and intra-professional health care teams.

Despite the criticality of human resources to the health system, Canada and the provinces, relative to other advanced countries making substantial investments in health care, conduct comparatively little evidence-based, system-wide health human resource planning including physician resource planning. This strategic framework and direction for physician resources will enable the Province of Nova Scotia to move forward with integrated HHR planning and detailed province-wide clinical services planning.

The provincial population context for health human resource planning is reflected in the adjacent graph. The bottom line represents the constant population of approximately 945,000 forecasted to 2021. The upper dotted line represents the standardized, for health service utilization, population forecast for the same period. In other words because the population will have increased chronic disease prevalence (assuming no change in the current trend) and be 6% older on average by 2021, it will consume health services equivalent to a population of 1,100,000.

Figure 1 Nova Scotia Actual and Adjusted Population Forecast, 2010-2021
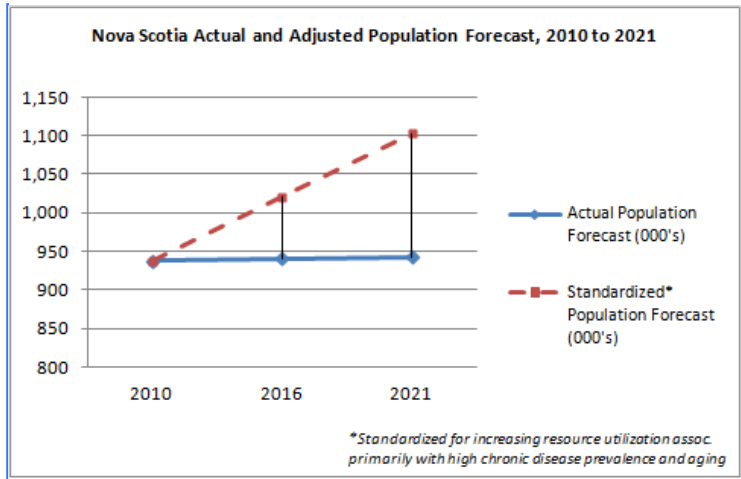
So, while the actual population will show virtually no change in size, the impact on health service utilization if chronic disease prevalence does not stabilize, combined with an aging population, will be as if the population size increased 16%. The adjacent graph illustrates the increased utilization of health services in Nova Scotia as a population with high chronic disease prevalence ages.

Figure 2 Relative #Physician Services Utilized by Age, Nova Scotia 2010
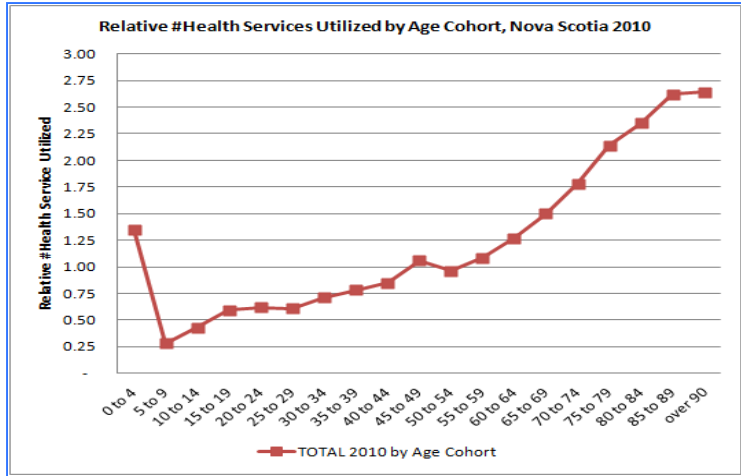
A well-designed, evidence-based integrated physician resource plan is a critical requirement in order to effectively direct the health care system to meet the future needs of the population in an appropriate, affordable, quality, and equitable manner.

3 PROJECT APPROACH

The Government of Nova Scotia Department of Health and Wellness was the project sponsor and leader. The department, at the outset, set the tone for the approach to the project – listen to as many people as possible and, particularly, all those with stewardship responsibilities.

The key stakeholders in the project included the District Health Authorities (DHAs), Izaak Walton Killam Health Centre (IWK), Doctors Nova Scotia (DNS), Dalhousie Faculty of Medicine (DFM), and College of Physicians and Surgeons of Nova Scotia (CPSNS).

The Consultant worked with two project committees:

Project Advisory Committee: comprised of senior executive representation from each key stakeholder, namely: DHAs, IWK, DNS, DFM, CPSNS, and the Department of Health and Wellness. It provided strategic feedback and advice on project methodology, draft reports, and recommendations.

Technical Working Group: comprised of a skilled methodology and data expert group of individuals providing detailed input and advice on methodology and particularly data sources, quality, and evaluation.

Project research emphasised interviews with individuals and groups across many different stakeholders from around the province. The Consultant conducted more than eighty separate interviews involving more than two hundred participants, including sessions with Medical Advisory Committees and Medical Staff Associations. The Consultant also met with the senior leadership of each key stakeholder.

Literature (grey and peer-reviewed) from within the province, across Canada, and selected countries (United Kingdom, Australia, United States of America, and New Zealand, in particular) was the second area of research focus. Provincial literature included numerous stakeholder submissions as well as documented initiatives with a direct bearing on the project, including Better Care Sooner, Primary Care Review, and the Academic Funding Plan Model. The third primary research focused on data. National and Nova Scotia specific data were acquired, analyzed, and summarized, including data on the Canadian medical education system, health system utilization, physician service utilization, fee-for-service billing and alternative payment data, physician registry (CPSNS, DFM) lists, physician surveys, population health indicators, provincial program information, geographic, service access times, and benchmarking.

The broad categories of research focus are summarized in the following figure.

Figure 3 Physician Resource Planning Variables
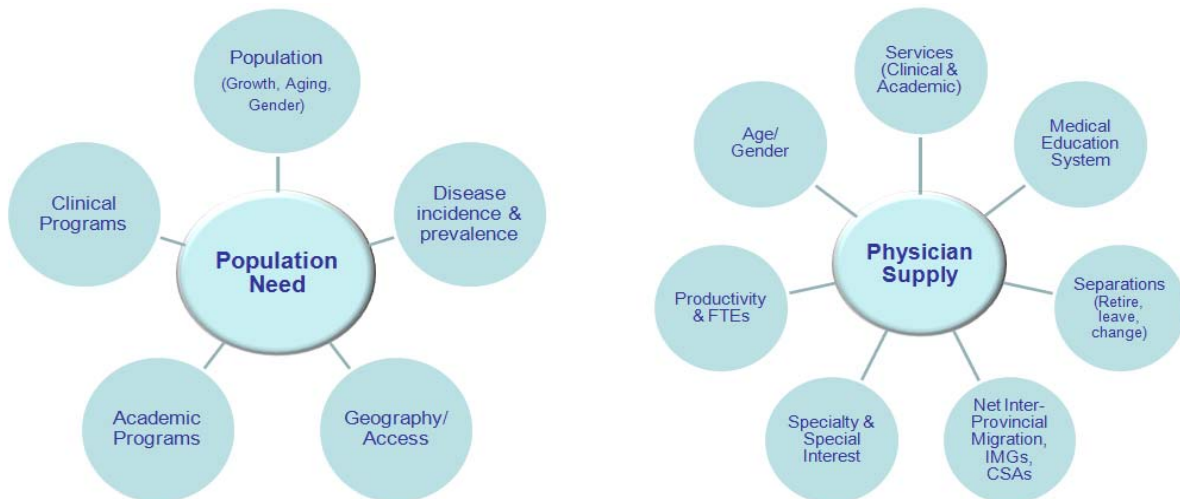
The accumulated research was organized into detailed databases and subjected to rigorous quality review, comprehensive analysis, external validation review, and reporting.

The project has resulted in two reports; an Environmental Scan and Final Report with recommendations. The Environmental Scan provides a data based review and analysis of physician resources and utilization

within Nova Scotia along with comparative national figures and analysis, a research based review of physician resource planning methodologies, results, and key trends in Canada, the United Kingdom, Australia, and United States of America, and interview findings from a broad base of Nova Scotia stakeholders. The Final Report includes a summary of the key international, national, provincial, and local findings identified in the Environmental Scan. The Final Report, summarizes the key findings on the current state, describes the physician resource forecast model methodology and design, and provides a detailed ten-year forecast by physician specialty under three scenarios (base case, high recruitment need case, and low recruitment need case). It concludes with a series of recommendations and closing comments on future planning and implementation considerations.

4   DATA LIMITATIONS

Each research source comes with limitations; however, the Consultant, with stakeholder assistance, has worked to mitigate each limitation. The Consultant consistently applied a number of research techniques including the use of corroborating evidence, standardized interview questionnaires, iterative data refinement to improve accuracy and quality, and conducted testing, revision, and validation of preliminary analytic results with stakeholders.

The data analyzed spanned 2004/05 to 2009/10. This time frame was long enough to permit trend identification and analysis. Within the data, limitations were noted:

(1)   Access to services – Very good data on access to services are recorded by DHAs, IWK, and collected and reported by DHW on surgical wait times and lists. Data on access to medical consultation and services wait times and lists were not available. Validated data on residents without a family physician were spotty. The Consultant was, therefore, unable to incorporate this element as originally envisaged in the work plan.

(2)   Active physicians – The Consultant narrowed the CPSNS registry file of 2,800 individuals to 2,500 active physicians as of 2009/10 by matching to itemized individual payment records. The list of 2,500 then underwent extensive external review and reconciliation to DHA department member lists, Alternative Funding Plan (AFP) rosters, and Dalhousie Faculty of Medicine academic appointment lists, resulting in a final count of 2,215 individual physicians and 1,988 full-time equivalents. These added review steps, albeit time consuming, added substantial integrity to the resulting databases.

(3)   Alternative Funding Plan(s) – DHW, DHAs, IWK, and DFM are reviewing and revising AFP agreements. When complete, these agreements will establish a percentage distribution between clinical and academic (research, teaching, and academic leadership) time, whether funded by the AFP or another source. In the interim, the Consultant set the percentage of academic time equal to the proportion of academic salary to total income. This approach is not ideal but is a reasonable, evidence-based option. The Forecast Model specifically provides for disaggregation of an FTE into clinical and academic components by individual.

(4)   Functional Specialty – Functional specialty (e.g., a cardiologist who spends 50% of professional time doing 'general internal medicine') is a complex, time-intensive construct to define and maintain. For

example, an individual can, and often does, change a functional focus in response to changes in local physician supply, such as the recruitment of a general internal medicine specialist enabling a cardiologist to revert to full-time cardiology, which in turn decreases cardiology referrals outside that DHA. A second significant complication is blurring of the definitional line between licensed and functional specialty (e.g., to practise cardiology one must also practise general internal medicine.) This report uses licensed specialty except in a few (less than 2%) instances where an individual is licensed in one specialty but has, often for many years, functioned 100% in another specialty. In these instances, the individual is reassigned to their functional specialty.

(5) Licensed Specialty – Currently no single source has complete, accurate information on licensed specialty by individual. Working from the license status assigned by the CPSNS, the Consultant facilitated an external review with DHAs, IWK, DFM, and AFP which resulted in about 1% of individuals to change from a general adult or paediatric specialty (e.g., Internal Medicine or General Paediatrics) to a subspecialty (e.g., Cardiology or Hematology/Oncology).

(6) Payments – Block-funded contracts are paid to groups rather than individuals, making the determination of full-time (FTE) equivalency a challenge in some cases. The Consultant used corroborating evidence to mitigate this weakness, e.g., Alternative Funding Plan (AFP) FTE budget status, DFM work status (full-time, part-time, retired), CPSNS registry status, and income from all other sources for each physician.

(7) Timing - Changes in physician counts and FTEs occurring after March 31, 2010 are not reflected in the baseline of the forecast projections. This is particularly important in certain subspecialties with small numbers. This report contains specific recommendations on the importance of maintaining the transferred physician resource forecast model and supporting database. A system of ongoing updating of the model database to 'current day' physician counts and FTEs can eliminate timing differences to reproduce an updated forecast.

ENVIRONMENTAL SCAN OF THE CURRENT STATE

A Review of Key Findings

This section of the Report summarizes key findings from the Environmental Scan and research into the international, Canadian, and Nova Scotian provincial and DHA health care systems. These key findings serve two purposes: to describe the context within which the subsequent forecast model, forecast results, and concluding recommendations should be interpreted, and to identify key developments in the national, provincial, and local environment of particular relevance to physician resource planning, implementation, and ongoing maintenance and enhancement.

5   NATIONAL PHYSICIAN RESOURCE PLANNING - KEY FINDINGS IN THE NOVA SCOTIA CONTEXT

Health Care Delivery

- Quality of Care – Physician resource planning must maintain and enhance the quality of patient care. The importance of this outcome was emphasized by the Department of Health and Wellness in the guiding principles and roadmap for this project: "Preserve and enhance quality of care - acceptable, appropriate, accessible, efficient, effective, and safe". A robust quality framework, evaluation methodology and processes are required to measure performance against this outcome. In this context the concurrent departmental renewal of its quality framework is fundamental to the ongoing management of the physician resource plan. For example, access to care guidelines will inform service delivery models that in turn, will inform physician resource planning.

- Primary Health Care - There is universal agreement that primary health care is the foundation of a quality health system. For a physician resource plan, this requires that the foundation is stable, sustainable, and high performing. Family practice models must be assessed in context of primary health care and collaborative care. Contracts must be structured to deliver performance-based services and sustainable recruitment and retention.

- Collaborative Care – The Primary Health Care Transition Fund of Health Canada working definition of collaborative care is, "The positive interaction of two or more health professionals, who bring their unique skills and knowledge, to assist patients/clients and families with their health decisions." Examining a family physician and nurse practitioner practicing collaborative care in the United Kingdom National Health Service, United States Veterans Administration, and a study in Ontario indicate that a nurse practitioner, functioning to full scope of practice, can add a minimum of 604 patients to a family practice. The current "family practitioner only" ratio in Nova Scotia is 1.0 FTE per 1,121 residents, indicating that collaborative family practitioner/nurse practitioner practice can provide care for a minimum 1,725 residents while maintaining or improving health outcomes for all patients.

  From project inception, Nova Scotia has emphasized the strategic importance of evolving the current model of health services delivery to a fully collaborative care based model. The objective is to redesign primary health care delivery to a patient-centric model with care provided by collaborative care teams on a comprehensive basis (augmented by a provincial HealthLink 811 service). Key elements include enhanced access to culturally sensitive care, comprehensive chronic disease prevention and management, population-based services and programs, full use of electronic medical records, quality monitoring, dedicated time to team building and collaboration, and all

providers functioning to a full scope of practice. The following figure illustrates current thinking on collaborative care in Nova Scotia.

Figure 4 Nova Scotia - Future of Primary Health Care

Current Model	Future Model
Problem-focused care	Patient-centred care
Heavy burden on individual providers	Collaborative care team (mix of providers) working to full scope-sharing the burden
• Up to 2-6 week wait for appointments • Availability 9 am to 5pm, 4-5 days/week • Walk-in clinics available (episodic care) • ER used as default	• Same day / Next day appointments • Extended hours, 7 days / week • Comprehensive care
Individual paper-based systems	Shared information - Electronic Medical Records
Reactive – high dependence on rescue technology	Proactive – preventative care and chronic disease management
Recruitment and retention challenges	• Should lead to increased job satisfaction • Better work/life balance (team support)

♦ Inpatient Care – Nationally models of inpatient care continue to evolve. Limited published evidence suggests there is little cost (e.g., longer stays) and quality (e.g., readmission, death) difference among patients managed primarily by family practitioners, general internists, or special interest/trained hospitalists. Hospitalists are predominantly family practitioners, general internists, or general paediatricians. An integrated model of one general internist consultant working seamlessly with family practitioners in a broader inpatient collaborative care team limits inefficiencies and quality issues associated with specialists, general internists, and family physicians providing inpatient care in isolation. General internists provide an effective bridge between family practitioners and subspecialists. In Nova Scotia 40% of all admissions are managed by family practitioners.

♦ Regionalization – Across Canada consolidation of governance from many local Boards to a few regional Boards has been undertaken to improve health system delivery performance through better system integration and rationalization. Consolidation of governance entities will also benefit provincial physician resource plan implementation (e.g. core services model, collaborative primary care) by delivering improved system wide integration and rationalization.

♦ Technology – Technology has a significant impact on physician practice and therefore on physician resource planning. A robust, evidence-based, assessment of technology is essential to separate efficacious advances from opportunistic changes in technology. The former can increase the need for physician resources while providing a positive overall cost/benefit. The latter can increase the need for physician resources but provide a negative overall cost/benefit. Advances in non-invasive surgical interventions continue to drive practice convergence, for example, the role of cardiologists, interventional radiologists, and cardiac surgeons in a broad range of heart procedures.

♦ Healthcare Policy – Healthcare policy, derived within a system an environment of finite resources, frequently impacts physician resource planning. For example, implementation of a cancer screening guideline revision may require more diagnostic endoscopy and a greater number of appropriately trained physicians to provide the service. Extending hours of in-house physician coverage of a particular service is another example of healthcare policy impacting physician resources. It is essential that physician resource plans be reflective of healthcare policy. The proposed physician resource plan model specifically incorporates the impact of healthcare policy as a defined variable.

◆ Core Physician Services - The concept of 'core' services has been implemented in a number of provinces. In general terms, the objective is to enable timely access for all residents to a defined range of primary and secondary care services, while centralizing tertiary and quaternary services. The consensus practice in Canada is to include the following as physician core services: comprehensive family practice, emergency medicine, general internal medicine, general surgery (and corresponding anaesthesia services), and general psychiatry, paediatrics, and obstetrics/gynaecology, supported by general laboratory (i.e., specimen collection and transport) and radiology (i.e., screening, routine diagnostic and imaging, x-ray, ECG) services. Detailed clinical service planning across all services is required to successfully implement a core service model.

Physician Supply

◆ Population per FTE – According to revised[1] CIHI data, Nova Scotia has less population per physician FTE than the Canadian average. In 2008/2009 the population per physician FTE in Canada was 553:1 compared to 514:1 in Nova Scotia. On this basis, Nova Scotia has 7.1% more physicians, equivalent to 129 FTE. The family practitioner ratio in Canada was 948:1 compared to 1,114:1 in Nova Scotia. On this basis Nova Scotia has (17.5%) fewer family practitioners, equivalent to (148) FTE. The specialist ratio in Canada was 1,354:1 compared to 953:1 in Nova Scotia. On this basis Nova Scotia has 30% more specialists, equivalent to 293 FTE. Population to FTE ratios of physician supply are a significant improvement on population to physician count ratios but do not substitute for more detailed assessment within each specialty. For example, the population of Nova Scotia has the highest or among the highest prevalence of chronic disease and certain subspecialties serve the broader Atlantic province population. These and other factors are incorporated in the forecast model and results.

Figure 5 Provinces - Population per Physician FTE, 2008/09 (Source: CIHI)

	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada	N.S.-% more/(less) Physicians
Family Medicine	943	1,021	1,114	1,107	1,027	856	1,014	969	1,045	973	948	(17.5%)
Medical Specialties (All)	2,049	2,998	1,305	2,167	1,895	2,084	2,209	2,914	3,030	2,093	2,097	37.8%
Internal Medicine	4,584	6,495	2,341	5,886	4,118	4,074	4,272	6,422	8,805	5,504	4,509	48.1%
Neurology	43,480	u/a	48,933	57,715	32,972	42,572	64,902	60,968	90,576	37,878	42,920	(14.0%)
Psychiatry	9,393	8,644	7,853	11,584	7,764	9,398	9,877	11,630	9,483	9,827	9,066	13.4%
Pediatrics	8,567	28,595	6,137	18,181	12,118	11,855	11,681	18,706	13,796	13,151	12,120	49.4%
Dermatology	42,165	u/a	53,528	88,978	47,032	66,921	89,767	257,841	73,009	90,616	64,964	17.6%
Physical Medicine	u/a	34,600	80,617	8,219	45,265	193,403	192,328	36,077	72,501	12,363	42,451	(89.9%)
Anesthesia	u/a	u/a	u/a	u/a	u/a	u/a	u/a	u/a	u/a	u/a	u/a	u/a
Surgical Specialties (All)	3,843	4,759	3,538	3,518	3,983	3,559	4,158	3,860	4,965	3,689	3,824	7.5%
General Surgery	13,768	13,356	17,950	17,171	16,257	16,364	16,189	15,667	25,533	20,838	17,466	(2.8%)
Thoracic/Cardiovascular	188,253	u/a	44,401	89,625	180,462	112,019	72,429	109,978	100,900	42,448	93,566	52.5%
Urology	64,140	u/a	50,996	36,287	50,244	46,975	84,257	82,733	80,423	60,585	53,534	4.7%
Orthopaedic	43,009	u/a	27,364	24,090	27,810	23,915	27,240	25,343	31,967	23,746	25,988	(5.3%)
Plastic	u/a	u/a	88,973	56,685	98,155	70,360	70,795	60,234	77,057	46,283	71,968	(23.6%)
Neurosurgery	u/a	u/a	101,433	109,146	139,684	130,819	u/a	77,315	142,478	116,892	130,455	22.2%
Ophthalmology	31,046	30,619	19,903	22,931	26,683	25,253	38,702	25,480	33,158	24,331	26,298	24.3%
Otolaryngology	35,017	138,400	39,118	44,397	45,507	50,656	73,982	61,357	72,888	46,702	50,459	22.5%
Obstetrics/Gynecology	13,426	10,485	19,485	19,062	20,102	16,180	19,952	20,620	22,353	20,740	18,394	(5.9%)
Population/Specialty FTE	1,336	1,839	953	1,341	1,284	1,314	1,443	1,660	1,882	1,335	1,354	29.6%
Population/All Physician FTE	542	617	514	594	560	516	589	601	672	560	553	7.1%
% more/less than Canada mean	1.9%	(11.6%)	7.1%	(7.6%)	(1.3%)	6.7%	(6.6%)	(8.8%)	(21.6%)	(1.4%)	0.0%	
Total Physician - COUNT	1,213	298	2,186	1,593	16,427	24,596	2,399	1,836	6,772	9,611	66,931	
Population/Physician Count	417	464	424	465	468	521	497	546	519	450	491	
% more/less than Canada mean	14.9%	5.4%	13.6%	5.3%	4.6%	(6.1%)	(1.3%)	(11.3%)	(5.8%)	8.4%	0.0%	

The header over the province columns reads: "Population per Physician FTE (FFS plus Alternate Payments), 2008–2009"

[1] See also 'Key Definitions #3.d.' for relevant methodology notation.

♦ Physician Mix – In general terms, Nova Scotia is well supplied with physicians in comparison to other provinces. It does however, have a pronounced difference in mix of physicians compared to other provinces. In 2008/2009, the ratio of family practitioner to specialist was 1.4:1 in Canada and 0.9:1 in Nova Scotia. The ratio of medical to surgical specialist was 1.8:1 in Canada and 2.7:1 in Nova Scotia.

♦ Generalism – The foundation of a core service model is the generalist physician specialties listed previously as 'core physician services'. It is commonly agreed that over the past thirty years the health care system physician workforce has become overly subspecialized and does not have enough generalists. Despite a 57% increase since 2000 in the size of the undergraduate and postgraduate medical education and training programs, there are proportionately more subspecialists entering the workforce than ever before.

Figure 6 National Growth (Number and %) in Postgraduate Positions (2000/01-2009/10) - Generalist & Non-Generalist Disciplines
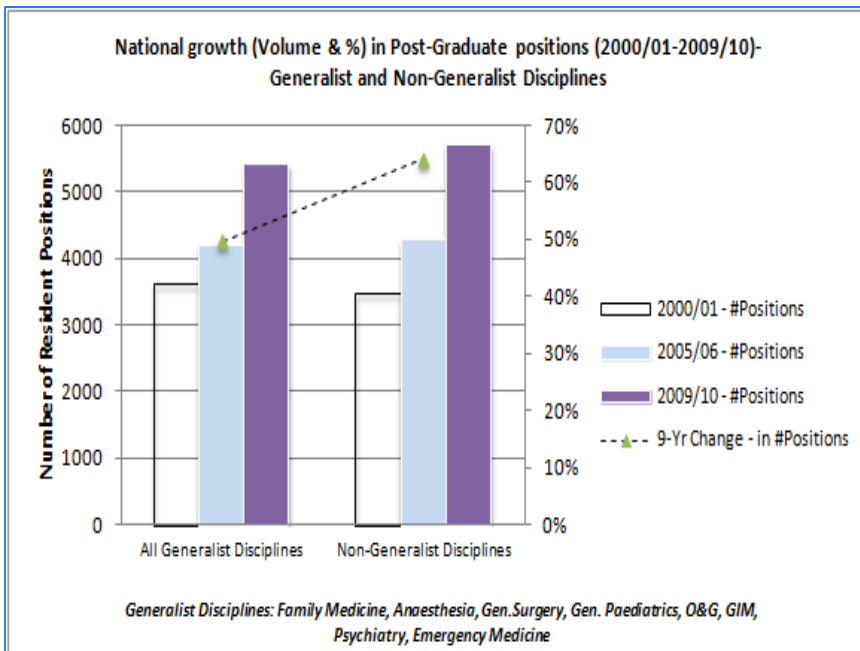
The pattern of growth at Dalhousie Faculty of Medicine parallels the national medical education system in terms of generalist/non-generalist distribution.

One of the keys to changing the distribution is altering the wide latitude afforded residents to pursue subspecialization after PGME year 3 once core training is completed in general surgery, general paediatrics, and internal medicine.

Non-generalist postgraduate training positions have increased by 64% compared to a 50% increase in generalist positions since 2000. The Royal College Physicians Surgeons of Canada and College Family Physicians of Canada view workforce supply compared to population need as a government responsibility. Governments and their primary delivery agents, health authorities, and faculties of medicine, will need to take responsibility for managing the supply of physicians to meet the need of populations.

♦ Physician Age - Nationally, the average age for family practitioners and specialists is 49.1 and 50.3 years respectively. Nova Scotia is comparable at an average age of 49.6 years for family practitioners and 49.9 years for specialists.

