MRI Supply in Canada: What are the Issues?

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Abstract
MRI technology is becoming increasingly important in diagnosis establishment and treatment. Due to the cost, limited supply, and shortage of staff to acquire, operate, and maintain these machines, waiting lists have become lengthy. In the present article, we will discuss issues surrounding the MRI shortage and potential solutions, such as private MRI clinics and more competitive wages to attract Magnetic Resonance technologists.

Introduction
Many breakthroughs in medical imaging have been realized during the latter part of the past century – Magnetic Resonance Imaging being one of the most prominent. Clinicians have become increasingly dependent on MRI to manage patient care, with uses ranging from establishing a diagnosis to judging the effectiveness of therapeutic interventions. Ironically, in modernizing medicine, MRI technology has solved many old problems but has created a new set of financial ones – the most prominent being dealing with long waiting lists in a cost-effective manner. In the present article, we will discuss briefly the history and science of MRI technology, and then focus on the economic and policy implications of long waiting lists, with the goal being to briefly outline key issues. We will argue that private MRI clinics may play an important role in alleviating this pressing issue and deserves serious consideration in any solution to this problem.

How does MRI Work?
Magnetic Resonance Imaging (MRI) was first proposed in 1974. MRI is an offshoot of a closely related technology, NMR (Nuclear Magnetic Resonance), which has been available to chemists for many years. The principle used is the same. Hydrogen atoms, when subjected to a radio frequency pulse, are polarized to a higher energy state. By measuring the electromagnetic energy released when the atoms relax to their original state, and by varying the sequence of excitation pulses, a three-dimensional image of internal structures can be constructed.

MRI has the advantage of not requiring ionizing radiation or intravascular contrast agents (except in some specialized examinations). It allows for the high-resolution visualization of soft tissue structures in three dimensions and has found wide application in many branches of medicine. Neurology, cardiology, orthopedics, urology, and general surgery all use MRI for making and confirming diagnoses. In addition, MRI can be used in angiography studies without the need for contrast.

Current MRI Cost and Availability
MRI technology is an expensive imaging modality when compared to others. The cost to acquire a machine varies with field strength, but can range from 1.5 to 2.4 million dollars per machine. Other costs include building an appropriate facility ($300,000 to $1,000,000), leasing a building to house the machine, and upgrading the machine to prevent it from becoming outdated ($200,000 per year).

Interestingly, MRI availability varies between provinces. In Ontario, there are currently 31 machines, which translates into one for every 278,000 people. Newfoundland has the fewest per capita at 1 machine for every 539,000 residents, while New Brunswick is at the other end of the scale with 1 machine for every 189,000 residents.

In Ontario, the average wait time for a non-urgent MRI is currently seven months; however, emergency studies can be done within days (http://www.ottawamri.com/thestory.htm). Although the Ontario government plans to add 11 new MRI machines by the end of next year, the waiting list is expected to grow by 12,000 over the same period.

The Emerging Private System
With inarguably long waiting times, a number of patients have elected to go to the U.S. and pay privately for the procedure. This can cost upwards of $700, not including the non-medical costs the patient incurs such as travel and accommodation. The cost to perform an MRI in the public health care system is considerably less. However, due to the lack of staff and machines, the government has been sending patients south of the border for scans since 1991. MRI technology is far more widespread in the U.S. at about 16 machines per 1,000,000 residents, compared to 1.7 in Canada. Interestingly, there are more MRI machines in Michigan than there are in all of Canada. Canada also lags far behind other member countries of the OECD. It ranks 21st in CT scanners, 19th in MRI units and last for bone mineral densitometry machines and PET scanners.

In recent years, an alternative to the expensive practice of cross-border visits has emerged in the form of local, private MRI clinics. The first private MRI clinic in Canada opened in Calgary in 1993, and a number of clinics have opened since then. The service is currently available in British Columbia, Quebec, and Alberta.

