Treating the right patient at the right time: Access to cardiovascular nuclear imaging

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Cardiovascular nuclear medicine uses agents labelled with radioisotopes that can be imaged with cameras (single-photon emission tomography [SPECT] or positron emission tomography [PET]) capable of detecting gamma photons to show physiological parameters such as myocardial perfusion, myocardial viability or ventricular function. There is a growing body of literature providing guidelines for the appropriate use of these techniques, but there are little data regarding the appropriate timeframe during which the procedures should be accessed. An expert working group composed of cardiologists and nuclear medicine specialists conducted an Internet search to identify current wait times and recommendations for wait times for a number of cardiac diagnostic tools and procedures, including cardiac catheterization and angioplasty, bypass grafting and vascular surgery. These data were used to estimate appropriate wait times for cardiovascular nuclear medicine procedures. The estimated times were compared with current wait times in each province.

Wait time benchmarks were developed for the following: myocardial perfusion with either exercise or pharmacological stress and SPECT or PET imaging; myocardial viability assessment with either fluorodeoxyglucose SPECT or PET imaging, or thallium-201 SPECT imaging; and radionuclide angiography. Emergent, urgent and nonurgent indications were defined for each clinical examination. In each case, appropriate wait time benchmarks were defined as within 24 h for emergent indications, within three days for urgent indications and within 14 days for nonurgent indications.

Substantial variability was noted from province to province with respect to access for these procedures. For myocardial perfusion imaging, mean emergent/urgent wait times varied from four to 24 days, and mean nonurgent wait times varied from 15 to 158 days. Only Ontario provided limited access to viability assessment, with fluorodeoxyglucose available in one centre. Mean emergent/urgent wait times for access to viability assessment with thallium-201 SPECT imaging varied from three to eight days, with the exception of Newfoundland, where an emergent/urgent assessment was not available; mean nonurgent wait times varied from seven to 85 days. Finally, for radionuclide angiography, mean emergent/urgent wait times varied from two to 20 days, and nonurgent wait times varied from eight to 36 days. Again, Newfoundland centres were unable to provide emergent/urgent access.

The publication of these data and proposed wait times as national targets is a step toward the validation of these recommendations through consultation with clinicians caring for cardiac patients across Canada.

Key Words: *Myocardial perfusion; Myocardial viability; Positron emission tomography; Radionuclide imaging; SPECT; Ventricular function*

Traiter le bon patient au bon moment : l'accès à l'imagerie nucléaire cardiovasculaire

La médecine nucléaire cardiovasculaire utilise des substances marquées par des radioisotopes que des caméras (tomographie par émission de photon unique [TEPU]) ou des appareils de tomographie (tomographie par émission de positrons [TEP]) peuvent transformer en images par la détection de photons gamma pour montrer différents paramètres physiologiques comme la perfusion myocardique, la viabilité du myocarde ou le fonctionnement ventriculaire. On trouve de plus en plus, dans la documentation médicale, des lignes directrices sur l'utilisation appropriée de ces techniques, mais il existe peu de données sur le moment approprié du recours à ces techniques. Un groupe de travail composé de cardiologues et de spécialistes en médecine nucléaire a fait de la recherche dans Internet pour relever les délais d'attente actuels et les recommandations sur le sujet concernant différents examens de diagnostic et différentes interventions en cardiologie, notamment le cathétérisme cardiaque et l'angioplastie, ainsi que le pontage coronarien et la chirurgie vasculaire. Les données recueillies ont servi à évaluer des délais d'attente acceptables en vue d'interventions en médecine nucléaire cardiovasculaire. Les délais établis ont été comparés aux temps d'attente actuels dans chaque province.

Des points de repère quant aux délais d'attente ont été élaborés pour les examens suivants : la perfusion myocardique avec épreuve d'effort physique ou médicamenteuse et imagerie par TEPU ou TEP; l'évaluation de la viabilité du myocarde par TEPU ou TEP au fluorodésoxyglucose ou par TEPU au thallium 201, de même que l'angiographie isotopique. Des indications associées à différents degrés d'urgence : très urgent, urgent, non urgent, ont été établies pour chacun des examens cliniques. Dans les tous les cas, les points de repère en vue de délais d'attente acceptables ont été fixés comme suit : 24 h ou moins pour les indications très urgentes; 3 jours ou moins pour les indications urgentes et 14 jours ou moins pour les indications non urgentes.