♦ Physician Gender – Nationally 35% of practising physicians and 28% of FTEs are female. In Nova Scotia the percentages are slightly higher at 37% and 31%, respectively. In 2009/2010, women represented 53% of first year medical postgraduate trainees, 45% of surgical, 46% of laboratory medicine, and 63% of family medicine trainees. Both the national and Nova Scotia ratio will continue

to change towards a 47% men, 53% women ratio based upon current UGME and PGME trends. Data shows that women work from 10% to 20% less over their career span than men. Notably before and after family-raising years, women will work similarly or equivalently to men. The physician resource plan model and resulting forecasts in this Final Report adjust for the changing gender mix.

♦ Physician Practice Location and Medical School of Graduation – The location of the medical school of graduation is the single biggest factor in determining where physicians decide to practice. Only Newfoundland, Quebec (McGill), Manitoba, and Saskatchewan had less than 50% of practicing physicians as graduates of their medical school. Nova Scotia retains 58% of Dalhousie Faculty of Medicine graduates and Dalhousie Faculty of Medicine graduates comprise 47% of all practicing physicians in the province.

Figure 7 Percentage of Canadian-trained physicians practising in the jurisdiction where they graduated from Medical School, 2009 (Source: CIHI)
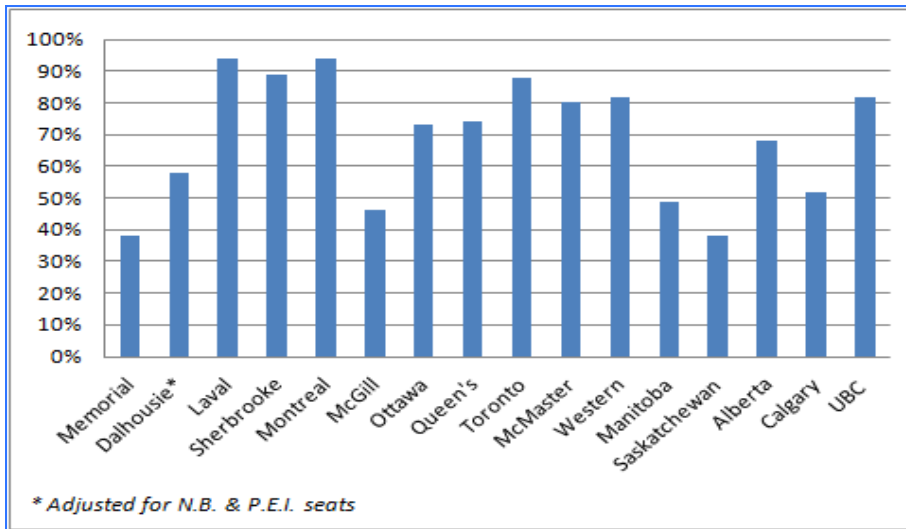
Given 58% of Dalhousie Faculty of Medicine graduates practice in the province, there is strong motivation to better align the postgraduate residency programs with the needs of the population and also to educate undergraduates accordingly.

♦ International Medical Graduates (IMGs) –Individuals who receive basic medical degrees from medical schools that are not accredited by the Committee on Accreditation of Canadian Medical Schools (CACMS) or the equivalent committee in the United States, the Liaison Committee on Medical Education (LCME), are considered to be IMGs. IMGs are typically Canadian citizens or permanent residents. Approximately thirty percent (30%) of IMGs are Canadians Studying Abroad (CSA). These individuals are typically born in Canada and take their undergraduate medical education outside Canada. Their main motivation (78%) for studying abroad is their inability to obtain a place in the highly competitive Canadian medical school system. In 2011, approximately 3,250 CSAs were studying medicine abroad with approximately 650 graduating each year and adding an additional 25% to the number of students looking for postgraduate training positions in Canada. Significant time is required to evaluate their UGME experience. In 2010, approximately 100 residents of Nova Scotia were CSAs, with approximately 25 applying annually through Canadian Resident Matching Service (CaRMS) to obtain a Canadian postgraduate training position.

Approximately 45% of IMGs enter medical practice after completing postgraduate training in Canada and 55% enter practice by meeting requirements for licensure without Canadian postgraduate training. Licensure requirements are administered at a provincial level but certain requirements are

common to all provinces such as successful completion of the Canada Evaluating Exam (MCCEE) and the Medical Council of Canada Qualifying Exam Part 1 (MCCQE1).

IMGs are an integral component of physician workforce planning. Since 2000 IMGs have filled one in three vacancies and new positions per year across Canada. Since 2005, 320 per year have entered practice after completion of Canadian postgraduate residency training and 400 per year have entered practice directly by meeting licensure requirements. In Nova Scotia, an average 45 IMGs have entered practice annually since 2000 and have filled approximately 40% of vacancies and new positions.

IMGs also present two key challenges to physician workforce planning. Firstly, while robust data is available nationally on the 45% IMGs in Canadian postgraduate training, information on the 55% entering practice directly resides at a provincial level and is therefore less accessible and standardized. Secondly, IMGs are very likely to move jurisdictions once initially licensed. Nationally only 65% are continuously active five years later in their initial practice jurisdiction and in Nova Scotia the number drops to 36%. Physician workforce planning must recognize and address these challenges.

♦ Net Interprovincial Migration (NIPM) – Between 2008 and 2009, Ontario and British Columbia had a net increase and the remaining provinces a net decrease in physicians as a result of NIPM. Only about 1% of the national physician workforce changes provinces annually. Nova Scotia had a net out migration of 1.1% between 2008 and 2009 and most of these individuals are assumed to be IMGs.

♦ Hours of Work – Average hours worked remain relatively unchanged with the influx of new physicians to the workforce. The 2010 National Physician Survey suggests the average hours worked per week remains unchanged since 2003. The national and Nova Scotia average remains in the 50-55 hours per week range, excluding hours on-call. Contracts for service paid at full-time rates that require fewer hours of work are having a significant impact on productivity.

Physician Supply – Canadian Medical Education System

Figure 8 National Ratio: cumulative growth of #M.D. graduates compared to cumulative growth in population - Actual 1990 to 2009, Estimate 2010-2021
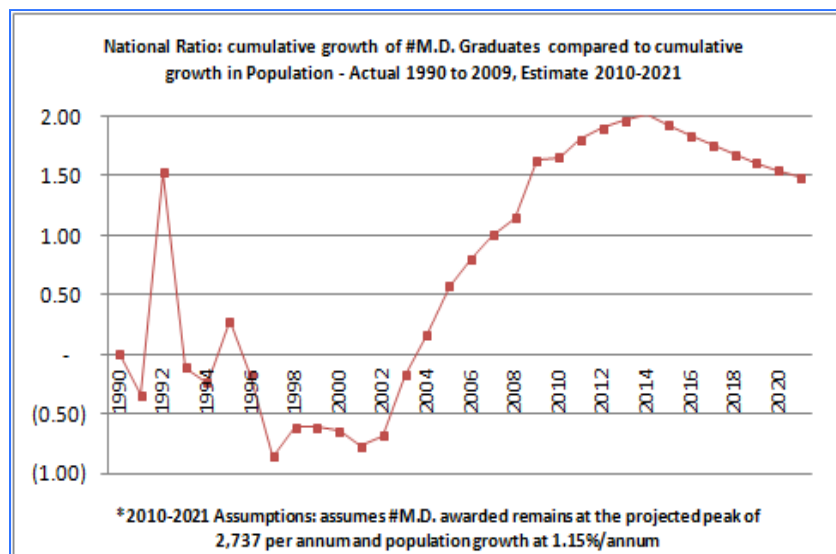
♦ Postgraduate training – Postgraduate trainee positions for Canadian citizens and permanent residents have increased 57% (4,011 positions) nationally since 2000 or 6.3% annually. Canada's population has grown an average 1.15% per annum over the same period.

M.D. expansion since 2000 will have a profound impact on physician supply throughout and beyond the forecast period ending 2021.

The figure does not ascertain whether a 1990 base year represents equilibrium between need and supply or whether population growth on its own might represent need. The figure does, however, illustrate a sustained increase in physician workforce disproportionate to population growth. Some likely medium and long-term outcomes of this dramatic sustained change in physician human resources include:

- A significant reduction in need for graduates of medical schools outside Canada, necessitating a fairly expedient revision of relevant strategies.

- Acceleration of the rise in fee-for-service costs in the absence of control of medical insurance billing numbers. The rise in fee-for-service costs will be much greater than the rate of age/gender standardized population growth, chronic disease, and other sentinel indicators of population need. This should provide substantial, increased impetus to governments to increase the proportion of physician payments paid by non-fee-for-service performance-based contract methods.

- Continued domestic shortage of family physicians and growing domestic surplus of specialist trained physicians (37% of practice entrants were family physicians in 2009 compared to 51% of the workforce). The family physician shortage, without a change in PGME position allocations, would need to be filled by IMGs. The specialist surplus will be compounded by IMGs coming to Canada unless government policies and strategies are revised.

Figure 9 Estimated Net Difference Nationally between Annual Physician Need and Supply
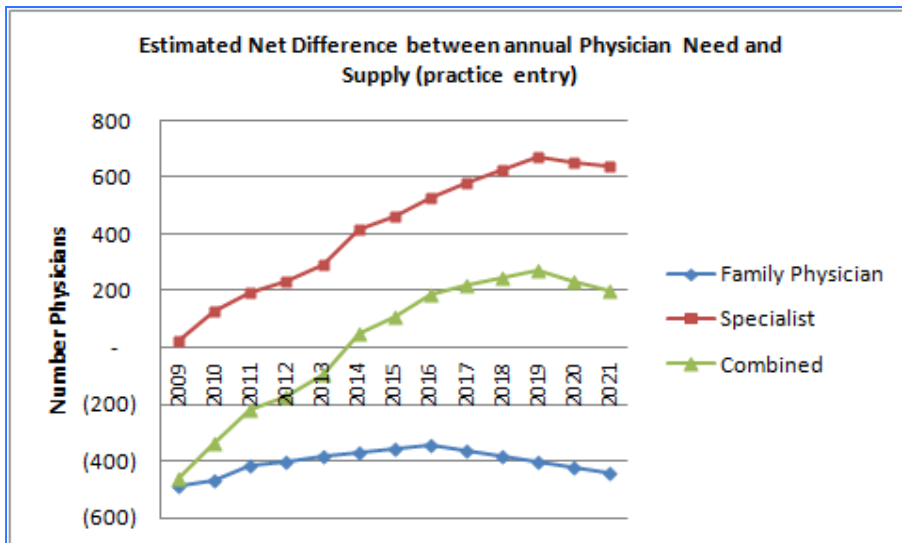
This figure estimates physician need as the sum of annual turnover (e.g., retirement) plus population growth plus gender shift adjustment. Physician supply is based on the expanded M.D. programs plus continuance of incoming IMGs, including CSAs.

Since the 1990's the medical education system has invested heavily in renewing curriculum and teaching models (e.g., CanMEDS, community-based learning, longitudinal clerkships) and expanding education and training capacity to accommodate the dramatic growth in the number of UGME and PGME learners. Conversely there is little evidence of physician resource planning at the national or provincial levels to provide evidence-based direction and long term stability to the medical education system. Nova Scotia, by developing a physician resource plan, is availing itself of the

opportunity to provide provincial direction and greater stability to the Dalhousie Faculty of Medicine UGME and PGME programs. The absence of national and inter-provincial collaboration on physician resource planning is a challenge Nova Scotia will have to manage proactively going forward.

Other

♦ Physician Payment Systems - Nationally, in 2008-09, 27% of payments were non-fee-for-service with the range being 49% in Nova Scotia to 15% in Alberta. Nova Scotia is a national leader in advancing alternative payment systems. Evidence supports the permanence, growth, and evolution of non-fee-for-service payment models. Alternative payment systems create a challenge for physician resource planning if an accurate measurement of services delivered is not maintained. This is not to say the services should be identical to fee-for-service; they do, however, need to be systematically defined, measured, and reported.

Figure 10 Physicians by Province paid partially and mainly through alternate payment methods, 2008/09 (Source: CIHI)

PROVINCE	Total #Physicians	# Receiving any portion of income from APP payments		Portion receiving majority income from APP payments		08-09 Pop.	#/1,000 Pop.
N.L.	1,213	610	50.30%	503	41.50%	506.5	2.39
P.E.I.	298	249	83.60%	169	56.70%	140.1	2.13
N.S.	2,343	1,546	66.00%	611	26.10%	927.5	2.53
N.B.	1,593	1,048	65.80%	666	41.80%	741.1	2.15
Que.	16,427	11,763	71.60%	4,452	27.10%	7,759.8	2.12
Ont.	24,596	13,447	54.70%	5,320	21.60%	12,952.9	1.90
Man.	2,399	1,890	78.80%	523	21.80%	1,204.3	1.99
Sask.	1,836	458	24.90%	n/a	n/a	1,015.6	1.81
Alta.	6,772	1,051	15.50%	700	10.3%	3,609.1	1.88
N.W.T.	78	75	96.20%	75	96.20%	n/a	n/a
Total	67,166	35,051	52.2%	N/A	N/A	33,250.2	2.02
Source: CIHI							

♦ Across Canada, physician resource planning is primarily reactive, unplanned, and predominantly demand-based. The following figure forecasts FTE growth in Nova Scotia of approximately 400 (20%) by 2021 in the current reactive, unplanned, demand-based environment.

Figure 11 Population and (demand-based) Physician FTE Change, 2010 to 2022
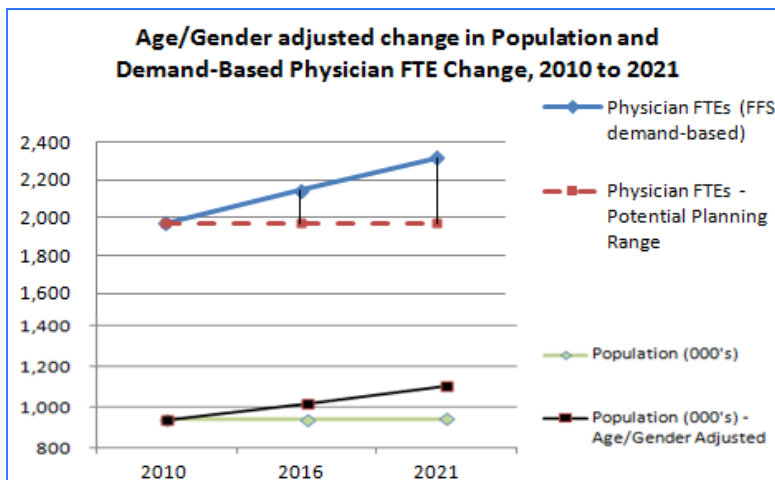
This FTE growth will arise primarily as a direct result of a dramatic increase in physician supply in context of an aging population with high chronic disease prevalence. Physician supply in excess of population-need will generate supply induced increases in service delivery.

6   PROVINCIAL PHYSICIAN RESOURCE PLANNING - KEY FINDINGS FROM PROVINCIAL ORGANIZATIONS, DHAS, AND IWK

♦   Key Provincial Organization Observations

- There is a strong reliance on IMGs to fill recruitment vacancies in physician workforce
- It is essential to engage physician representatives in the project
- Alternative Funding Plans are undergoing needed review and revision
- There is strong support for expansion of collaborative care models
- Provincial programs are focused and most continue to become progressively sophisticated. The use of multi-disciplinary teams is prominent in a number of the programs.

♦   Key Observations from interviews with DHAs and IWK

- Seven DHAs cited a pressing need for improved access to quality mental health services
- Five DHAs cited population with high social need linked to low income, low education, and moderate to high unemployment
- A strong need for generalists was cited by seven DHAs
- Opportunities to expand adoption of collaborative care models were cited by five DHAs
- Majority felt that relations and engagement was generally good with Dalhousie Faculty of Medicine
- Consensus that Dalhousie Faculty of Medicine needs to train more generalists
- All DHAs and IWK have high interest in contributing to the physician resource plan project and most have provided substantial submissions to the Consultant

♦   Significant productivity differences exist across DHAs for the same specialty. Productivity is a function of many factors including infrastructure, distance, call-duty, and volume of local demand. Traditional productivity assessments do not incorporate measures of the quality of services.

♦   DHA local residents will commute beyond the county and DHA boundaries to receive care and physicians will also commute beyond a primary location to other communities to deliver care. This '(export)'/import (see Key Definitions) behaviour is commonplace in health systems. Export/import behaviour provides valuable insight for service planning. For example, residents of South Shore and Colchester East Hants DHAs access 6% and 9% of general practice services outside their District Health Authority. This may represent a physician resource plan service gap. Similar examples exist in the data reflecting generalist services such as internal medicine, general surgery, and obstetrics.

♦   Surgical wait lists and times are tracked comprehensively. Wait lists are growing in most surgical services, albeit with significant variance across DHAs. Productivity per surgeon also varies significantly across DHAs.

7 NOVA SCOTIA - POPULATION CHARACTERISTICS

♦ Population Growth - The population will not increase for the forecast period to 2021. DHA population will decrease slightly with the exception of Capital District Health Authority, which will increase by 17,500 by 2021. The average population age is forecast to increase 6% from 41.3 years in 2011 to 43.9 years in 2021. The age cohort greater than 60 years will increase from 23.4% to 30.5%.

Figure 12 Ten-Year Provincial Population Forecast (Source: NS Department of Finance
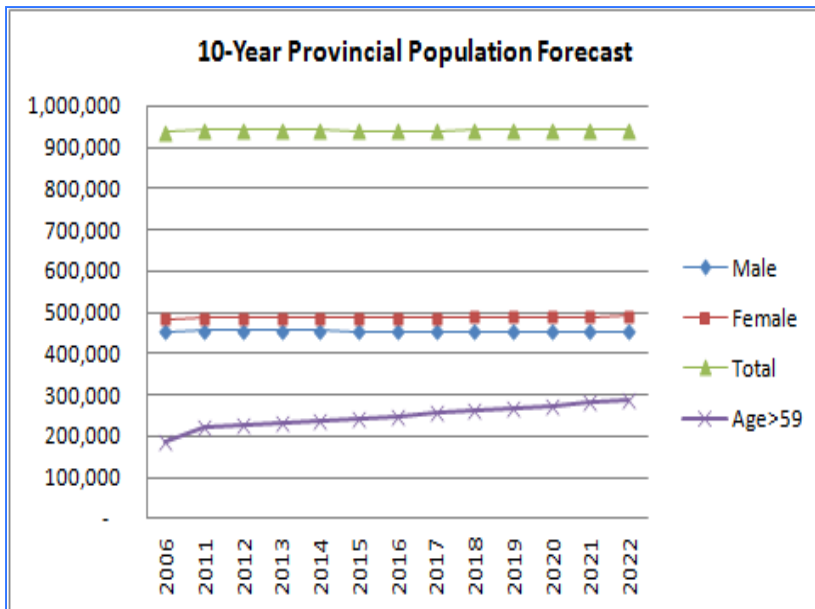
♦ Population Rurality and Remoteness – Nova Scotia has a population density three times the national average (excluding the Northwest Territories, Yukon Territory, and Nunavut). In this context remoteness and rurality are not significant factors for provincial physician resource planning in Nova Scotia. They are, however, significant factors for subsequent clinical service planning since many people live in rural areas and some live in communities that are both rural and remote.

♦ Population Diversity - A physician resource plan must be able to serve the population with sensitivity to its characteristics and demography. 4% (approximately 37,000) of Nova Scotians have French as their first language and 2.5% are First Nations aboriginal. Among visible minorities, those of African descent are by far the largest group at 2.5%. Very few of African descent enter medical school in the province and those that do then leave to practice elsewhere.

♦ Chronic Disease - The prevalence of chronic disease in Nova Scotia is at or near the highest among Canadian provinces (Source: Public Health Agency of Canada, Community Health Survey). For example the following are all higher than the national average:

- Arthritis - 61% higher (i.e., Nova Scotia 24.5%, Canada 15.2%);
- Asthma - 14% higher (i.e., Nova Scotia 9.2%, Canada 8.1%);
- Chronic obstructive pulmonary disease - 67% higher (i.e., Nova Scotia 7%, Canada 4.2%);
- Diabetes - 28% higher (i.e., Nova Scotia 7.7%, Canada 6%);
- Heart disease 33% higher (i.e., Nova Scotia 6.4%, Canada 4.8%); and
- Hypertension 27% higher (i.e., Nova Scotia 21.5%, Canada 16.9%).

The incidence rate of new chronic disease cases in Nova Scotia is fairly constant with the exception of diabetes whose incidence has increased from 8.3% to 9.9%. Obesity, as measured by adult body mass index equal to or greater than 30, is 36% higher in Nova Scotia than the national average. The 'perceived' health of Nova Scotians is comparable to other provinces.

♦ Cancer - The incidence and prevalence of most female and male cancer types in Nova Scotia is or is near the highest in Canada. Combined cancer incidence is 12% higher than the Canadian average. The rate of change in cancer incidence has been slight.

- The female age-standardized incidence rate (ASIR) of various cancers has increased 4.2% between the period of 2000-2004 and 2011 with significant variation by type of cancer. Non-Hodgkin's lymphoma and malignant melanoma account for the increase, while ovarian, cervical, and colorectal cancers have declined. ASIR overall is 7% higher in the province (396.0) compared to the national average (369.0).

- The male ASIR of various cancers has increased slightly at 1.2% between the period of 2000-2004 and 2011 with significant variation by type of cancer. Bladder cancer and malignant melanoma account for the increase while lung, oral, and colorectal cancers have declined. ASIR overall is 16% higher in the province compared to the national average.

♦ Mental Health - It is estimated that 11.6% of Canadians suffer from some form of mental health disorder in comparison to 15% of Nova Scotians. 15% of Nova Scotians suffering from a mental health disorder are seen by a psychiatrist, 42% by a family practitioner, 10% by a psychologist, and 10% by a social worker. These figures exclude neurologic disorders most frequently associated with aging, such as the dementias.

♦ Provincial Programs – selected key findings

- Cancer Care – Patient outcomes appear to be poor in comparison to other provinces.

- Diabetes Care - The network of Diabetes Centres is unique in Canada and appears to be a significant factor in improved quality of care albeit with less evidence of this improvement in Halifax.

- Cardiovascular Health – Expect specialists that are hybrid trained with fewer cardiac surgeons, and increasing collaboration and integration among cardiology, interventional radiology, cardiac and vascular surgery.

- Renal Disease – Increased numbers of Nova Scotians are diagnosed with kidney disease, resulting in a 6% growth in demand for renal replacement therapy annually.

- Reproductive Care - Birth rates have reversed downward trend and stabilized with some upswing (more in urban than rural).

8 NOVA SCOTIA - PHYSICIAN SUPPLY

♦ Physician Supply Total - There were 1,988 physician FTE in 2009/10 in the province with a count of 2,215 active physicians from a CPSNS total registry of approximately 2,800. The majority (58.6%) are based in Capital DHA and IWK.

Figure 13 Number of FTE by Physician Category by DHA/IWK, 2009/10 (Source: NS MSI)

Category	DHA1 SSH	DHA2 SWNDHA	DHA3 AVH	DHA4 CEHHA	DHA5 CHA	DHA6 PCHA	DHA7 GASHA	DHA8 CBDHA	DHA9 CDHA	IWK	FTE PROVINCE	COUNT PROVINCE
Diagnostic & Therapeutic	6.8	6.6	10.8	6.7	2.5	3.8	5.4	12.9	85.2		141	151
Family Medicine/Practice*	53.6	52.0	68.1	60.3	29.8	33.4	44.1	103.8	395.6		841	940
Medical	12.5	12.7	22.5	19.5	6.8	11.1	13.5	51.8	315.3		466	519
Paediatric - Diagnostic & Therapeutic	-	-	1.0	-	-	-	-	-		12.1	13	15
Paediatric - Medical	1.2	3.1	2.7	6.2	-	1.0	3.1	7.4		99.7	124	137
Paediatric - Surgical	-	-	-	-	-	-	-	-		29.6	30	35
Surgical	16.0	14.1	31.3	16.1	7.5	11.9	12.5	36.7	227.1		373	411
TOTAL	90.1	88.5	136.4	108.8	46.7	61.3	78.6	212.5	999.9	164.8	1,988	2215
	4.5%	4.5%	6.9%	5.5%	2.3%	3.1%	4.0%	10.7%	50.3%	8.3%	100.0%	

*GPs with CCFP (EM) are included under 'Medical'

- Physician Supply DHAs/IWK– The following figure identifies the ratio of population per FTE. The variance in population per Family Physician FTE ranges from 1,001 in DHA7/GASHA to 1,378 is DHA6/PCHA. GASHA is 12% above the provincial Family Practice average and PCHA is 19% below the average. The figure does not adjust for residents accessing services outside their DHA of residence. The IWK column is based on the population under age 18 only.

Figure 14 Population per Physician FTE, 2009/10 (Source: NS MSI)

	DHA1 SSH	DHA2 SWNDHA	DHA3 AVH	DHA4 CEHHA	DHA5 CHA	DHA6 PCHA	DHA7 GASHA	DHA8 CBDHA	DHA9 CDHA	IWK	FTE PROVINCE
Population	59,782	62,097	82,028	72,222	31,485	46,093	44,106	125,829	418,881	173,054	942,522
Diagnostic & Therapeutic	8,742	9,371	7,589	10,780	12,374	12,196	8,190	9,788	4,916	n/a	6,696
Family Medicine/Practice*	1,116	1,194	1,205	1,198	1,057	1,378	1,001	1,212	1,059	n/a	1,121
Medical	4,768	4,898	3,652	3,695	4,604	4,135	3,276	2,431	1,334	n/a	2,030
Paediatric - Diagnostic & Therapeutic	-	-	82,028	-	-	-	-	-	-	11,079	56,712
Paediatric - Medical	-	20,129	30,465	-	-	-	-	-	-	1,799	7,800
Paediatric - Surgical	-	-	-	-	-	-	-	-	-	5,845	31,833
Surgical	3,741	4,391	2,617	4,477	4,207	3,864	3,529	3,425	1,833	n/a	2,515
TOTAL POPULATION/FTE	663	701	602	664	675	752	561	592	419	1,050	474

*GPs with CCFP (EM) are included under 'Medical'

Figure 15 CPSNS - Register Change 2006 to 2010

- Physician Supply CPSNS – The CPSNS Defined Register lists physicians who are not eligible for full licensure; most are IMGs. The temporary Register lists physicians who are not eligible for full licensure but are sponsored by the Dalhousie Faculty of Medicine or Department of Health and Wellness and all are IMGs. CIHI data align with the CPSNS registry data and indicates an

	2006	2007	2008	2009	2010	Change Count	Change Annual %
Full Register	2001	2026	2026	2068	2102	101	1.3%
Defined Register	195	192	192	201	215	20	2.6%
Temporary Register	51	67	67	72	75	24	11.8%
Total	2247	2285	2285	2341	2392	145	1.6%
Specialists	1122	1159	1159	1195	1228	106	2.4%
Non-Specialists	1125	1126	1126	1146	1164	39	0.9%
Total	2247	2285	2285	2341	2392	145	1.6%
Place of Graduation							
Dalhousie	1050	1064	1064	1083	1089	39	0.9%
Other Canadian	540	551	551	559	587	47	2.2%
U.S.	34	37	37	30	32	-2	-1.5%
All other	623	633	635	669	684	61	2.4%
Total	2247	2285	2287	2341	2392	145	1.6%

annual growth in count of 1.6% since 1999. Overall the provincial workforce continues to grow at a rate of 1.3% per annum according to the CPSNS register. The figure highlights the steady growth in provincial physician numbers.

