

BACKGROUND

2.1 Over the past several years, the issue of access to diagnostic imaging services in Canada has become a priority for the provinces and nationally. In September 2004, the First Ministers agreed on a 10-year plan to strengthen health care in Canada. That plan included a commitment to achieve meaningful reductions in wait times for diagnostic imaging services, and to report to citizens on progress made.

2.2 To support the 10-year plan for improving health services, the Federal government established a Diagnostic/Medical Equipment Fund in 2000 of \$1 billion over two years, and announced an additional \$1.5 billion over three years in 2003. In 2004, an additional \$0.5 billion was announced. Nova Scotia's share totaled \$92.1 million (2000 - \$32.5 million, 2003 - \$44.6 million, 2004 - \$15 million). As of December 31, 2006, \$19.6 million has yet to be spent. Of this unspent amount, \$2.5 million has yet to be allocated for specific equipment purchases.

2.3 The issue of access to diagnostic imaging services is complex as described in the following excerpt from the Canadian Institute for Health Information's (CIHI) publication *Medical Imaging in Canada 2005*.

"When addressing the waiting time issue for diagnostic imaging in Canada, most people refer to the availability of equipment. However, this is only one dimension of the problem. More machines do not necessarily mean more imaging services. The machines could be under-used for a variety of reasons, such as funding limitations, human resources constraints, etc. Hence, the importance of considering the level of utilization of the imaging equipment and of assessing the efficiency of its operation." (page 69)

2.4 According to CIHI's *Medical Imaging in Canada 2005*, two of the more expensive types of diagnostic imaging services are Magnetic Resonance Imaging (MRI) and Computed Tomography Scans (CT).

"Magnetic resonance imaging (MRI) uses three components to create detailed images of the inside of the body - hydrogen atoms in the tissues, a strong external magnet and intermittent radio waves... MRI can provide detailed images of all tissues except bone." (page 25)

"Computed tomography (or CT), also known as 'computer assisted tomography' (or CAT), is used to create three-dimensional images of the structures within the body. CT scans use X-ray images processed by a computer to create virtual slices of the part of the body being examined. A computer then processes data to create images that show a cross-section of body tissues and organs." (page 18)

"Expensive technologies such as MRI and CT scanners have high initial costs compared to common technologies such as X-rays and ultrasounds. An MRI scanner costs over

\$2 million, whereas the average cost of a CT scanner is about \$1 million [note that both figures exclude installation costs which may be significant] . . . Viewed in another way, for the cost of one MRI scanner it would be possible to buy about five X-ray machines at about \$340,000 each or 12 ultrasounds at about \$160,000 each. Of course, making these choices would affect which types of patients would benefit, operating costs and many other factors.” (page 65)

- 2.5** Governments have invested heavily in acquisitions of MRIs and CTs over the last several years. In 1991, there were 22 MRIs in Canada (N.S. - 1), and the number had grown to 196 by 2006 (N.S. - 5). In 1991, there were 200 CT scanners in the country (N.S. - 7). By 2006, the figure had grown to 378 (N.S. - 15). (*Medical Imaging Technologies in Canada, 2006 - Supply, Utilization and Sources of Operating Funds*, Canadian Institute for Health Information, 2006, pages 23-24).
- 2.6** In 2006, there were four functioning publicly-funded MRIs in the Province; two at Capital Health (CDHA), one at the Cape Breton District Health Authority (CBDHA), and one at the IWK Health Centre. In addition, there was a privately-owned and operated MRI clinic in the Halifax Regional Municipality. There were fifteen publicly-funded CT scanners in the Province. Capital Health had six CT scanners, while the Cape Breton District Health Authority had two.
- 2.7** The Department of Health (DOH) provides funding, both capital and operating, to the nine District Health Authorities in the Province and the IWK Health Centre (collectively referred to as DHAs). Prior to 2000, DOH allocated funding between operating and capital. As of April 2000, the Department began to allocate capital equipment funding to the portable funding base. Consequently, the DHAs are responsible for determining the allocation of total funding between operating costs and capital requirements. The Department, as part of its business planning process, requires DHAs to submit requests for three major capital equipment purchases such as diagnostic imaging equipment. The Department may decide to separately fund certain of these requests through the Federal Medical Equipment Fund (see paragraph 2.2 above) or other available funds. In those cases, the DHAs are generally required to fund 25% of the cost from their own resources. In addition, DHAs may access equipment funds from Foundations or other non-government sources. DOH also provides funding for equipment purchases to DHAs in emergency situations.
- 2.8** According to Statistics Canada, approximately 4.3% of Canadians aged 15 and older had a non-emergency CT scan in the previous 12 months and 3.9% had a non-emergency MRI in the previous 12 months (*Medical Imaging Technologies in Canada, 2006 - Supply, Utilization and Sources of Operating Funds*, Canadian Institute for Health Information, 2006, page 12). Exhibits 2.1 and 2.2 show the number of MRI and CT exams per 1,000 population by province and Canada. Note that these exhibits show Nova Scotia’s rate for MRIs was the same as the national rate, but the rate for CTs was higher.
- 2.9** In 2004, the Department of Health initiated a review of options for MRI service delivery in Nova Scotia. The report was released in August 2004 (*Magnetic Resonance*

Imaging Needs Assessment, Michael H. Barry, MD, FRCPC, August 2004, full document available at http://www.gov.ns.ca/health/downloads/mri_needs_assessment.pdf.) The report recommended purchase of three MRIs for rural District Health Authorities, and two to replace aging MRIs at Capital Health. In September 2005, the Department of Health conducted a Request for Proposals. A committee with representation from DOH and the DHAs determined the vendor, price and technical specifications of the MRIs to be acquired. The DHAs were to award the contracts for procurement of six MRIs. The first of the new MRIs was officially opened on September 15, 2006 in Yarmouth and the second opened February 1, 2007 in New Glasgow. The remaining four MRIs are targeted to open in 2007.

- 2.10** In 2004, a committee formed by the Department of Health recommended a target wait time for MRI and CT scans of between 3 and 28 calendar days depending on the priority assigned to the patient (*Report of the Provincial Wait Time Monitoring Project Steering Committee*, January 2004, page 19). The recommended target for priority 1 patients (most urgent) was 3 calendar days or less and the target for priority 3 patients (least urgent) was 15 to 28 calendar days. The Committee, comprised of representatives of the clinical and administrative communities at the Department of Health and District Health Authorities, noted that “Target wait times are meant to be goals or objectives toward which the system can strive to better serve patients. They are not guarantees for service within particular lengths of time.” (page 19)
- 2.11** In October 2005, the Department of Health established a website (<http://www.gov.ns.ca/health/waittimes/default/htm>) which “provides information on Nova Scotia’s plan to improve wait times, highlighting the progress to date, and sharing wait time information for publicly funded tests, treatments, and services across the province.” Wait times for MRI and CT scans are included. As at December 2006, the wait time for MRI at Capital Health was reported to be 119 days while the Cape Breton District Health Authority reported a time of 37 days (see Exhibit 2.4). The wait time for CT scans was reported to be between 6 and 38 days at Capital Health (depending on the equipment location) and 59 days at the Cape Breton District Health Authority (see Exhibit 2.3).
- 2.12** In 2006, we conducted an audit of the management of MRIs and CT scanners at the Department of Health, Capital Health and the Cape Breton District Health Authority. This audit was conducted jointly with legislative auditors in several Canadian jurisdictions using a common audit plan. The audit was coordinated by a sub-committee of the Canadian Council of Legislative Auditors (Health Study Group). The Auditor General of Ontario released his report on this topic to the Legislative Assembly of Ontario on December 5, 2006. The legislative auditors of a number of other jurisdictions will issue reports on this subject in the future.

RESULTS IN BRIEF

- 2.13** The following are the principal observations from this audit.
- The Department of Health does not have a formal capital planning process in place. A capital plan is necessary to ensure that high priority equipment needs

are met on a Province-wide basis and that funds are spent with due regard for economy and efficiency.