Des écarts importants ont été observés entre les provinces en ce qui concerne l'accès à ces interventions. Par exemple, les temps d'attente

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moyens en vue d'une imagerie de perfusion myocardique dans les cas très urgents ou urgents variaient de 4 à 24 jours et ceux dans les cas non urgents, de 15 à 158 jours. L'accès à l'évaluation de la viabilité du myocarde était limité en Ontario seulement, et l'examen au fluorodésoxyglucose n'était offert que dans un centre. Les temps d'attente moyens en vue d'une évaluation de la viabilité du myocarde par TEPU au thallium 201 dans les cas très urgents ou urgents variaient de 3 à 8 jours, sauf à Terre-Neuve où il n'était pas possible d'offrir l'examen pour les indications très urgentes ou urgentes; les temps d'attente moyens dans les cas non urgents variaient de 7 à 85 jours. Enfin, les temps d'attente moyens en vue d'une angiographie isotopique dans les cas très urgents ou urgents variaient de 2 à 20 jours et ceux dans les cas non urgents, de 8 à 36 jours. Encore une fois, les centres de soins à Terre-Neuve ne pouvaient offrir l'examen dans les cas très urgents ou urgents. La publication des présentes données et des délais d'attente proposés comme cibles nationales constitue un pas vers la validation des recommandations formulées, dans le cadre d'une consultation, par des cliniciens soucieux du soin des patients cardiaques, partout au Canada.

The Canadian Cardiovascular Society (CCS) is the national professional society for cardiovascular specialists and researchers in Canada. At the Canadian Cardiovascular Congress Public Policy Session in 2002, Senator Wilbert Keon stated that an important role of a national professional organization such as the CCS is to develop national benchmarks for access to cardiovascular care. Currently, national benchmarks, or targets, for access to care for cardiovascular procedures or office consultations do not exist. As a professional organization with a broad based membership of cardiovascular experts, the CCS is ideally suited to initiate a national discussion and commentary on wait times and access to care issues as they pertain to the delivery of cardiovascular care in Canada.

The CCS Council formed the Access to Care Working Group ('Working Group') in the spring of 2004 to use the best science and information to establish reasonable triage categories and safe wait times for access to common cardiovascular services and procedures. The Working Group elected to start the process with a series of commentaries. Each commentary is intended to be a first step in the development of national targets. The commentaries summarize the current variability of benchmarks and wait times across Canada, where the information is available. They also summarize the currently available data, particularly focusing on the relationship between the risk of adverse events as a function of wait time and on the identification of gaps in existing data. Using best evidence and expert consensus, each commentary takes an initial position on what the optimal benchmark for access to care should be for a cardiovascular service or procedure. The commentaries also call on cardiovascular researchers to fill the gaps in this body of knowledge and further validate safe wait times for patients at varying degrees of risk.

Cardiovascular nuclear medicine, or nuclear cardiology, uses agents labelled with radioisotopes that can be imaged with cameras capable of detecting gamma photons. These imaging techniques include single-photon emission computed tomography (SPECT) and positron emission tomography (PET). In contrast to most other forms of imaging, nuclear imaging tests show the physiological or biological function of the system being investigated, rather than its anatomy. In cardiology, nuclear imaging is most often used to examine myocardial perfusion, and ventricular function and/or viability (viable recoverable myocardial tissue).

There is a growing body of literature that provides guidelines for the appropriate use of diagnostic cardiovascular nuclear medicine techniques. The guidelines provide direction on the use of these technologies, but little data are available on the appropriate timeframe during which they should be accessed. The present paper summarizes the literature on the appropriate use of these imaging techniques and states the reported wait time data, where available, and synthesizes additional wait time information from expert opinion, comparing those with wait times that currently exist across the country. Some of these findings and recommendations were included collectively as a subdocument of the Canadian Association of Nuclear Medicine (CANM) submission to the Wait Time Alliance (WTA) with the focus on applications in cardiovascular disease (1).

METHODOLOGY

The Standards of Pracitce Committee of the CANM identified a list of established and new nuclear medicine procedures (1) used in the assessment of patients with atherosclerotic heart disease and other cardiac diseases. Procedures relevant to cardiovascular disease are listed in Table 1. The following resources were then searched for guidelines relating to the use of those procedures:

- The Canadian Medical Association Infobase Clinical Practice Guidelines <mdm.ca/cpgsnew/cpgs/index.asp>;
- American College of Radiology <www.acr.org>;
- The Royal College of Radiologists <www.rcr.ac.uk>;
- The American College of Cardiology <www.acc.org>;
- The CCS <www.ccs.ca>; and,
- American Society of Nuclear Cardiology <www.asnc.org>.