♦ Physician Supply – Geographic Distribution of Generalist Physicians – The geographic distribution of generalist physicians is uneven. The figure below indicates the percentage each DHA is above or below (negative %) the provincial average population per 1.0 Generalist FTE. Six of nine DHAs have fewer general practitioners than the provincial average.

Figure 16 Percent Above/(Below) the provincial average population per 1.0 Generalist FTE, 2009/10

Licensed Specialty	DHA1 SSH	DHA2 SWNDHA	DHA3 AVH	DHA4 CEHHA	DHA5 CHA	DHA6 PCHA	DHA7 GASHA	DHA8 CBDHA	DHA9 CDHA	TOTAL FTE Prov.
Population	59,782	62,097	82,028	72,222	31,485	46,093	44,106	125,829	418,881	942,522
General Practitioner	(5%)	(8%)	(6%)	(6%)	7%	(22%)	12%	(7%)	6%	0%
General Internal Medicine	15%	13%	0%	(7%)	45%	62%	10%	(31%)	(28%)	0%
Psychiatry	(298%)	(284%)	(119%)	(12%)	(44%)	(213%)	(6%)	(22%)	33%	0%
Paediatric General	nil	(34%)	(37%)	18%	nil	(105%)	37%	(30%)	25%	0%
Anaesthesia	(39%)	(76%)	(6%)	(92%)	(7%)	(78%)	(148%)	(67%)	30%	0%
General Surgery	19%	5%	(46%)	16%	(5%)	(2%)	19%	(53%)	7%	0%
Obstetrics & Gynaecology	12%	(19%)	14%	1%	(59%)	(26%)	29%	(73%)	10%	0%

♦ Retirement - 31% of the current workforce will retire by 2021. This rate is consistent with national averages.

♦ Gender – Gender shift will continue in all specialties, especially in family practice, medical specialties, and diagnostic specialties. Female physicians work less over the course of their careers than males. 42.1% of family physician FTEs are female however 63% of PGME 1st year trainees are female. The adult medical specialties are 32% female now and this ratio will continue to increase to 53% over time. Paediatrics is 48% female and this will change somewhat over time to 50%-55%. Surgical specialties are 18% female currently and this will increase to 45% overall but with significant variation by surgical specialty.

♦ International Medical Graduates (IMGs) – Postgraduate trainee positions for Canadian citizens and permanent residents have increased by 57% (4,011 positions) nationally since 2000. This will have a dramatic downward effect on the need for IMG positions.

♦ National comparison of population to generalist physician FTE ratios – Compared to the national average population per FTE Nova Scotia has:

• 4% fewer General Surgeons at 1:18,258 population compared to 1:17,481 nationally;

• 5% fewer Family Physicians at 1:997 population compared to 1:947 nationally;

• 8% fewer Obstetrician/Gynaecologists at 1:19,818 population compared to 1:18,335 nationally;

• 54% fewer General Internal Medicine specialists at 1:21,652 compared to 1:14,058 nationally;

• 24% more Psychiatrists at 1:7,268 population compared to 1:9,016 nationally;

• 44% more General Paediatricians at 1:4,075 population under age 18 years compared to 1:7,287 under age 18 years nationally;

◆   Individual Specialties

Figure 17 Provincial ratio of population per FTE by Functional Specialty, March 31, 2010 (Source: PHReD)

Licensed Specialty	PROVINCE TOTAL	POP Nova Scotia (All) / FTE
Anatomic Pathology	24.3	38,747
Diagnostic Radiology	78.9	11,941
General Pathology	5.3	179,525
Haematological Pathology	7.2	130,229
Medical Biochemistry	2.0	471,253
Medical Genetics	0.7	1,346,437
Medical Microbiology	3.0	314,169
Neuropathology	2.0	471,253
Nuclear Medicine	4.2	224,406
Radiology - Oncology	13.1	71,903
Diagnostic & Therapeutic - Subtotal	**140.8**	**6,696**
Emergency Medicine	6.2	152,847
General Practitioner [1]	832.4	1,132
Palliative Medicine	2.1	448,303
Family Medicine/Practice - Subtotal	**840.7**	**1,121**
Cardiology	33.2	28,415
Community Medicine	1.8	538,575
Critical Care Medicine	12.9	73,029
Dermatology	17.3	54,502
Emergency Medicine	65.5	14,381
Endocrinology & Metabolism	5.3	176,594
Gastroenterology	17.5	53,829
General Internal Medicine	43.5	21,652
Geriatric Medicine	11.2	83,943
Haematology	10.6	88,649
Infectious Diseases	7.1	131,936
Medical Oncology	17.4	54,137
Nephrology	17.7	53,268
Neurology	20.8	45,242
Occupational Medicine	5.4	176,169
Palliative Medicine	9.1	103,572
Physical Medicine & Rehabilitation	11.5	81,957
Psychiatry	129.7	7,268
Psychiatry - Forensic	4.0	235,627
Respiratory Medicine	11.8	80,173
Rheumatology	12.4	76,201
Medical - Subtotal	**465.7**	**2,024**

[1] Includes the equivalent of 38 FTE GPs (without CCFP (EM)) who work in Emergency Departments across the DHAs.

The adjacent figure is a list, by licensed specialty, of the number of FTEs as of March 31, 2010 and relative to the Nova Scotia population.

Among the generalist disciplines the FTE to population ratios are:

• Family/general practice 1: 1,121;

• General internal medicine 1:21,652;

• Psychiatry 1:7,268;

• General paediatrics 1:4,075 under age 18;

• General surgery 1:18,258; and

• Obstetrics and gynaecology 1:19,818.

(Source: MSI, PHReD, AFP data, Departmental review)

Provincial ratio of population per FTE by Specialty, March 31, 2010 continued…

Licensed Specialty	PROVINCE TOTAL	POP Nova Scotia (All) / FTE	Pop Nova Scotia <age18/ FTE	Pop Maritimes <age18/ FTE
Anatomic Pathology	2.2	433,367		158,102
General Pathology	1.0	942,506		343,846
Paediatric Diagnostic Radiology	6.9	135,716		49,512
Paediatric Medical Genetics	3.0	314,169		114,615
Paediatric - Diagnostic & Therapeutic -	**13.1**	**71,840**		**26,209**
Paediatric Cardiology	4.2	224,406	41,203	81,868
Paediatric Child Health	0.8	1,256,675	230,739	-
Paediatric Clinical Immunology & Allergy	6.0	157,084	28,842	57,308
Paediatric Critical Care	5.4	174,881	32,110	63,800
Paediatric Developmental	4.0	235,627	43,264	85,962
Paediatric Emergency Medicine	4.6	205,063	37,652	-
Paediatric Endocrinology & Metabolism	3.0	314,169	57,685	114,615
Paediatric Gastroenterology	1.9	484,319	88,926	176,690
Paediatric General	42.5	22,195	4,075	-
Paediatric Haematology/Oncology	5.5	171,365	31,464	62,518
Paediatric Infectious Diseases	4.8	197,034	36,178	71,882
Paediatric Medical Genetics	2.9	323,649	59,425	118,074
Paediatric Medical Microbiology	0.7	1,357,344	249,223	495,188
Paediatric Neonatology	7.4	126,606	23,246	46,189
Paediatric Nephrology	1.0	942,506	173,054	343,846
Paediatric Neurology	7.0	134,644	24,722	49,121
Paediatric Palliative	1.7	553,316	101,595	201,861
Paediatric Respiratory Medicine	1.8	528,467	97,032	192,796
Paediatric Rheumatology	3.5	269,287	49,444	98,242
Psychiatry - Adolescent	15.7	60,149	11,044	21,944
Paediatric - Medical - Subtotal	**124.3**	**7,580**	**1,392**	**2,765**
Paediatric Anaesthesia	15.1	62,562	11,487	22,824
Paediatric Cardiac Surgery	1.0	942,506	173,054	343,846
Paediatric General Surgery	3.4	279,874	51,388	-
Paediatric Ophthalmology	2.0	463,322	85,071	169,030
Paediatric Orthopedic Surgery	2.4	390,760	71,748	142,558
Paediatric Otolaryngology	2.6	361,414	66,360	131,852
Paediatric Plastic Surgery	1.0	942,975	173,140	344,017
Paediatric Urology	2.1	444,074	81,537	162,008
Paediatric - Surgical - Subtotal	**29.6**	**31,832**	**5,845**	**11,613**
Anaesthesia	109.4	8,618		
Cardiac Surgery	8.0	117,813		
General Surgery	51.6	18,258		
Gynaecological Oncology	4.0	234,511		
Neurosurgery	9.1	103,224		
Obstetrics & Gynaecology	47.6	19,818		
Ophthalmology	46.6	20,227		
Orthopedic Surgery	33.9	27,809		
Otolaryngology	23.7	39,760		
Plastic Surgery	10.4	90,393		
Thoracic Surgery	5.5	170,898		
Urology	16.2	58,226		
Vascular Surgery	7.4	128,069		
Surgical - Subtotal	**373.4**	**2,524**		
TOTAL	**1,987.6**	**474**		

The provincial population of 942,522 is used as the denominator (column 3) except for the paediatric specialties where the Nova Scotia and Maritime population aged 0 to 17 of 173,054 (column 4) and 343,846 (column 5) respectively, has been applied.

9   NOVA SCOTIA – PHYSICIAN SERVICES UTILIZATION

- Population Service Utilization - Between 2005 and 2010, provincial population over age 59 years increased from 20% to 23.4% with little increase in total population. The following graphs illustrate the decreases and increases in total physician service utilization between the two time periods by age cohorts. Most notable are the decreased total utilization by the 30 to 50 years cohorts and the increases from age 50 years and greater (particularly ages 60 to 70 years). This trend, in a status quo delivery system, reveals what can be anticipated over the next ten years as the population increases from 23.4% over age 59 years to 30.5% by 2022.

Figure 18 Provincial Physician Utilization - Total Services provided by Age Cohort (Source: NS MSI)
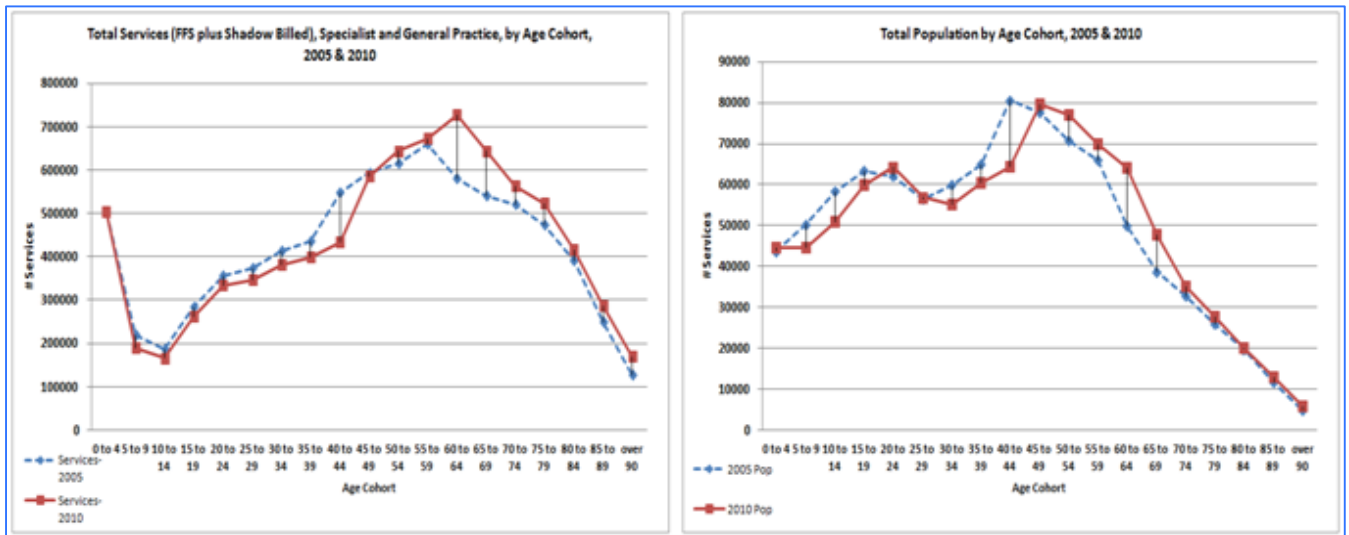
The relative inter-age cohort utilization of physician services in Nova Scotia, as illustrated in the next figure follows a similar pattern as other provinces.

Figure 19 Provincial Physician Utilization – Relative Utilization of Services by Age Cohort (Source: NS MSI)
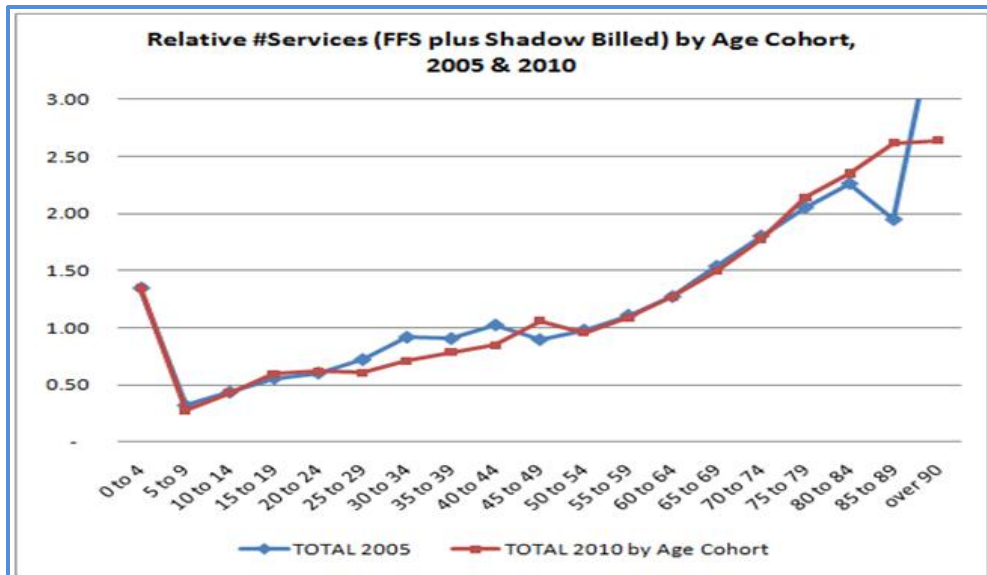
- DHA/IWK Population – The correlation between the prevalence of chronic illness and physician service utilization is strong. Physician service utilization increases as a population ages and the longer-term effects of chronic illness become more evident. This relationship between chronic illness and age is an important variable in forecasting future physician resource needs. A closer examination of DHA-specific population age over the ten-year forecast period to 2021 reveals significant differences that are important in forecasting physician resource needs at a DHA and IWK level. Adjusting DHA and IWK (under age 18) population for the average provincial physician utilization rates based on five-year age cohorts has the effect of lowering the population of Cumberland and Pictou DHAs by (15%) and (17%) respectively and increasing the population of South Shore, Guysborough Antigonish Strait, and Cape Breton DHAs by 5%, 5%, and 8% respectively. In other words, Cumberland and Pictou DHA populations are younger and South Shore, Guysborough Antigonish Strait, and Cape Breton DHAs are older than the provincial average. A population-needs based approach to physician resource planning incorporates the relationship between aging, chronic illness, and increased service utilization as a significant forecast model variable.

- Access to Services – The median wait for surgical procedures as of July 2011 varied across the province as follows:

  o General surgical procedures - is highest in the Capital and Cape Breton DHAs and lowest in the South Shore and Guysborough Antigonish Strait DHAs. The Capital DHA wait list at 802 is high but the highest on a per population basis is the Cape Breton DHA.

  o Orthopaedic surgical procedures - is highest in Capital and Cape Breton DHAs, and lowest in Annapolis Valley DHA and IWK. The Capital DHA wait list at 3,752 is high but comparable to the other DHAs on a per population basis.

  o Obstetric/gynaecologic – is substantially higher in the Cape Breton DHA.

  o Urology procedures - is highest in Capital and Cape Breton DHAs.

  o Vascular surgery - is highest in the Capital DHA. Annapolis Valley and Cape Breton DHAs are comparable.

  o Neurosurgery - Of the two DHAs offering neurosurgery, the median wait is highest in Cape Breton DHA and lowest in Capital DHA.

- Out-of-Province Patients - Out-of-Province (OOP) inpatients represent 8% of total admissions and 6% of total inpatient days stay at QEII and 7.5% of total admissions and 14% of total inpatient days stay at IWK. At IWK, 20% of all patients (inpatient, outpatient, and travelling clinics) are from out-of-province. Based on detailed MSI and shadow-bill data and supplementary IWK data on travel clinics delivered outside the province, it is estimated that 19% to 23% of services provided and patients seen by IWK Department of Medicine full-time members are OOP residents. This includes services provided in New Brunswick and Prince Edward Island. New Brunswick and Prince Edward Island residents are the vast majority of OOP patients (followed by Newfoundland and Labrador) for certain subspecialty programs, such as renal transplantation.

- Nova Scotians Out-of-Province – 2.8% of physician services received by Nova Scotians were obtained out-of-province. 9,219 Nova Scotians received an average 5.73 services each in 2009/10 in New Brunswick.

10 NOVA SCOTIA - ACADEMIC MEDICINE

♦ Medical Education and Population Need - The Association of Faculties of Medicine of Canada has reaffirmed that postgraduate medical education should reflect the right mix of physicians to meet societal needs, curricula and training models must be aligned to evolving health care needs, and faculties must provide support to clinician-teachers through professional development.

♦ Maritime Role at the Dalhousie Faculty of Medicine - 40% of Dalhousie Faculty of Medicine undergraduate seats are allocated to out-of-province Canadian students (New Brunswick 28%, P.E.I. 5%, and other provinces 7%).

♦ Nova Scotia Role of the Dalhousie Faculty of Medicine - 47% of the current provincial physician workforce, including 48% of the generalist specialties, are graduates of the Dalhousie medical school. At a DHA level, only SWNDHA, CHA, and IWK have a percentage of Dalhousie graduates less than 45%. Europe and Ontario medical schools are the next most frequent locations at 11% and 10% respectively among the current provincial physician workforce.

♦ Dalhousie Faculty of Medicine senior leadership identified the following factors as requiring careful consideration in physician resource planning:

- General Internal Medicine has been left behind by sub-specialization

- Pronounced need for more physicians practicing as generalists

- The numbers of specialists may be reasonable but the geographic distribution and mix between specialties is not appropriate to need

- A need to define core services at the provincial level then apply locally

- A strong distributive undergraduate education and post-graduate training is critical to promote generalism and encourage rural recruitment and retention

- The Dalhousie Faculty of Medicine residency programs can be changed once the Department of Health and Wellness defines needs by specialty and the mix between specialists and subspecialists

- The ongoing Alternative Funding Plan review and design revision is needed if physician resource planning is to proceed optimally

♦ Dalhousie Faculty of Medicine Physicians - There are 864 active M.D. academic appointments at Dalhousie Faculty of Medicine including 16.2% full-time, 82.4% part-time, and 1.4% other. These include Nova Scotia physicians and those based in New Brunswick. On an income attribution basis, and in the absence of further data on workload, the equivalent of 55.8 FTE is 100% academic or 6.8% of the total FTE of 820. In academic medicine, the percentage time spent on academic work varies widely by individual (education, research, and leadership). The variation reflects many factors, including the ability to attract and sustain research grant salary support, the presence or absence of academic salary, alternative payment systems that develop and/or support fields of targeted strategically important research, and the quality of research infrastructure.

♦ Dalhousie Faculty of Medicine ranks tenth nationally out of seventeen medical schools in the ratio of full-time faculty per trainee. This ratio does not account for the rapidly increasing number of part-time preceptors/teachers in the community as all faculties look to distribute medical education outside major tertiary teaching centres.

♦ Research specialization presents difficult choices for strategic planning. A recently commissioned study identified Dalhousie Faculty of Medicine areas of greatest research opportunity in geriatrics and aging, arthritis, child health, obstetrics and gynaecology, gastroenterology, and nursing. Current identified strengths included these examples plus neurosciences, psychiatry, and general internal medicine.

♦ Dalhousie Faculty of Medicine current areas of research focus, as measured by CIHR grant revenue (only), are the fields of neurosciences, geriatric medicine, psychiatry, and population health/health outcomes specialties. The total research revenue (excluding industry contract research revenue) in 2008/2009 was $50,887,000.

FORECAST MODEL

Methodology and Design Description

11 APPROACH

The Department of Health and Wellness has determined, appropriately, that population health needs are the key drivers to a physician resource plan. The Consultant strongly supports this approach. The number of commonly employed physician resource plan methodologies can be grouped into four general categories: demand-based, population ratio, benchmarking, and population health-based need.

Demand models project physician resource needs based upon current rates of service provision. Population need models translate the health characteristics of the population served into a projection of physician service need. Population ratio blends expert opinion with epidemiologic data, member survey, and benchmarks from other jurisdictions to recommend standards for FTEs per "x" population. Benchmarking models compare the present physician supply with different geographic regions. It assumes that selected geographic regions are "the future" of health care and are de facto benchmarks.

12 MODEL DESIGN

An Adjusted Population Needs-Based Model (APNM) provides the best alignment with the stated strategic government direction for the physician resource plan and the practical realities of modeling a physician resource plan and its many variables. This model combines demand model variables (e.g., current fee-for-service/non-fee-for-service utilization patterns by specialty) with population need model variables (e.g., population growth, disease incidence and prevalence, chronic disease management) and then conducts a reasonability test of the results against benchmarks and ratios.

This approach is a hybrid that incorporates elements of all four major categories of physician resource modeling, i.e. demand-based, population ratio, benchmarking, and population health-based need. The model incorporates attributes of both static and dynamic modeling. Dynamic modeling is applied to three independent variables of physician supply and need (i.e., separations, collaborative care, and population growth/change). Static modeling is applied to the balance of variables, e.g., the application of benchmarks, either specialty-specific population or workload related, does not change over time. A deterministic (i.e., three fixed estimates of a variable value), rather than stochastic (random variation), approach to uncertainty is applied. The three fixed estimates generate three forecast scenarios; low, base, and high recruitment need forecasts. The base case forecast scenario is ascribed the highest probability.

13 DESCRIPTION OF ASSESSED VARIABLES OF SUPPLY AND NEED

The physician resource plan model developed and applied to the assessed variables is described in the following subsection.

13.1   Future Supply Variables

Ten independent variables driving the dependent variable 'Future Supply' are incorporated into the model. These represent the materially key supply variables for the physician resource plan. Each variable is described below.

#1   Full-Time Equivalency

Full-time equivalency (FTE) is calculated using the methodology described in the introductory section on Key Definitions and applies to all FTE references in this report.

#2   NIPM and RFA

- NIPM – Net Inter-Provincial Migration is the number leaving and returning to the province annually.

  Annual inter-provincial migration into Nova Scotia (+1.9%) and out of Nova Scotia (-2.8%) has a net negative impact of (0.09%) (Source: CIHI).

  Each case (i.e., low, base, and high) assumes Dalhousie University will continue to be the dominant provider of the provincial workforce over the forecast period.

- RFA - Return from Abroad (physicians returning from abroad to practice in Nova Scotia)

  The annual number of physicians returning to practice in Nova Scotia, net of those leaving Nova Scotia to practice abroad, is negligible (i.e. less than 2 per annum – Source: CIHI).

  The combined effect of NIPM and RFA is in the range of (0.8%-1.2%) decrease per annum.

#3   Gender (male/female) Adjustment

- Gender Adjustment – Is the relative difference between males and females in absolute FTE value between the ages of 25 and 75.

  In Nova Scotia, the ratio of female to male is 0.84 in family medicine, 0.945 for specialists, and 0.90 overall. Nationally the ratios are 0.74, 0.82, and 0.79, respectively.

  The CIHI data are undermined by the absence of non-fee-for-service FTE in the ratio (FTE over Count) numerator, assuming females are more greatly weighted to non-fee-for-service than their male counterparts. The Nova Scotia data are relatively current and based on actual comprehensive fee-for-service and non-fee-for-service data. The Consultant also examined 2008/2009 provincial data and found similar ratios to 2009/2010 data.

#4   Work Hours Adjustment

- Work Hours Adjustment - Expected change in average hours worked per week and per year between T_1 and T_{10}.

  The pattern of average hours worked per week remains unchanged since 2003, according to the latest National Physician Survey conducted in 2010. The average remains in the range of 50-55 hours per week, excluding hour's on-call. The model adjusts for the shorter work week (i.e., 38 hours) required in certain contracts for service with family physicians in Nova Scotia.

  Average hours worked remains relatively unchanged with the influx of new physicians to the workforce. Hours of work do not decline until age 65+years is reached.

#5 Separations

- Separations – Represents the change in FTE value as one ages ending, ultimately, at zero FTE value as one enters full retirement.