- Capital Health (CDHA) and the Cape Breton District Health Authority (CBDHA) have adequate capital planning processes in place but have significant unmet equipment needs due to lack of funding. CDHA has estimated its unmet needs to be approximately \$82 million while CBDHA has estimated about \$57 million. Use of equipment that is beyond its useful life makes scheduling processes more difficult for District Health Authority staff, and has an impact on patient access to necessary services.
- We examined the processes for procurement of MRIs by the Department of Health and CBDHA. In both cases, we found procurement policies were followed but identified weaknesses in the way the proposals were evaluated. We have recommended improvements to ensure the best value for money is achieved in future procurements.
- One of the factors that impacts timely access to diagnostic services is whether the equipment is used for medically necessary, appropriate examinations. We believe that the Department of Health and DHAs should incorporate use of clinical practice guidelines in their policies to decrease the risk that the ordered examination is not appropriate. This is especially important as general practitioners are given the right to order more examinations. However, we recognize that implementation of clinical practice guidelines poses significant challenges for physicians and requires changes in expectations of some patients.
- Various statistical reports are produced and used to monitor aspects of diagnostic imaging services including wait times. However, many of the reports are prepared manually and require extensive effort to produce. In some cases, the information technology systems in use have the capacity to produce this performance information more efficiently but it is not utilized. We recommend that CDHA and CBDHA examine the computerized diagnostic imaging systems in use with a view towards automating statistical reports to the extent possible, and that requirements for statistical reporting be included in future information system procurements.
- The Department of Health should take a more active role in assuring adequate quality assurance processes are in place for diagnostic imaging equipment throughout the Province. The two DHAs examined had significantly different quality assurance processes. Diagnostic imaging equipment that is not appropriately functioning can provide risks to patients, including excessive exposure to radiation.
- At CDHA, we examined policies governing medical staff involvement in the private MRI clinic. We noted that CDHA does not have its own conflict of interest guidelines for medical staff although its by-laws refer to conflict of interest guidelines established by the College of Physicians and Surgeons. We

believe that such policies are necessary to ensure the interests of the Health Authority and the patient are protected when medical staff enter into other business arrangements such as involvement with privately-owned health facilities.

AUDIT SCOPE

- 2.14** The major objectives of our audit were to assess:
- due regard for economy, efficiency and effectiveness in the acquisition and maintenance of MRIs and CT scanners, and compliance with applicable purchasing policies and procedures;
 - adequacy of processes and procedures to ensure that use of MRIs and CT scanners complies with applicable legislation and policies, and minimizes risk to patients;
 - adequacy of scheduling processes for examinations and reporting systems for examination results to ensure timely access by patients;
 - adequacy of policies and procedures for maintenance of MRIs and CT scanners to ensure compliance with standards and reduced risk to patients; and
 - the government's policies relating to the privately-owned MRI clinic and CDHA's conflict of interest guidelines for medical staff involved in ownership of private clinics.
- 2.15** Our audit objectives and criteria were developed jointly by all jurisdictions participating in the audit.
- 2.16** Our audit approach included interviews with management and certain medical staff of DOH, CDHA and CBDHA as well as the examination of contracts, studies, reports and other documentation considered relevant. We performed such tests and other procedures as we deemed necessary.

PRINCIPAL FINDINGS

Results of Accreditation Process

- 2.17** District Health Authorities are accredited by the Canadian Council on Health Services Accreditation (CCHSA). We reviewed the most recent accreditation reports for CDHA and CBDHA to determine whether there were any significant recommendations related to Diagnostic Imaging equipment.
- 2.18** The Capital District Health Authority's most recent accreditation review was in late 2004. The report is available on CDHA's website at <http://www.cdha.nshealth.ca/newsroom/uploads/FinalReport04.pdf>. CDHA received an accreditation

recognition decision of “Accreditation with Focused Visit” (page 2) which means that there were significant issues that needed to be addressed in an urgent manner over the following 12 months. Of the three areas identified as the reason for the focused visit, two related to equipment: the urgent need to address capital equipment and physical plant deficiencies (page 16) and long wait times for certain diagnostic imaging procedures (page 19). The focused visit took place in early 2006 and the result was that CDHA had made adequate progress in addressing the high urgency recommendations.

- 2.19** The Cape Breton District Health Authority’s most recent accreditation was in late 2005. CBDHA received an accreditation decision of “Accreditation” and no high urgency recommendations relating to equipment were identified.

Capital Planning Process

- 2.20** We assessed the medical equipment capital planning processes at DOH, CDHA and CBDHA to determine whether decision-making processes incorporate due regard for economy and efficiency. Adequate capital equipment planning includes identifying and prioritizing equipment needs based on the organization’s strategic plan, and identifying strategies for financing. We concluded that adequate capital planning processes exist at the DHAs, but improvements are needed at the Department of Health. In addition, the lack of predictable funding has a significant impact on the effectiveness of capital planning at both the Department of Health and District Health Authorities.
- 2.21** As part of its business planning process, the Department of Health requests three capital equipment submissions from each DHA for Federal Medical Equipment funding. There is no formal process to prioritize these requests on a Province-wide basis and there is no plan to address the medical equipment needs of the Provincial system as a whole over a period of time. For example, DOH contracted a needs assessment for MRIs (see paragraph 2.9) but there was no formal assessment to support spending \$12.5 million (DOH share of equipment and installation costs) on MRIs rather than other medical equipment needs. The needs assessment recommended locations for five new MRIs which the Department of Health addressed when placing the new equipment. However, an additional MRI was purchased and located in a community that had not been identified as a short-term priority (New Glasgow). This decision resulted in two of the new MRIs being located in close proximity (Antigonish and New Glasgow). The Department of Health should have a formal capital planning process in place to demonstrate that funds are being spent with due regard for economy and efficiency.
- 2.22** The Province provides annual operational funding to the DHAs which can be used to fund both operating and capital needs. Management at both DHAs indicated that cost pressures in operational areas result in limited Provincial funds available to address capital equipment needs. For example, in 2005-06, of the \$563 million in Provincial funding provided to CDHA, \$1 million was allocated to capital expenditures. Capital equipment purchases over the last several years have been funded either through the Federal Medical Equipment Fund (see paragraph 2.2),

Provincial funding in emergency situations, hospital Foundations, or other non-government sources of revenue (see Exhibit 2.7 for 2005-06 breakdown for CDHA and CBDHA).

- 2.23** The Federal government established the Diagnostic/Medical Equipment Fund to help the provinces address medical equipment needs. Nova Scotia's share of this fund is \$92.1 million. Of the total funding spent by the Province to date, \$29.4 million was allocated to CDHA, \$7.0 million to CBDHA and \$12.5 million to fund the MRI purchases (see paragraph 2.30). To access funding, each DHA was to submit a prioritized list of equipment requirements to DOH for approval, and all DHAs received funding. In 2005-06, CDHA submitted requests totalling \$106 million and received \$6.9 million; CBDHA submitted \$5.4 million and received \$650,000. The Province had no formal capital plan or funding criteria to support these funding allocations.
- 2.24** We acknowledge that medical equipment funding is a complex issue and that DOH has limited funds to address the significant needs identified by the DHAs. However, when funds are scarce, it is even more important that the highest priority items on a Province-wide basis are funded.

Recommendation 2.1

We recommend that DOH, in conjunction with the DHAs, develop a long-term Provincial medical equipment capital plan including criteria for assessing competing DHA needs on a Province-wide basis.

- 2.25** CDHA and CBDHA have annual processes in place to identify and prioritize medical equipment needs based on pre-established criteria. Both DHAs are currently in the process of reviewing the capital equipment process to ensure it is effective in prioritizing equipment needs. At both DHAs, input is solicited from all clinical areas. The two DHAs have identified significant long-term capital equipment requirements; in the range of \$82 million at CDHA and \$57 million at CBDHA.
- 2.26** Certain equipment at both DHAs is beyond its useful life. Outdated and inefficient equipment can impact patient care, efficiency, wait times and the ability of DHAs to attract specialist physicians. Exhibit 2.5 shows the age of the CT scanners used by CDHA and CBDHA, while Exhibit 2.6 shows the age distribution of equipment in use at Canadian hospitals. Across Canada, 4% of CT scanners in use in 2005 were more than 10 years old, while at CDHA and CBDHA, 25% were more than 10 years old. The two MRIs in use at CDHA were 10 and 12 years old as of January 1, 2006 while only 6% of the MRIs used in Canada were more than 10 years old. The Canadian Institute for Health Information (*Medical Imaging in Canada 2005*, page 80) notes that "standards for evaluating ageing equipment in Canada have not been developed." However, it quotes work by the European Coordination Committee of Radiological and Electromedical Industries which indicates that equipment older than ten years is

“No longer state-of-the-art technology; not more than 10% of the installed base can be tolerated to be older than ten years; replacement is essential.”

