Critical Care in Canada

An overview of critical care medicine training and the clinical and research fellowship opportunities for international medical graduates

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Canadian Healthcare

Canada has a part public (70%) and part privately (30%) financed health care system. As a proportion of gross domestic product (GDP) in 2007, health care expenditure was 10.1%, ranking Canada 6th in the OECD top thirty member countries. In terms of spending per capita it ranks 4th after the US, Norway, and Switzerland (the UK ranked 15th)\(^1\).

This national health insurance program is determined at the federal level, by the *Canada Health Act* and is administered through thirteen provincial and territorial health insurance plans. Each plan adheres to national principles, ensuring that all eligible residents have reasonable access to medically necessary insured services without direct charges at the point of service.

The *Canada Health Act* requires this care to be: comprehensive, covering all medically necessary services; portable, providing coverage within Canada or outside the country; accessible; and universal. That said, it does not cover all the costs of drugs, neither directly nor indirectly with a prescription charge as in the United Kingdom. In common with the UK it will not cover dental surgery, ophthalmic optics, or some orthotics.

Hospital services are delivered through private, non-profit institutions e.g. the University Health Network, Toronto. This is therefore different from healthcare delivery in the UK which is predominantly publicly funded (81%) and delivered. Many doctors are self-employed practitioners who work in independent or group practices. Few doctors are directly employed by hospitals. Some doctors work in community health centres or hospital-based group practices or partnerships. Attending (Consultant equivalent) doctors are generally paid on a fee-for-service basis and submit their service claims directly to the provincial health insurance plan for payment. Physicians in other practice settings may be paid either on a fee-for-service basis, or may be salaried or remunerated through an alternative payment scheme.
**Critical Care in Canada**

Canada has approximately 6.7 critical care beds per 100,000 persons, somewhat more than England (4.5 beds per 100,000) but less than the United States (25 beds per 100,000). More than half of these beds represent closed ICU’s – predominantly in larger academic centres.

Closed ICU’s are staffed by critical care trained physicians. In the United Kingdom more than 95% of intensivists have an anaesthesiology background. In Canada, like the United States, intensive care physicians come from a broader background with base specialties including: internal medicine, respirology, anaesthesia, surgery, emergency medicine and paediatrics.

Like the UK, most ICUs are integrated medical-surgical ICUs; in contrast to the United States, where surgical and medical ICUs are frequently separated and under different management. Many ICU’s in smaller communities have open or mixed model units and are staffed by physicians that more frequently do not have specialist training in critical care. Some hospitals adopt a hybrid model where intensivists staff the ICU during the day and hospital-based physicians cover the unit at night.

The difficulties encountered in providing increased critical care resources during the SARS outbreak in early 2003 resulted in a re-evaluation and a shake-up of the provision of critical care in Canada, particularly in Ontario where the epicentre of the outbreak was. A key part of this *Critical Care Transformation Project* was the adoption of Critical Care Response Teams, similar to Medical Emergency Teams and Outreach Teams in Australia and the UK respectively. Such teams have now been adopted nationally and are largely physician-led teams, comprising doctors, nurses, and respiratory therapists.
Critical Care Training

In Canada

Canada has eleven Critical Care training programs accredited by the Royal College of Physicians and Surgeons of Canada (www.rcpsc.medical.org). Each is administered by the Faculty of Medicine of a Canadian University e.g. the University of Toronto, McMaster in Hamilton, and McGill in Montreal. The national goals and objectives for training are laid out by the Royal College. These directives include not only clinical knowledge and expertise, but also the multidimensional skills required of a clinician as detailed in the CanMEDS (Canadian Medical Education Directives for Specialists) physician competency framework.

The goals of postgraduate medical education in Canada were broadened following an initiative of the RCPSC to ensure that specialty training programs were fully responsive to societal needs. The overarching objectives were to change the focus of specialty training from the interests and abilities of providers to the needs of society – orienting these programs to consider the needs of individual patients in context of the population at large.

Residents from the primary specialties of anaesthesia, cardiac surgery, emergency medicine, general surgery, internal medicine, or paediatrics may be allowed admission to subspecialty training in Critical Care. Critical Care certification requires two years of adult Critical Care training, and certification in the primary specialty. Unlike postgraduate medicine in the United States, accreditation is under one jurisdiction, irrespective of the primary specialty. All residents write a common national examination in critical care and receive equivalent accreditation from the College.