Figure 20 Nova Scotia Physicians ratio of Count to FTE by Gender (Source: MSI and PHReD 2009/10)
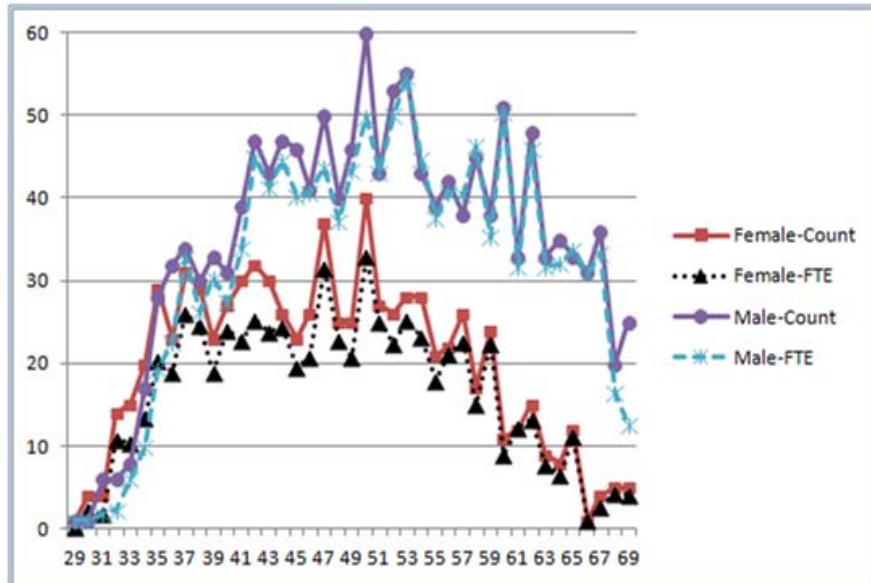
The separation rate variable captures the changes in service provision that accompany changes in age. The provincial data (figure opposite) are reasonably robust in this regard and demonstrate a familiar pattern for both genders as they move through the early to middle to late career stages.

The Consultant has assumed a default full retirement at age seventy in all the Nova Scotia specific physician FTE data analyses in this report. Individuals aged 70 years or older in 2011 have been removed from the FTE calculations on the assumption they will not be practicing actively beyond the first year of the ten-year forecast (2012). There will be exceptions to this rule; however, in the interests of methodology consistency the rule has been applied uniformly.

The distribution of Nova Scotia physicians according to years of experience is comparable nationally (e.g., in Canada and within Nova Scotia 40% of physicians completed their M.D. more than 25 years ago). The Nova Scotia workforce is slightly more experienced in that 14% completed their M.D. less than 10 years ago compared to 17% nationally. Physician mobility is generally more pronounced in the early career years with more experienced physicians less likely to leave their province of work. These observations point to a stable workforce with the exception of IMGs. IMGs are highly mobile generally and only 36% were still working in Nova Scotia five years after establishing practice in the province.

#6 Benchmark(s)

- Benchmarks – Comparable external benchmarks for each specialty were identified, researched, and compared to current practice in Nova Scotia. Benchmarks fell into two categories as follows:

  a. Ratio of Population per 1.0 FTE (not population to 'count'); and

  b. Service volume per FTE, e.g., sum of major plus minor surgical cases per 1.0 FTE.

  In order to be considered a valid benchmark, the source had to originate in one of a peer-reviewed specialty-specific journal article, a publication from an authoritative body (e.g., U.K. Royal College of Physicians), a national workforce planning authority (e.g., U.K. National Health Service, Australia Department of Health), and be published after 1999. If a comparable benchmark could not be identified from one of these sources, no benchmark was cited for that specialty.

Benchmarks require careful analysis and evaluation prior to application within a model. Achievement of service volume improvements cannot be allowed to come at the expense of quality; however, in some cases, greater volume may equate to improved outcomes. Lean process and agencies such as Leapfrog USA, along with peer-reviewed literature, provide insight to this process. The Section on 'Individual Specialties' within the Environmental Scan Report contains sources for all benchmarks used in the forecast model.

#7 Specialist Physician Profile

- Specialist Physician Profile – Each FTE in the forecast model is subdivided into the following four functional subcategories:

    - Clinical - Clinical work directly or indirectly related to the patient.

    - Teaching (concurrent) and Education - Teaching conducted concurrent to clinical service. Education conducted in the absence of concurrently delivered patient care, e.g., classroom, curriculum development, small group sessions, etc.

    - Research - Population, translational, applied, or bench research conducted as part of 'protected' research time.

    - Leadership and Administration - Time spent in a management role leading or participating in department, program, committee work. Ideally subdivided into work related to each of the preceding three activities.

The academic FTE portion[2] per faculty member was derived using income data rather than academic hours and service volumes. Contractually agreed data on academic hours and service volumes were not available. The academic FTE portion per faculty member was calculated as the sum of Dalhousie Faculty of Medicine paid salary and benefits over total member income.

There are 864 active M.D. faculty member appointments at Dalhousie Faculty of Medicine (16.2% full-time, 1.4% other, and 82.4% part-time). These include individuals from across the province and those based in New Brunswick. On an income attribution basis and pending outcome of Department of Health and Wellness and DFM review, the equivalent of 55.8 FTE is 100% academic or 7% of the total FTE of 823. In academic medicine the percentage time spent on academic work varies widely by individual (education, research, and leadership). Variation reflects many factors, including the ability to attract and sustain research grant paid salary support, the presence or absence of academic salary, alternative payment systems that develop and/or support fields of targeted strategically important research, and the quality of research infrastructure.

#8 General Practitioner

- General Practitioner Profile - Each general practitioner FTE was subdivided into the following four functional subcategories:

    - Clinical – Community - Community-based office practice, community health centre-based clinic, home visits, and related hospital-based care of admitted community patients

    - Clinical – Other - Hospitalist, surgical assistant, anaesthesia, shifts in urgent care centre, emergency department, and third party services (e.g. cosmetic, medico-legal, etc.)

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[2] Includes education, research, and academic leadership and administration. Concurrent teaching is embedded in clinical work and is therefore considered to be part of the clinical FTE.

- Teaching (concurrent) and Education - As per Specialist Profile
- Leadership and Administration - As per Specialist Profile

The Canadian Medical Association National Physician Survey asked family/general practitioners to characterize specific services offered to patients. Twenty-nine services were identified in the responses. Those rated lowest within the family practice service grouping were intrapartum care at 11% of respondents and rehabilitation at 15%. Provision of other medically insured and third party insured services were generally higher in Nova Scotia than the national average. This is potentially significant in terms of access to community-based family practice in Nova Scotia.

The response to the question of patients seen in a typical week would seem to mitigate the concern for community-based family practice. Nova Scotia responses reveal 43.1% of family physicians see more than 100 patients per week compared to the national average of 39.5%. This finding is corroborated by the DNS July 2011 survey.

One research study that focused on Ontario general practitioners using 1990 fee-for-service billing data concluded that the variation in total billings across physicians is dominated by variation in billings per hour rather than variation in hours of direct patient care per week. This pattern held when subgroups by practice location, practice type, physician gender, and years since graduation. This study implies, on average, a pattern of shorter patient visits rather than longer hours. Average hours of direct patient care per week were 41.3 with females (35.0) providing 18% fewer direct care hours than males (42.9).

#9 Collaborative Primary Care

- Collaborative Care - Collaborative provision of primary care is a priority initiative of the Nova Scotia health delivery system. The approach is predicated on role optimization of each member of a multi-disciplinary team of health care providers, e.g., family physician, nurse practitioner, family practice nurse, and dietician.

- Collaborative primary care teams are described as 'providers that bring separate and shared knowledge together to support a comprehensive range of high quality, effective health-care service'. The team may include for example, a family physician, dietician, nurse, and/or pharmacist, etc., noting that no two teams need be identical.

The Base Case scenario assumes implementation of a collaborative primary care model with 1.0 family physician and 1.0 nurse practitioner FTE per 1,750 population. This ratio is based upon the experience in the United Kingdom Primary Care Trust and USA Veterans Administration health network. The figure below shows the FP replacement needs annually (Line 5) due to turnover (separations) in the Base Case. Line 7 shows the impact of a phased implementation and Line 10 the annual and cumulative (column 'n') population aligned with a collaborative primary care team.

Figure 21 only illustrates replacement needs and the impact of collaborative care. Including other factors such as meeting the benchmark and adjusting for disease burden are presented in the Base Case, Section 17 on page 63. The overall impact of all model variables results in the number of family physician FTEs increasing from 832.5 in 2002 944.5 FTEs in 2021, a 1.3% annual increase over the ten-year period.

Figure 21 Collaborative Care Model - Base Case Implementation

ELEMENT	NOTE	I_0 2011	I_1 2012	I_2 2013	I_3 2014	I_4 2015	I_5 2016	I_6 2017	I_7 2018	I_8 2019	I_9 2020	I_{10} 2021	10-Yr Total
Population		942,349	941,899	941,255	940,711	940,711	940,556	940,675	941,060	941,683	942,329	942,820	471
FTE	Beginning	832.5	832.5	832.5	830.2	824.6	815.7	803.3	787.6	768.5	746.1	720.3	
Less:	Replacement Needs		(13.0)	(15.8)	(18.3)	(22.5)	(26.3)	(28.5)	(31.7)	(33.3)	(32.6)	(31.8)	(253.93)
Plus:	Recruitment		13.0	15.8	18.3	22.5	26.3	28.5	31.7	33.3	32.6	31.8	253.93
Less:	Impact of Collaborative Care implementa	-	(2.2)	(5.6)	(9.0)	(12.3)	(15.7)	(19.1)	(22.4)	(25.8)	(29.2)	(141)
Net:	Ending	832.5	832.5	830.2	824.6	815.7	803.3	787.6	768.5	746.1	720.3	691.1	7,820
Collaborative Care													
.	Population 'enrollment'	Annual	0	7,000	17,500	28,000	38,500	49,000	59,500	70,000	80,500	91,000	441,000
@[1:1750]	General Practitioner FTE	Annual	0	2.2	5.6	9.0	12.3	15.7	19.1	22.4	25.8	29.2	141
KEY DRIVER	Nurse Practitioner FTE	Annual	0	4	10	16	22	28	34	40	46	52	252
	Family Practice Nurse FTE	Annual	0	0	0	0	0	0	0	0	0	0	-
	Population 'enrollment'	Cummulative	0	7000	24500	52500	91000	140000	199500	269500	350000	441000	441,000
	General Practitioner FTE	Cummulative	0	2.2	7.9	16.8	29.2	44.9	63.9	86.4	112.2	141.3	141
	Nurse Practitioner FTE	Cummulative	0	4	14	30	52	80	114	154	200	252	252
	Family Practice Nurse FTE	Cummulative	0	0	0	0	0	0	0	0	0	0	-

The above model is 12% lower in cost than the current ratio of 1.0 family practitioner FTE per 1,121 population and provides 18% more hours of service.

Many challenges must be surmounted before the future model can be achieved. Planners caution that the process will take time, require extensive broad based engagement and consultation, and detailed careful analysis and planning.

#10 Health System Planning

- Health System Planning – Department of Health and Wellness planning and policy will have direct impact on the physician resource plan. The model has been refined to allow for planning and policy based adjustments to the physician resource plan. The following subjects are current examples:
    - CORE Services, e.g., general paediatrics, general surgery, general internal medicine, etc.
    - Colon cancer screening program, i.e., under review for expanded screening age 50 and over.
    - Emergency Department coverage i.e. under review as a result of the 'Better Care Sooner' report.

The model is flexible enough to allow incorporation of these planning and policy initiatives as further information becomes available.

◆ Summary

The provincial workforce continues to grow at a net overall rate of 1.3% FTE per annum after adjusting for the combined effects of migration (international and inter-provincial), Dalhousie Faculty of Medicine

postgraduate and IMG recruitment, change in age cohorts, gender shift, death, and retirement within the workforce.

13.2 Future Need Variables

There are five independent variables driving the dependent variable 'Future Need' that are incorporated into the model. They represent the materially key variables for the physician resource plan. Each variable is described below.

#1 Age

- The changing age of the population over time correlates with changes in health service utilization. Department of Finance provided the population data and forecasts organized according to five-year age cohorts by gender.

#2 Gender

- Both the pattern and quantity of health service utilization by the population differs by gender.

#3 Disease:

- ▪ Incidence - The change in rate of disease incidence over time in so far as the disease is a Sentinel Service indicator; and
- ▪ Prevalence - The change in rate of disease prevalence over time in so far as the disease is a Sentinel Service indicator.

#4 Access to Service

- Timely, appropriate, access to core services is a health system priority.

#5 Major Capital Projects

- There are no definitive major capital projects that will result in a new building(s) in a new location distant from current building locations.

13.3 Forecasting Model Schematic

The following figure is a schematic illustration of the physician resource plan forecast model.

Figure 22 Forecast Model Schematic
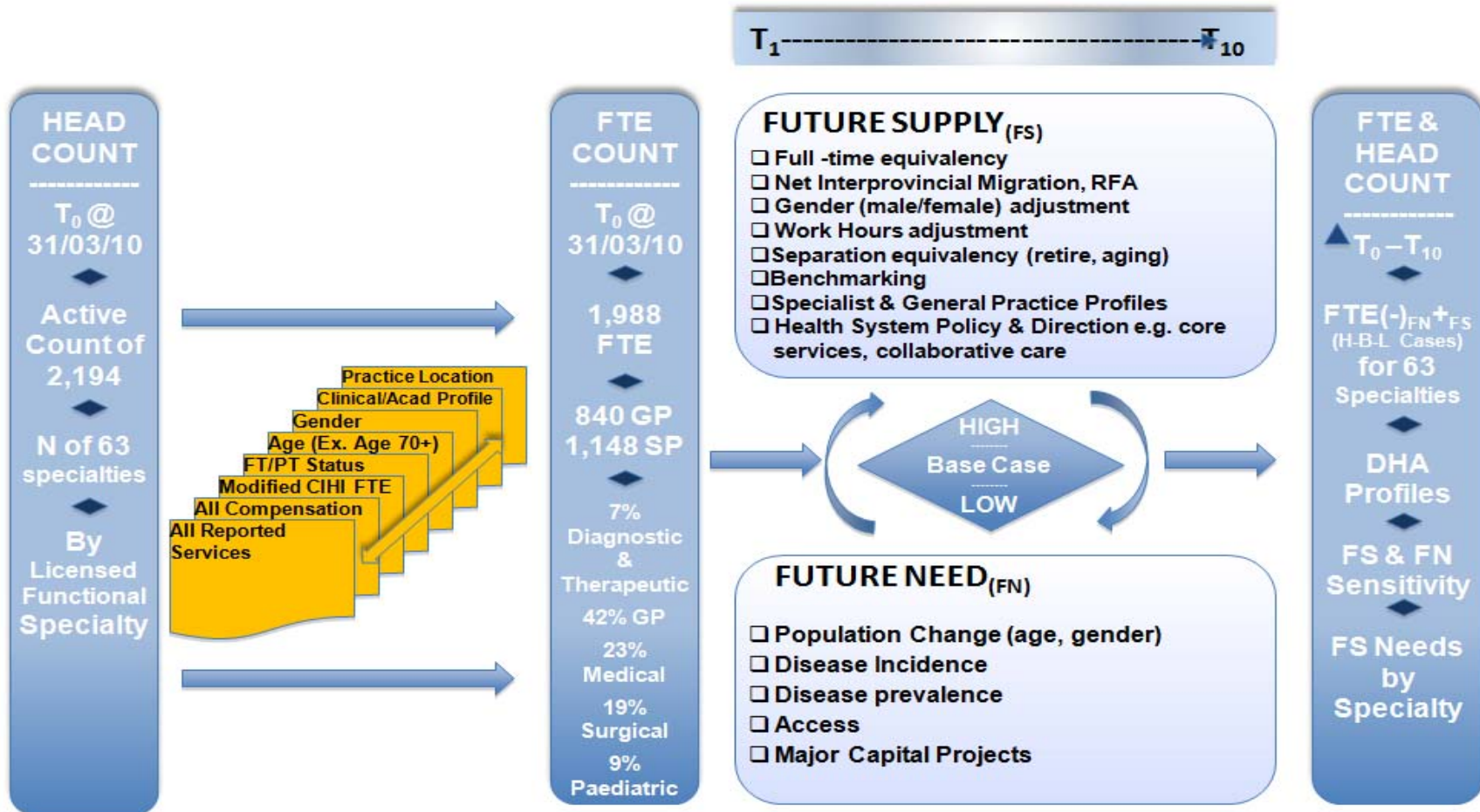
14 APPLICATION OF ASSESSED VARIABLES OF SUPPLY AND NEED

As referenced, the physician resource plan forecasting model is a hybrid model that incorporates attributes of both static and dynamic modeling. The following figure identifies each variable as static or dynamic and provides a brief description of the method of application of each independent variable.

14.1 Future Supply

INDEPENDENT VARIABLE (IV_n)	MODE	DESCRIPTION
♦ **Net inter-provincial migration (NIPM) and return from abroad (RFA)**		
▪ *NIPM - Leave and return to province*	STATIC	Set at a fixed rate $T_1 - T_{10}$
▪ *RFA - Return from abroad*	STATIC	Set at a fixed rate $T_1 - T_{10}$
♦ **Gender (male/female)**	DYNAMIC	Set at an age (25 to 75) and gender (M-F) specific rate that changes with the annual change in each individual physician age from $T_1 - T_{10}$
♦ **Work Hours**	STATIC	Set at a fixed amount $T_1 - T_{10}$
♦ **Separations**	DYNAMIC	Set at an age (25 to 75) and gender (M-F) specific rate that changes with the annual change in each individual physician age from $T_1 - T_{10}$
♦ **Benchmark(s)**	STATIC	Set at a fixed amount $T_1 - T_{10}$. Benchmarks are only applied if they met certain criteria (see Section 13.1 #6 – Benchmarks).
♦ **Specialist Physician Profile** **(Clinical, Teaching (concurrent) and Education, Research, Leadership and Administration)**	STATIC	Set at a fixed proportion at an individual physician level, $T_1 - T_{10}$
♦ **General Practitioner Profile** **(Clinical – Community, Clinical – Other, Teaching (concurrent) and Education, Leadership and Administration)**	STATIC	Set at a fixed proportion at an individual physician level, $T_1 - T_{10}$

♦ **Collaborative Care**	DYNAMIC	Set at an increasing rate over time, $T_1 - T_{10}$
♦ **Health System Planning and Policy**	DYNAMIC	[Individual policy dependant] Recommended CORE services model is included is this variable group.

14.2 Future Need

| INDEPENDENT VARIABLE (IV$_n$)	MODE	DESCRIPTION
1. **Population Change in Age and Gender**	DYNAMIC	Forecast at a changing rate over time, $T_1 - T_{10}$
2. **Disease Incidence and Prevalence**	STATIC	Set at fixed rates $T_1 - T_{10}$
3. **Access to Service**	STATIC	Individual policy dependant, e.g., colonoscopy screening guideline and impact on Gastroenterologists, final implementation approach to 'Better Care Sooner' initiative and the resultant impact on emergency physician staffing of Emergency Departments.
4. **Major Capital Projects**	N/A	There are no definitive major capital projects that will result in a new building(s) in a new location distant from current building locations.

15 FORECAST SCENARIOS

Three physician resource plan forecast scenarios are presented **- a base case, a low recruitment need case, and a high recruitment need case**. The base case represents the forecast that best matches both the evidence assembled in the Environmental Scan and Analysis and indicated government strategic policy direction. The high need case represents the workforce need assuming the future behaviour of variables is at the upper predicted rate for each variable. The low need case assumes future behaviour is at the lower predicted rate for each variable.

The rates applied annually (T_1-T_{10}) to each variable, in the model mode (static or dynamic) described in the prior figure, in the low, base, and high cases are identified in the following figure. Reference information on each variable is provided in the report Section indicated in the right hand column.

15.1 Future Supply Variables

The following table itemizes each supply variable and the rate methodology applied to each of the low, base, and high case scenarios.

	INDEPENDENT VARIABLE	LOW CASE	BASE CASE	HIGH CASE
1	**Full-time equivalency**	As per 'Base Case'	As described in 'Key Definitions'	As per 'Base Case'
2	**NIPM and RFA**			
	▪ *NIPM - Leave and return to province*	(1.06%) (per CIHI)	(1.06%) (per CIHI)	(1.75%) (per Nova Scotia Medavie billing and CPSNS Registry analysis)
	▪ *RFA - Return from abroad*	0.00% (per CIHI)	0.00% (per CIHI)	0.00% (per CIHI)
3	**Gender (male/female)**	As per 'Base Case'	Family Med/GP – 0.84 female per 1.0 male; Medical specialties – 0.95 female per 1.0 male; Surgical specialties – 0.95 female per 1.0 male	Family Med/GP 0.74 female per 1.0 male; Medical specialties – 0.82 female per 1.0 male; Surgical specialties – 0.82 female per 1.0 male
4	**Work Hours**	0.00%	0.00%	(0.00%)
		The Base, Low, and High Cases assume no change in the average hours worked per week over the forecast period. The model is highly sensitive to a change in hours of work e.g. a one hour (~2%) reduction in hours of work per week and an equivalent reduction in volume of services provided equates to a 10-year negative FTE impact of (40.00) or (4.00) per annum.		

	INDEPENDENT VARIABLE	LOW CASE	BASE CASE	HIGH CASE
5	**Separations**	(2.74%) (Base Case less 1 Std. Dev)	(3.11%)	(3.25%) (Base Case plus 1 Std. Dev)
		The 2009/10 provincial data will be used to generate the detailed age/gender specific separation rates for the Base Case. Based upon the provincial data analysis the annual average rate over T_1-T_{10} is (3.11%) in the Base Case; equivalent to 57 to 63 FTE annually.		
6	**Benchmarks**	Specialty-specific benchmarks (0.8%) & (16.7) FTE/yr	Specialty-specific benchmarks (0.40%) & (8.2) FTE/yr	Specialty-specific benchmarks (0.43%) & (8.5) FTE/yr
		Each of 63 specialties was researched for benchmarks. This information is provided in the Environmental Scan and too voluminous to reproduce here in this Summary Report. The subsequent Section 'Forecast Results' in subsection 17.1.1 includes a detailed assessment of the impact of benchmarking by specialty. Detailed information on specialty benchmarks is provided in the Environmental Scan Report Section 4.0 on Individual Specialties.		
7	**Specialist Physician Profile**			
	▪ *Clinical*	Maintain current profile	Maintain current profile	Maintain current profile
	▪ *Teaching (concurrent)*	Maintain current profile	Maintain current profile	Maintain current profile
	▪ *Education (didactic)*	Maintain current profile	Maintain current profile	Maintain current profile
	▪ *Research*	Maintain current profile	Maintain current profile	Maintain current profile
	▪ *Leadership and Administration*	Maintain current profile	Maintain current profile	Maintain current profile
		The Base, Low, and High Cases are premised upon the current state in terms of time and FTE allocation between clinical, teaching (concurrent), education (didactic), research, and leadership and administration (i.e., 7% estimate of academic time based upon academic salary not withstanding). Once the Department of Health and Wellness and Dalhousie Faculty of Medicine review is complete two forecast model steps can occur: 1. The estimate of 7% academic time can be revised at an individual level based on more detailed information about the current state; and 2. Contracted changes in the current state can be applied going forward.		

	INDEPENDENT VARIABLE	LOW CASE	BASE CASE	HIGH CASE
8	**General Practitioner Profile**			
	▪ *Clinical - Community*	Increase community capacity 2.32% ~(12.0 FTE)	Maintain current profile	Maintain current profile
	▪ *Clinical – Hospital-based* ▪ *Teaching (concurrent)*	Maintain current profile	Maintain current profile	Maintain current profile
	▪ *Education (didactic)*	Maintain current profile	Maintain current profile	Maintain current profile
	▪ *Leadership and Administration*	Maintain current profile	Maintain current profile	Maintain current profile
		The Base, Low, and High Cases will be applied as follows: • Base Case: Status quo – average of 90 visits per week per 1.0 FTE • Low Case: A decrease in the percent seeing less than 100 patients per week from 45.7% currently to 40%. Net capacity increases 2.32% provincially. • High Case: As per 'Base Case'.		
9	**Collaborative Care**	As per 'Base Case'	1.0 FP FTE per 1,750 (+1 NP) at a 47% implementation rate.	1.0 FP FTE per 1,750 (+1 NP) with at a 25% implementation rate.
		The Base, Low, and High Cases will be applied as follows: • Base Case: 1.0 family practitioner and 1.0 nurse practitioner FTE per 1,750. This ratio is applied to total forecast departures (i.e., the sum of NIPM/RFA, Gender, Separations, and Work Hours). By doing so the transition is implemented only as FPs depart the system (usually through retirement) and not to current active FPs. The Base Case ratio is further tempered by assuming a phased implementation over T_1-T_{10}. In the Base Case this means full annual conversion will not be achieved in the forecast period and the net effective rate of conversion achieved will be 47% of the population over T_1-T_{10}. A 47% population conversion is equivalent to a notional population enrollment of 441,000 in collaborative primary care practices. This scenario is contingent upon contracting 252 NP FTE. • Low Case: As per the Base Case. • High Case: The rate of implementation is slowed to 25% in the High Case as compared to the 47% rate of implementation in the Base Case. The high case results in increased need for FPs. The net effective rate of conversion		

	achieved is modified to be 25% over T_1-T_{10}. A 25% conversion is equivalent to a notional population enrollment of 236,500 in collaborative primary care practices. This scenario requires 135 NP FTE. See also subsection 13.1 for a detailed description of how Collaborative Care has been applied.		
10 Core Services	See below and subsection 15.1.2.	See below and subsection 15.1.2.	See below and subsection 15.1.2.

15.1.1 Core Services Variable

The application of 'core' services requires detailed clinical service planning and preparation prior to implementation. Conceptually and strategically what is intended is a definition, based on evidence, of the population health service need that residents must have reasonable and appropriate access to within the community or surrounding region. Consensus practice in Canada is to define core services as follows: comprehensive family practice across the province, and emergency, general internal medicine, general surgery (and corresponding anaesthesia services), general psychiatric, general paediatrics, general obstetrics and gynaecology, and general laboratory and radiology (screening, routine diagnostic and imaging, x-ray, ECG) services in community and regional hospitals. A limited number of regional hospitals would also have urological, orthopaedic, and ophthalmological services.