A review of the health technology assessments of the emerging technology of 18F-fluorodeoxyglucose (FDG) positron emission tomography (PET) imaging recently published in the Canadian Society of Nuclear Medicine newsletter *Photon* (2) has been incorporated into the main CANM report. Because FDG is also relevant in cardiovascular imaging, comments are included in the present cardiovascular nuclear imaging report. Of note, a joint position statement on advanced cardiac imaging from the CCS, the Canadian Association of Radiologists, the CANM and the Canadian Nuclear Cardiology Society is currently in preparation.

Information on wait time criteria for clinical procedures and treatments related to the nuclear medicine procedures in question was obtained from an Internet search using the term 'wait times for medical procedures'. Information regarding appropriate wait times was also obtained by consensus of the primary panel and review by the secondary panel members. Panel members consisted of experts in cardiology and/or nuclear imaging.

A search on the Internet for wait time target information yielded a number of sources that listed current wait times for access to various therapies, including cardiac catheterization, coronary artery bypass graft (CABG) surgery, cardiac angioplasty and vascular surgery. These data were also used to estimate appropriate wait times for related nuclear medicine procedures (3-8).

A survey of nuclear medicine facilities across Canada was performed by the CANM (1) to determine urgent and elective wait times for the list of procedures, including cardiovascular nuclear imaging.

The information presented in the present commentary should be used to stimulate discussion among members of the CCS and administrators, and may prove to be useful in aiding with the development of a methodology to determine consensus wait times for cardiovascular nuclear medicine and other diagnostic procedures.

Classification of evidence

A number of systems have been used to classify levels of evidence (9-12). For cardiovascular nuclear imaging, guidelines from the American College of Cardiology/American Heart Association/American Society of Nuclear Cardiology (11) and the CCS (12) were reviewed and used as the basis for clinical indications of cardiac nuclear imaging. Comprehensive details of these indications are provided in these documents; however, the published guidelines do not provide recommendations for appropriate wait times.

Recommendation review: The present document was originally prepared as part of the nuclear medicine submission to the Canadian Medical Association-sponsored WTA and the Wait Times Working Group of the CANM. The document was then reviewed by the CCS Access to Care Working Group and the Nuclear Cardiology Wait Times Subgroup. From this primary document, the subgroup reviewed the established clinical indications (from guidelines of the American College of Cardiology/American Heart Association/American Society of Nuclear Cardiology and the CCS), which led to the determination of benchmarks for wait times for different cardiac imaging indications. The primary panel's findings and recommendations were then reviewed by a secondary panel of experts.

Wait times for cardiovascular nuclear imaging technologies

There is a dearth of data regarding recommended wait times for access to diagnostic technologies. Some data are posted to various Web sites that display current wait times for other diagnostic tests such as computed tomography and magnetic resonance imaging; Manitoba posts wait times for myocardial perfusion imaging (MPI) (methoxyisobutyl isonitrile stress test), which are examinations addressed in the present report (6). The present paper took the perspective that appropriate wait times are linked to the speed with which the information provided is required to plan or execute therapy. Wait times for imaging procedures must therefore be viewed in the clinical context in which the patient presents.

In each case, we selected the shortest recommended wait times among all indications as the target wait time for procedures to provide best clinical care. These times contrast with the target wait times noted in Appendix B of the WTA report (1). For example, for a patient with an acute coronary syndrome (ACS), a wait time of seven days (as classified for urgent cases in Appendix B of the report) would not be the best benchmark to provide optimal clinical care for an ACS.

In nonurgent cases, such as patients undergoing evaluation of chest pain to assess for ischemia, patients may begin a series of investigations and treatments that may include coronary angiography, percutaneous coronary intervention (PCI) and CABG surgery for which other wait times are recommended. There is evidence to support the use of a strategy whereby MPI is used to define the need for cardiac catheterization (11,13). It seems reasonable, therefore, to set wait times within those defined for access to cardiac catheterization by groups such as the Cardiac Care Network of Ontario (3) and by other Access to Care working groups (14,15). This methodology would result in a recommended wait time of zero to three days in urgent cases and 14 calendar days in nonurgent cases. It is recognized that these targets may not be achieved in several jurisdictions in Canada, but the committee agreed that they represented the benchmarks needed to ensure optimal outcomes. The targets await feedback from the medical community, government and patients.