- 2.27** The aging equipment causes difficulties for DHA management. For example, management informed us that the image quality on MRIs at CDHA is not acceptable for certain types of examinations. This causes complexity in scheduling. For example, certain examinations must be completed on the IWK Health Centre’s MRI to ensure acceptable image quality. CBDHA faces similar problems due to the age of its CT scanners - one is more than ten years old. Obtaining replacement parts for outdated equipment is difficult. We were informed of one case where CDHA procured two used ultrasound machines from a hospital in PEI which was disposing of them. The machines were 12 years old and procured at a cost of \$4,999 each. Management indicated that CDHA used the machines for approximately one year.
- 2.28** Keeping pace with rapid changes in technology poses challenges for the Department of Health and DHAs. Technological advancements permit better image quality and more accurate diagnosis. Physicians require access to newer technologies to enhance patient care. Diagnostic imaging equipment is expensive and a systematic approach to technology refreshment should be built into capital equipment plans.

Planning and Procurement Process for New MRIs and CTs

- 2.29** We assessed documentation supporting the planning and procurement processes for the purchase of MRIs and CT scanners to determine whether there was compliance with procurement policies and whether the equipment was acquired in an economical manner using a competitive selection process. We concluded that procurement policies were followed but we have identified weaknesses in the way the MRI proposals were evaluated. We have recommended improvements to ensure the best value for money is achieved in future procurements.
- 2.30** **DOH** - In 2005, DOH managed the procurement process for the purchase of new MRIs to provide for equipment compatibility throughout the Province and economies of scale. As indicated in paragraph 2.9, the procurement process was preceded by a needs analysis performed by an external consultant. DOH created a committee to develop a Request for Proposals (RFP) and assess vendor submissions. Committee members included representatives from DOH, the Provincial Procurement Branch and technical expertise from various DHAs. Vendor submissions were analyzed using pre-established criteria and weightings. The winning vendor was awarded the right to supply six MRIs for \$10.4 million.
- 2.31** Although the RFP process and assessment complied with the Government Procurement Policy, we note that lifecycle costs, such as annual maintenance and operating costs, were not explicitly considered in the quantitative analysis of proposals. Best practices would suggest that the present value of all costs, including acquisition, maintenance and operating costs, over the useful life of the equipment should be considered to ensure appropriate comparisons between

competing equipment and due regard for economy and efficiency. Staff of the Department of Health indicated that the decision to exclude lifecycle costs from the analysis process was reasonable because the difference between the various alternatives, in this case, was not significant.

- 2.32** The committee analyzed the proposals on the basis of a technical review (70% weighting) and cost to acquire five base unit MRIs (30% weighting). Based on the combined score, a winning proposal for base units was accepted. DOH management indicated that, because additional resources were available, a decision was made to purchase a sixth unit, three system upgrades and additional accessories such as special purpose coils. As a result, the six machines actually purchased were not all base units - three were enhanced units for use in tertiary care facilities. Additional accessories, such as special-purpose coils, were also excluded from the vendor cost comparisons but included in the final contract award. Submissions for the more costly enhanced units had been received from the vendors in response to the RFP but were not considered during the analysis process. The evaluation process should be enhanced to more specifically compare the costs of all equipment purchased to ensure value for money is achieved. We believe that planning for this project should have identified the specific equipment requirements prior to issue of the RFP and the process for assessment of vendor submissions should have included all equipment in the final contract. We recognize there were extenuating circumstances in this case because this was new technology for rural DHAs and committee members only reached a decision on the specific equipment requirements during the technical review process when they had the opportunity to see the equipment operate and compare image quality. We also understand the committee was given a timeline of approximately six months to request proposals and reach a decision which impacted its ability to introduce detailed specifications in the proposal document.
- 2.33** **CBDHA** - In 2003, the Cape Breton District Health Authority acquired a MRI at a cost of \$3.1 million, including site renovations. A RFP process was conducted. CBDHA management informed us there was no formal scoring process for the bids received. Section 6 of the RFP document indicated the evaluation weighting would be based on 50% for technical specifications, 20% for service technology refresh and 30% for cost. Each vendor's submission included proposed pricing but there was no summary documentation of how the various bidders scored in relation to the evaluation weighting included in the RFP. A committee was formed to conduct a technical evaluation of the vendor submissions and a letter was prepared which recommended the preferred vendor. The letter included a rationale for the committee's choice. Management informed us that procurement staff began negotiations with the preferred vendor on a purchase price after the technical review had been completed and the negotiated price was less than the preferred vendor's original submission. Again, the present value of all lifecycle costs was not included in the quantitative analysis.
- 2.34** **CDHA** - In December 2005, CDHA purchased two CT scanners (16 slice and 64 slice). A competitive process was used which was compliant with CDHA and government procurement policies. CDHA uses a Best Value approach for the

procurement of expensive, highly technical equipment such as a CT scanner. The evaluation of bids also includes evaluation weightings based on technical specifications and cost. CDHA included the price of service agreements for four years for each vendor as part of its cost evaluation although not all lifecycle costs were included.

- 2.35** To ensure procurement practices are open and fair and best value for money is achieved, it is important that complete equipment requirements be identified prior to preparation of the RFP, the present value of lifecycle costs be included in the quantitative analysis, and the entire procurement process be appropriately documented.

Recommendation 2.2

We recommend the procurement processes at DOH and the DHAs be improved to include:

- **identification of all needs prior to issuing the RFP;**
 - **inclusion of the present value of lifecycle costs in the quantitative analysis; and**
 - **documentation of the entire procurement process including a detailed comparison of bids received according to criteria in the RFP document.**
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Equipment Maintenance

- 2.36** We assessed the systems and processes in place at the DHAs to determine whether MRIs and CT scanners are supported by cost-effective preventive maintenance programs and required maintenance and repairs are performed in a timely and economic manner. Overall, we concluded that both CDHA and CBDHA had adequate systems in place but improvements could be made with respect to monitoring equipment downtime. Also, at CBDHA, we recommended establishment of a process to monitor maintenance performed by equipment manufacturers.
- 2.37** **Annual preventive maintenance service contracts** - Due to the technical complexity of MRIs and CT scanners, only the equipment manufacturer has the expertise to perform required repairs and maintenance. The DHAs' options for sourcing maintenance and repairs are limited. Annual preventive maintenance service contracts for MRIs and CT scanners are costly; for example, maintenance contracts for CDHA MRI and CT scanners range from \$124,000 to \$185,900 per year. CBDHA has an annual maintenance contract of \$165,000 for the MRI and \$230,000 for a single contract covering both CT scanners. Typically these contracts are inclusive of parts and labour with the exception of older equipment where the manufacturer may no longer be able to guarantee the availability of parts - the situation for one of CDHA's CT scanners.
- 2.38** Maintenance contracts include equipment up-time guarantees under which the manufacturer guarantees that the MRI or CT scanner will be up and running for a certain percentage of time excluding regular preventive maintenance. These

guarantees typically range from 95% to 97%. If this percentage is not achieved, the manufacturer is usually required to pay a financial penalty. Neither CDHA nor CBDHA were closely monitoring these percentages to ensure they were met. We performed an analysis of the actual up-time of a small sample of equipment and identified an instance where the guaranteed up-time was not being met. CDHA management then brought this to the attention of the manufacturer who agreed to remedy the situation by the end of the year or provide extra months of free service.

Recommendation 2.3

We recommend that CDHA and CBDHA actively monitor manufacturers' equipment up-time guarantees.

- 2.39** CDHA has established a database which is used to track and monitor preventive maintenance and required repairs to all diagnostic imaging equipment including MRI and CT scanners. CBDHA has not established a similar process and relies primarily on the equipment manufacturer to ensure that all required maintenance has been performed. Management of the CBDHA clinical engineering department indicated that it has identified the lack of monitoring of MRIs and CT scanners as an issue and that it is making progress in implementing AIMS software, described in paragraph 2.40, which will address the situation.

Recommendation 2.4

We recommend that CBDHA establish a process to track and monitor required maintenance and repairs to its MRI and CT scanners.

- 2.40** **Equipment listings** - Adequate control of capital assets requires entity-wide capital asset listings which should be periodically verified by comparing the list to equipment on hand. CDHA does not maintain a DHA-wide capital equipment ledger; each divisional head is responsible for separate capital equipment listings. The Diagnostic Imaging Department maintains a database of all its equipment. The main purpose of the database is to track preventive maintenance and repairs performed as well as inventory each piece of equipment. CBDHA does not maintain a capital asset subledger. Information on capital assets is maintained in several spreadsheets. CBDHA management approved the acquisition of software (AIMS.Net) which we understand is specifically designed for hospitals. Functionality includes equipment management, work order control, preventive maintenance performance and quality, and contract management. Operational implementation is planned for 2007-08. We understand that the Department of Health is examining the feasibility of a Province-wide solution which would utilize the relevant module of the SAP/R3 corporate financial management system if that system is adopted to meet the financial information needs of DHAs.

Recommendation 2.5

We recommend that CDHA and CBDHA implement formal capital asset ledgers to control all medical equipment.

