# Treating the right patient at the right time: Access to echocardiography in Canada

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The Canadian Cardiovascular Society is the national professional society for cardiovascular specialists and researchers in Canada. In the spring of 2004, the Canadian Cardiovascular Society Council formed the Access to Care Working Group ('Working Group') to use the best science and information available to establish reasonable triage categories and safe wait times for access to common cardiovascular procedures. The Working Group decided to publish a series of commentaries to initiate a structured national discussion on this important issue, and the present commentary proposes recommended wait times for access to echocardiography. 'Emergent' echocardiograms should be performed within 24 h, 'urgent' within seven days and 'scheduled' (elective) within 30 days. A framework for a solution-oriented approach to improve access is presented.

## Traiter le bon patient au bon moment : L'accès à l'échocardiographie au Canada

La Société canadienne de cardiologie (SCC) est la société nationale de spécialistes et de chercheurs en cardiologie du Canada. Au printemps 2004, le conseil de la SCC a formé le groupe de travail sur l'accès aux soins (le « groupe de travail ») afin d'utiliser les meilleures données scientifiques et la meilleure information disponibles pour établir des catégories de triage raisonnables et des temps d'attente sécuritaires en vue d'accéder à des interventions cardiovasculaires courantes. Le groupe de travail a décidé de publier une série de commentaires afin d'amorcer des discussions nationales structurées sur ce sujet important. Le présent commentaire présente les temps d'attente recommandés pour accéder à l'échocardiographie. Les échocardiogrammes « impérieux » devraient être exécutés dans les 24 heures, les échocardiogrammes « urgents », dans les sept jours, et les échocardiogrammes « prévus » (non urgents), dans les 30 jours. Une structure en vue d'adopter une démarche orientée vers un meilleur accès est présentée.

**Key Words:** *Echocardiography, Health policy, Wait times*

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 that could be validated and adopted or adapted by the provinces.

Currently, national benchmarks, or targets, for access to care for echocardiography do not exist. Some provinces have established targets for certain frequent or visible cardiovascular procedures, such as coronary bypass surgery. However, a national consensus does not exist for wait time targets for many other diagnostic tests and cardiovascular services that form important components of a patient's journey to optimal outcomes. Furthermore, there are issues of regional disparities and little consensus on how to measure or approach the problem in various parts of this country.

Echocardiography is an excellent subject for a commentary. There is tremendous variability across Canada in the provision of this vital diagnostic tool. Some provinces allow privately purchased equipment and sonographers to perform the procedure, while others deliver the service in highly centralized, publicly funded facilities. Within the same provincial boundaries, great variability exists in wait times for this important imaging tool.

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 services across Canada.

The CCS Council formed an Access to Care Working Group ('Working Group') in the spring of 2004 to use the best science and information available to establish reasonable triage categories and safe wait times for access to common cardiovascular services and procedures. The members of the Working Group elected to start the process with a series of commentaries, and because they consider access to the full breadth of cardiovascular services necessary for optimal cardiovascular care, commentary topics were selected to reflect this. The commentaries are intended to be a first step in the development of national targets. They summarize the current variability of benchmarks and wait times across Canada, where this information is available. 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.

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It is recognized that the benchmark wait times indicated may not be achievable in the near term in many areas of Canada. However, establishing these targets is the crucial first step to building the systems and capacity required to improve access to this vital diagnostic tool. It cannot be overstated that echocardiography enables many other components of a patient's journey: it facilitates specialist consultation, and it is a vital tool to noninvasively assess patients with chronic cardiac conditions and judge the timing of invasive procedures, such as cardiac catheterization, and corrective or palliative percutaneous or surgical procedures.

The authors of the present commentary emphasize that these benchmarks are not standards and are not to be interpreted as a line beyond which a health care provider or funder has acted with negligence. They have been derived by medical experts – cardiovascular specialist physicians – who, using the best evidence available, have determined acceptable wait times from a patient-advocate perspective. On the other hand, these benchmarks do not reflect current constraints on the capacity to achieve them. If current wait times were acceptable from the perspective of patients and policy makers, the development of wait time benchmarks for these services and procedures would not be a health care priority today. The physicians who contributed to the present document believe that these benchmarks represent a goal toward which we should strive to improve access to care and increase public confidence in our wait list management for cardiovascular services.

## METHODS

The recommendations in the present commentary are based on:

- A literature review to identify published articles on medically acceptable wait times for echocardiography;
- A review of existing guidelines for echocardiography services;
- Discussions with representatives from various Canadian jurisdictions regarding existing wait times for echocardiography services; and
- A review of the CCS' recently developed wait time benchmarks for cardiovascular services and procedures, including the benchmarks for other diagnostic tests. The commentary was reviewed by the primary authors, who are cardiologists specialized in several disciplines. The final draft was sent to members of the executive of the Canadian Society of Echocardiography (CSE) for secondary review.