TABLE 1
Wait time benchmarks for cardiac nuclear imaging by indication (in calendar days)

	Emergent	Urgent	Nonurgent
Myocardial perfusion – exercise or pharmacological stress (SPECT or PET)	1	3	14
Myocardial viability (FDG or thallium-201)	1	3	14
Radionuclide angiography	1	3	14

FDG Fluorodeoxyglucose; PET Positron emission tomography; SPECT Single-photon emission computed tomography

Wait times in the WTA report (1) are stated in calendar days. The national CANM survey was conducted before the WTA report; therefore, the tables in the Appendix refer to working days. Otherwise, all wait times in the present report are indicated in calendar days.

RECOMMENDED WAIT TIMES AND THE RATIONALE

Recommended wait times were derived by a number of methods, and a rationale for each recommended wait time was developed. Table 1 summarizes the maximum recommended emergent, urgent and routine wait times for each indication (MPI, viability assessment and left ventricular function). The Appendix includes tables that list current wait times by province and compares these with the recommended times for each indication category.

MPI

MPI may be performed with exercise or pharmacological stress using SPECT or PET imaging. For accepted clinical indications (1,11,12), recommended wait times should be zero days for emergent cases, zero to three days for urgent cases and 14 calendar days for routine cases.

Urgent wait times apply in all conditions where the patient's clinical status dictates the need for diagnostic information to make urgent therapeutic decisions. For example, for patients with an ACS in whom nuclear imaging is indicated (11), testing is considered emergent or urgent to identify those patients who would benefit most by further invasive procedures, PCI or CABG surgery during their index hospitalization.

ACS: Clinical indications for MPI include the assessment of myocardial risk after documented or possible ACS, including unstable angina, non-ST segment elevation myocardial infarction, ST segment elevation myocardial infarction without revascularization, or residual disease (11,12). The Working Group considered indications in the setting of 'ACS as emergent or urgent' to identify those patients who would benefit most by further invasive procedures, specifically PCI with stent placement or CABG surgery, during their index hospitalization.

Coronary artery disease risk assessment and prognosis: MPI is clinically indicated for the diagnosis of patients with an intermediate likelihood of coronary artery disease (CAD)

TABLE 2
Nuclear medicine facilities by province

	Number of nuclear medicine facilities, n			Number of facilities reporting wait times, n (%)		
Province	Hospital	IHF	Total	Hospital	IHF	Total
Newfoundland	4	0	4	4 (100)	0	4 (100)
Nova Scotia	10	0	10	8 (80)	0	8 (80)
New Brunswick	6	0	6	3 (50)	0	3 (50)
Prince Edward Island	1	0	1	1 (100)	0	1 (100)
Quebec	49	2	51	27 (55)	0	27 (53)
Ontario	73	42	115	41 (56)	31 (74)	72 (62)
Manitoba	6	3	9	5 (83)	2 (66)	7 (77)
Saskatchewan	3	0	3	3 (100)	0	3 (100)
Alberta	13	10	23	11 (85)	6 (60)	17 (74)
British Columbia	22	1	23	18 (82)	1 (100)	19 (83)
Total	187	58	245	121	40	161 (66)

IHF Independent health facility

and/or for risk stratification in patients with intermediate or high likelihood of CAD.

When a patient is seen in the outpatient setting with symptoms suggestive of ischemic heart disease, the degree of urgency depends on the stability of the patient's symptoms. In those with stable cardiac disease in whom nuclear imaging is indicated (6,11-13,15), the nonurgent wait times noted in Table 1 are considered reasonable.

Risk stratification before noncardiac surgery: MPI is indicated for diagnosis and/or risk stratification before noncardiac surgery, when the surgery is nonemergent, and when cardiac revascularization may be indicated or when identification of increased cardiac risk may alter plans for surgery (11,12). In these circumstances, the appropriate wait time would be dictated by the usual wait time for the noncardiac surgery. These wait times may range from one to nine months (4-7), and thus, a minimum wait time for MPI of 14 calendar days within the specified timeframe seems acceptable.