Appropriate use of MRIs and CT scanners

2.41 We assessed the systems in place at CDHA and CBDHA to provide for timely access by patients to MRIs and CT scanners. One of the factors that determines timely access is whether the equipment is being used for medically necessary, appropriate examinations. We found that both DHAs rely on the professional expertise of radiologists to confirm appropriateness of examinations requested by referring physicians. We have recommended increased use of clinical practice guidelines to strengthen this process.

2.42 Appropriate use of MRIs and CT scanners is necessary to achieve due regard for economy and efficiency and patient safety. However, appropriate use is not always achieved as illustrated by the following quote from an October 2005 study conducted by a consortium of the Atlantic Health Sciences Centre, Canadian Association of Radiologists and Medicalis Inc. titled *Demand-Side Control of Diagnostic Imaging Through Electronic Clinical Decision Supports: A Pilot Using Appropriateness Guidelines*.

“The retrospective analysis, applying all available guidelines found that 86% of tests ordered were entirely appropriate. In 9% of orders a different test would have been more efficient; about half of those changes were to a simpler modality. Four percent of tests ordered were not required for patient management according to the full set of appropriateness guidelines. Although referring clinicians had the most difficulty in appropriately ordering advanced DI tests (CT, MRI, NM, and BD) the volume of basic tests (XR, US, FL, MM) (89%) made any inappropriate ordering in these categories costly to the health care system.” (page 2)

2.43 The Canadian Institute for Health Information, in *Medical Imaging in Canada 2005*, discusses challenges in achieving appropriate use.

“Medical imaging may be done for many reasons: screening patients at risk for a disease, reducing uncertainty about a diagnosis to reassure patients and caregivers, assisting with decisions about care choices, assessing treatments and prognoses and/or guiding surgery or other interventions.

Deciding which is the best tool (or tools) to use in each of these contexts for different patients is challenging, particularly given the ongoing evolution of imaging technologies, research evidence and practice patterns. Often a particular type of imaging is of obvious, undisputed value for some groups of patients or types of research. Other cases are less clear. . . .

More recent technology, such as CT and MRI, is increasingly used to investigate non-specific symptoms. Possible factors for the increase in utilization include growing

patient demand and increased access to scanners, clinicians' concerns about missing a treatable illness and concerns about litigation if an important abnormality is not diagnosed. . . . Although millions of Canadians use imaging services each year, still relatively little is known about how these technologies are used and how they affect patient care and outcomes." (pages 6-7)

- 2.44** Diagnostic imaging procedures are not risk free. CT scans provide significantly higher doses of radiation to patients than X-rays. MRIs use strong magnetic fields and radio frequencies to produce images. Risk to the patient is another important reason for ensuring that all diagnostic imaging examinations performed are appropriate. (See paragraph 2.71 for discussion of risks and quality assurance).
- 2.45** Exhibits 2.1 and 2.2 show the number of MRI and CT exams per 1,000 population by province and Canada. Nova Scotia's rate for MRIs was the same as the national rate, but the rate for CTs was higher.
- 2.46** At both CDHA and CBDHA, only specialists can request appointments for MRIs. Both general practitioners and specialists can request CT scans. We understand that it is likely that general practitioners will be able to request MRIs when the new rural MRIs are functioning. For example, general practitioners can request MRIs at the new Yarmouth MRI which began operating in fall 2006.
- 2.47** A standard consultation form is completed by the referring physician, and all forms are to be reviewed by staff radiologists to ensure the exam requested is appropriate in the radiologist's professional opinion. Radiologists prioritize the requests based on pre-established categories of acuity. Although we were told that radiologists question the appropriateness and medical necessity of examinations requested by physicians, this process is not documented and, accordingly, we cannot conclude on the extent of the challenge that takes place.
- 2.48** The Canadian Association of Radiologists published *Diagnostic Imaging Referral Guidelines* in October 2005 which provide guidance regarding appropriateness of examinations from a clinical perspective. These guidelines are available to referring physicians but have not been formally adopted by the Department of Health and DHAs. Although software is available to assist in determining appropriateness (e.g., Precipio), these tools are not yet used in Nova Scotia. The Department of Health is currently investigating the use of this clinical decision software on a test basis to provide guidance to family physicians when ordering diagnostic imaging examinations. The software uses guidelines developed by the Canadian Association of Radiologists and is based on guidelines used in the United States and the United Kingdom. We believe that the Department of Health and DHAs should incorporate use of clinical practice guidelines, such as those issued by the Canadian Association of Radiologists or similar tools, in their policies to decrease the risk that the ordered examination is not appropriate. This is especially important as general practitioners are given the right to order more examinations.
- 2.49** Physicians at the DHAs informed us of significant challenges associated with the introduction of clinical practice guidelines. They indicated that use of such

software is perceived to increase the time required by fee-for-service physicians to order an examination and this time is currently not included in the fee schedule. Another impediment to implementation of clinical practice guidelines is patient demand for various types of diagnostic examinations which is often based on internet research. Physicians are sometimes reluctant to refuse services demanded by patients. Finally, they suggested that successful implementation of clinical practice guidelines would require changes to medical school curricula.

- 2.50** In late March 2007, subsequent to our audit, Health Canada and the Nova Scotia Department of Health announced a project to be funded through the Patient Wait Times Guarantee Trust Fund with the objective of improving efficiencies in diagnostic imaging. The Diagnostic Imaging Project was described in a Health Canada news release dated March 26, 2007 as follows:

“Diagnostic imaging services are a critical and frequently time-consuming juncture in a patient’s care journey. Nova Scotia’s “Improving Access to Diagnostic Imaging Services” project will help primary care physicians order the best diagnostic test for their patients, using appropriateness guidelines developed by the Canadian Association of Radiologists. It will also improve efficiencies in diagnostic imaging and support patient choice on where and when they receive care.”

Recommendation 2.6

We recommend that the Department of Health, in conjunction with radiologists, establish and implement clinical practice guidelines for use of MRIs and CT scans in the Province.

Booking Systems

- 2.51** One of the factors that plays a role in achieving timely access is adequacy of booking processes for CTs and MRIs. We examined the booking processes at CDHA and CBDHA and concluded that they are generally adequate for ensuring that priority patients receive access to the diagnostic equipment. However, we made some recommendations for improvement.
- 2.52** CDHA uses a computerized system (QuadrIS) to book both MRIs and CT scans. For CTs, each site books its own equipment separately - there is no centralized booking of all CDHA CT scanners. MRIs are booked centrally but, at the time of our audit, were only being booked until February 2007 when two new MRIs were planned to start operating. Management informed us that they are developing plans to book CTs centrally in the future. We encourage management to proceed with these plans to ensure all CTs are utilized for the highest priority patients and to ensure that a single patient does not appear on multiple wait lists.

Recommendation 2.7

We recommend that CDHA implement centralized booking for all CDHA's CT scanners.

- 2.53** At the time of our audit, CBDHA used a manual booking system for MRIs and examinations were only scheduled three days in advance of the procedure. CT scans were booked centrally using the Meditech system (Nova Scotia hospital Information System). We advised CBDHA that the Meditech system is available for booking of MRIs and should be used because it has the capability to generate useful wait time and performance information in addition to advance booking. Also, entering all requisitions into the system as they are received ensures better control than maintaining them in an unbooked requisitions file. Recently, CBDHA management indicated that MRIs are booked for a longer time frame and that the Meditech system is now being used.
- 2.54** The booking schedule includes time allocations for inpatients, outpatients and patients of various clinics, and emergencies. Patients are prioritized by radiologists (see paragraph 2.47 above). The booking schedule for MRIs at CDHA is also impacted by the age of the equipment and the image quality. As a result, certain types of examinations can only be performed on certain pieces of equipment. This complicates the booking process but should be rectified when the new equipment is operational. Finally, the schedules are impacted somewhat by the availability of radiologists as a radiologist must be present for certain types of examinations.
- 2.55** We examined procedures for dealing with cancellations and patients who do not present themselves for a scheduled examination (i.e., “no shows”). CDHA maintains cancellation lists and calls other patients when notice of cancellation is received while CBDHA does not maintain a cancellation list. “No show” rates are monitored by management through manual calculations while cancellation rates are generally not monitored because the resulting vacancies are filled by new bookings. We determined that CDHA’s “no show” rate for MRI and CT appointments was 4.1% and 10.7%, respectively, for the 2005-06 fiscal year. We examined a sample of utilization records at each DHA and found that vacancies created by “no shows” were generally filled by other patients such as inpatients and emergencies so the impact of “no shows” on actual utilization is minimal.
- 2.56** CDHA’s MRIs are available for scheduled patients weekdays from 7 a.m. to 8 p.m. and the Halifax Infirmary site is open on weekends from 8 a.m. to 8 p.m. CDHA also uses the MRI at the IWK Health Centre for 27 hours per week for adult patients. A technologist is available on call after hours for emergency patients. The CT scanners located at the Victoria General operate weekdays from 7 a.m. to 5 p.m. while those at the Halifax Infirmary operate 24 hours per day, 7 days a week. At CBDHA, CT scanners operate weekdays from 8 a.m. to 9 p.m. and staff are on call after 9 p.m. and on weekends. MRI hours had previously been 8 a.m. to 7 p.m. weekdays but have recently been reduced, because of staffing issues, to weekdays from 8 a.m. to 4 p.m. with no on-call or weekends. At both DHAs, the overall utilization rates for MRIs and CT scanners, both in total and for individual

equipment, are informally monitored. We believe that the DHAs should monitor their equipment utilization more formally, including establishing utilization standards and comparing actual utilization to standards to ensure that it is used as efficiently as possible. This would also provide useful input to the capital equipment planning process on levels of utilization of existing equipment.