There is a great deal of controversy surrounding private MRI clinics because many consider them to be a direct violation of the Canada Health Act, which prohibits personal payment for medically
necessary services. Despite this, third party insurance companies, private citizens, and even the Albertan provincial government have been paying these organizations for medically necessary studies. In fact, the government of Alberta has allocated $3.2 million for private MRIs this year.\textsuperscript{12}

The practice of privately funded MRIs has also found its way into major public centers in Ontario. As the private system expands, the question of how to deliver MRI service in a cost-effective and fair manner becomes crucial.

**Policy and Economic Discussion**

MRI tests, like any other economic good, constitute a limited resource, and this often leads to difficult decisions in deciding how to allocate, and to whom. This reality has led to public (and perhaps media-driven) uproar in Canada, as many individuals often have to face lengthy waits to have vital tests performed, while those who are able to pay can obtain these procedures readily.

The present shortage and lengthy waiting lists can be attributed partly to the public nature of Canada’s health care system, where resources are rationed. While there are many benefits, including “accessibility to care”, one of the drawbacks of such a system is that shortages inevitably arise due to market failures. A market failure arises when the demand of individuals for a service cannot be accommodated by the amount offered by suppliers. Until very recently, the government was the only supplier of MRI technology. In effect, the government has a monopoly in this area. Thus there are no competitive market forces in place to address, promptly and efficiently, any shortages that develop. In addition, governments are increasingly faced with a harsh public that demands fiscal responsibility and lower taxes. Expectedly, less money is available for capital expenditure, which further compounds the shortage problems.\textsuperscript{13}

Also, the number of technologists and radiologists capable of operating these machines is in short supply in Canada, which has effectively limited the utilization of these machines.\textsuperscript{13,14,15} Inadequate anticipation of the demand for these professions and lack of competitive wages has compounded the problem. As a result, machines are often not available for public usage after office hours, and a lucrative private market has consequently emerged, utilizing publicly owned machines to provide testing for paying individuals. For example, professional athletes will often have MRI scans in early morning hours or on weekends.\textsuperscript{16} Again, critics contend that using publicly owned MRI machines for private purposes violates the Canada Health Act. However, proponents of private usage counter that private use helps to subsidize the public MRI system, as it generates income for hospitals.

Proponents of private MRI clinics further argue that parallel private MRI clinics will provide competition for public MRI clinics, pushing them to be more efficient and innovative in delivering service, and helping them maintain a dominant role in the Canadian health care sector.

Clearly, the present MRI delivery model is not meeting the requirements of all Canadians. Waiting lists are long, staffing is poor, and funding is either inadequate or not being allocated in the most optimal way. Policy makers need to think outside the box.

We believe wages should become more competitive to retain and attract individuals into the MRI technology field. This would in turn allow longer operating hours for clinics, helping to stem the tide of swelling waiting lists. While critics will argue that this will require more funding at a time when governments are already overstretched, we assert that many more savings will be realized in terms of a more productive and healthier population resulting from quicker diagnosis, and hence treatment. Also, fuller utilization of machines will result in lower operating costs per scan.\textsuperscript{15}

In addition, high tech funds should be set up in health budgets to ensure a predetermined amount of money is spent on technology, rather than diverted to put out the most pressing “political fire”. Also, the benefits of a parallel private MRI system, where only private funds are exchanged, need to be considered. Potential benefits include shortened waiting lists in the public system, as those able to pay can opt to access the private system. Consequently, more funds would be available on a per capita basis for users of the public system. While it is true that this might ultimately lead to a two-tiered health system, we believe that it is better for everyone to receive some minimal standard of health care promptly than for some to receive none. In an ideal world, everyone would receive equal care in good time, but as is quite evident now in Canada, this may not be possible.

Furthermore, a private system could lead to market-driven changes in the radiation technology field, one more responsive to surpluses or shortages. When technologists are in demand, wages would increase, acting as a signal to encourage more students to enter the program and attracting foreign trained technologists to Canada.

**Conclusion**

Currently there are no ready or easy solutions to the complex problem of MRI shortages in Canada. Novel solutions must be considered and evaluated on their merits, not on their political appeal. Courage is needed on the part of our policy makers to make bold decisions, which might not be politically prudent in the short-run. While many will argue that the notion of privately funded health care services undermines core Canadian values, we believe it is important to seriously consider this option to address health care shortages.

**References**


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