## ROLE OF ECHOCARDIOGRAPHY IN CARDIOVASCULAR DIAGNOSIS

Transthoracic echocardiography is the primary noninvasive imaging modality for assessment of cardiac anatomy and function. As such, echocardiography plays an essential role in all facets of cardiovascular care. Multiple guidelines exist describing the indications for echocardiography to measure right and left ventricular function and hemodynamics, and to diagnose and assess valvular or pericardial abnormalities or congenital defects (1,2). Echocardiograms may be repeatedly performed to assess progression and prognosis of various cardiomyopathies, valvular stenosis or regurgitation, and to judge timing of more invasive diagnostic procedures or corrective interventions. To properly assess a patient's condition, in many, if not in most cases, it is appropriate for an echocardiogram to be performed before consultation with a cardiologist or before a procedure. This allows for a more informed consultation or a more focused invasive procedure.

## LITERATURE ON WAIT TIMES FOR ECHOCARDIOGRAPHY

No studies evaluating patient outcomes related to wait times for echocardiography were identified. Obtaining data in this area should be a priority for health care system administrators, health care professionals and researchers.

One study (3) was identified that assessed the value of an open-access echocardiography laboratory. The study concluded that "the service was well used by general practitioners and led to advice to change management in more than two thirds of patients".

A number of provinces limit the provision of echocardiography to hospital-based imaging. Others allow publicly funded nonfacility-based echocardiography, whereby the capital and operating costs are borne by a clinic or physician. An area of potential research that would be extremely useful to health care planners is comparing modes of delivery of echocardiography with resultant wait times. Clearly, the major concerns of funders are appropriateness and overuse. It is important to determine a balance between appropriateness and timely patient access.

## CURRENT WAIT TIMES FOR ECHOCARDIOGRAPHY

A recent survey in British Columbia reported a mean wait time of 10.7 ± 6.1 weeks for echocardiography, with a median wait time of 10 weeks for an outpatient echocardiogram (K Kingsbury, personal communication). In Nova Scotia, there is a high degree of centralization of specialists in a single tertiary care centre, the Queen Elizabeth II Health Sciences Centre, Halifax. In addition, the provision of echocardiography is limited to hospitals. In this model, the wait time for echocardiography is up to four weeks for urgent studies and more than 20 weeks for nonurgent studies in the two largest health care districts. However, the wait time for echocardiography is less than two weeks in the major regional hospitals that provide the procedure (BJ O'Neill, personal communication).

## BENCHMARKS AND RATIONALE FOR THE PROVISION OF ECHOCARDIOGRAPHY

Echocardiography is an essential diagnostic tool in the continuum of patient care for acute and chronic cardiovascular conditions. It is required to exclude the diagnosis of significant pathology, or to reassure patients or physicians of a stable patient condition. It is used to risk-stratify patients and even to determine whether further investigations are required before a a patient undergoes a cardiac or noncardiac procedure. One can and should, therefore, set access targets for echocardiography based on the suggested access targets for specialist consultation and other important diagnostic cardiac imaging procedures or disease management services.

Previous recommendations by the CCS have suggested that no person should have to wait longer than:

- Six weeks for an initial consultation with a cardiologist (4);
- 14 days for diagnostic cardiac nuclear imaging (5);

- Six weeks for a diagnostic catheterization for patients in stable condition, percutaneous coronary intervention for patients in stable condition and coronary artery bypass graft surgery for nonemergent cases, valvular cardiac surgery, pacemaker implants or heart failure services (4,6-8);

- 12 weeks for referral to an electrophysiologist, electrophysiology testing or catheter ablation (7); or

- 30 days to begin cardiac rehabilitation (9).

In developing benchmarks for noninvasive testing (4) and nuclear cardiology (5), the Working Group considered the recommended target wait times in the context of other required cardiovascular services or procedures, and the patient factors that determine the risk of waiting. Thus, benchmarks for specialist consultation, prioritized on the basis of the acuity and risk of the patient's diagnosis or potential diagnosis, also are useful in prioritizing wait times for echocardiography.

Echocardiography, including stress studies, also provides information on the planning of cardiovascular care. As with nuclear imaging, for instance, if echocardiography is indicated in a patient before a consultation or procedure, the echocardiogram must be completed and interpreted before the target time. Therefore, in hemodynamically unstable patients with suspected certain cardiovascular conditions (eg, pericardial effusion with tamponade, mechanical complications postmyocardial infarction), echocardiography on an emergency basis is indicated. Echocardiography in less urgent situations should be provided within a timeframe such that the study is completed and interpreted before the benchmark for evaluation in that patient is reached.