Myocardial viability assessment

Both rest-redistribution thallium-201 imaging and 18F-FDG PET (or SPECT) imaging (combined with either SPECT or PET rest MPI) may be used to define viable myocardial tissue that has the potential for functional improvement if revascularization is undertaken. PET techniques appear to have greater accuracy, and in particular, greater sensitivity (11,16). The randomized Canadian PET and Recovery following Revascularization-2 (PARR2) trial, which has recently concluded recruitment, is expected to provide a more definitive assessment of these techniques in approximately two years. Both techniques are currently recommended as Class I investigations at Evidence Level B (1,11,12).

Myocardial viability assessment can also be emergent or urgent in critically ill patients with heart failure when decisions need to be made rapidly as to whether a revascularization procedure is indicated. Most cases of viability assessment are semiurgent or nonurgent investigations. However, data from previous Canadian studies indicate that there is increased mortality when revascularization is delayed more than five weeks after significant viability is defined (17). Therefore, investigation and prescription of a treatment plan needs to be completed promptly. Hence, a benchmark of within 14 days was determined.

TABLE 3
Factors contributing to prolonged wait times or lack of access to services, as reported by 161 facilities

Province	Insufficient operating funds	Technical staff vacancies (number of FTE)	Physician staff vacancies (number of FTE)	Equipment shortage (number of instruments)	Lack of access to PET and FDG*
Newfoundland	3	4 (7)	2 (2)	4 (4)	X
Nova Scotia	0	2 (0.8)	0	3 (7)	X
New Brunswick	1	0	0	1 (1)	X
PEI	0	1 (1)	0	1 (1)	X
Quebec	13	13 (6)	3 (4)	7 (13)	
Ontario	9	16 (15)	3 (4)	22 (40)	
Manitoba	3	3 (6)	1 (1)	0	
Saskatchewan	1	2 (4)	0	3 (11)	X
Alberta	2	1 (2)	1 (1)	3 (8)	
British Columbia	5	3 (4)	2 (0.6)	7 (12)	
Total	37	45 (45.8)	12 (12.6)	51 (97)	

**X indicates that service is not available. FDG Fluorodeoxyglucose; FTE Full time equivalent; PEI Prince Edward Island; PET Positron emission tomography*

Radionuclide angiography

For ventricular function assessment with radionuclide angiography, appropriate wait times are again best defined by the clinical presentation. The assessment of ventricular function before consideration of a potentially cardiotoxic chemotherapy agent in cancer treatment may also be considered urgent (ie, within three working days of the specified timeframe) and may be required before instituting the chemotherapy regimen. Routine wait times (14 days) would be appropriate for a patient being considered for a prophylactic implantable cardioverter defibrillator.

CANM SURVEY RESULTS

Table 2 demonstrates the distribution of facilities that provided data toward the present report. Completeness of reporting varied substantially from province to province.

Factors affecting availability of nuclear medicine procedures

Facilities were asked to identify factors that contributed to prolonged wait times or the lack of access to service; Table 3 summarizes those responses. For both technical staff vacancies and physician vacancies, the number of facilities reporting a vacancy is given first, followed by the total number of vacant positions in brackets. No distinction was made between cardiac- and noncardiac-related services.

Two dominating factors emerged from this review: the inadequacy of the equipment base and the inability to offer PET services. Lack of access to PET services does not preclude viability imaging and MPI, because they may be performed by SPECT imaging methods. However, the lack of access to FDG and PET does limit access to the more accurate viability and MPI methods that PET is able to provide.

Equipment: Variability in wait times could be caused by varying availability of equipment or maintenance of equipment from jurisdiction to jurisdiction. The recent Canadian Institute for Health for Information report entitled, "Medical Imaging in Canada 2004" (18) provides some data on the number of nuclear medicine cameras reported per million people for each province (referred to as 'rate'). These rates range

from a low of 14.5 in Prince Edward Island to a high of 27.8 in Nova Scotia, with a Canadian mean of 19.5. The report, however, identified the difficulties that the survey had in obtaining information from independent health facilities (IHFs). This has almost certainly resulted in a significant error in the calculation of the instrumentation rate in Ontario, where only four of the 48 IHFs reported information. As seen in Table 4, IHFs comprise a significant proportion of imaging facilities.