In Toronto

The departments of medicine, surgery, anaesthesia and paediatrics together comprise the Interdepartmental Division of Critical Care Medicine of the
Faculty of Medicine, University of Toronto. Its mission is to produce global leaders in critical care who are competent, caring and resourceful. The remarkable success of its training program can be attributed to the diversity and expertise of its faculty and its progressive and positive approach to education.

During the two year CCM program, trainees undertake rotations at four University of Toronto teaching hospitals and complete a combination of both mandatory and elective attachments. This provides a solid foundation in core and community critical care medicine, as well as experience in complementary specialties including: internal medicine, anaesthesia, cardiology, transfusion medicine, trauma and radiology.

The goals and objectives of the University of Toronto Critical Care Medicine training program are based on the Can MEDS Physician Competency Framework for subspecialty training. This framework encompasses the various professional roles of a physician and forms the basis for accreditation, evaluation and examinations, as well as objectives of training and standards for continuing professional development. There are clearly identified general and specific requirements for acquisition of the competencies required to fulfill each role.

A well organised and comprehensive program of academic activities complements the clinical training. Formal, city-wide academic half days are held weekly and consist of a combination of lectures on core critical care topics, case based scenarios, roundtable medical ethics discussions, simulation training and journal clubs.

As part of development of their managerial, collaborative and academic skills, trainees are expected and encouraged to develop and complete a research or quality assurance project and present it at a national or international scientific meeting. These academic activities are well supported with both financial and intellectual resources such as experienced mentors, full-text online journal access, and post-production facilities for articles and posters.
Throughout the program there are regular evaluations of progress and identification of goals; feedback sessions are mandated at the end of each monthly rotation. In addition to the final fellowship examination at the end of the program, candidates will sit the Society of Critical Care Medicine (SCCM) Multidisciplinary Critical Care Knowledge Assessment Program examination as a formative assessment.

The combination of faculty dedication to training, good organisation and a uniquely supportive environment has made this program both highly successful and extremely popular. It is therefore no surprise that it continues to attract ever increasing numbers of high calibre candidates.

**Critical Care Research**

*In Canada*

Canada has the highest output of critical care research and the largest number of leading investigators in the world, when corrected for population size.$^2$ The Canadian Critical Care Trials Group has produced more than 80 peer-reviewed publications, including several landmark studies that have changed the practice of critical care medicine. The evidence produced has lead to advances in defining transfusion thresholds for critically ill patients, managing paediatric head injury, and determining the long term consequences of ARDS.$^3$-$^5$

Several large, multi-centred studies are currently in progress, including investigations into the potential value of daily interruption of sedation, the effect of early use of high frequency oscillatory ventilation on mortality in ARDS, the thromboprophylactic qualities of low molecular weight and unfractionated heparin, and the impact of critical illness on survivor’s functional outcome and caregiver wellbeing.$^6$-$^9$

True to its mission statement, this internationally renowned group continues to
foster high quality clinical research through a culture of inquiry, mentorship, and collaboration, with an enduring emphasis on patient relevance.

In Toronto
Many of the principle investigators are appointed to the University of Toronto and are attending staff at the University Hospitals. This unique concentration of academic expertise, together with the positive and encouraging attitude of these and other leading researchers, creates a truly unique, supportive research environment for trainees.

In addition to clinical research there is a well established, highly productive basic science and translational research culture, with frequent collaboration between the Critical Care department and other specialities on several projects.

There are numerous academic meetings including regular citywide Clinical Research in Progress Rounds which provide a positive and supportive environment for new research ideas and the annual Critical Care Canada Forum (http://www.criticalcarecanada.com). The Critical Care Canada Forum, formerly the Toronto Critical Care Symposium, is a well established, highly respected, international conference that attracts eminent speakers from around the world.

Another recent development in the education program is the establishment of international, video conference Pro /Con debates, which provide a forum for lively discussion of those clinical topics where the evidence is not yet established.
International Fellowship Program

Objectives

The University Health Network and Mount Sinai Hospital in Toronto offers several well funded fellowship positions to suitably qualified candidates. Fellowship appointments are made annually, and in recent years the program has attracted elite critical care trainees from all over the world, making it highly competitive. The acuity of the ICU patients in these University hospitals, and the level at which fellows function (Junior Attending), requires that successful applicants for the program have already 12-18 months of Critical Care experience. An additional minimum requirement for application is that candidates hold a specialty certificate in Internal Medicine, Emergency Medicine, Critical Care, Surgery, or Anaesthesia (such as the MRCP (UK) or FANZCA (Australia and New Zealand) from their own country.