Recommendation 2.8

We recommend that CDHA and CBDHA establish utilization standards for each MRI and CT scanner and monitor performance in achieving the standard.

Wait Time Data

- 2.57** Wait times data is an important indicator of patient access to diagnostic services. The Department of Health established a website in October 2005 which reports current information on MRI and CT wait times by DHA. This information is reproduced in Exhibits 2.3 and 2.4. In addition, management at both DHAs receive wait time reports on a regular basis.
- 2.58** We reviewed the systems to support production of MRI wait times information at CDHA and CBDHA and reported our findings in the December 2006 Report of the Auditor General (Chapter 4). We were unable to conclude on the adequacy of the system to support MRI wait times at both DHAs because certain supporting documentation was not available for our review after the wait time was calculated and reported. At that time, we made the following recommendations for improvements to CDHA's and CBDHA's systems for measuring and reporting this wait time information:
- *Recommendation 4.4 - We recommend that the Department of Health modify the definition of MRI wait times used on the website to ensure it is consistent with the information calculated and provided by the District Health Authorities.*
 - *Recommendation 4.5 - We recommend that the Department of Health's website disclosure of the wait time for MRIs reflect more comprehensive information such as the specific wait times for major types of MRI examinations rather than just a single data point such as the average for all types.*
 - *Recommendation 4.8 - We recommend that the Department of Health consider building the requirement for wait time information and reports into automated systems.*
 - *Recommendation 4.9 - We recommend implementation of a formal quality control process for wait time data at both the District Health Authorities where the reports originate and the Department of Health.*
 - *Recommendation 4.10 - We recommend that the Department of Health formally document policy guidance for how each wait time is to be calculated.*

- **Recommendation 4.11** - We recommend that the District Health Authorities retain, for at least one year, the support for all wait times reported to the Department of Health.

- 2.59** Wait times for CT scans are calculated in a manner similar to MRIs so the recommendations above also apply.
- 2.60** CDHA has established a standard of 28 days for the wait time for elective CT scans and MRIs. This standard is consistent with the *Report of the Provincial Wait Time Monitoring Project Steering Committee* for examinations categorized as “least urgent” (page 19). CBDHA has not formally adopted a wait time standard. Exhibit 2.3 shows that, for CT scans, the target is exceeded at CBDHA and two of the three CDHA sites. Exhibit 2.4 shows that, for MRIs, the target is exceeded at both DHAs although the waits at CDHA are considerably longer.
- 2.61** The wait time for CT at CDHA is disclosed for each of the three sites with CTs (Queen Elizabeth II Health Sciences Centre, Dartmouth General Hospital and Cobequid Community Health Centre). The individual facilities perform a manual calculation to weight the calculation by body part but we were unable to determine the support for the weightings used. More comprehensive reporting of wait times such as expected wait time for each major type of examination, by facility, would improve the relevance and value to the user of the information.
- 2.62** At CBDHA, wait times for CT are calculated for those examinations requiring contrast medium and those that do not. It is the only DHA that reports its CT wait times to DOH in this way; other DHAs sometimes report by body part. CBDHA’s figures show that there is a difference in wait times between contrast and non-contrast examinations; non-contrast examinations have a significantly longer wait time but are excluded in the Department of Health’s website figures. We recognized the need for consistency and an increased level of detail in our December 2006 report and reiterate recommendations 4.5 and 4.10 noted in paragraph 2.58 above.
- 2.63** In March 2007, the Department of Health released a plan to improve wait times in the Province. *Timely Access to Healthcare in Nova Scotia: Improving Wait Times 2007-2010* is available on the Department’s website at http://www.gov.ns.ca/health/waittimes/Wait_Time_Strategy_2007.pdf

Reporting of Examination Results

- 2.64** We examined the DHAs’ systems for ensuring that examination results are reported on a timely and accurate basis. We concluded that monitoring of turnaround times in relation to the expected standard should be improved.
- 2.65** When an MRI or CT scan is complete, the image is sent to a staff radiologist for analysis. The radiologist verbally dictates a report which is transcribed, either through use of a transcriptionist or electronically using voice recognition software. The radiologist reviews the accuracy of the transcribed report and signs it before it is sent to the referring physician. Physicians with access to PACS (the

computerized Picture Archiving and Communications System) can access reports through that system or reports will be transmitted either by fax or mail. We noted that, with the exception of the mammography pre-screening program, no independent, regular peer review of reports is performed prior to release.

- 2.66** CDHA has set a time standard of 24 hours from the time of the examination to the time when the radiologist's final report is available. CDHA reported the average turnaround time for the 2005-06 fiscal year was 44 hours, but varies by site. CBDHA informally tracks the time from examination to report. Management indicated that excess time may be attributable to delays in the transcription process and unavailability of radiologists to sign the final report.

Recommendation 2.9

We recommend that CBDHA set standard times for reporting of diagnostic imaging examination results and monitor progress in achieving the standard. CBDHA and CDHA should take action to ensure standard turnaround times are achieved.

Staffing

- 2.67** We examined the DHAs' processes for ensuring staff performing CT scans and MRIs are appropriately qualified and allocation of staff is reasonable. We concluded that there are processes to ensure appropriately qualified staff.
- 2.68** Technologists must be licensed by the Canadian Association of Medical Radiation Technologists and the Nova Scotia Association of Medical Radiation Technologists. Specialty training is required for operation of MRIs but not CTs. MRI training is not available in the Atlantic Provinces but is available through correspondence courses and requires passing a national certification examination. Educational requirements are included in the relevant position descriptions. Although CDHA had no vacancies for full-time CT and MRI staff at the time of our audit, no casual staff were available. There have been instances where examinations have had to be cancelled due to staff shortages when a technologist is sick or otherwise unavailable.

Performance Information

- 2.69** We examined the DHAs' systems for monitoring performance of the Diagnostic Imaging Department. We found that various useful statistical reports are produced on a regular basis. For example, the Diagnostic Imaging Department at CDHA produces a comprehensive monthly scorecard report. However, many of the reports are prepared manually and require extensive effort to produce. Manual preparation also increases the potential for error and we found errors in some of the calculations. The preparers of this information are often clinical staff and managers whose primary responsibility is for patient care and they are spending significant time preparing administrative reports.

- 2.70** In some cases, the information technology systems in use would have the capacity to produce this performance information more efficiently but the system's capabilities may not generally be recognized. For example, CBDHA had been booking MRIs manually. Therefore, the Meditech system's capabilities to produce performance information such as wait times were not used. In other cases, primarily at CDHA, the systems in use do not have the ability to produce the required information and this requirement should be considered when these are replaced in the future.

Recommendation 2.10

We recommend that CDHA and CBDHA examine the computerized diagnostic imaging systems in use to determine whether they can produce additional statistical information, such as wait times and utilization indicators, which are currently manually produced. We also recommend that requirements for statistical reports be included in future information system procurements.