FDG imaging: The full CANM report and its appendixes (1) provide a more complete discussion of the situation with respect to this technology, and it is at various stages of being introduced to practice and availability in Quebec, Ontario, Manitoba, Alberta and British Columbia. Because of the short half-life of the radionuclide product (109 min), it must be produced in facilities near the imaging site. Access to FDG imaging technology (SPECT or PET) is limited for most Canadian patients due to limited and variable provincial strategies to fund its added cost (available in almost all countries in the European union, Australia and the United States [19-24]) and the regulatory requirements imposed by the Biologics and Genetic Therapies Directorate of Health Canada; further details are discussed in the main CANM document. Currently, service providers and governments are working together to resolve these issues in several jurisdictions.

TABLE 4
Comparison of numbers of nuclear medicine facilities as determined from the CIHI (18) CANM survey (1)

	CIHI database			CANM survey		
Province	Hospital	IHF	Total	Hospital	IHF	Total
Newfoundland	4	0	4	4	0	4
Nova Scotia	10	0	10	10	0	10
New Brunswick	6	0	6	6	0	6
PEI	1	0	1	1	0	1
Quebec	47	1	48	49	2	51
Ontario	66	4	70	73	42	115
Manitoba	6	0	6	6	3	9
Saskatchewan	3	0	3	3	0	3
Alberta	13	4	17	13	10	23
British Columbia	22	1	23	22	1	23
Total	178	10	188	187	58	245

CANM Canadian Association of Nuclear Medicine; CIHI Canadian Institute for Health Information; CNSC Canadian Nuclear Safety Commission; IHF Independent health facility; PEI Prince Edward Island

DISCUSSION AND CONCLUSIONS

Wait times

Canadians have unequal access to nuclear medicine procedures such as cardiovascular imaging. Substantial variability exists from province to province and within each province. No nuclear medicine procedures are available in Canada's three territories.

Data collected to date are not sufficient to analyze the reasons for this variability. No attempt has been made to assess varying demand for service as a cause for variation in wait time.

The creation of wait time targets and a standardized collection of wait time information should provide an incentive for regional health authorities to allocate appropriate resources to reduce wait times.

Limitations in the use of wait times as a measure of system efficiency

A list of wait times is an indication of the capacity in the system present before data were collected. The expansion of operating hours by the addition of technical staff or improved efficiency resulting from the replacement of older equipment can have a dramatic effect on wait times. It is important to track whether wait times for any one procedure or therapy are increasing, decreasing or stable. Most wait time data currently available are not displayed in this format, although direct discussion with facilities providing services demonstrates that they are aware of the importance of monitoring wait time changes.

When analysis of wait times is applied to diagnostic testing as opposed to therapies, several confounding factors emerge. Clinicians and their patients expect that diagnostic data will be available to them quickly enough that they will be able to create and implement a treatment plan in an acceptable timeframe. For example, it is generally accepted that CABG surgery should be carried out in an expeditious manner. However, appropriate assessment before consideration of surgery may require several weeks and may include cardiology consultation, noninvasive testing and coronary angiography. Thus, wait times in cardiac care must be determined by a physician's assessment of urgency based on a patient's clinical presentation and findings of other test results. System wait times must report the patient's total wait time for the service, be that revascularization or access to a disease management program such as a heart failure clinic.

Alternative diagnostic methods may be more invasive or costly (eg, coronary angiography versus MPI for the diagnosis of CAD). When the risk of waiting for the most appropriate diagnostic test exceeds the risk of an alternative but less appropriate testing and treatment strategy, the physician, in consultation with the patient, would choose the latter. Thus, adding the collection of data regarding inappropriate use of technologies (noninvasive and invasive) would provide a more complete picture of 'bottlenecks' in the system and their impact.

PET is an emerging technology in Canada, despite its acceptance as a clinical tool in most Organisation for Economic Cooperation and Development countries. With no or limited access to this technology, wait times are unavailable in most jurisdictions.

Collection of data

The collection of data for the present report was difficult and time consuming (and as yet, incomplete), but this need not be the case. The majority of nuclear medicine departments and nuclear cardiology laboratories use or will use their institution's radiology information system (RIS) to book studies, and create and issue reports. Increasingly, the RIS drives the creation of imaging work lists on each imaging modality and links to a picture archival and retrieval system to provide a comprehensive data set that is used internally within the institution to manage the program. Parameters such as urgent and routine wait times, and time from booking to examination completion, completion to reporting and reporting to transcription may be monitored. It should be possible to routinely collect those data from selected studies to monitor both wait times and wait time trends.