Core services are projected provincially but ultimately will be managed at a DHA level and planned and implemented at a community catchment area level. In order to enhance quality and sustainability, all core service physicians would be credentialed in their core service specialty, function as a single integrated clinical department, and organize their overall care including call, coverage and quality improvement activities at the DHA level.

The Final Report recommends the core service model include the services described in the following figure. The adjusted benchmark is based upon the benchmarking methodology described previously. For Core Services the benchmark has been adjusted favourably by 10%-15% for most of the listed specialties in recognition of the need to ensure appropriate community level access and the critical mass of physicians this requirement entails. The provincial Core Service FTE quantity is an extrapolation of the adjusted benchmark indicator(s).

Specialty	Adjusted Benchmark(s)	Comment	Provincial Core Service #FTE	Implementation Assumption T_1-T_{10}
Comprehensive Family practice	1:1,750 (ratio as per collaborative care model)	• Base Case: 1.0 FP FTE per 1,750 (+1 NP) • Low Case: +15% i.e. 1.0 FP FTE per 2,000 (+1 NP) • High Case: -15% i.e. 1.0 FP FTE per 1,500 (+1 NP)	539.0 471.0 628.0	Base Case: Phased implementation at rate of 36% of the natural (separation, NIPM, RFA, etc.) turnover in the FP workforce. Equivalent to 141 FTE.
Anaesthesia	N /A	Core Service ratio of 0.50 FTE per general surgeon is 10% above the benchmark of 0.44 FTE applied to the balance of Anaesthesia.	30.7	Implementation tied directly to implementation of Core Service Model for General Surgery

Specialty	Adjusted Benchmark(s)	Comment	Provincial Core Service #FTE	Implementation Assumption T1-T10
General Surgery	1:15,788; and 490 surgical cases/ yr/ FTE.	Core Service Model ratio of 1:15788 is set 10% below the national average of 1:17,466.	59.7	Surgical volume is incorporated into the #FTE.
General Internal Medicine	1:14,058 3,000 services /yr /FTE	Core Service Model ratio of 1:14,058 is set 35% below the current Nova Scotia ratio of 1:21,637.	67.0	Ratio of 1:14,058 is set at the Canadian Society of GIM recommended ratio and assumes 3,000 services/yr/FTE
Psychiatry	230 patient caseload (67% severe)	Core Service Model ratio of 230 is 10% less than the benchmarks.	112.2	Integration with overall provincial Mental Health Service Plan is required.
Paediatrics - general	1:5,100 (<age18)	Core Service Model ratio of 1:5,100 (<age18 in Nova Scotia) is 30% lower than the Canadian national average of 1:7,287.	34.0	Unlike subspecialty paediatrics, general paediatrics is not adjusted for Atlantic province workload.
Obstetrics & Gynaecology	1:16,555	Core Service Model ratio of 16,555 is 10% less than the Canadian national average of 1:18,394.	51.0	Incorporates relative Nova Scotia obesity and birth rates.

General laboratory and radiology, while in-scope for core services, are omitted due to the many approaches to modeling access to these services. Emergency Services modeling defers to the final implementation plan for the Better Care Sooner (BCS) initiative.

15.1.2 Core Services - Base, Low, and High Case Rates

The Base, Low, and High Cases will be applied as follows:

- Base Case: Ratios and rates as per the preceding Table.
- Low Case: Average of 50% of Base Case increases in recruitment associated with Core Service Model.
- High Case: Maintain the current state, i.e., no Core Service Model implementation.

15.1.3 Core Services – Illustrative County Level Distribution

The following figures provide an illustrative core service FTE distribution based upon the recommended provincial Base Case FTE (before population and disease incidence and prevalence adjustments). Actual sub-DHA allocations and service delivery models are subject to detailed clinical services.

Figure 23 Core Services Implementation - General Paediatrics

DHA	DHA NAME	Pop <Age 18	General Paediatrician FTE Current Distribution	Core Service Distribution
1	South Shore Health	9,120	-	2.00
2	South West	11,365	2.08	2.00
3	Annapolis Valley H	15,271	2.69	3.00
4	Colchester East Hai	13,270	3.97	3.00
5	Cumberland Health	4,745	-	1.00
6	Pictou County	8,865	1.01	2.00
7	Guysborough Antig	7,872	3.13	3.00
8	Cape Breton	23,484	4.35	6.00
9	Capital Health	79,062	25.23	12.00
	Province	173,054	42.47	34.00

* Core Service (ceiling) Ratio 1:7000

The adjacent figure illustrates general paediatric FTE distribution currently and under the core service model. Currently there is 1 general paediatrician per 3,134 under age 18 within Capital DHA and 1 per 5,542 outside Capital DHA.

This is a (43%) difference in relative distribution. In the core service model a general paediatrician would be based in all but six counties. Travelling clinics, for example, would come to these remaining six counties rather than residents travelling to another county.

Figure 24 Core Services Implementation - General Obstetrics & Gynaecology

DHA	DHA NAME	Female Pop 15-39	Obstetrics & Gynaecology FTE Current Distribution	Core Service Distribution
1	South Shore Health	7,890	3.43	2.68
2	South West	9,131	2.64	3.10
3	Annapolis Valley H	11,899	4.81	4.04
4	Colchester East Hai	11,529	3.69	3.91
5	Cumberland Health	3,892	1.00	1.32
6	Pictou County	7,206	1.85	2.44
7	Guysborough Antig	6,974	3.11	1.97
8	Cape Breton	18,063	3.67	6.53
9	Capital Health	73,725	23.36	25.00
	Province	150,309	47.56	50.98

* Core Service (ceiling) Ratio 1:2950 (females aged 15-39)

The adjacent figure illustrates general obstetrics /gynaecology FTE distribution currently and under he core service model. Current distribution is comparable in/out of Capital DHA. An obstetrician/ gynaecologist would be based in numerous counties. Travelling clinics, for example, would come to the remaining counties.

Figure 25 Core Services Implementation - General Surgery and corresponding Anaesthesia services

DHA	DHA NAME	POP	General Surgery FTE* Current Distribution	Core Service Distribution	Anaesthesia Corresponding Core Service Distribution
1	South Shore Health	59,782	4.04	3.80	1.90
2	South West	62,097	3.60	4.00	2.00
3	Annapolis Valley Health	82,028	3.08	5.00	2.50
4	Colchester East Hants	72,222	4.68	4.60	2.30
5	Cumberland Health	31,485	1.64	2.00	1.00
6	Pictou County	46,093	2.48	3.00	1.50
7	Guysborough Antigonish Strait	44,106	2.98	2.80	1.40
8	Cape Breton	125,829	4.50	8.00	4.00
9	Capital Health	418,881	24.62	26.60	13.30
	Province	942,522	51.62	59.80	29.90

* Core Service (ceiling) Ratio 1:15790

The adjacent figure illustrates general surgeon FTE distribution currently and under the core service model. A team of general surgeons would be based in numerous counties.

Access to services by residents of other counties will depend upon a number of variables including availability of suitable local surgical facilities, trained staffing, equipment, case volume, etc.

Figure 26 Core Services Implementation - General Internal Medicine

DHA	DHA NAME	POPULATION	General Internal Medicine FTE Current Distribution	Core Service Distribution
1	South Shore Health	59,782	3.23	4.40
2	South West	62,097	3.29	4.00
3	Annapolis Valley Health	82,028	3.80	5.00
4	Colchester East Hants	72,222	3.12	4.70
5	Cumberland Health	31,485	2.67	2.00
6	Pictou County	46,093	5.57	3.00
7	Guysborough Antigonish Strait	44,106	2.26	4.00
8	Cape Breton	125,829	4.44	9.40
9	Capital Health	418,881	15.14	29.80
	Province	942,522	43.53	66.30

* Core Service (ceiling) Ratio 1:14,058

The adjacent figure illustrates general internal medicine FTE distribution currently and under the core service model. General internists would be based out of local and/or regional hospitals across the province. There is a substantial shortage of general internists which would be filled through benchmark based adjustment of 8.0 FTE and core service based adjustment of 14.0 FTE.

Figure 27 Core Services Implementation - General Psychiatry

DHA	DHA NAME	POPULATION	General Psychiatry FTE Current Distribution	Core Service Distribution
1	South Shore Health	59,782	2.07	7.00
2	South West	62,097	2.22	8.00
3	Annapolis Valley Health	82,028	5.14	9.50
4	Colchester East Hants	72,222	8.84	8.50
5	Cumberland Health	31,485	3.00	4.00
6	Pictou County	46,093	2.03	5.50
7	Guysborough Antigonish Strait	44,106	5.75	5.50
8	Cape Breton	125,829	14.14	15.50
9	Capital Health	418,881	86.48	48.70
	Province	942,522	129.68	112.20

* Core Service (ceiling) Ratio 1:9344, actual average 1:8,401, and a minimum of 2.0 FTE per location.

The adjacent figure illustrates general psychiatry FTE distribution currently and under the core service model. A substantial shortage of general psychiatrists exists outside CDHA. A portion (13.0 FTE) of this shortage can be filled through planned replacement as CDHA based psychiatrists retire. 13.0 FTE will pass age 70 during the forecast period.

See Environmental Scan for a detailed discussion and review of the 'core service' concept.

15.2   Future Need Variables

The following table itemizes each need variable and the rate methodology applied to each of the low, base, and high case scenarios.

	INDEPENDENT VARIABLE	LOW CASE	BASE CASE	HIGH CASE
1	**Population Change (See also below)**			
	▪ *Age*	(2.09%)	0.032%	1.46%
	▪ *Gender*	Included in 'age'	Included in 'age'	Included in 'age'
2	**Disease (See also below)**			
	▪ *Incidence (cancer)*	See below	See below	See below
	▪ *Prevalence (Chronic Disease)*	See below	See below	See below
3	**Access to Service**	Policy Dependant	Status Quo	Policy Dependant
4	**Major Capital Projects**	N/A	N/A	N/A

15.2.1 Population

Figure 28 Population Forecast to 2021 (Source: Department Finance)

	2010 Actual	2021 Base	2021 Low	2021 High
Population - Unadjusted	942,506	942,820	922,825	956,309
Absolute Change		0.03%	(2.09%)	1.46%
Relative Change to BASE			(2.12%)	1.43%
Population - Adjusted*	943,410	1,018,236	1,000,000	1,035,592
Absolute Change		7.93%	6.00%	9.77%
Relative Change to BASE			(1.79%)	1.70%

* adjusted for the relative differences in physician service consumption by age (0 to 90+) and gender.

The predicted variability of provincial population forecasts is identified in the following figure. The population forecasts are provided by the Department of Finance. The base forecast calls for a 0.3% increase in population over the ten years. The low forecast is a decrease of (2.09%) and the high forecast an increase of 1.46%. The difference between the low and high population forecasts is 3.55%. The difference on an adjusted population basis is slightly narrower at 3.49%. In the adjusted population figures the values are adjusted for the relative consumption of physician services by age and gender. Hence in a population with high chronic disease prevalence, such as Nova Scotia, the adjusted population as it ages shows a higher increase than the unadjusted values. The adjusted population will grow by 7.93%, 6%, and 9.77% between the base, low, and high forecasts respectively, assuming the rate of consumption of physician services remains unchanged over the forecast period.

15.2.2 Disease Incidence and Prevalence

The future rate of disease incidence and prevalence was examined in the Environmental Scan. The incidence rate of new chronic disease cases in Nova Scotia is fairly constant with the exception of diabetes where the incidence has increased from 8.3% to 9.9% over the past five years.

Figure 29 Chronic Disease Prevalence 2003 to 2009

INDICATOR (Source: CIHI & CCHS)	2009		2005		2003		Six-Year Change*	
Self-Reported Conditions (Source: CIHI & CHS)	% of Population (Confidence Intervals)		% of Population (Confidence Intervals)		% of Population (Confidence Intervals)		Total	Annual
Diabetes (age 12+)	7.7	(6.4–8.9)	6.6	(5.8-7.5)	5.5	(4.8–6.2)	40.0%	6.7%
High Blood Pressure (age 12+)	21.5	(19.6–23.4)	18.1	(17.0-19.3)	18.1	[16.7–19.5]	18.8%	3.1%
Asthma (age 14+)	9.2	(7.5–11.0)	9.3	(8.3-10.4)	9.3	(8.1–10.4)	-1.1%	(0.2%)
COPD (age 35+)	7.0	(5.4–8.5)	11	(8.6-12.5)	11	(8.6-12.5)	-36.4%	(6.1%)
Arthritis (age 12+)	24.5	(22.4–26.5)	20.8	(19.2-22.5)	24.1	[22.7–25.5]	1.7%	0.3%
Adult Body Mass Index =>30 (age 18+)	24.3	(21.4–27.2)	18.3	(16.4-20.2)	19.8	[18.2–21.4]	22.7%	3.8%
Weighted Average								3.5%
Self-Reported Health Behaviours								
Current Smoker (Age 12+)(Daily or Occasional)	23.3	(20.8–25.7)	24.4	(22.1–26.6)	23.5	u/r	-0.9%	(0.1%)
Heavy Drinking (Age 12+) [5+ Drinks on One Occasion, 12 or More Times a Year]	20.8	(18.5–23.0)	28.6	(26.0–31.2)	28.6	[26.0–31.2)	-27.3%	(4.5%)
* Population change 0.7% 2003 to 2009								

The annual age standardized incidence rate of all cancers, male and female, increased 0.2% and 0.6% respectively between 2004 and 2011.

Figure 30 Cancer ASIR

Nova Scotia - Percent Annual Change in Age-Standardized Incidence Rate (ASIR) & Estimated New Cases in 2011					
Cancer Type	Male		Cancer Type	Female	
	Incidence	New Cases		Incidence	New Cases
Prostate	0.4%	910	Breast	(0.5%)	720
Lung	(1.7%)	500	Colorectal	(1.5%)	360
Colorectal	(0.9%)	470	Lung	0.5%	410
Bladder	6.5%	210	Body of Uterus	(0.3%)	130
Non-H Lymphoma	(0.5%)	120	Non-H Lymphoma	4.1%	120
Melanoma	3.0%	140	Melanoma	2.3%	130
Kidney	1.0%	130	Cervix	(2.6%)	45
Oral	(2.8%)	85	Kidney	0.6%	90
Other		735	Ovary	(2.7%)	60
			Other		735
All Cancers (Males)	0.2%	3,300	All Cancers	0.6%	2,800

The following figure summarizes the FTE impact of forecast increases in sentinel disease incidence and prevalence. While the FTE impact is isolated to a specific specialty(s), the deployment of the incremental FTE may be distributed beyond the single specialty e.g. Psychiatry/Mental Health and Nephrology/Diabetes program and service delivery planning may employ a greater mix of allied health professionals.

Figure 31 Disease Incidence and Prevalence Impact on Forecast Period

BASE CASE - WORKFORCE SUPPLY FORECAST	FTE	Cancer ASIR	Diabetes Prev.	Heart Disease	Arthritis	Asthma/ COPD	Renal Disease	Mental Health	(11a) Disease Incidence	(11b) Disease Prevalence
		Change in Incidence or Prevalence/ Annum							10-Year FTE Impact	
1 Anatomic Pathology	24.3	1.0%							2.68	-
10 Radiology - Oncology	13.1	1.0%							1.44	-
Diagnostic & Therapeutic Subtotal	140.8								4.12	4.12
11 General Practitioner Subtotal (1)	832.5	0.0%							-	132.0
12 Cardiology	33.1			1.0%						3.64
17 Endocrinology & Metabolism	5.3		3.5%							2.06
21 Haematology	10.6	1.0%							1.17	
22 Infectious Diseases	7.1									
23 Medical Oncology	17.4	1.0%							1.91	
24 Nephrology	17.7						3.5%			6.81
29 Psychiatry	129.7							1.0%		12.97
31 Respiratory Medicine	11.8					1.0%				1.29
32 Rheumatology	12.4				1.3%					1.77
MEDICAL - SUBTOTAL	474.0								3.1	160.6
53 Paediatric Respiratory Medicine	1.8					1.0%				0.20
55 Psychiatry - Adolescent	15.7							1.5%		2.58
PAEDIATRIC SUBTOTAL	166.0									
65 Cardiac Surgery	8.0			1.0%						0.88
66 General Surgery	51.6	1.0%							5.68	
75 Vascular Surgery	7.4			1.0%						0.81
SURGICAL SUBTOTAL	369.4								5.7	1.7
	-									
TOTAL	1,982.6	0.8%	3.5%	1.0%	1.3%	1.0%	3.5%	1.3%	12.9	166.4

(1) A weighted average of 1.5% per annum is applied to General Practice to encompass the impact of chronic disease increasing prevalence

The weighted average of 1.5% per annum is applied to Family Practice to encompass the impact of chronic disease increasing prevalence.

To avoid double counting the impact of chronic illness on service utilization and FTEs; those specialties receiving an adjustment in the figure above did not also receive an adjustment for the effect of population aging (preceding variable). Those specialties that did not receive an adjustment for chronic illness did receive an adjustment for population aging.

15.2.3 Base, Low, and High Case Rates

The Base, Low, and High Cases will be applied as follows:

- Base Case: An effective rate of 1.0% per annum of the total provincial FTE (per the preceding figure).
- Low Case: An effective rate of 1.0% per annum of the total provincial FTE;
- High Case: An effective rate of 1.4% per annum of the total provincial FTE;

The High Case assumes a weighted average of 2.5% per annum is applied to Family Practice instead of the Base Case rate of 1.5%.

FORECAST RESULTS

A Review of the Low, Base, and High Case Forecast Scenarios

16 SUMMARY

This section summarizes the forecast base, low and high case recruitment need scenario results. The base case represents the most likely, and recommended approach for the Department of Health and Wellness in planning for physician resource needs over the coming ten years.

Figure 32 Base, Low, and High Case recruitment scenario (numeric) summary of ten year forecast results

	BASE CASE DETAIL BY CATEGORY					BASE CASE SUMMARY			LOW CASE SUMMARY			HIGH CASE SUMMARY		
	SPECIALTY CATEGORIES					PROVINCE			PROVINCE			PROVINCE		
	Diagnostic & Therapeutic	Family /GPs	Medical	Paediatric*	Surgical	Total FTE	Total % Change	Annual % Change	Total FTE	Total % Change	Annual % Change	Total FTE	Total % Change	Annual % Change
A. Current FTE	141	832	474	166	369	1,983			1,983			1,983		
(1) NIPM/ RFA	14.9	88.2	50.3	17.6	39.2	210.2	10.6%	1.1%	210.2	10.6%	1.1%	347.0	17.5%	1.8%
(2) Gender	9.0	47.7	23.4	13.7	43.7	137.5	6.9%	0.7%	137.3	6.9%	0.7%	232.2	11.7%	1.2%
(3) Work Hours	-	-	-	-	-	-	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%
(4) Separations	41.9	253.9	124.4	56.3	111.9	588.4	29.7%	3.0%	559.9	28.2%	2.8%	614.1	31.0%	3.1%
B. SUBTOTAL: Replacement Recruitment	66	390	198	88	195	936	47.2%	4.7%	907	45.8%	4.6%	1,193	60.2%	6.0%
(5) Benchmark FTE Adj.	(5.3)	121.3	(2.8)	(22.4)	(8.8)	82.1	4.1%	0.4%	(167.6)	(8.5%)	(0.8%)	85.3	4.3%	0.4%
(6) Academic Physician Profile	-	-	-	-	-	-	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%
(7) GP Profile	-	-	-	-	-	-	0.0%	0.0%	(12.0)	(0.6%)	(0.1%)	15.2	0.8%	0.1%
(8) Collaborative Care	-	(141.3)	-	-	-	(141.3)	(7.1%)	(0.7%)	(141.3)	(7.1%)	(0.7%)	(75.7)	(3.8%)	(0.4%)
(9) Core Services	-	-	15.9	10.3	11.0	37.1	1.9%	0.2%	19.6	1.0%	0.1%	-	0.0%	0.0%
(10) Population Change	4.9	-	9.2	5.1	12.4	31.7	1.6%	0.2%	50.6	2.6%	0.3%	77.9	3.9%	0.4%
(11a) Disease Incidence	4.1	-	3.1	-	5.7	12.9	0.6%	0.1%	10.7	0.5%	0.1%	50.6	2.6%	0.3%
(11b) Disease Prevalence	-	132.0	28.5	2.8	1.7	165.0	8.3%	0.8%	188.1	9.5%	0.9%	224.5	11.3%	1.1%
C. SUBTOTAL - Policy & Planning Recruitment Impact	4	112	54	(4)	22	187	9.5%	0.9%	(52)	(2.6%)	(0.3%)	378	19.1%	1.9%
D. TOTAL Workforce FTE Needs	70	502	252	83	217	1,124	56.7%	5.7%	856	43.2%	4.3%	1,571	79.2%	7.9%
TOTAL FTE at 2021 (A. plus D.)	210	1,334	726	249	586	2,170	9.5%	0.95%	1,931	(2.6%)	(0.26%)	2,360	19.1%	1.91%
Annual % Increase/ (Decrease)	0.27%	1.35%	1.14%	(0.25%)	0.59%	0.95%			(0.26%)			1.91%		

*Includes Medical, Surgical, and Diagnostic & Therapeutic*

The low case scenario is 1,931 FTE and is 11% or 239 FTE lower over ten years than the base case forecast of 2,170 FTE. The high case is 2,360 FTE and is 10% or 190 FTE higher than the base case. The base case forecast is 2,170 FTE with a range from -11% (239 FTE) to +10% (190 FTE).

The forecast variables fall into two categories as identified in the model design. The first category is future supply which accounts for 83% of forecast recruitment needs. The second category, future need (population change, disease incidence and prevalence), accounts for the remaining 17%. Within the future supply category NIPM/RFA, Gender, and Separations account for the vast majority of recruitment needs and benchmarking, core services, and collaborative care the balance. Within the future need category disease prevalence accounts for 79% of recruitment needs and population change and disease incidence the remaining 21%. It is important to note that the academic profile variable has been set at 7% academic, 93% clinical for each full-time Dalhousie Faculty of Medicine faculty member. This ratio can be updated once alternative funding plan contractual agreements are in place.

The largest case variance between variables is benchmarking and disease incidence. The former is the subject of added detailed review and comments in a subsequent subsection. The latter variable is sensitive to lifestyle choice that manifests as a population ages by changing rates of increasing or decreasing health service utilization.

Figure 34 Base, Low, and High Case recruitment scenario summary of ten year forecast results
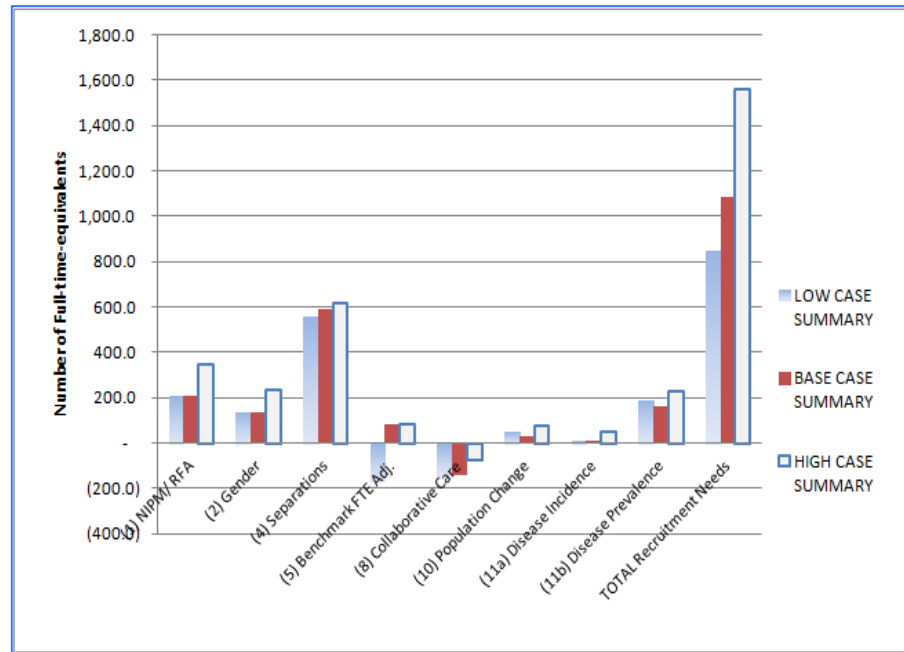
Figure 33 % Difference by Variable between the Low and High Cases as compared to the Base Case
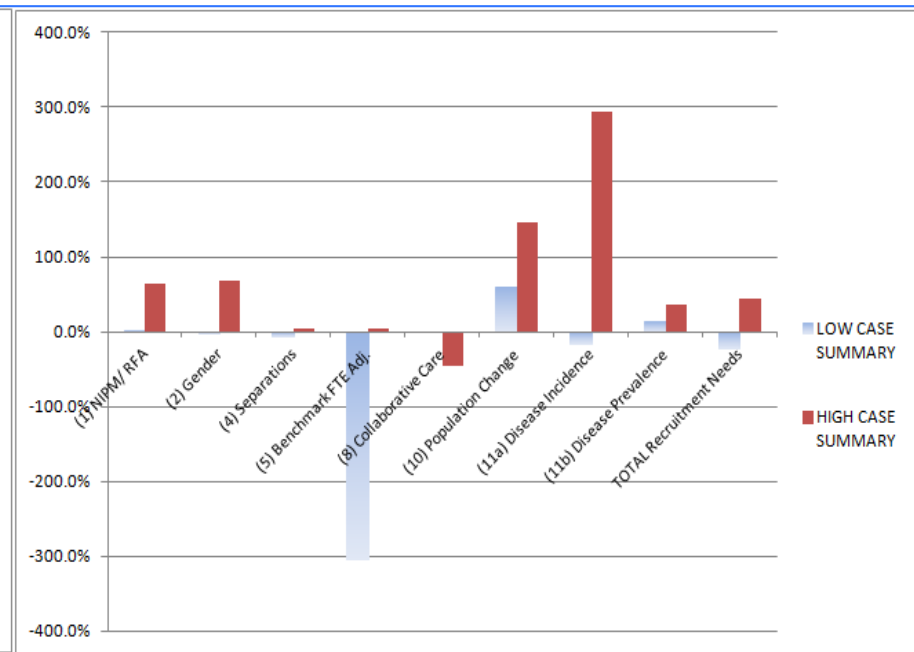
The summary forecast results are as follows:

FORECAST SCENARIO	ANNUAL CHANGE		TOTAL 10 YEAR CHANGE		10 Year Forecast Range COMPARED TO BASE CASE
	%	FTE	%	FTE	
BASE CASE	0.95	18.7	9.5	187.0	
LOW CASE	(0.26)	(5.2)	(2.7)	(52.0)	(12.1%) and (239 FTE) lower
HIGH CASE	1.91	37.8	19.1	378.0	+10.0% and 190 FTE higher

16.1   Forecast Variables

A second important perspective on the multiple variables applied in the model is to view them in terms of being either workforce resources or health system planning variables. The former occur largely naturally as part of the normal turnover of physician resources as they enter practice, change practice over their career, and ultimately exit practice into retirement. As such, they are largely outside the influence of government and stakeholders. The latter are directly within the policy and control of government and stakeholders.