Quality Assurance

- 2.71** We examined the quality assurance processes to determine whether there are quality standards in place, whether achievement of standards is monitored, and whether the processes attempt to minimize risk to patients. We concluded that CDHA has adequate quality control processes for CT scanners but that the processes relating to MRIs could be improved in some areas. CBDHA's processes for quality control for both MRIs and CT scanners should be improved. The documentation of policies and procedures related to diagnostic imaging quality assurance at both DHAs should be improved. We believe the Department of Health should take a more active role in assuring adequate quality assurance processes are in place for diagnostic imaging equipment throughout the Province.
- 2.72** Health Canada has published various safety codes related to X-ray equipment, including MRI's and CT scanners, but these guidelines were published several years ago and do not reflect current equipment. For example, the guideline related to CT scanners was issued in 1994 when 1-slice CT scanners were predominant. These would now be considered outdated technology due to the rapid advancements in CT technology over the last five years and the use of multi-slice scanners. CDHA management informed us that the most authoritative guidelines respecting the operation of MRIs and CT scanners are the quality control manuals published by the American College of Radiology. There are no national standards relating to maximum acceptable levels of exposure to radiation. However, CDHA is monitoring and attempting to reduce patient radiation levels.
- 2.73** The major quality assurance processes at CDHA are listed below.
- A diagnostic imaging quality assurance staff is headed by a Medical Physicist. Quality assurance staff perform quality control testing (for equipment other than MRIs) and acceptance testing of new equipment.

- A quality assurance committee and reporting process are in place for most aspects of the DHA's clinical operations. The results of these processes are reported to senior management and the DHA Board and the processes are examined as part of the CCHSA accreditation process.
- CDHA has a Radiation Safety program which includes a Radiation Safety officer and committee.
- A preventive maintenance program is in place as described in paragraph 2.37 above and new equipment is tested by the vendors.
- There is an incident reporting program for all aspects of the DHA's clinical operations.
- A Diagnostic Imaging Department quality assurance committee exists but its focus is limited at this time, and the scope does not cover all sites.
- The DHA subscribes to safety alerts issued by the Emergency Care Research Institute and follows up on relevant information received.

2.74 At CBDHA, the processes are similar to CDHA with the following major exception:

- CBDHA has no quality assurance staff to perform tests on diagnostic imaging equipment. Testing for conventional diagnostic imaging equipment has been contracted to the private sector, but there is no process in place to test CT scanners and MRIs. We were told that, in the past, the Provincial government had a process in place to test radiation levels from X-ray machines but that the process was discontinued.

2.75 Our audit procedures included documentation of the roles and responsibilities of the various participants in quality assurance, discussions with staff involved, and review of relevant documentation. Although there is extensive quality assurance activity taking place in the Diagnostic Imaging Department, there is limited documentation of policies and procedures. There is also a similar lack of documented policies relating specifically to patient safety at CDHA and CBDHA. Lack of documentation of policies and procedures increases the risk that not all necessary activities will take place as required.

Recommendation 2.11

We recommend that CDHA and CBDHA document policies and procedures relating to the quality assurance processes, including patient safety, for diagnostic imaging equipment and related testing of MRIs and CT scanners.

2.76 CDHA's quality assurance staff conducts tests of CT scanners annually. We reviewed files and concluded that the equipment testing is occurring as indicated. As noted above, there is no equivalent testing at CBDHA.

- 2.77** The American College of Radiology (ACR) has issued guidelines on Magnetic Resonance Safety. We reviewed the guidelines and used them as the basis for our audit of MRI safety practices. CDHA complies with the guidelines in all major respects. There were some minor deviations relating to such practices as security (e.g., locking of doors). We also found that documentation supporting the completion of patient safety questionnaires was not available in 3 of the 12 cases we examined. The questionnaire is essential for ensuring patient safety. A major focus of the questionnaire is to ensure that metal is not placed in proximity to the magnet. We found that CBDHA follows the ACR safety practices with minor exceptions (e.g., not all magnet-safe equipment is marked as such which could increase the risk for unsafe equipment to be brought in to the magnet site).

Recommendation 2.12

We recommend that CDHA ensure patient safety questionnaires are completed for all MRI patients and retained in the patients' files.

- 2.78** CDHA quality assurance staff does not perform tests on MRIs. The only testing is performed under the preventive maintenance arrangements with the original equipment manufacturers. We were informed that a Provincial quality assurance testing program for MRIs is being developed by CDHA quality assurance staff. The ACR *MRI Scanner Quality Control Manual* will be used as the basis for the program. We encourage the Department of Health and CDHA to implement this program to mitigate patient safety risk associated with MRIs operating in all areas of the Province. We also believe that the scope of the program should be expanded to CT scanners to ensure that appropriate quality assurance processes exist at all Provincial locations.

Recommendation 2.13

We recommend that the Department of Health and the DHAs establish and implement a quality assurance program for all MRIs and CT scanners in the Province.

Private MRIs

- 2.79** There is a private MRI clinic located in Halifax. It provides services to individuals and third-party payors for a fee. In 2006, the clinic was purchased by two radiologists on staff at the Capital District Health Authority (Cobequid Community Health Centre). The objective of our audit was to determine whether the Department of Health has policies and practices related to the operation of this clinic, and to determine whether the purchase of the clinic complied with relevant conflict of interest guidelines.
- 2.80** At the time of the purchase of the clinic, the Department of Health had no policies and procedures regarding private clinics. The clinic was not regulated by the

Department of Health, and the Department did not provide any type of funding for the clinic or the MRI examinations performed there.

- 2.81** The Department of Health compensates radiologists in the Province on a fee-for-service basis. Although radiologists on staff at CDHA were involved in reading the MRIs performed at the private clinic, they were not compensated for that service by DOH. The images were read on-site at the private clinic and the radiologists were paid by the clinic. We concluded that there was low risk that CDHA radiologists were compensated by public funds for work done at the private clinic. However, there is a risk that the radiologist hired by the private clinic to read an exam may not be the best qualified in the specific situation which could impact the patient's diagnosis. There is also a potential for conflicting opinions if the patient later seeks services from a DHA.
- 2.82** The Health Facilities Licensing Act received first reading in the House of Assembly on November 23, 2006 and has not yet been passed. The proposed legislation includes the following major provisions related to improved accountability.
- Health facilities providing diagnostic and surgical procedures or other designated services would require a licence from the Minister.
 - Health facilities would be required to provide annual returns including financial statements to the Minister.
 - Health facilities would be required to be accredited by the relevant professional body.
 - The Minister of Health would be required to approve changes in ownership of health facilities.
- 2.83** The proposed legislation also includes provisions which would allow private health facilities to perform insured health services if certain specified criteria are met.
- 2.84** We inquired about conflict of interest policies that would relate to the purchase of the MRI clinic by CDHA radiologists. The CDHA has by-laws for medical staff which refer to conflict of interest guidelines established by the College of Physicians and Surgeons. CDHA does not have its own conflict of interest guidelines for its medical staff. We believe that CDHA should have its own policies in this area to ensure that its interests, and those of patients, are protected when medical staff enter into other business arrangements. We recognize that this is a complex area due to the myriad of arrangements that individual physicians may be involved with. Conflict of interest guidelines would help to ensure that the DHA has knowledge of other arrangements and their potential impact on DHA services. We also believe that DOH needs to play a role in the development and approval of these guidelines to ensure that the interests of patients are protected.

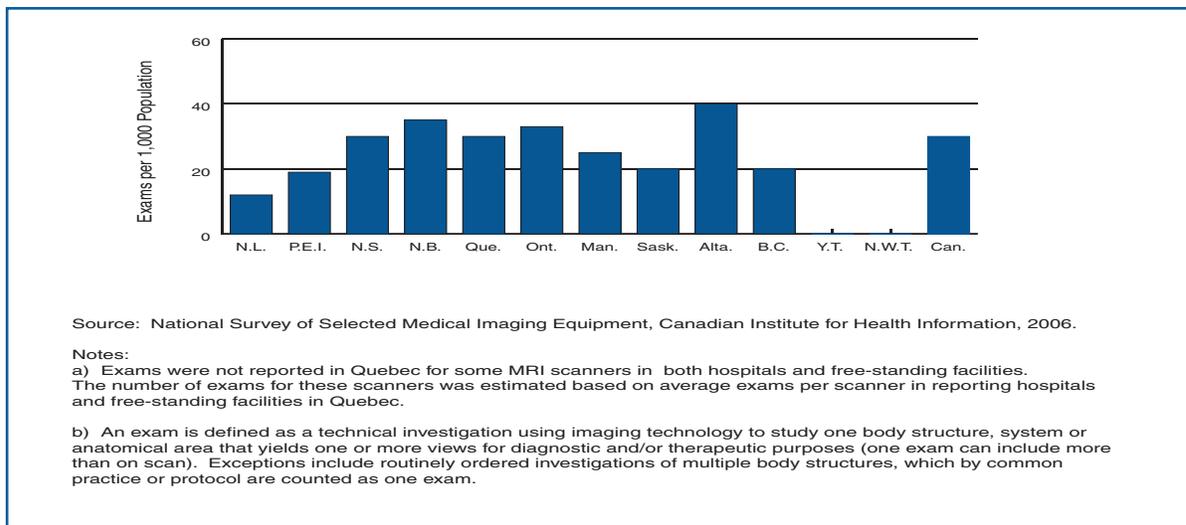
Recommendation 2.14

We recommend that CDHA and DOH establish conflict of interest guidelines for medical staff including policies on relationships with private facilities.