We propose the following benchmarks for the provision of echocardiography in Canada:

- Emergent: as soon as possible, but within one day for all patients (may require transfer to a facility where 24/7/365 echocardiography is available);

- Urgent or semiurgent: within seven days; and

- Scheduled: within 30 days.

The above benchmarks refer to the period from the receipt of the request (either written or verbal for urgent or semiurgent cases) to the receipt of the final interpretation of the final echocardiographic report (or at least a preliminary report for urgent or semiurgent cases). These recommendations are summarized in Table 1.

**TABLE 1**
**Recommended wait time benchmarks (in days) for echocardiography for patients with class 1 or 2 indications**

| Urgency category | Recommended wait time* |
|---|---|
| Emergent: hemodynamically unstable patients with suspected certain cardiovascular conditions (eg, pericardial effusion with tamponade, mechanical complications, postmyocardial infarction) | Within 1 day |
| Urgent/semiurgent: critically ill patients who do not meet the definition of emergent and patients with a condition that could deteriorate rapidly (eg, symptomatic aortic stenosis) | Within 7 days |
| Scheduled: all patients who do not fall into the previous categories (eg, assessment of murmurs in asymptomatic individuals, assessment of left ventricle mass) | Within 30 days |

**From receipt of the request (either written or verbal for urgent and semiurgent cases) to the receipt of the final interpretation of the final echocardiographic report (or at least a preliminary report for urgent or semiurgent cases)*

## APPROPRIATENESS

To ensure appropriate usage, the proposed wait time benchmarks for echocardiography should be applied only to class 1 and 2 indications, defined as follows (1):

- Class 1 (definite) indication: the indication is supported by results of clinical studies and/or general agreement and accepted clinical practice. The latter is based on the principle that the echocardiographic examination is known to have a positive impact on clinical practice.

- Class 2 (selective) indication: clinical study evidence is not available. The impact of echocardiographic examination in these situations is generally, but not universally, established or limited to specific clinical situations.

To ensure effective use of resources in echocardiography, education of ordering physicians cannot be understated. A reduction in the number of unnecessary studies will lead to shorter wait times for more urgently needed echocardiographic studies.

## IMPLICATIONS FOR THE HEALTH CARE SYSTEM

Implementing the recommendations in the present document will likely require a substantial investment (time and money) in human resources, equipment and related infrastructure support to meet these targets.

We believe that all patients have the right to timely health care (within the benchmarks proposed) as well as high-quality echocardiography. Therefore, it is essential that all echocardiograms in Canada be performed and interpreted by individuals and in facilities that meet all CCS/CSE recommendations on the provision of echocardiography (1). We specifically recommend against providing echocardiography in any other setting until definitive data exist to confirm that the same quality can be assured.

We also believe that urban settings may benefit from a mix of facility-based (ie, hospital) and nonfacility-based (ie, office/clinic) echocardiography services within our publicly funded system, credentialed to meet the CCS/CSE standards to ensure quality. Quite simply, given the multiple competing demands for capital and human resources in large health care facilities, it is uncertain whether the recommended targets would be achievable using a model that only allows facility-based echocardiography services. However, this must be planned in an overall health care system approach to avoid loss of personnel that could aggravate access problems.

**TABLE 2**
**Recommended level of echocardiography services depending on facility type**

| | TTE | Stress echocardiography | TEE |
|---|---|---|---|
| Noninstitutional facilities | + | – | – |
| Community hospitals | +/– | – | – |
| Regional hospitals | + | +/– | – |
| Tertiary hospitals | + | + | + |

*+ Should generally be available; – Should generally not be available; +/– Should only be available if volume and local expertise justifies; TEE Transesophageal echocardiography; TTE Transthoracic echocardiography*

Echocardiography is highly dependent on the skills of the personnel performing and interpreting the studies. Sonographers are presently in extremely short supply and represent a major resource barrier for echocardiography access. Regardless of the mix of facility- and nonfacility-based laboratories within any jurisdiction, the dearth of sonographers is generally expected to be one of the main limitations to the access of echocardiographic services. Innovative methods will be required to attract and maintain our pool of sonographers, including funding to expand training sites, distance learning, financial enticement for training and retraining of those who already have a cardiology background, such as electrocardiogram technicians. Centres with special populations (eg, adult congenital heart disease, transplant centres, large cardiac surgery centres) require additional resources to support these activities and to continue to provide timely access to patients who present for regular specialist assessments as part of these centres' secondary care mandate.

Because injury in the workforce is a disincentive for many who want to enter the field of sonography, it is imperative that further research into the factors that cause repetitive strain injury be initiated, perhaps in concert with industry partners.