- Workforce Resource Variables

The workforce resource variables, NIPM/ RFA, Gender, Work Hours, and Separations, account for 74%[3] of the forecast recruitment requirements.

- Health System Planning Related Variables

The health system planning variables, adjusting to benchmarks, collaborative care, resourcing population change, and resourcing disease Incidence and disease prevalence account for 26% of forecast recruitment requirements. Within this diverse group of variables, the Canadian health care system has by and large met increased needs arising from population change, disease incidence, and disease prevalence, through a fairly hands off demand-based response by physicians. Collaborative primary care is a function of government and stakeholder policy, planning, and operations. Benchmarking is a function of clear, integrated system-wide clinical service planning with is also specifically a function of government and stakeholder policy, planning, and operations.

At 26% of recruitment needs, government and stakeholders have the ability to provide substantial direction as to the future design, functioning, and delivery of provincial, district, and local health care services as well as referral services from the Maritime and Atlantic provinces.

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[3] Workforce resource recruitment of 936 FTE plus Health system variables of 329 FTE (187.5 plus add back Collaborative Care reduction of 141 FTE if this key plan is not successfully implemented) for a total of 1,265 FTE real impact. 936 is 74% of 1,265.

17 BASE CASE

The base case beginning FTE balance is 1,983. The ten-year forecast turnover due to retirement, migration, and gender adjustment of new recruits is forecast as 936 FTE or 4.7% per annum. Health policy and planning variables have a net 187 FTE impact or 0.9% per annum. Assuming turnover of 936 FTE is replaced then the FTE in 2021 (year ten of the forecast period) will be an increase of 187 to 2,170 or 0.95% per annum. Each column in the following figure[4] corresponds with a variable and description provided in the preceding Forecast Model design subsection. Positive values represent an identified recruitment need. Negative values represent a reduction in need as a result of a health system-planning variable.

BASE CASE - WORKFORCE FORECAST	CURRENT FTE	WORKFORCE RESOURCE VARIABLES					HEALTH SYSTEM PLANNING RELATED VARIABLES											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Specialty		(1) NIPM/ RFA	(2) Gender	(3) Work Hours	(4) Separations	SUBTOTAL: Replacement Recruitment	(5) Benchmark FTE Adj.	(6) Academic Physician Profile	(7) GP Profile	(8) Collaborative Care	(9) Core Services	(10) Population Change	(11a) Disease Incidence	(11b) Disease Prevalence	SUBTOTAL - Policy & Planning Recruitment Impact (Col's 8-15)	TOTAL FTE Recruitment Needs (Col's 7+16)	TOTAL FTE at 2021 (Col's 2+16)	Annual % Increase/ (Decrease)
1 Anatomic Pathology	24.3	2.6	1.3	0.0	9.0	12.9	(4.3)	o/s	n/a	n/c	n/c	0.9	2.7	n/c	(0.8)	12.1	23.5	(0.3%)
2 Diagnostic Radiology	79.0	8.4	5.1	0.0	22.6	36.1	0.0	o/s	n/a	n/c	n/c	2.7	n/c	n/c	2.7	38.8	81.7	0.3%
3 General Pathology	5.3	0.6	0.9	0.0	2.9	4.3	0.1	o/s	n/a	n/c	n/c	0.2	n/c	n/c	0.2	4.6	5.5	0.4%
4 Haematological Pathology	7.2	0.8	(0.3)	0.0	0.7	1.1	0.0	o/s	n/a	n/c	n/c	0.3	n/c	n/c	0.3	1.3	7.5	0.3%
5 Medical Biochemistry	2.0	0.2	0.3	0.0	1.3	1.8	(0.1)	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.0	1.8	2.0	0.1%
6 Medical Genetics	0.7	0.1	0.3	0.0	0.7	1.1	0.0	o/s	n/a	n/c	n/c	0.0	n/c	n/c	0.0	1.1	0.7	0.0%
7 Medical Microbiology	3.0	0.3	0.0	0.0	0.7	1.0	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	1.1	3.1	0.3%
8 Neuropathology	2.0	0.2	0.3	0.0	0.3	0.8	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	0.9	2.1	0.5%
9 Nuclear Medicine	4.2	0.5	0.4	0.0	0.6	1.4	0.0	o/s	n/a	n/c	n/c	0.1	0.0	n/c	0.1	1.6	4.3	0.3%
10 Radiology - Oncology	13.1	1.4	0.9	0.0	3.1	5.3	(0.9)	o/s	n/a	n/c	n/c	0.5	1.4	n/c	1.0	6.3	14.1	0.8%
Diagnostic & Therapeutic Subtotal	140.8	14.9	9.0	0.0	41.9	65.9	(5.3)	0.0	0.0	0.0	0.0	4.9	4.1	0.0	3.8	69.6	144.5	0.3%
11 General Practitioner Subtotal	832.5	88.2	47.7	0.0	253.9	389.8	121.3	0.0	0.0	(141)	0.0	0.0	0.0	132.0	112.0	501.9	944.5	1.3%

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[4] o/s – outstanding pending alternate funding plan contract agreements, n/c – no change attributable to the specialty for the variable, 'BCS' – Better Care Sooner, n/a – variable is not applicable to the particular specialty

- Base Case Figure continued…

BASE CASE - WORKFORCE FORECAST	CURRENT FTE	WORKFORCE RESOURCE VARIABLES					HEALTH SYSTEM PLANNING RELATED VARIABLES											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Specialty		(1) NIPM/ RFA	(2) Gender	(3) Work Hours	(4) Separations	SUBTOTAL: Replacement Recruitment	(5) Benchmark FTE Adj.	(6) Academic Physician Profile	(7) GP Profile	(8) Collaborative Care	(9) Core Services	(10) Population Change	(11a) Disease Incidence	(11b) Disease Prevalence	SUBTOTAL - Policy & Planning Recruitment Impact (Col's 8-15)	TOTAL FTE Recruitment Needs (Col's 7+16)	TOTAL FTE at 2021 (Col's 2+16)	Annual % Increase/ (Decrease)
12 Cardiology	33.1	3.5	1.6	0.0	6.8	12.0	2.1	o/s	n/a	n/c	n/c	0.0	n/c	3.6	5.8	17.7	38.9	1.7%
13 Community Medicine	1.8	0.2	0.2	0.0	0.8	1.2	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	1.3	1.9	0.6%
14 Critical Care Medicine	12.9	1.4	0.7	0.0	2.6	4.7	0.6	o/s	n/a	n/c	n/c	0.5	n/c	n/c	1.1	5.7	14.0	0.8%
15 Dermatology	17.3	1.8	0.7	0.0	5.5	8.1	0.0	o/s	n/a	n/c	n/c	0.6	n/c	n/c	0.6	8.7	17.9	0.3%
16 Emergency Medicine	71.7	7.6	2.2	0.0	12.8	22.6	0.2	o/s	n/a	n/c	o/s (BCS)	2.5	n/c	n/c	2.7	25.3	74.4	0.4%
17 Endocrinology & Metabolism	5.3	0.6	0.2	0.0	0.5	1.3	3.1	o/s	n/a	n/c	n/c	0.0	n/c	2.1	5.1	6.5	10.5	9.6%
18 Gastroenterology	17.5	1.9	(0.2)	0.0	3.1	4.7	0.8	o/s	n/a	n/c	n/c	0.6	n/c	n/c	1.4	6.1	18.9	0.8%
19 General Internal Medicine	43.6	4.6	2.9	0.0	13.3	20.8	8.0	o/s	n/a	n/c	14.0	1.5	n/c	n/c	23.5	44.3	67.0	5.4%
20 Geriatric Medicine	11.2	1.2	(0.3)	0.0	1.7	2.6	0.0	o/s	n/a	n/c	n/c	0.4	n/c	n/c	0.4	3.0	11.6	0.4%
21 Haematology	10.6	1.1	1.1	0.0	2.5	4.7	0.0	o/s	n/a	n/c	n/c	0.4	1.2	n/c	1.6	6.3	12.2	1.5%
22 Infectious Diseases	7.1	0.8	0.3	0.0	2.8	3.8	0.0	o/s	n/a	n/c	n/c	0.2	n/c	n/c	0.2	4.1	7.4	0.3%
23 Medical Oncology	17.4	1.8	0.6	0.0	4.6	7.0	0.0	o/s	n/a	n/c	n/c	0.6	1.9	n/c	2.5	9.5	19.9	1.4%
24 Nephrology	17.7	1.9	0.1	0.0	2.4	4.4	(2.5)	o/s	n/a	n/c	n/c	0.0	n/c	6.8	4.3	8.7	22.0	2.4%
25 Neurology	20.8	2.2	1.3	0.0	7.0	10.5	0.8	o/s	n/a	n/c	n/c	0.7	n/c	n/c	1.6	12.1	22.4	0.7%
26 Occupational Medicine	5.3	0.6	0.7	0.0	2.2	3.5	0.0	o/s	n/a	n/c	n/c	0.2	n/c	n/c	0.2	3.7	5.5	0.4%
27 Palliative Medicine	11.2	1.2	1.3	0.0	3.5	5.9	0.0	o/s	n/a	n/c	n/c	0.4	n/c	n/c	0.4	6.3	11.6	0.4%
28 Physical Medicine & Rehabilitation	11.5	1.2	0.5	0.0	4.2	5.9	0.0	o/s	n/a	n/c	n/c	0.4	n/c	n/c	0.4	6.3	11.9	0.3%
29 Psychiatry	129.7	13.8	7.4	0.0	39.6	60.8	(19.5)	o/s	n/a	n/c	1.9	0.0	n/c	13.0	(4.5)	56.2	125.2	(0.4%)
30 Psychiatry - Forensic	4.0	0.4	0.6	0.0	1.1	2.1	(1.2)	o/s	n/a	n/c	n/c	0.1	n/c	n/c	(1.1)	1.0	2.9	(2.8%)
31 Respiratory Medicine	11.8	1.3	1.4	0.0	4.5	7.1	4.1	o/s	n/a	n/c	n/c	0.0	n/c	1.3	5.4	12.5	17.2	4.6%
32 Rheumatology	12.4	1.3	0.1	0.0	3.0	4.4	0.6	o/s	n/a	n/c	n/c	0.0	n/c	1.8	2.4	6.7	14.8	1.9%
MEDICAL - SUBTOTAL	474.0	50.3	23.4	0.0	124.4	198.0	(2.8)	0.0	0.0	0.0	15.9	9.2	3.1	28.5	54.0	252.0	528.0	1.1%

Negative values represent reductions in FTE

- Base Case Figure continued…

BASE CASE - WORKFORCE FORECAST — Specialty (1)	CURRENT FTE (2)	WORKFORCE RESOURCE VARIABLES — (1) NIPM/RFA (3)	(2) Gender (4)	(3) Work Hours (5)	(4) Separations (6)	SUBTOTAL: Replacement Recruitment (7)	HEALTH SYSTEM POLICY & PLANNING RELATED VARIABLES — (5) Benchmark FTE Adj. (8)	(6) Academic Physician Profile (9)	(7) GP Profile (10)	(8) Collaborative Care (11)	(9) Core Services (12)	(10) Population Change (13)	(11a) Disease Incidence (14)	(11b) Disease Prevalence (15)	SUBTOTAL - Policy & Planning Recruitment Impact (Col's 8-15) (16)	TOTAL FTE Recruitment Needs (Col's 7+16) (17)	TOTAL FTE at 2021 (Col's 2+16) (18)	Annual % Increase/(Decrease) (19)
33 Paediatric Anatomic Pathology	2.2	0.2	0.1	-	0.8	1.1	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	1.2	2.2	0.35%
34 Paediatric Diagnostic Radiology	7.0	0.7	0.5	-	2.0	3.2	0.0	o/s	n/a	n/c	n/c	0.2	n/c	n/c	0.2	3.4	7.2	0.35%
35 Paediatric General Pathology	1.0	0.1	0.2	-	0.6	0.8	0.0	o/s	n/a	n/c	n/c	0.0	n/c	n/c	0.0	0.9	1.0	0.32%
36 Paediatric Medical Microbiology	0.7	0.1	0.1	-	0.1	0.2	0.0	o/s	n/a	n/c	n/c	0.0	n/c	n/c	0.0	0.2	0.7	0.00%
37 Paediatric Cardiology	4.2	0.5	0.4	-	2.3	3.2	0.2	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.3	3.5	4.5	0.75%
38 Paediatric Child Health	0.8	0.1	(0.1)	-	0.1	0.1	0.0	o/s	n/a	n/c	n/c	0.0	n/c	n/c	0.0	0.1	0.8	0.00%
39 Paediatric Clinical Immunology & Alle	6.0	0.6	0.9	-	3.0	4.6	0.0	o/s	n/a	n/c	n/c	0.2	n/c	n/c	0.2	4.8	6.2	0.33%
40 Paediatric Critical Care	4.4	0.5	0.1	-	1.5	2.0	0.0	o/s	n/a	n/c	n/c	0.2	n/c	n/c	0.2	2.2	4.5	0.37%
41 Paediatric Developmental	4.0	0.4	0.2	-	1.2	1.8	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	1.9	4.1	0.25%
42 Paediatric Emergency Medicine	4.6	0.5	0.1	-	1.2	1.9	0.0	o/s	n/a	n/c	n/c	0.2	n/c	n/c	0.2	2.1	4.8	0.43%
43 Paediatric Endocrinology & Metabolis	3.0	0.3	(0.6)	-	0.2	(0.0)	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	0.1	3.1	0.33%
44 Paediatric Gastroenterology	2.0	0.2	0.3	-	0.8	1.4	0.9	o/s	n/a	n/c	n/c	0.1	n/c	n/c	1.0	2.4	3.0	5.21%
45 Paediatric General	42.4	4.5	0.9	-	11.8	17.2	(18.7)	o/s	n/a	n/c	10.3	1.5	n/c	n/c	(7.0)	10.2	35.5	(1.64%)
46 Paediatric Haematology/Oncology	5.5	0.6	0.6	-	1.5	2.6	0.0	o/s	n/a	n/c	n/c	0.2	n/c	n/c	0.2	2.8	5.7	0.36%
47 Paediatric Infectious Diseases	4.8	0.5	1.2	-	2.7	4.5	0.0	o/s	n/a	n/c	n/c	0.2	n/c	n/c	0.2	4.7	5.0	0.42%
48 Paediatric Medical Genetics	5.9	0.6	(0.0)	-	1.7	2.3	0.0	o/s	n/a	n/c	n/c	0.2	n/c	n/c	0.2	2.5	6.1	0.34%
49 Paediatric Neonatology	7.4	0.8	1.3	-	3.4	5.5	0.0	o/s	n/a	n/c	n/c	0.3	n/c	n/c	0.3	5.8	7.7	0.38%
50 Paediatric Nephrology	1.0	0.1	0.2	-	0.1	0.4	1.3	o/s	n/a	n/c	n/c	0.0	n/c	n/c	1.3	1.7	2.3	12.82%
51 Paediatric Neurology	7.0	0.7	1.0	-	3.4	5.1	(3.3)	o/s	n/a	n/c	n/c	0.2	n/c	n/c	(3.1)	2.1	3.9	(4.40%)
52 Paediatric Palliative	1.7	0.2	(0.1)	-	0.5	0.5	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	0.6	1.8	0.59%
53 Paediatric Respiratory Medicine	1.8	0.2	0.5	-	1.1	1.8	0.0	o/s	n/a	n/c	n/c	0.0	n/c	0.2	0.2	2.0	2.0	1.10%
54 Paediatric Rheumatology	3.5	0.4	(0.1)	-	0.4	0.7	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	0.8	3.6	0.29%
55 Psychiatry - Adolescent	15.7	1.7	1.4	-	5.3	8.3	(2.7)	o/s	n/a	n/c	n/c	0.0	n/c	2.6	(0.2)	8.1	15.5	(0.10%)
56 Paediatric Anaesthesia	15.1	1.6	2.3	-	5.4	9.3	0.0	o/s	n/a	n/c	n/c	0.5	n/c	n/c	0.5	9.8	15.6	0.33%
57 Paediatric Cardiac Surgery	1.0	0.1	(0.0)	-	0.1	0.2	0.0	o/s	n/a	n/c	n/c	0.0	n/c	n/c	0.0	0.2	1.0	0.00%
58 Paediatric General Surgery	3.4	0.4	0.1	-	0.3	0.7	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	0.8	3.5	0.30%
59 Paediatric Ophthalmology	2.0	0.2	0.6	-	0.5	1.3	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	1.4	2.1	0.49%
60 Paediatric Orthopedic Surgery	2.4	0.3	0.4	-	1.3	2.0	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	2.1	2.5	0.41%
61 Paediatric Otolaryngology	2.6	0.3	0.3	-	1.2	1.8	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	1.9	2.7	0.38%
62 Paediatric Plastic Surgery	1.0	0.1	0.6	-	1.1	1.8	0.0	o/s	n/a	n/c	n/c	0.0	n/c	n/c	0.0	1.8	1.0	0.00%
63 Paediatric Urology	2.1	0.2	0.3	-	1.0	1.5	0.0	o/s	n/a	n/c	n/c	0.1	n/c	n/c	0.1	1.6	2.2	0.47%
PAEDIATRIC SUBTOTAL	**166.0**	**17.6**	**13.7**	**-**	**56.3**	**87.7**	**(22.4)**	**0.0**	**0.0**	**0.0**	**10.3**	**5.1**	**0.0**	**2.8**	**(4.2)**	**83.5**	**161.8**	**(0.25%)**

Negative values represent reductions in FTE

- Base Case Figure continued…

	BASE CASE - WORKFORCE FORECAST	CURRENT FTE	WORKFORCE RESOURCE VARIABLES					HEALTH SYSTEM PLANNING RELATED VARIABLES									TOTAL FTE Recruitment Needs (Col's 7+16)	TOTAL FTE at 2021 (Col's 2+16)	Annual % Increase/ (Decrease)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	Specialty		(1) NIPM/ RFA	(2) Gender	(3) Work Hours	(4) Separations	SUBTOTAL: Replacement Recruitment	(5) Benchmark FTE Adj.	(6) Academic Physician Profile	(7) GP Profile	(8) Collaborative Care	(9) Core Services	(10) Population Change	(11a) Disease Incidence	(11b) Disease Prevalence	SUBTOTAL - Policy & Planning Recruitment Impact (Col's 8-15)			
64	Anaesthesia	109.3	11.6	11.4	-	32.2	55.1	4.6	o/s	n/a	n/c	n/c	3.8	n/c	n/c	8.4	63.5	117.7	0.77%
65	Cardiac Surgery	8.0	0.8	0.8	-	2.6	4.3	(2.0)	o/s	n/a	n/c	n/c	0.0	n/c	0.9	(1.1)	3.1	6.9	(1.42%)
66	General Surgery	51.6	5.5	6.0	-	14.8	26.3	2.3	o/s	n/a	n/c	6.0	1.8	5.7	n/c	15.8	42.1	67.5	3.06%
67	Neurosurgery	9.1	1.0	(0.3)	-	0.9	1.6	(1.9)	o/s	n/a	n/c	n/c	0.3	n/c	n/c	(1.6)	(0.0)	7.5	(1.77%)
68	Obstetrics & Gynaecology	47.6	5.0	6.8	-	16.4	28.3	(1.6)	o/s	n/a	n/c	5.0	1.6	n/c	n/c	5.0	33.3	52.6	1.06%
69	Ophthalmology	46.6	4.9	10.4	-	22.0	37.4	(6.8)	o/s	n/a	n/c	n/c	1.6	n/c	n/c	(5.1)	32.3	41.5	(1.10%)
70	Orthopedic Surgery	33.9	3.6	3.5	-	8.8	15.9	2.4	o/s	n/a	n/c	n/c	1.2	n/c	n/c	3.6	19.4	37.4	1.05%
71	Otolaryngology	23.7	2.5	1.7	-	5.4	9.6	(5.0)	o/s	n/a	n/c	n/c	0.8	n/c	n/c	(4.2)	5.4	19.5	(1.76%)
72	Plastic Surgery	10.4	1.1	0.5	-	1.8	3.4	2.7	o/s	n/a	n/c	n/c	0.4	n/c	n/c	3.1	6.4	13.5	2.93%
73	Thoracic Surgery	5.5	0.6	1.1	-	2.0	3.7	(2.3)	o/s	n/a	n/c	n/c	0.2	n/c	n/c	(2.1)	1.6	3.4	(3.82%)
74	Urology	16.2	1.7	1.1	-	3.3	6.2	1.5	o/s	n/a	n/c	n/c	0.6	n/c	n/c	2.1	8.3	18.3	1.28%
75	Vascular Surgery	7.4	0.8	0.6	-	1.7	3.1	(2.6)	o/s	n/a	nc	n/c	0.0	n/c	0.8	(1.8)	1.3	5.5	(2.50%)
	SURGICAL SUBTOTAL	369.4	39.2	43.7	0.0	111.9	194.7	(8.8)	0.0	0.0	0.0	11.0	12.4	5.7	1.7	21.9	216.7	391.3	0.59%
	TOTAL	1,982.6	210.2	137.5	0.0	588.4	936.1	82.1	0.0	0.0	(141.3)	37.1	31.7	12.9	165.0	187.5	1,123.6	2,170.1	0.95%
	Percentage (Total) of 'CURRENT FTEs'		10.6%	6.9%	0.0%	29.7%	47.2%	4.1%	0.0%	0.0%	(7.1%)	1.9%	1.6%	0.6%	8.3%	9.5%	56.7%		
	Percentage (Annual) of 'CURRENT FTEs'		1.06%	0.69%	0.00%	2.97%	4.72%	0.41%	0.00%	0.00%	(0.71%)	0.19%	0.16%	0.06%	0.83%	0.95%	5.67%		

Negative values represent reductions in FTE

The following figure is a time series (T$_0$-T$_{10}$) of replacement variables 1 through 4 from the preceding figure i.e. NIPM/RFA, Gender adjustment, Work Hours, and Separations. The average annual turnover rate is forecast at (4.72%).