CONCLUDING REMARKS

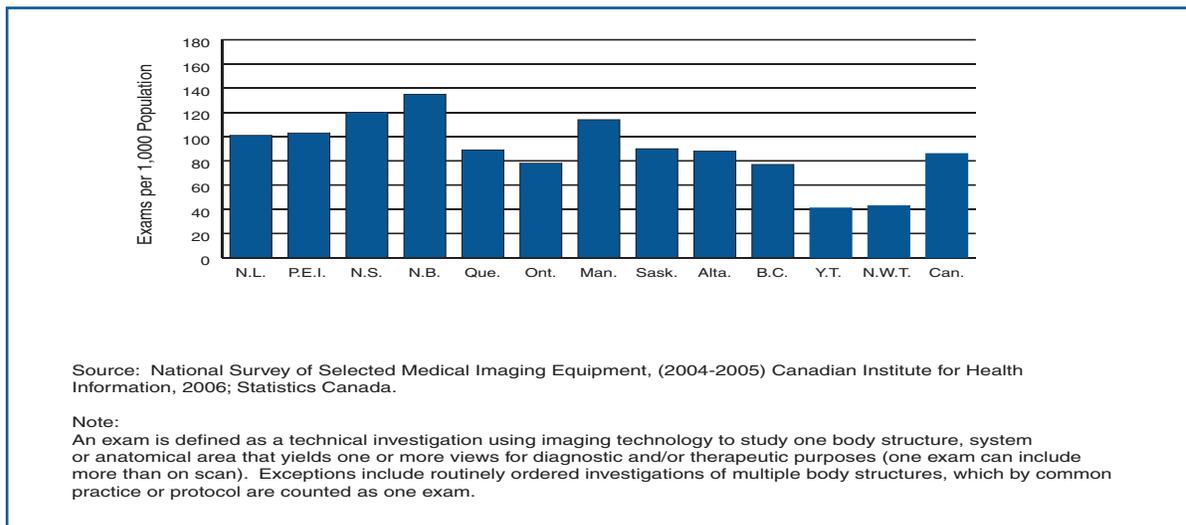
- 2.85** This was our first audit of the acquisition, management and use of diagnostic imaging equipment. We found that the DHAs we audited generally had processes in place to provide for patient safety and prioritize patient access to required services. However, we made recommendations to improve management and efficiency of some aspects of these processes.
- 2.86** The Department of Health does not have a formal planning process for capital equipment. This increases the risk that decisions are not made with due regard for economy and efficiency and that funding may not be allocated to the highest priority needs on a Province-wide basis. The lack of funding for capital equipment for the District Health Authorities has been a recurring finding in our audits (for example, see paragraph 6.49 of December 2004 Report of the Auditor General). The Department of Health should make it a priority to ensure that required equipment is available to provide necessary services to patients.
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Number of MRI Exams per 1,000 Population, by Jurisdiction and Canada, 2005-06



Source: *Medical Imaging Technologies in Canada, 2006 - Supply, Utilization and Sources of Operating Funds*, Canadian Institute for Health Information, 2006, page 11

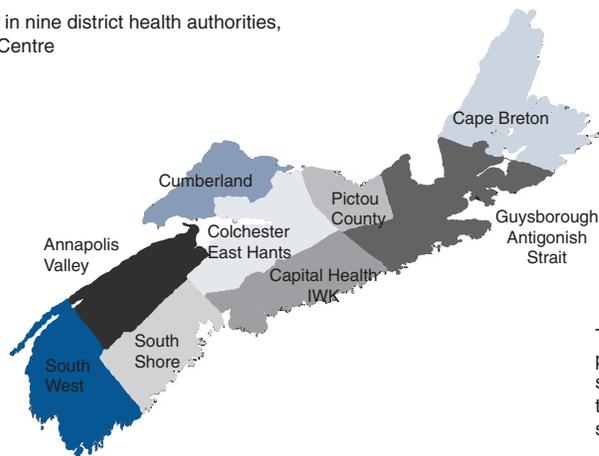
Number of CT Exams per 1,000 Population, by Jurisdiction and Canada, 2004-05



Source: *Medical Imaging in Canada, 2005*, Canadian Institute for Health Information, 2005, page 71

Wait Times Data - Diagnostic Services CT Scan

CT Scans are provided in nine district health authorities, and at the IWK Health Centre



The wait times provided here are for scheduled tests, treatments and services only.

Expected Wait Times for CT Scans

District Health Authority	Community	Facility	Wait Times (Calendar Days)
Annapolis Valley	Kentville	Valley Regional Hospital	49
Cape Breton	Sydney	Cape Breton Regional Hospital	59
Capital Health	Halifax	Queen Elizabeth II Health Science Centre	38
	Dartmouth	Dartmouth General Hospital	36
	Lower Sackville	Cobequid Community Health Centre	6
Colchester East Hants	Truro	Colchester Regional Hospital	20
Cumberland	Amherst	Cumberland Regional Health Care Centre	26
Guysborough	Antigonish	St. Martha's Regional Hospital	34
IWK Health Centre	Halifax	IWK Health Centre	0
Pictou County	New Glasgow	Aberdeen Hospital	30
South Shore	Bridgewater	South Shore Regional Hospital	56
South West	Yarmouth	Yarmouth Regional Hospital	42

Data Source: DHA Diagnostic Imaging Departments, December 2006
Next update: End of January 2007

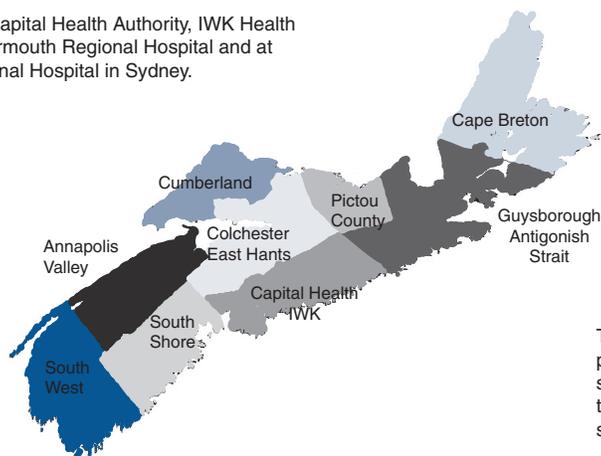
How do we measure wait times for a CT Scan?

Wait times for CT Scans are measured by counting the number of calendar days from the day the request arrives in the diagnostic imaging department to the next available day with three open appointments.

Source: Department of Health website:
http://www.gov.ns.ca/health/waittimes/wt_treatment_service/diagnostic/ct_scan.htm

Wait Times Data - Diagnostic Services Magnetic Resonance Imaging (MRI)

MRIs are provided at Capital Health Authority, IWK Health Centre, South West Yarmouth Regional Hospital and at the Cape Breton Regional Hospital in Sydney.



The wait times provided here are for scheduled tests, treatments and services only.

Expected Wait Times for MRIs

District Health Authority	Community	Facility	Wait Times (Calendar Days)
Cape Breton	Sydney	Cape Breton Regional Hospital	37
Capital Health	Halifax	Queen Elizabeth II Health Science Centre	119
IWK Health Centre	Halifax	IWK Health Centre	85*
South West	Yarmouth	Yarmouth Regional Hospital	55

Data Source: DHA Diagnostic Imaging Departments, December 2006
Next update: End of January 2007

* Patients under the age of 7 years requiring sedation may wait longer as special preparation is needed. Wait times may also include women requiring MRI for gynecological examinations.

Adult MRIs scheduled through Capital Health and done at the IWK Health Centre are included in Capital Health's data.

How do we measure wait times for MRI (Magnetic Resonance Imaging)?

Wait times for MRIs are measured by counting the number of calendar days from the day the request arrives in the diagnostic imaging department to the next available day with three open appointments.