Another potential barrier to echocardiography in smaller settings is the lack of interpreting physicians who meet CCS/CSE credentialing standards, which means that innovative strategies may be required in these settings. Telehealth technologies and central support for sonographers, generalists or radiologists who obtain additional training in echocardiography from CCS/CSE-credentialed laboratories may improve access in rural areas of Canada and assure that the quality of the studies remains high.

## RECOMMENDED LEVEL OF ECHOCARDIOGRAPHY BASED ON FACILITY TYPE

In Canada, cardiovascular care is most frequently centralized, thus, the specialist mix and services available differ depending on the institution and its available resources. This is not necessarily unacceptable, because it allows for the concentration of expertise and a critical mass of diagnostic testing in larger institutions. Unfortunately, there may be inconvenient distances involved that can be a barrier to access, but these are potentially solvable by technology (10). However, health care systems need to evolve to make these centralized services more available to patients in smaller communities and their community hospitals.

Currently, most provinces have developed intra- or extra-provincial or -territorial referral systems. They organize hospitals into community hospitals (which have a defined catchment population), regional hospitals (which provide a higher level of care and accept secondary referrals) and tertiary/quaternary hospitals (which provide the full array of cardiac services). We suggest that the level of echocardiography services that should be available in these settings varies according to the type of facility, which will clearly also relate to the echocardiographic expertise available. We acknowledge that each jurisdiction must assess its local situation, including human resource availability, to decide which level of service can or should be provided to meet the echocardiography wait time targets. Nevertheless, common waiting lists should be developed and managed to ensure equitable access to the most appropriate modality for the patient. It also means developing systems, such as telehealth technology (10) to support smaller communities and the patients living there, as well as the physicians practising there.

Traditionally, echocardiography has been performed as a transthoracic two-dimensional ultrasound (TTE) of the heart and adjacent great vessels. As such, TTE should be available at all regional hospitals and major community hospitals. Nonfacility-based echocardiography is available in larger cities of some provinces, and we would also support this model, provided that laboratories and operators meet minimum standards.

Although TTE remains the cornerstone of diagnostic cardiac ultrasound, transesophageal echocardiography (TEE) has become widely recognized as a valuable complementary tool (11). Compared with TTE, TEE offers superior visualization of posterior cardiac structures because of the close proximity of the esophagus to the posterior heart, the lack of intervening lung and bone, and the ability to use high-frequency imaging transducers, which afford superior spatial resolution. With TEE, in a mildly sedated patient, it is possible to discern varied conditions, from proximal aortic dissection to the exact etiology of valvular regurgitation, to better plan operative intervention. Clearly, these diagnostic procedures must be performed and interpreted by highly skilled and appropriately trained physicians and will only be available in major regional hospitals with appropriate cardiology expertise. Guidelines are available from both the Canadian (1) and American (2,11) echocardiography societies for training and appropriate indications for TEE. TEE should not, in our opinion, be offered outside of hospital facilities.

Other uses of the transthoracic technique include exercise or pharmacological stress echocardiography to assess myocardial viability or ischemia. Stress echocardiography can be used to demonstrate the presence of coronary disease (by showing inducible wall motion abnormalities), assess myocardial viability before revascularization, identify a 'culprit' lesion, risk-stratify patients with known or suspected disease, and stratify patients based on preoperative risk before noncardiac surgery. Stress echocardiography is a comparable diagnostic test with stress nuclear imaging in terms of diagnostic accuracy and prognostic value, and the choice of test is based largely on local availability and expertise (12-14). Because of the expertise required by sonographers and echocardiographers in performing stress echocardiography, this test should generally only be available at tertiary hospitals, but may be offered in regional hospitals with the appropriate training and expertise. These recommendations are summarized in Table 2.

## SUMMARY

Echocardiography plays an essential role in all facets of cardiovascular care. We could not identify any studies evaluating the outcome of patients related to wait times for echocardiography. Obtaining data in this area should be a priority for health care system administrators and health care professionals. Currently, wait times should be based on factors such as patient acuity and risk of underlying disease, and the echocardiography should be performed in a timely enough fashion to allow specialist consultation or facilitate other important cardiovascular tests or procedures. The level of echocardiography services available (TTE, TEE, stress echocardiography) should depend on the type of health care facility. We recommend that all echocardiograms in Canada be performed and interpreted by individuals in facilities who meet all CCS/CSE recommendations on the provision of echocardiography.

We propose the following benchmarks for the provision of echocardiography in Canada in patients with CCS/CSE class 1 or 2 indications (2):

- Emergent: as soon as possible, but less than one day for all patients (may require transfer to a facility where 24/7/365 echocardiography is available);
- Urgent or semiurgent: within seven days; and
- Scheduled: within 30 days.

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