Figure 35 Base Case - Separations per year by Specialty

BASE CASE - WORKFORCE SUPPLY FORECAST	CURRENT FTE	SUBTOTAL: Replacement Recruitment (Col.7)										SUBTOTAL: Replacement Recruitment (Col.7)
1	2	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Specialty												
1 Anatomic Pathology	24.3	1.0	0.9	1.6	1.2	1.9	1.4	1.6	1.6	1.2	0.7	13.0
2 Diagnostic Radiology	79.0	2.5	2.5	2.6	2.9	3.7	3.4	3.5	5.5	5.0	4.5	36.1
3 General Pathology	5.3	0.1	0.3	0.5	0.1	0.6	0.4	0.7	0.8	0.5	0.4	4.4
4 Haematological Pathology	7.2	0.1	0.1	0.0	(0.0)	0.1	0.2	0.1	0.2	0.0	0.2	1.1
5 Medical Biochemistry	2.0	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.1	0.3	0.3	1.8
6 Medical Genetics	0.7	0.1	0.1	0.1	0.3	0.1	0.2	0.2	0.2	0.1	0.0	1.1
7 Medical Microbiology	3.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0
8 Neuropathology	2.0	0.0	0.0	0.2	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.7
9 Nuclear Medicine	4.2	0.2	(0.3)	0.1	0.2	0.1	0.1	0.5	0.1	0.2	0.1	1.4
10 Radiology - Oncology	13.1	0.6	0.3	0.3	0.8	0.3	0.0	0.8	0.6	0.6	0.8	5.3
Diagnostic & Therapeutic Subtotal	**140.8**	4.8	4.1	5.4	5.7	7.2	5.9	8.1	9.3	8.1	7.4	66.1
11 General Practitioner Subtotal	**832.5**	22.9	25.7	27.5	33.1	41.0	43.5	49.7	47.8	47.0	51.6	389.8
12 Cardiology	33.1	0.8	0.8	0.4	0.8	0.9	1.2	1.5	1.7	1.6	2.3	12.0
13 Community Medicine	1.8	0.1	0.1	0.1	0.3	0.1	0.1	0.3	0.1	(0.1)	0.2	1.2
14 Critical Care Medicine	12.9	0.3	0.1	0.3	0.4	0.5	0.4	0.5	0.6	1.0	0.8	4.7
15 Dermatology	17.3	0.3	1.3	0.6	0.9	0.7	0.9	(0.0)	1.3	1.0	1.2	8.0
16 Emergency Medicine	71.7	1.5	1.3	1.3	2.0	2.6	1.9	1.8	2.9	3.4	4.0	22.6
17 Endocrinology & Metabolism	5.3	0.1	(0.0)	(0.0)	0.0	0.1	0.1	0.2	0.5	0.2	0.1	1.3
18 Gastroenterology	17.5	0.7	0.3	0.7	0.4	0.2	0.7	0.3	0.5	0.4	0.5	4.8
19 General Internal Medicine	43.6	2.3	1.3	1.2	1.2	1.9	1.7	2.4	3.1	3.2	2.4	20.8
20 Geriatric Medicine	11.2	0.0	0.5	0.2	0.2	0.3	0.3	(0.1)	0.1	0.8	0.3	2.6
21 Haematology	10.6	0.8	0.6	0.3	0.6	0.3	(0.0)	0.7	0.3	0.4	0.8	4.7
22 Infectious Diseases	7.1	(0.0)	0.0	0.6	0.5	0.2	0.7	0.4	0.3	0.6	0.6	3.9
23 Medical Oncology	17.4	0.4	0.6	0.3	0.8	1.0	0.9	0.7	1.1	0.6	0.7	7.0
24 Nephrology	17.7	0.4	(0.0)	0.5	0.5	0.3	0.4	0.2	0.7	0.5	0.9	4.4
25 Neurology	20.8	1.3	0.6	0.9	0.9	1.0	1.2	1.0	1.1	1.1	1.5	10.5
26 Occupational Medicine	5.3	0.2	0.3	0.2	0.5	0.2	0.5	0.4	0.3	0.2	0.8	3.5
27 Palliative Medicine	11.2	0.3	0.2	0.4	0.2	0.8	0.4	0.7	0.7	0.8	1.5	6.0
28 Physical Medicine & Rehabilitation	11.5	0.8	0.5	0.6	0.7	1.1	0.2	0.6	0.7	0.7	0.1	5.9
29 Psychiatry	129.7	4.4	4.6	4.8	6.3	4.7	5.0	6.6	8.9	3.8	11.9	60.8
30 Psychiatry - Forensic	4.0	0.1	0.1	0.5	0.1	0.1	0.1	0.2	(0.2)	0.6	0.5	2.1
31 Respiratory Medicine	11.8	0.5	0.4	0.9	0.6	1.0	0.6	0.9	0.4	1.0	0.7	7.0
32 Rheumatology	12.4	0.4	0.3	0.6	0.8	1.2	0.7	0.2	0.3	0.1	(0.3)	4.4
MEDICAL - SUBTOTAL	**474.0**	15.5	13.9	15.1	18.7	19.1	17.8	19.5	25.3	21.9	31.4	198.1

- Separations per year figure continued…

BASE CASE - WORKFORCE SUPPLY FORECAST Specialty	CURRENT FTE	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	SUBTOTAL: Replacement Recruitment Impact (Col.7)
33 Paediatric Anatomic Pathology	2.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0
34 Paediatric Diagnostic Radiology	7.0	0.0	0.2	(0.2)	0.2	0.6	0.3	0.3	0.8	0.2	0.6	3.1
35 Paediatric General Pathology	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8
36 Paediatric Medical Microbiology	0.7	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.1	0.3
37 Paediatric Cardiology	4.2	0.1	(0.0)	0.5	0.2	0.6	0.5	0.4	0.7	0.1	0.1	3.1
38 Paediatric Child Health	0.8	0.0	0.0	0.0	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
39 Paediatric Clinical Immunology & Allergy	6.0	0.2	0.4	0.4	0.4	0.6	0.5	0.2	0.4	0.8	0.5	4.6
40 Paediatric Critical Care	4.4	0.1	(0.0)	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.3	2.1
41 Paediatric Developmental	4.0	0.1	0.4	(0.0)	0.1	(0.2)	0.1	(0.2)	0.4	0.2	0.8	1.8
42 Paediatric Emergency Medicine	4.6	0.2	0.1	0.2	0.1	0.3	0.1	0.2	0.3	0.3	0.2	1.9
43 Paediatric Endocrinology & Metabolism	3.0	(0.2)	-	0.1	0.1	0.1	0.0	(0.0)	(0.1)	0.1	0.1	(0.0)
44 Paediatric Gastroenterology	2.0	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.3	0.2	1.4
45 Paediatric General	42.4	1.3	1.5	1.4	0.4	1.8	1.3	1.5	2.0	4.2	1.9	17.2
46 Paediatric Haematology/Oncology	5.5	0.1	(0.1)	0.2	0.2	0.2	0.2	0.6	0.3	0.7	0.3	2.6
47 Paediatric Infectious Diseases	4.8	(0.3)	0.2	0.5	0.1	0.4	1.3	0.5	0.6	0.5	0.6	4.4
48 Paediatric Medical Genetics	5.9	(0.2)	0.2	0.1	0.1	0.4	0.1	0.4	0.4	0.3	0.3	2.3
49 Paediatric Neonatology	7.4	0.3	0.4	0.3	0.3	0.8	0.3	0.8	0.7	0.8	0.9	5.5
50 Paediatric Nephrology	1.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.4
51 Paediatric Neurology	7.0	0.8	0.3	0.3	0.3	0.5	0.2	0.5	1.4	0.5	0.4	5.1
52 Paediatric Palliative	1.7	0.4	0.0	0.1	0.1	0.1	(0.3)	-	0.1	0.1	0.1	0.6
53 Paediatric Respiratory Medicine	1.8	0.1	0.1	0.1	0.5	0.1	0.3	0.3	0.3	0.2	0.0	1.8
54 Paediatric Rheumatology	3.5	(0.1)	0.1	0.0	0.1	0.1	0.4	0.1	0.0	0.1	(0.0)	0.7
55 Psychiatry - Adolescent	15.7	0.3	0.6	1.0	0.8	1.4	0.6	0.9	1.3	0.6	1.0	8.3
56 Paediatric Anaesthesia	15.1	0.3	0.7	1.1	0.9	0.7	1.2	1.1	1.0	1.3	1.0	9.3
57 Paediatric Cardiac Surgery	1.0	0.0	0.0	0.0	0.0	(0.1)	(0.0)	0.0	0.0	0.0	0.2	0.2
58 Paediatric General Surgery	3.4	-	(0.1)	0.0	0.1	0.0	0.3	0.2	0.1	0.1	0.1	0.8
59 Paediatric Ophthalmology	2.0	0.0	0.1	(0.1)	0.1	0.2	0.1	0.1	0.3	0.1	0.4	1.2
60 Paediatric Orthopedic Surgery	2.4	0.1	0.4	0.1	0.2	0.2	0.2	0.5	0.0	0.1	0.2	2.0
61 Paediatric Otolaryngology	2.6	0.1	0.4	0.1	0.3	0.3	0.0	0.5	0.1	0.1	0.1	1.8
62 Paediatric Plastic Surgery	1.0	0.1	0.1	0.1	0.1	0.4	0.1	0.3	0.3	0.3	0.3	1.8
63 Paediatric Urology	2.1	0.1	0.2	0.2	0.3	0.4	0.0	0.0	0.0	0.0	0.1	1.5
PAEDIATRIC SUBTOTAL	**166.0**	4.3	6.3	7.1	6.3	10.3	8.3	9.9	11.8	12.6	10.7	87.6
64 Anaesthesia	109.3	2.0	3.5	4.9	4.6	5.6	6.6	7.3	6.8	6.5	7.3	55.1
65 Cardiac Surgery	8.0	0.4	0.2	0.2	0.4	0.3	0.6	0.4	0.5	0.7	0.6	4.2
66 General Surgery	51.6	1.9	1.5	2.3	3.1	1.6	2.4	3.0	2.8	4.1	3.5	26.3
67 Neurosurgery	9.1	0.1	0.0	0.2	0.3	0.1	0.2	0.4	-	0.1	0.2	1.6
68 Obstetrics & Gynaecology	47.6	0.6	1.6	2.2	2.8	2.3	3.3	4.3	3.2	4.2	3.8	28.3
69 Ophthalmology	46.6	3.0	3.2	4.1	3.9	3.8	4.8	4.6	4.2	2.9	2.9	37.4
70 Orthopedic Surgery	33.9	0.9	1.4	0.7	1.6	1.6	1.3	2.6	1.6	2.4	1.7	15.9
71 Otolaryngology	23.7	0.2	0.5	0.8	1.1	0.7	0.7	1.1	1.5	1.7	1.4	9.6
72 Plastic Surgery	10.4	0.0	0.1	0.2	0.3	0.4	0.1	0.3	0.4	0.5	1.1	3.4
73 Thoracic Surgery	5.5	0.2	0.1	0.3	0.7	0.3	0.4	0.3	0.8	0.5	0.4	3.7
74 Urology	16.2	0.3	0.2	0.3	0.5	0.6	0.5	0.6	0.8	0.8	1.4	6.1
75 Vascular Surgery	7.4	0.1	0.3	0.2	0.3	0.5	0.4	0.8	0.1	(0.0)	0.6	3.1
SURGICAL SUBTOTAL	**369.4**	9.8	12.7	16.3	19.4	17.7	21.3	25.7	22.7	24.2	24.8	194.6
TOTAL	**1,982.6**	**57.3**	**62.7**	**71.4**	**83.1**	**95.3**	**96.9**	**112.9**	**116.9**	**113.7**	**125.9**	**936.1**
Percentage (Annual) of 'CURRENT FTEs'		2.9%	3.2%	3.6%	4.2%	4.8%	4.9%	5.7%	5.9%	5.7%	6.4%	47.2%

17.1   Provincial - Base Case Review

In the Provincial Base Case, the net result of applying each of the independent variables to the initial workforce of 1,983 FTE is an overall ten-year recruitment need of 1,123 FTE. 1,123 FTE will require a count of new recruits from 1,200 to 1,220. The annual recruitment requirement is 112 FTE and 120-125 individuals. These 10-year results are based upon the explicit assumptions described in the preceding Forecast Model Section.

The key results of the Base Case by variable are:

VARIABLE	TOTAL FTE IMPACT	COMMENTS
(1) NIPM/RFA	210	Variable with the 2nd highest impact
(2) Gender	138	
(3) Work Hours	0.0	Assumes no change in current status
(4) Separations	588	Variable with the highest impact
SUBTOTAL: Replacement Recruitment Impact	936	(94) replacement FTE needed per annum
(5) Benchmark(s)	82	Increase in FTE from applying benchmarks. Family practitioners increase by 121 FTE and specialists decrease by (39) FTE.
(6) Academic Physician Profile	0.0	This variable in on hold pending ongoing Department of Health and Wellness review
(7) GP Profile	0.0	Assumes no change in current status
(8) Collaborative Care	(141)	Reduction in GP recruitment needs applying a 47% population notional conversion rate.
(9) Core Services	37	Added recruitment needs primarily to enable improved access to general internal medicine (14 FTE) and general paediatrics (10 FTE) outside metro Halifax.
(10) Population Change	32	Added recruitment for impact of population aging.
(11a) Disease Incidence	13	Impact of Sentinel Indicators of workload as determined by cancer incidence
(11b) Disease Prevalence	165	Impact of Sentinel Indicators of workload as determined by chronic disease prevalence.
SUBTOTAL: Health System Planning Recruitment Impact	187	+18.7 FTE per annum.
TOTAL: PRP Workforce FTE Needs (2011-2021)	1123	112 net FTE recruitment per annum. Equivalent to 120-125 individuals.

RESHAPING THE WORKFORCE CAREFULLY OVER TIME:

- As of March 31, 2010 the workforce was divided into 42% family physicians, 18% other generalists, and 40% subspecialists; and
- As of March 31, 2021, under the Base Case, the workforce is divided 49% primary health care (944.5 FTE family practice physicians and 252 FTE nurse practitioners), 17% other generalists, and 34% subspecialists.

BASE CASE NEED AND FUTURE SUPPLY

The following analysis compares the above ten-year base case generalist recruitment need with the Canadian PGME supply as of 2009/10. The key findings from this comparison are:

Group A – Need significantly exceeds future supply:

- Family Practitioners – 20% supply deficit. Twenty two percent (22%) of postgraduate trainee positions are allocated to family medicine however because the program is shorter than specialties, about 40% of all practice entrants each year are family practitioners however the need is at 50%-55%.
- General Internal Medicine – 69% supply deficit. The substantial deficit highlights the need for reform of PGME position allocations. Subspecialty trainee positions need to be reduced and reallocated to generalist programs including the new five-year general internal medicine certification program.

Group B – Relative balance between need and supply:

- General Surgery – need and supply are in balance. The balance between need and supply assumes continuance of 21% of surgeons entering and remaining in practice as general surgeons and not changing towards special interest areas such as trauma, surgical oncology (only), etc., or towards further subspecialization e.g. transplantation, thoracic, etc.
- Anaesthesia - need and supply are in balance.

Group C – Relationship between future need and supply is uncertain:

- General Paediatrics – the number entering practice as generalists is not available.

Group D – Supply exceeds future need:

- Obstetrics and Gynaecology, Emergency Medicine, and Psychiatry.

Figure 36 Comparison of Base Case 10-Year Need to Current PGME Supply Distribution by Specialty

	Specialty	BASE CASE - 10-YEAR WORKFORCE NEED	TOTAL Workforce FTE Needs (Col's 7+16)	% Distribution	CURRENT PGME SUPPLY (ex. IMG, Visa) PGME % Distribution 2009/109	Ratio (Supply/ Need)
1	Anatomic Pathology	24.3	12.1	1.08%	1.91%	1.78
2	Diagnostic Radiology	79.0	38.8	3.46%	4.49%	1.30
3	General Pathology	5.3	4.6	0.41%	0.25%	0.62
4	Haematological Pathology	7.2	1.3	0.12%	0.09%	0.75
5	Medical Biochemistry	2.0	1.8	0.16%	0.16%	1.00
6	Medical Genetics	0.7	1.1	0.10%	0.00%	-
7	Medical Microbiology	3.0	1.1	0.10%	0.57%	5.63
8	Neuropathology	2.0	0.9	0.08%	0.04%	0.47
9	Nuclear Medicine	4.2	1.6	0.14%	0.39%	2.81
10	Radiology - Oncology	13.1	6.3	0.56%	1.52%	2.69
	Diagnostic & Therapeutic Subtotal	**140.8**	**69.6**	**6.20%**	**9.42%**	**1.52**
11	**General Practitioner Subtotal**	**832.5**	**501.9**	**44.68%**	**21.87%**	**0.49**
12	Cardiology	33.1	17.7	1.58%	3.64%	2.30
13	Community Medicine	1.8	1.3	0.11%	2.46%	21.95
14	Critical Care Medicine	12.9	5.7	0.51%	1.20%	2.36
15	Dermatology	17.3	8.7	0.77%	1.89%	2.44
16	Emergency Medicine	71.7	25.3	2.25%	4.68%	2.07
17	Endocrinology & Metabolism	5.3	6.5	0.57%	1.05%	1.83
18	Gastroenterology	17.5	6.1	0.54%	1.69%	3.13
19	General Internal Medicine	43.6	44.3	3.94%	1.22%	0.31
20	Geriatric Medicine	11.2	3.0	0.27%	0.62%	2.31
21	Haematology	10.6	6.3	0.56%	1.08%	1.92
22	Infectious Diseases	7.1	4.1	0.36%	0.48%	1.33
23	Medical Oncology	17.4	9.5	0.85%	1.75%	2.06
24	Nephrology	17.7	8.7	0.77%	1.64%	2.12
25	Neurology	20.8	12.1	1.08%	1.99%	1.85
26	Occupational Medicine	5.3	3.7	0.33%	0.00%	-
27	Palliative Medicine	11.2	6.3	0.56%	0.21%	0.36
28	Physical Medicine & Rehabilitation	11.5	6.3	0.56%	1.00%	1.79
29	Psychiatry	129.7	56.2	5.00%	6.89%	1.38
30	Psychiatry - Forensic	4.0	1.0	0.09%	0.00%	-
31	Respiratory Medicine	11.8	12.5	1.11%	0.73%	0.66
32	Rheumatology	12.4	6.7	0.60%	0.38%	0.64
	MEDICAL - SUBTOTAL	**474.0**	**252.0**	**22.43%**	**34.60%**	**1.54**

- Comparison Figure cont....

	Specialty	BASE CASE - 10-YEAR WORKFORCE NEED	TOTAL Workforce FTE Needs (Col's 7+16)	% Distribution	CURRENT PGME SUPPLY (ex. IMG, Visa) PGME % Distribution 2009/109	Ratio (Supply/ Need)
33	Paediatric Anatomic Pathology	2.2	1.2	0.11%	u/k	
34	Paediatric Diagnostic Radiology	7.0	3.4	0.30%	u/k	
35	Paediatric General Pathology	1.0	0.9	0.08%	u/k	
36	Paediatric Medical Microbiology	0.7	0.2	0.02%	u/k	
37	Paediatric Cardiology	4.2	3.5	0.31%	0.29%	0.94
38	Paediatric Child Health	0.8	0.1	0.01%	u/k	
39	Paediatric Clinical Immunology & Alle	6.0	4.8	0.43%	0.29%	0.68
40	Paediatric Critical Care	4.4	2.2	0.20%	0.29%	1.49
41	Paediatric Developmental	4.0	1.9	0.17%	u/k	
42	Paediatric Emergency Medicine	4.6	2.1	0.18%	u/k	
43	Paediatric Endocrinology & Metabolis	3.0	0.1	0.01%	0.29%	36.47
44	Paediatric Gastroenterology	2.0	2.4	0.21%	0.51%	2.43
45	Paediatric General	42.4	10.2	0.91%	3.02%	3.32
46	Paediatric Haematology/Oncology	5.5	2.8	0.25%	0.44%	1.75
47	Paediatric Infectious Diseases	4.8	4.7	0.41%	0.29%	0.70
48	Paediatric Medical Genetics	5.9	2.5	0.22%	u/k	
49	Paediatric Neonatology	7.4	5.8	0.51%	0.91%	1.77
50	Paediatric Nephrology	1.0	1.7	0.15%	0.37%	2.41
51	Paediatric Neurology	7.0	2.1	0.18%	0.15%	0.79
52	Paediatric Palliative	1.7	0.6	0.06%	u/k	
53	Paediatric Respiratory Medicine	1.8	2.0	0.18%	u/k	
54	Paediatric Rheumatology	3.5	0.8	0.07%	u/k	
55	Psychiatry - Adolescent	15.7	8.1	0.72%	u/k	
56	Paediatric Anaesthesia	15.1	9.8	0.87%	u/k	
57	Paediatric Cardiac Surgery	1.0	0.2	0.02%	0.03%	1.77
58	Paediatric General Surgery	3.4	0.8	0.07%	0.12%	1.57
59	Paediatric Ophthalmology	2.0	1.4	0.12%	0.03%	0.22
60	Paediatric Orthopedic Surgery	2.4	2.1	0.18%	0.03%	0.15
61	Paediatric Otolaryngology	2.6	1.9	0.17%	0.03%	0.16
62	Paediatric Plastic Surgery	1.0	1.8	0.16%	0.03%	0.17
63	Paediatric Urology	2.1	1.6	0.14%	0.03%	0.19
	PAEDIATRIC SUBTOTAL	**166.0**	**83.5**	**7.43%**	**7.13%**	**0.96**
64	Anaesthesia	109.3	63.5	5.65%	5.95%	1.05
65	Cardiac Surgery	8.0	3.1	0.28%	0.56%	2.01
66	General Surgery	51.6	41.8	3.72%	4.09%	1.10
67	Neurosurgery	9.1	(0.0)	0.00%	1.18%	-
68	Obstetrics & Gynaecology	47.6	33.3	2.97%	4.67%	1.57
69	Ophthalmology	46.6	32.3	2.88%	1.92%	0.67
70	Orthopedic Surgery	33.9	19.4	1.73%	4.10%	2.37
71	Otolaryngology	23.7	5.4	0.48%	1.46%	3.02
72	Plastic Surgery	10.4	6.4	0.57%	1.28%	2.23
73	Thoracic Surgery	5.5	1.6	0.14%	0.01%	0.11
74	Urology	16.2	8.3	0.74%	1.54%	2.09
75	Vascular Surgery	7.4	1.3	0.11%	0.11%	0.97
	SURGICAL SUBTOTAL	**369.4**	**216.4**	**19.27%**	**21.03%**	**1.09**

17.1.1 Benchmark Review

The following figure is an itemization of benchmark adjustments by specialty where the adjustment is greater than +/-1.0 FTE. Benchmark adjustments are one of eight health system planning related variables in the model and forecast. Included with each benchmark is a specialty specific comment providing direction relevant to achieving the benchmark in context of a comprehensive, integrated clinical services plan. Detailed information on specialty benchmarks in the figure below is provided in the Environmental Scan Report Section 4.0 on Individual Specialties.

Figure 37 Specialty Benchmark Review

	Specialty	(1) BASE FTE @2009-10	(2) Benchmark (BM) FTE Adj.	(3) % Adjustment to BM	Revised BM FTE	(4) COMMENT
1	Anatomic Pathology	24.3	(4.3)	(17.9%)	20.0	(5.0) FTE projected to retire within forecast period. Benchmark (BM) is achievable by siting the service at a single provincial location (an evidence-based objective and outcome).
11	Family/General Practitioner	832.5	121.3	14.6%	953.8	Excludes GPs working full-time Emergency Medicine
12	Cardiology	33.1	2.1	6.4%	35.2	Targeted recruitment required.
17	Endocrinology & Metabolism	5.3	3.1	57.6%	8.4	Targeted recruitment required.
19	General Internal Medicine	43.6	8.0	18.3%	51.6	See Also - Core Service Adjustment of +14.0.
24	Nephrology	17.7	(2.5)	(14.3%)	15.2	Requires further review vis-à-vis % functional work is general internal medicine
29	Psychiatry	129.7	(19.5)	(15.0%)	110.3	(20.0) FTE projected to retire within forecast period (note- Psychiatrists frequently continue past age 70). See Also - Core Service Adjustment of +1.9
30	Psychiatry - Forensic	4.0	(1.2)	(30.0%)	2.8	Review of critical mass requirement is required
31	Respiratory Medicine	11.8	4.1	35.0%	15.9	Review vis-à-vis adult critical care is required.
45	Paediatric General	42.4	(18.7)	(44.0%)	23.7	It is probable that the current FTEs are providing significant primary care. See Also - Core Service Adjustment of +10.3.
51	Paediatric Neurology	7.0	(3.3)	(47.4%)	3.7	(1.5) FTE projected to retire within forecast period.
55	Psychiatry - Adolescent	15.7	(2.7)	(17.5%)	12.9	(2.5) FTE projected to retire within forecast period.

- Benchmark Analysis Figure cont….

Specialty	(1) BASE FTE @2009-10	(2) Benchmark (BM) FTE Adj.	(3) % Adjustment to BM	Revised BM FTE	(4) COMMENT
64 Anaesthesia	109.3	4.6	4.2%	113.9	BM adjustment is predicated on current surgical workforce and workload. See Also - Core Service Adjustment of 0.0.
65 Cardiac Surgery	8.0	(2.0)	(25.2%)	6.0	(1.0) FTE projected to retire within forecast period.
66 General Surgery	51.6	2.3	4.5%	54.0	See Also - Core Service Adjustment of +6.0.
67 Neurosurgery	9.1	(1.9)	(21.0%)	7.2	Base FTE excludes age 70 neurosurgeon. No retirements projected in forecast period.
68 Obstetrics & Gynaecology	47.6	(1.6)	(3.3%)	46.0	See Also - Core Service Adjustment of +5.0.
69 Ophthalmology	46.6	(6.8)	(14.5%)	39.8	(17.0) FTE projected to retire within forecast period (note- Ophthalmologists frequently continue past age 70).
70 Orthopedic Surgery	33.9	2.4	7.0%	36.3	Targeted recruitment required.
71 Otolaryngology	23.7	(5.0)	(21.2%)	18.7	(2.0) FTE projected to retire within forecast period.
73 Thoracic Surgery	5.5	(2.3)	(41.8%)	3.2	BM is achievable by siting the service at a single provincial location (an evidence-based objective and outcome).
74 Urology	16.2	1.5	9.3%	17.7	Targeted recruitment required.
75 Vascular Surgery	7.4	(2.6)	(36.0%)	4.7	(1.0) FTE projected to retire within forecast period. BM is achievable by siting the service at a single provincial location (an evidence-based objective and outcome). General surgery being done by Vascular surgeons in DHAs 3 & 8 will require transferance to Gen.Surgeons
SUBTOTAL	**1,526.0**	**74.9**	**4.9%**	**1,600.9**	58% of BM's with a reduction could be realized via projected retirements (assuming retirement by age 70)
Other Specialties	**456.6**	**7.2**	**(0.0)**	**463.8**	Net result of BM's is a 4% shift from specialist to family physicians (42% to 46%) in the workforce.
TOTAL	**1,982.6**	**82.1**	**4.1%**	**2,064.7**	

(1) Before BM can be applied the FTE must be recalculated to the current period
(2) List includes only those specialties with a BM adjustment >= +/(-) 1.0 FTE
(3) BM's are adjusted for out-of-province workload
(4) Any reference to 'retirement' has assumed full retirement occurs at age '70'

Notably:

- 58% of BM's with a reduction could be realized via projected retirements (assuming retirement by age 70);
- The Net result of benchmark implementation is a 4% shift from specialist to family physicians (42% to 46%) in the overall workforce.

RECOMMENDATIONS

These recommendations are the result of the cumulative research, analysis, modelling, and forecasting generated over the course of the project and documented in this Final Summary report.

18 PHYSICIAN RESOURCE PLAN IMPLEMENTATION

Key consideration(s) informing the subsequent recommendation(s):

The impact of a physician resource plan extends to many health professions, particularly nursing. Successful implementation, first and foremost, requires a 'health systems and patient-centric' approach. A health systems approach fosters system-wide integration, coordination, and collaboration. A patient-centric approach fosters quality of care in its broadest sense. The as yet still evolving Department of Health and Wellness 'quality framework', is critical to informing this focus. To achieve this, physician resource plan implementation must be led and constantly shaped by these two perspectives. Alternative stakeholder-centric approaches will create silos and are not recommended.

IT IS RECOMMENDED THAT:

1.1   The Base Case physician resource plan and forecast be the strategic framework, direction, and plan for physician resources to 2021.

1.2   The province, by the combined impact of collaborative care and core services implementation along with planned replacement recruitment, change the current mix of family to specialist physicians from 42% family physicians to 49% primary healthcare providers (family physicians and nurse practitioners) by 2021 at the latest.

1.3   The province changes the current mix of generalists to specialists from 61% generalist to 67% generalist by 2021 at the latest.