Source: Department of Health Website:

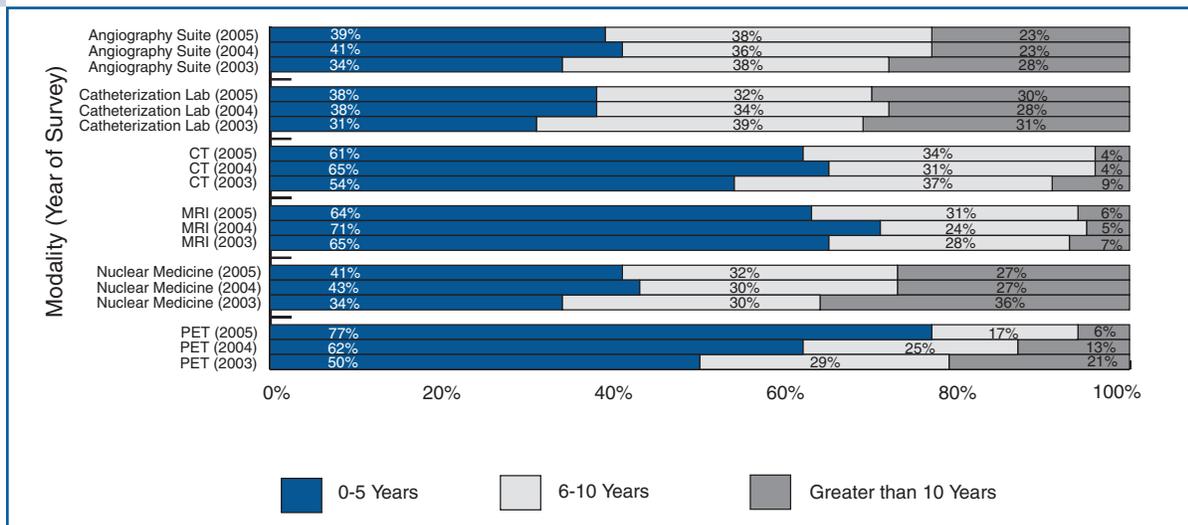
http://www.gov.ns.ca/health/waittimes/wt_treatment_service/diagnostic/mri.htm

CDHA and CBDHA - Age of CT Scanners as at January 1, 2006

DHA	Site	Age (years)	Type
CDHA	Dartmouth General Hospital	1	Multi-slice
CDHA	Cobequid Community Centre	1	Multi-slice
CDHA	QEII - Halifax Infirmary	2	Multi-slice
CDHA	QEII - Halifax Infirmary	10	Single-slice
CDHA	QEII - Victoria General	4	Multi-slice
CDHA	QEII - Victoria General	12	Single-slice
CBDHA	Cape Breton Regional Hospital	7	Multi-slice
CBDHA	Cape Breton Regional Hospital	11	Single-slice

Source: National Survey of Selected Medical Equipment (2006), Canadian Institute for Health Information.

Age of Selected Medical Imaging Equipment in Canada



Source: Medical Imaging in Canada 2005, Canadian Institute for Health Information, Page 60.

Sources of Capital Funding - CDHA and CBDHA for the year ended March 31, 2006 (\$ millions)

Exhibit 2.7

	District Health Authority			
	Capital		Cape Breton	
Funding Source				
Federal Government	\$4.1	12%	\$0.6	11%
Nova Scotia Department of Health	17.6	53%	3.7	68%
Hospital Foundation	8.3	25%	0.9	17%
Other	3.4	10%	0.2	4%
Total	\$33.4	100%	\$5.4	100%
Capital Expenditures				
Equipment	17.8	53%	3.3	61%
Building	-	-	2.1	39%
Leasehold Improvements	12.9	39%	-	0%
Information Technology	2.7	8%	-	0%
Total	\$33.4	100%	\$5.4	100%

Source: CDHA - March 31, 2006 audited financial statements

CBDHA - Capital Equipment Plan, September 2006 and March 31, 2006 audited financial statements

DEPARTMENT OF HEALTH'S RESPONSE

Recommendation 2.1 - The Department of Health (DoH) concurs with this recommendation. The DoH is making reasonable efforts to establish appropriate technical positions to lead, develop and evaluate/maintain a provincial planning process. Presently such planning is done within the DoH/DHA/IWK Business Planning Process. The establishment of such a process is well recognized and will be a priority of the DoH.

Recommendation 2.2 - The DoH will provide an internal and an external directive to ensure that these considerations form a part of all future RFP processes at the DoH and the DHAs. This information will be shared with present DoH Action Committees which are composed of Department & DHA staff.

Recommendation 2.4 - Although we believe that such a system already exists, the DoH will direct correspondence to the CBDHA instructing them of the need to comply. This will also be reviewed by our internal quality committee.

Recommendation 2.6 - This requirement is one of the goals and objectives of the MRI review committee established as an activity to follow the last MRI diffusion.

Recommendation 2.9 - As per the response to recommendation 2.4, the necessity to comply with this recommendation will be included in our correspondence to all DHAs.

Recommendation 2.10 - Refer to above response. We will also communicate this requirement internally to the information system management group for their information and future action.

Recommendation 2.11 - Again, although we believe that such a system already exists, the DoH will direct correspondence to the CBDHA and the CDHA instructing them of the need to comply.

Recommendation 2.12 - The DoH will so direct all DHAs to comply.

Recommendation 2.13 - These activities are also being addressed within processes of the MRI review committee.

Recommendation 2.14 - The DoH will review this requirement with Department Legal Staff for advice on compliance.

Recommendation 4.4 through 4.11 inclusive - These recommendations will be reviewed by Department staff responsible for all wait time activities and those responsible for the production and maintenance of the DoH website.

CAPE BRETON DISTRICT HEALTH AUTHORITY'S RESPONSE

Recommendation 2.1

We recommend that DOH, in conjunction with the DHAs, develop a Provincial long-term medical equipment capital plan including criteria for assessing competing DHA needs on a Province-wide basis.

We have a departmental 5-year plan which equipment planning is a part. To date this has not been started, and the plan is to begin a 5-year equipment plan this fall - 2007.

Recommendation 2.2

We recommend the procurement processes at DOH and DHAs be improved to include:

- **identification of all needs prior to issuing the RFP;**
- **inclusion of the present value of lifecycle costs in the quantitative analysis; and**
- **documentation of the entire procurement process including a detailed comparison of bids received according to criteria in the RFP document.**

Diagnostic Imaging has consulted with Materiels Management to improve procurement process to include recommendations on future purchases. Materiels Management has agreed.

Recommendation 2.3

We recommend that CDHA and CBDHA actively monitor manufacturers' equipment up-time guarantees.

Materiels Management has purchased AIMS software which will enable CBDHA to monitor manufacturers equipment uptime guarantees. To date resources are not in place to support however a business case is being put forth.

Recommendation 2.4

We recommend that CBDHA establish a process to track and monitor required maintenance and repairs to its MRI and CT scanners.

AIMS software will enable us to do this.

Recommendation 2.5

We recommend that CDHA and CBDHA implement formal capital asset ledgers to control all medical equipment.

CBDHA is currently recording all capital assets on procurement and working toward a complete ledger system.

Recommendation 2.6

We recommend that the Department of Health, in conjunction with radiologists, establish and implement clinical practice guidelines for use of MRIs and CT scans in the Province.

CBDHA radiologists recommend that this be carried out with the Nova Scotia Association of Radiologists.

Recommendation 2.7

We recommend that CDHA implement centralized booking for all of the CDHA's CT scanners.

Referenced CDHA only.

Recommendation 2.8

We recommend that CDHA and CBDHA establish utilization standards for each MRI and CT scanner and monitor performance in achieving the standard.

There is presently a provincial committee being established to look at MRI protocols.

Recommendation 2.9

We recommend that CBDHA set standard times for reporting of diagnostic imaging examination results and monitor progress in achieving the standard. CBDHA and CDHA should take action to ensure standard turnaround times are achieved.

As of May 2005 we have set a standard for turnaround time of reports at 24 hours. We have begun to monitor this monthly to assess and subsequently take action.

Recommendation 2.10

We recommend that CDHA and CBDHA examine the computerized diagnostic imaging systems in use to determine whether they can produce additional statistical information, such as wait times and utilization indicators, which are currently manually produced. We also recommend that requirements for statistical reports be included in future information system procurements.

CBDHA will do.

Recommendation 2.11

We recommend that CDHA and CBDHA document policies and procedures relating to the quality assurance processes, including patient safety, for diagnostic imaging equipment and related testing of MRIs and CT scanners.

Provincially there is a QA process/program being established for MRI. CBDHA Diagnostic Imaging also put forth a business case for a Quality Assurance Technologist.

Recommendation 2.12

We recommend that CDHA ensure patient safety questionnaires are completed for all MRI patients and retained in the patient's files.

Referenced CDHA only.

Recommendation 2.13

We recommend that the Department of Health and the DHAs establish and implement a quality assurance program for all MRIs and CT scanners in the Province.

Provincially there is a QA process/program being set up for MRI.

Recommendation 2.14

We recommend that CDHA and DOH establish conflict of interest guidelines for medical staff including policies on relationships with private facilities.

Referenced CDHA & DOH only.