Unfortunately, data held within the RIS are frequently collected according to province-specific fee schedules and are not directly comparable from jurisdiction to jurisdiction. For

example, an MPI study (imaging only) in Ontario may be represented by four fee codes, but the identical study in Alberta may be represented by one fee code. Although these schedules are linked to a federal workload measurement system, that system is unable to provide wait list information. The creation of a Canada-wide procedure listing, which could be linked to province-specific fee schedules, would enable the routine collection of these data.

The Working Group recommended that the collection and posting of wait time data in each jurisdiction for a specific list of procedures should be automated through the use of each facility's information system. This would require the creation of a common procedures list across the country for the selected procedures.

Data from IHFs

The report entitled, "Medical Imaging in Canada 2004" (18) highlights the difficulties in obtaining information from IHFs; the CANM survey was able to obtain more representative data. The absence of data from independent health facilities results in difficulties of data interpretation. If wait time management is to be successful, those independent facilities that receive funding from the provincial government should be obligated, as a condition of licensing, to provide statistical information, including wait times and information regarding instrumentation. Complete information is crucial to the better management of health care delivery. It was the recommendation of the Working Group that all facilities receiving public funding should be obligated to provide information regarding wait times, and resource information such as staffing, equipment type, numbers and age as a condition of operation.

RECOMMENDATIONS FOR WAIT TIMES IN CARDIOVASCULAR NUCLEAR IMAGING

The wait times proposed in the present report are recommended as national targets for cardiovascular nuclear imaging procedures. These national targets should be validated through a process of consultation with clinicians and patients, and whenever possible, through the use of objective outcome data.

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APPENDIX

The national Canadian Association of Nuclear Medicine survey was conducted before the final nomenclature of the Wait Time Alliance (WTA) was determined. The survey used the terms 'urgent' and 'routine'.

The survey reported data in working days; however, the final report of the WTA chose calendar days, which were used elsewhere in the present report.

Survey terms	WTA nomenclature	Recommended wait times
Urgent	Emergent/urgent	1 day/0–3 days
Routine	Nonurgent	14 calendar days (10 working days)

Procedure: Myocardial perfusion imaging – exercise or pharmacological stress SPECT or PET

	Urgent wait times (working days)		Routine wait times (working days)	
Province	Mean	Range	Mean	Range
Newfoundland	Not available on urgent basis		146	75–200
Nova Scotia	4	1–7	28	7–56
New Brunswick	6	1–14	57	42–90
Prince Edward Island	15	15	15	15
Quebec	24	1–300	97	5–810
Ontario	5	1–28	20	1–110
Manitoba	6	2–14	158	84–252
Saskatchewan	10	7–10	91	10–222
Alberta	7	1–35	31	9–60
British Columbia	5	1–14	33	2–120

Procedure: Myocardial viability – fluorodeoxyglucose

Newfoundland	NA	NA	NA	NA
Nova Scotia	NA	NA	NA	NA
New Brunswick	NA	NA	NA	NA
Prince Edward Island	NA	NA	NA	NA
Quebec	NR	NA	NA	NA
Ontario	3	3	42	42
Manitoba	NA	NA	NA	NA
Saskatchewan	NA	NA	NA	NA
Alberta	NA	NA	NA	NA
British Columbia	NA	NA	NA	NA

Procedure: Myocardial viability – thallium-201

Newfoundland	Not available on urgent basis		85	75–95
Nova Scotia	4	1–7	30	5–56
New Brunswick	3	1–3	16	2–42
Prince Edward Island	NA	NA	NA	NA
Quebec	4	1–7	20	1–100
Ontario	3	1–14	8	1–28
Manitoba	6	3–9	7	5–9
Saskatchewan	8	3–15	12	7–15
Alberta	5	1–7	20	5–60
British Columbia	6	1–10	15	9–30

Procedure: Radionuclide angiography

Newfoundland	Not available on urgent basis		36	20–50
Nova Scotia	3	1–7	10	4–21
New Brunswick	3	1–7	15	1–30
Prince Edward Island	20	20	20	20
Quebec	8	1–120	21	1–180
Ontario	3	1–14	9	1–30
Manitoba	2	1–7	12	2–35
Saskatchewan	2	1–3	11	7–14
Alberta	2	1–7	8	2–21
British Columbia	3	1–14	12	2–28

NA Not available; NR Not reported; PET Positron emission tomography; SPECT Single-photon emission computed tomography

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