1.4   The High and Low Case physician resource forecasts be the upper and lower planning boundaries for physician resources to 2021.

1.5   The Department of Health and Wellness initiate the development of a Clinical Services Plan.

1.6   The Department of Health and Wellness design the Clinical Services Plan to enable implementation of the benchmarks as described in the previous Section.

1.7   The Department of Health and Wellness ensure that advice, input and participation is obtained from all relevant stakeholders, particularly, DHAs, IWK, DNS, DFM, CRNNS, and CPSNS is included in the implementation of the physician resource plan within a broader Clinical Service Plan.

1.8   As the Department of Health and Wellness develops new policies and models of care that improve productivity, these improvements in productivity be incorporated into the policy input of the physician resource plan.

1.9   Implementation of the physician resource plan is led within the Department of Health and Wellness under the auspices of a broader Health Human Resources mandate.

1.10   That the Department of Health and Wellness update the physician resource plan ten-year forecasts (ex ante) annually and compared annually to actual results (ex post).

19 PHYSICIAN RESOURCE PLAN METHODOLOGY

Key consideration(s) informing the subsequent recommendation(s):

Physician resource planning in the Canadian health care system is driven largely by patient, provider, and technology induced demand as evidenced by annual cost increases that exceed changes in population served. To achieve the Department of Health and Wellness objective for an affordable, sustainable health care system a change from a relatively unfettered demand based to managed population needs-based approach to physician resource planning is required.

IT IS RECOMMENDED THAT:

2.1   An adjusted population-needs based approach to, and methodology for, physician resource planning be formalized as policy of the Department of Health and Wellness.

2.2   An adjusted population-needs based physician resource plan methodology is based on allocating resources based on population need rather than demand-based planning based on extant utilization and legacy data.

20 DEFINING AND IMPLEMENTING CORE SERVICES

Key consideration(s) informing the subsequent recommendation(s):

The Department of Health and Wellness objective is a health system that delivers equitable access across the geographic distribution of the population with local access to core services and referral access to added services. It is also committed to the provision of a demonstrable high quality of medical care that is ensured by exposure to an appropriate mix and volume of patients, cases, and treatments, and continuous professional development (as described by Royal College Physicians Surgeons of Canada and College Family Physicians of Canada), in an environment where a critical mass of specialties interact constantly. Variations in access to core services may occur based on population density and distances to secondary, tertiary or quaternary care. Effective resource planning requires definition of which clinical services are available to the public at local and regional levels.

IT IS RECOMMENDED THAT:

3.1   Core physician services are defined as services that are provided to all residents within their community or DHA. Variation in access to core services will occur based on population density and distance to other secondary care.

3.2   The following physician services are core services:

- Comprehensive family practice across the province
- Emergency care
- General internal medicine
- General surgery and anaesthesia
- General psychiatry
- General paediatrics

- General obstetrics; and
- General laboratory and radiology (screening, routine diagnostic and imaging, x-ray, ECG) services

3.3   All core service physicians are credentialed in their core service specialty.

3.4   The geographic distribution and mix of physician services be adjusted across the province over time to reflect the provision of core services as defined. Physician resources should also be optimized by clustering them to optimize call coverage, instill a system of mutual support to enable time for professional development, foster knowledge sharing, and create opportunities to reduce practice overheads through larger group practices.

Core Services: Related Observations

- A detailed functional refinement of the preceding broad definition of core physician services must be developed. The services need to be agreed provincially, governed and managed at a DHA level, and delivered and sustained locally in order to operationalize the physician resource plan.
- In order to enhance quality and sustainability, all core service physicians would function as a single integrated clinical department, and organize their overall care including call, coverage and quality improvement activities at the DHA level.
- The Clinical Services Plan must reflect the change the mix and distribution of specialties over time that implementing these core services will entail. A detailed operational and functional plan will be a prerequisite to core service implementation e.g. staffing, infrastructure, operating theatres, clinical space, etc.

21 DEFINING AND IMPLEMENTING PROVINCIAL SERVICES

Key consideration(s) informing the subsequent recommendation(s):

Quality of care is enhanced in a setting that enables exposure to an appropriate mix and volume of patients, cases, and treatments. Quality of care, continuous professional development (as described by Royal College Physicians Surgeons of Canada), and work satisfaction is enhanced in an environment where a critical mass of specialists interacts constantly.

IT IS RECOMMENDED THAT:

4.1   Provincial services are defined as services that are not provided locally or regionally as a defined core service. For example, cardiac surgery, neurosurgery, thoracic surgery, and vascular surgery as well as complex urologic, gynaecologic, plastic, otolaryngological, and orthopaedic procedures, at a minimum, should all be categorized as provincial services.

4.2   The tertiary/quaternary portion of provincial inpatient surgical services need only be provided at one or possibly two designated facilities in the province. This applies at a minimum to cardiac surgery, neurosurgery, thoracic surgery, and vascular surgery as well as complex urologic, gynaecologic, plastic, otolaryngological, and orthopaedic procedures.

4.3   Provincial services be programmed, planned, and governed provincially, and managed and operated at a DHA/IWK and site level as defined by the provincial service.

Provincial Services: Related Observations

- Given their mandate and focus on complex acute specialized care with a significant emphasis on teaching trainees, tertiary and quaternary hospitals are not the most efficient sites to host and deliver secondary health care. The province should consider more efficient models of secondary care delivery, for example, surgicentres, birthing centres staffed by midwives, and community hospitals within metropolitan areas. This observation is relevant to the implementation of core services that will require repatriation of tertiary services to a tertiary hospital and decanting secondary care from tertiary hospitals.

22 EXPANDING COLLABORATIVE PRIMARY CARE

Key consideration(s) informing the subsequent recommendation(s):

Evidence indicates that an effective health system is aligned with appropriate inter- and intra-professional, innovative, delivery models including collaborative models of care and role optimization of health professions. Support for delivery models based upon collaborative care has been demonstrated in a strong and consistent fashion. This has included Primary Health Care and Mental Health Care as well as in many complex acute care settings such as Emergency Departments and ICUs. Department of Health and Wellness has identified enhancing team-based care in Primary Health Care is a policy priority. The Department is also anticipating a major report on organization and provision of Mental Health Care in the near future.

IT IS RECOMMENDED THAT:

5.1   The physician resource plan includes a collaborative primary care model for the delivery of comprehensive primary care services as a policy variable.

5.2   The objective is a ratio of 2,100-2,300 population per 3.0 FTE as follows:

Health Care Provider	Current Model	Collaborative Primary Care Model	Comment
♦ **Family Physician (FP)**	1,121 per 1.0 FTE		Provincial population divided by 832.5 FTE (2009/10) is 1,121 residents per 1.0 FTE.
♦ **Nurse Practitioner (NP)**			Add 1.0 FTE working at full scope of practice per 1.0 family physician to the collaborative primary care team.
♦ **Other Health Professional (OHP)**			Add up to 1.0 FTE comprised of an appropriate combination of health practitioner services tailored to local population need, e.g., a family practice

			nurse, mental health counselor, dietician, pharmacist, etc.
TOTAL	1,121 per 1.0 FTE	2,100 to 2,300 per 3.0 FTE	The FP, NP, and OHP work as a team (3.0 FTE) and have a contract for service to meet all primary health care needs of 2,100 to 2,300 individuals (age/gender standardized).

Collaborative Care: Related Observations

- A collaborative primary care model ratio of less than 2,100 population per 3.0 FTE is very likely to be more expensive than the current model. A ratio in the range of 2,100-2,300 per 3.0 FTE is from 6% to 15% lower in cost and provides 25% to 35% more total hours of service than the current model.
- The current predominant payment and contracting models such as fee-for-service/independent contractor for physicians and salary/employee for other health professionals do not align with the collaborative primary care team or with the objectives of comprehensive primary care. Payment models should be redesigned. Consideration should be given to a performance-based payment model as an independently contracted collaborative primary care team.
- An appropriately skilled individual from within each collaborative care team should fulfill the essential role of team leader in order to ensure the team functions effectively and efficiently in the long-term. The target ratio of 2,100-2,300 population per 3.0 FTE includes provision for leadership time.

23 MAINTAINING THE PHYSICIAN RESOURCE PLAN MODEL

Key consideration(s) informing the subsequent recommendation(s):

To remain relevant in a dynamic, ever changing, health system environment, the physician resource plan model must be continually maintained and enhanced. Data needs to be updated and variables changed as the environment changes. The plan must be seen as one that evolves over time, as opposed to fixed in time.

IT IS RECOMMENDED THAT:

6.1   The department assign responsibility and mandate for the use, maintenance, and enhancement of the physician planning model to an appropriately skilled unit.

6.2   The department maintain a provincial physician roster in a robustly re-engineered database. The database will support all relevant views of the information including, but not limited to, licensed and functional specialty, clinical, education, research, and leadership/administration FTE, AFP FTE, address of primary practice location, Dalhousie Faculty of Medicine rank, status, etc.

6.3   The department write and maintain a Procedure Manual that addresses each key requirement of quality physician resource planning, i.e., planning, model, data, definitions, standards, roles of organizations, units, and staff.

6.4   The department update the model based on agreed contracted academic FTEs by position by specialty, division, and department. That the agreed academic FTE be linked to a named individual. That the agreed academic FTE be subdivided into clinical, research, education, and leadership/administration components with notation of estimated percentage time of clinically concurrent teaching.

6.5   The physician resource plan model 'Workforce Resource Variables' be maintained as follows:

- o   (1) NIPM/ RFA

    - Be maintained in collaboration with the CPSNS through enhanced tracking via the CPSNS Registry (See 'Physician Resource Plan Information' recommendations below).

- o   (2) Gender

    - Be maintained annually through gender-based FTE analysis.

- o   (3) Work Hours

    - Be held at zero impact unless either of the following sources give evidence to the contrary – CMA survey, Nova Scotia Chapter, or AFP agreements that raise or lower the current standard self reported and contracted hours of work plus hours on-call and call back.

- o   (4) Separations

    - Be maintained annually through physician resource plan Master Roster updating and analysis.

6.6   That the physician resource plan model 'Health System Planning Variables' be managed as follows:

- o   (5) Benchmark FTE Adjustment

    - Be maintained and enhanced by Department of Health and Wellness with expert panel input,   i.e., England NHS approach.
    - Be treated as physician resource plan planning boundaries (i.e. Low, Base, and High).

- o   (6) Specialist Physician Profile

    - Be maintained consistent with formal Department of Health and Wellness, DFM, DHA agreement(s).

- o   (7) GP Profile (e.g., community family practice, surgical assistant, hospitalist)

    - Be maintained through collaborative Department of Health and Wellness, DNS annual survey (single page, available on-line)

- o   (8) Collaborative Care

- Be maintained according to information provided by the Clinical Service Delivery Planning - Collaborative Care initiative (e.g., information from electronic medical record) and through periodic provider billing data analysis.

o (9) Core Services

- Be maintained according to information provided by the Clinical Service Delivery Planning - Core Services initiative and through periodic provider billing data analysis.

o (10) Population Change

- Be updated annually from the Department of Finance at a community, county, DHA, and provincial level by individual age (not five-year cohorts) and gender.

o (11a) Disease Incidence

- Be maintained at three intervals according to information provided by the Health Canada Community Health Survey. This information should be supplemented with detailed Medavie and hospital abstract data analysis. Provincial program input should also be provided.

o (11b) Disease Prevalence

- Be maintained at three intervals according to information provided by the Health Canada Community Health Survey. This information should be supplemented with detailed Medavie and hospital abstract data analysis. Provincial program input should also be provided.

24 MAINTAINING PHYSICIAN RESOURCE PLAN INFORMATION

Key consideration(s) informing the subsequent recommendation(s):

To increase the quality of the physician resource plan model certain gaps in information must be closed.

IT IS RECOMMENDED THAT:

7.1   The physician resource plan Roster track non-fee-for-service payment status such as sessional, AFP, contract, etc. and organization status, e.g., DFM rank, DHA functional specialty, CPSNS licensed specialty.

7.2   Services are reported for all non-fee-for-service payments in a defined, timely, accurate, and comprehensive manner. Reporting by a physician, at a minimum, includes a count of new and follow-up patients, visits, and consultations delivered along with a primary and secondary diagnosis. This recommendation includes sessional payments to psychiatrists

7.3   Department of Health and Wellness work with the CPSNS to augment the Registry with key added data elements, i.e., "licensed" specialty (for example, 'internal medicine' would not be used and instead replaced with the subspecialty of certification or designation of 'general internal medicine'), "status," i.e., active, member, register history (for example, provisional register – postgraduate trainee, full), and conditions on practice permit (for example, provisional, full, none).

25 INFLUENCING THE FUTURE NATIONAL SUPPLY AND MANAGING THE FUTURE PROVINCIAL PHYSICIAN SUPPLY

Key consideration(s) informing the subsequent recommendation(s):

The Canadian medical postgraduate education system has expanded by 57% since 2000 compared to a population increase of 10.5%. Canada, with its comparatively high quality of life, compensation levels, single public payer system, and the global portability of a Canadian medical education, attracts large numbers of foreign-trained physicians and medical students each year. Dalhousie University Faculty of Medicine has participated in this increase through undergraduate enrolment and matching postgraduate positions. Depending on issues such as physician productivity and changing models of care, the possibility of surplus/excess/oversupply of physicians could itself create demand. Opportunities to practice as physicians in Canada may become more competitive in face of the defined need-based physician resource plans.

IT IS RECOMMENDED THAT:

8.1   The Department of Health and Wellness take the lead in advocating at provincial/territorial and pan-Canadian levels for a/meetings for an initial and ongoing review and monitoring of the national supply physicians relative to population needs. In particular the ratio of family physicians to specialists, ratio of generalists to subspecialists, supply relative to population need by specialty, foreign physician recruitment, and international medical graduate pathway to practice must be reviewed and evaluated.

8.2   The Department of Health and Wellness and the Dalhousie University Faculty of Medicine jointly review the size of the undergraduate and postgraduate medical programs in light of the number of seats funded by Nova Scotia, the retention in Nova Scotia of graduates, any pan-Canadian review of the physician supply and the projected health needs of Nova Scotia over the 10 years of this physician resource plan.

8.3   The Dalhousie Faculty of Medicine undergraduates are formally (curriculum element) and collaboratively (Department of Health and Wellness, DHAs, IWK, and DFM representation) informed in year two and year four of Nova Scotia's health care system workforce requirements. It must be made clear to undergraduates the needs of the population so career counselling and decision-making can result in much greater alignment between supply and needs.

8.4   The Department of Health and Wellness and the Dalhousie University Faculty of Medicine and other stakeholders to ensure that the curriculum is keeping up with research on best practice and system evolution regarding delivery collaborative care in interprofessional teams.

8.5   The Department of Health and Wellness and the Dalhousie University Faculty of Medicine revise the specialty allocation of postgraduate residency positions to align with the needs of the physician resource plan and in context of the changing national physician supply.

8.6   A strategy be designed and implemented to significantly reduce the number of post year 3 PGME positions, with the exception of the newly approved (December-2010) five-year GIM Royal College Physicians Surgeons of Canada certification program.

8.7   The International Medical Graduate programs and services are reviewed in context of rapidly expanding national physician supply and the program size and priorities be realigned to the needs of the physician resource plan.

8.8   The Department of Health and Wellness maintain the current Francophone medical seats it sponsors as data shows all graduates to date have returned to Nova Scotia to practice. The on-going need for French-speaking physicians to meet the linguistic needs of Acadians and Francophone's is an important factor in physician resource planning.

8.9   The approach to attract qualified applicants of visible minorities, particularly those of African and First Nations descent, is revised with the advice of expert governmental and external authorities as well as Medical School(s) with a proven successful track record in this area.

8.10   The Department of Health and Wellness:

- Establish a Department of Health and Wellness led provincial 'Centre for Workforce Intelligence' modeled after the U.K. England NHS (http://www.cfwi.org.uk/).
- Promote creation of a government directed nation-wide 'Centre for Workforce Intelligence' modeled after the U.K. England NHS (http://www.cfwi.org.uk/).

26 UPDATING FOR ACADEMIC MEDICINE

Key consideration(s) informing the subsequent recommendation(s):

To increase the quality of the physician resource plan model certain gaps in information must be closed.

IT IS RECOMMENDED THAT:

9.1   The physician resource plan model be updated based upon agreed contracted academic FTEs by position by specialty, division, and department.

9.2   The agreed academic FTE be linked to each individual.

9.3   The agreed academic FTE be subdivided into research, education, and leadership/administration components with notation of estimated percentage time of clinically concurrent teaching.

27 SUMMARY

In comparison to other provinces Nova Scotia has relatively more physicians for the population after adjusting for full-time equivalency, Atlantic province referral workload, disease prevalence, and relative population age/gender. In comparison to benchmarks Nova Scotia has significantly fewer family physicians (15%) and more specialists (18%). There is significant variation at the specialty level both in comparison to other provinces and in comparison to benchmarks. In summary, the provincial physician workforce is sufficient to population need but the mix between family and specialist physicians, within specialties, and between generalists and subspecialists does not align with population need.

The current mix of physicians, 42% family physicians and 58% specialists, is overly specialized and needs to change over the forecast period. The national average is 50%-55% family physicians and 50%-45% specialists. The 7% change in mix resulting from implementation of the preceding recommendations will result in an increase of 364 primary health care providers (112 family physicians and 252 nurse practitioners), and a decrease of 75 in the number of specialists. This change to 49% primary healthcare providers and 51% specialists will strengthen local access to comprehensive primary health care. Provincial implementation of collaborative primary health care will mean nurse practitioners must function to full scope of practice. Province-wide, rather than DHA based, planning for specialty services is required to optimize specialist program delivery and achieve a more appropriate balance between family physicians and specialists.

The geographic distribution of generalist physicians does not align with population need. Six of nine DHAs have insufficient family physicians. Implementation of a core services model will geographically redistribute generalist physician services to better match local population need.

The future supply of physicians, both from Canadian postgraduate programs and IMGs, does not align with population need. More generalists, including family physicians, and fewer subspecialists are required.

Effective maintenance of the adjusted population-needs based approach to, and methodology for, physician resource planning is required to enable and sustain quality health system planning.

CONCLUSIONS

The Environmental Scan provides an extensive research base for the Department of Health and Wellness and stakeholders as they move forward with the Final Report recommendations and strategic framework and direction for physician resource planning. Through this and other key linked projects such as Better Care Sooner and the Primary Health Care review, the Province of Nova Scotia is positioned to achieve a more sustainable, quality, accessible, and innovative health care system.

Implementation of the recommendations contained in this report will make a substantial contribution to strengthening the health care system in the medium- and long-terms by:

❖ **Consolidating delivery of tertiary services resulting in greater program sustainability, improved quality of subspecialist work life, and improved patient outcomes;**

❖ **Increasing local access to core services across the province;**

❖ **Increasing quality of generalist work life across the province by creating sustainable clusters of core service physicians that care share expertise, distribute the burden of call duty, and formalize and refine subspecialty referral pathways; and**

❖ **Increasing access to enhanced primary health care through local collaborative care model(s).**

Conversely, there are many risks associated with maintenance of the status quo rather than moving forward with planned effective change. Across Canada for the foreseeable future far more new physicians will be entering the workforce than have in the past. Strong indications are that the increased supply, combined with international medical graduates, will more than offset needs generated through forecast retirements, gender shift, emigration, and population growth and aging. Provinces with open access to fee-for-service billing, hospital privileging, soft cap fee-for-service budget policies, and alternate payment plan recruitment that is not linked to a province-wide plan, will find their already taxed health care expenditure budgets under even greater pressure. New physicians will be looking across the country for opportunities to enter the workforce. Provinces taking steps to proactively manage the number and type of physician positions available in their health care system will have an opportunity to match physician supply with population need in a rational, planned manner. Faculties of Medicine can, and are ready to be, a significant contributor to the strategies and solutions, e.g., by graduating more family physicians and other generalists and fewer subspecialists.

In Nova Scotia, maintenance of the status quo would result in:

❖ **Accelerated growth in physician supply and service utilization disproportionate to population need;**

❖ **Continued shortages of family physicians and other generalists, over subspecialization;**

❖ **Marginalization of non-physician providers and budgets in a crowded supply market;**

❖ **An outcome in 2021 that requires more physician resources than forecast in the 'high case' scenario as key initiatives like collaborative primary care falter. Collaborative care is directly tied to a planned change in family practitioner need of 141 FTE over ten years; and**

❖ **Continuance of the current system design and service delivery and associated population outcomes.**

Alternatively, Nova Scotia has distinct advantages that it can build upon while creating a more sustainable, quality health care system. Already a national leader in alternative non-fee-for-service

payment systems and contracts, the province can mitigate some of the increased fee-for-service budget pressure as long as it continues the shift to alternative payment systems and performance-based contracts for service. A second advantage is being in a position of relative strength in physician numbers when compared to other provinces and benchmarks. The mix and geographic distribution are not what is needed by the population; however, the third key advantage can address this challenge. Having taken the important step to create a provincial physician resource plan, Nova Scotia can shape proactively the future system rather than simply react to external events. Being in a position to act proactively means that change can be brought to the system in a consultative, carefully planned manner rather than hastily and reactively.

For example, Nova Scotia will be in a position to:

❖ **Implement a core physician services model that will improve local access while reducing travel frequency and distance for patients;**

❖ **Achieve 52% of the benchmark targets recommended well before the end of the ten-year forecast period through natural retirement;**

❖ **Replace a retiring specialist with a new position aligned to an area of population need, such as general internal medicine, rather than with another similar specialist;**

❖ **Create a positive domino effect whereby replacing retired specialists with a population need such as general internal medicine enables the remaining subspecialists to practise less general medicine and to provide subspecialty care;**

❖ **Relocate tertiary physician services to a central location(s), and a critical mass of subspecialists, most often in context of retiring subspecialists and a planned decanting of secondary care from predominantly tertiary facilities to more efficient, currently underutilized, secondary care facilities; and**

❖ **Achieve its objective of changing the geographic distribution of physicians and the mix between generalists and subspecialists and between family physicians and specialists through planned implementation of the report recommendations.**

To achieve a more sustainable, quality, accessible, and innovative health care system a strategic framework and direction for physician resources and a clinical service delivery plan are essential. The base case model forecasts a population need for 187 more FTE between now and 2021. Growth in the physician workforce will substantially exceed this forecast without timely effective action on the recommended strategic framework and direction for physician resource planning.

The recommendations in this report are closely interrelated. For example, implementation of a core service model cannot occur without province-wide planning and direction on all other specialty services. Without core service and province-wide planning, the physician workforce mix, distribution, and quantity cannot be effectively changed with a result that raises quality and improves sustainability.

Nova Scotia's advantages are numerous and the opportunity is there to create a win-win-win outcome for patients, providers, and taxpayers.

APPENDIX

A.1. ENVIRONMENTAL SCAN

The Environmental Scan, December 31, 2012, Report is a companion document to this Final Report. The Environmental Scan provides additional detailed information on all aspects of this Final Report.

A.2. ACRONYMS

- AFP   Academic Funding Plan
- APP   Alternative Payment Plan
- ASIR   Age-standardized incidence rate
- CanMEDS   Canadian Medical Education Directives for Specialists
- CAPERS   Canadian Post-M.D. Education Registry Service
- CaRMS   Canadian Resident Matching Service
- CCFP (EM)   Canadian College of Family Physicians (Emergency Medicine)
- CIHI   Canadian Institute for Health Information
- CACMS   Committee on Accreditation of Canadian Medical Schools
- CFPC   College of Family Physicians Canada
- CMA   Canadian Medical Association
- CPSNS   College of Physicians and Surgeons of Nova Scotia
- CSAs   Canadians studying abroad
- DAD   Discharge Abstract Database
- DHA   District Health Authority
- FFS   Fee-for-service
- FM   Family medicine
- FP   Family Physician
- FTE   Full-Time Equivalent
- IR   Incidence Rate
- IMG   International Medical Graduate
- LCME   Liaison Committee on Medical Education
- LOS   Length of Stay
- MD   Medical Doctor
- MSI   Medical Services Insurance
- NACRS   National Ambulatory Care Reporting System
- NB   New Brunswick
- NP   Nurse Practitioner
- PAC   Project Advisory Committee
- PEI   Prince Edward Island
- PGME   Post-graduate medical education
- PHReD   Physician Health Resource Database (Department of Health and Wellness)
- PRP   Physician Resource Planning
- RCPSC   Royal College of Physicians and Surgeons of Canada
- RIW   Resource Intensity Weight
- S-Bill   Shadow-bill
- SMR   Standardized mortality rate
- TWG   Technical Working Group
- UGME   Undergraduate medical education

- VA   Veterans Affairs (U.S. Department of)
- WTE   Whole-time equivalent

Organizations and Facilities – Nova Scotia

- AVH   Annapolis Valley Health
- CBDHA   Cape Breton District Health Authority
- CDHA   Capital District Health Authority
- CEHHA   Colchester East Hants Health Authority
- CHA   Cumberland Health Authority
- CHBs   Community Health Boards
- CRNNS   College of Registered Nurses of Nova Scotia
- CVHNS   Cardio-Vascular Health Nova Scotia
- DFM   Dalhousie Faculty of Medicine
- DNS   Doctors Nova Scotia
- DHW   Department of Health and Wellness (Nova Scotia)
- GASHA   Guysborough Antigonish Strait Health Authority
- IWK   Izaak Walton Killam Health Centre
- NSHRF   Nova Scotia Health Research Foundation
- PARNS   Patient Access Registry Nova Scotia
- PCHA   Pictou County Health Authority
- PHRED   Physician Health Resource Database
- SSH   South Shore Health
- SWNDHA   South West District Health Authority
- QEII   Queen Elizabeth II

Physician Services

- AP   Anatomic Pathology
- C/S   Cardiac Surgery
- CCM   Critical Care Medicine
- E&M   Endocrinology and Metabolism
- ED   Emergency Department
- ENT   Ear, Nose, Throat (Otolaryngology)
- EP   Electrophysiology
- FP   Family Practitioner
- GIM   General Internal Medicine
- GP   General Practitioner
- GS   General Surgery
- O&G   Obstetrics & Gynaecology
- PMR   Physical Medicine & Rehabilitation