In line with the objectives of the CCM program, the aim is to train future leaders in critical care medicine and through ongoing collaboration with our international alumni, to ensure continued global improvement in the care of the critically ill. To achieve this objective, successful candidates are provided with a comprehensive training program which builds on the foundations laid by their individual national training programs, and encompasses all the salient dimensions of good medical practice.

In accordance with the CanMEDS Physician Competency Framework, each educational activity is designed to achieve not only competence but excellence in each of the following roles:

- Medical Expert
- Communicator
- Collaborator
- Manager
- Health Advocate
- Scholar
- Professional
Clinical Experience

The clinical experience offered by the program covers the full spectrum of critical care medicine. Each fellow will spend time at the following three hospitals which each individually are internationally recognised for their particular expertise.

Toronto General Hospital – A 404 bed hospital located in downtown Toronto. It is the largest of the three hospitals that together comprise the University Health Network. It has three formal critical care areas: a 20-bed Medical Surgical Intensive Care Unit, an 18-bed Cardiovascular Intensive Care Unit, and a 13-bed Coronary Intensive Care Unit. In addition to this it has 5 sub-specialty high dependency units. The Medical Surgical Intensive Care Unit is a busy unit, admitting more than 800 patients per year. Sub-specialty fellowship training afforded at the TGH site includes:

- High Frequency Ventilation (Jet and Oscillation Ventilation)
- Extracorporeal Membrane Oxygenation (ECMO) and Ventilation (Nova lung)
- Heart-Lung, Lung, and Liver Transplantation Critical Care
- Cardiovascular Intensive Care, including Heart Transplant and VAD management

Toronto Western Hospital – A 240 bed hospital, located in the West of the city. Toronto Western is both an internationally renowned neurosciences centre and a busy provider of acute secondary care to the Greater Toronto Area. The combined Medical-Surgical and Neuroscience Intensive Care Unit has 20 ICU beds and 12 Neurosurgical ‘Step-Down’ monitored beds. It provides comprehensive neuro critical care experience and is an ARDS referral centre. Sub-specialty fellowship training afforded at the TWH site includes:

- Neurosurgical and Neurological Critical Care
- High Frequency Ventilation (Jet and Oscillation Ventilation)
- ARDS
- Neuroradiology
Mount Sinai Hospital – A well established 460 bed-hospital in downtown Toronto. Mount Sinai has world renowned expertise in the management of high risk obstetric patients and sarcoma surgery. It has a 16 bed Medical – Surgical Critical Care department with 3 additional high dependency beds. Its close proximity to Princess Margaret Hospital means that it provides critical care for those with haematological and malignancy related critical illness. It is also an ARDS referral centre. Sub-specialty fellowship training afforded at Mount Sinai Hospital includes:

- ARDS
- Haematology-Oncology and Bone Marrow Transplantation Critical Care
- Obstetric Critical Care

Academic Opportunities

The program is recognised by the University of Toronto, Faculty of Medicine and upon completion; fellows are awarded a certificate from the University. Fellows are actively encouraged to pursue higher qualifications and many choose to sit the American Board of Internal Medicine Critical Care examinations and the European Diploma of Intensive Care Medicine during their fellowship. The well structured and comprehensive teaching provided has proved invaluable to those preparing for examinations.

In addition to daily on-site teaching, there are weekly grand rounds, monthly mortality and morbidity meetings and weekly University Fellowship academic afternoons as described before.

As a centre for both clinical and academic excellence, the Toronto Critical Care network provides ample opportunities for those with research interests. Benefiting from the experience and mentorship of global leaders in critical care research, fellows are able to refine their academic writing and critical appraisal skills and develop and conduct practical projects. The regular Clinical Research in Progress Rounds and journal clubs are essentially research master classes where ideas, methodology and critical appraisal skills are developed and refined. These are further complimented by the numerous
academic meetings that are held which attract local, national and international experts, and provide invaluable opportunities to further develop ones academic knowledge and research skills.

_Electives_
International fellows are able to broaden their experience through periods of elective training in complementary disciplines. Electives may be arranged in specialties such as: cardiac critical care, transplant medicine, surgery, anaesthesiology, trauma, transfusion medicine, burns, radiology etc.

_Application Process and Further Information_
Further information, including one trainee’s experience of the program, useful links, and details of the application process are available through the Interdepartmental Division of Critical Care, University of Toronto website - [http://www.criticalcare.utoronto.ca/fellowship.htm](http://www.criticalcare.utoronto.ca/fellowship.htm).
Alternatively you can contact the Program Director, Dr Andrew Steel, via email: icu.fellowship@uhn.on.ca
References


