Training/Practice
Health Policy and Promotion

Canadian Cardiovascular Society Quality Indicators for Heart Failure

Members of the Heart Failure Working Group: Robert S. McKelvie, MD, PhD, FRCP,C
George A. Heckman, MD, MSc, FRCP,C
Jafna L. Cox, BA, MD, FRCP, FACC,d
Rinky K. Harkness, RN, PhD,g Gordon Moe, MD, FRCPC,h
Sulan Dai, MD, PhD,i Paul Dorian, MD FRCPC,j
David E. Johnstone, MD, FRCPC, FACC (retired), k Other authors: Erin C. McGeachie, BAH,l
Jack V. Tu, MD, PhD,m and Laurie J. Lambert, PhDn

ABSTRACT
A working group was convened by the Canadian Cardiovascular Society (CCS) in 2010 to identify quality indicators (QIs) for heart failure (HF). Using the CCS “Best Practices for Developing Cardiovascular Quality Indicators” methodology, a total of 49 “long-list” QIs was identified and rated. Subsequent ranking and discussion led to the selection of an initial “short-list” of 6 QIs to evaluate quality care, including daily

Clinical practice guidelines (CPGs) provide recommendations for diagnostic or therapeutic interventions, or both, requiring clinical judgement in their application. However, guidelines represent only 1 component of the strategy to improve health care and must be combined with an approach to quantify the quality of health care provided to patients.1

RESUMÉ
En 2010, la Société canadienne de cardiologie (SCC) a confié à un groupe de travail le mandat de déterminer les indicateurs de qualité (IQ) pour l’insuffisance cardiaque (IC). Suivant la méthodologie d’élaboration des IQ cardiovasculaires selon les meilleures pratiques de la SCC (Best Practices for Developing Cardiovascular Quality Indicators), 49 IQ ont initialement été cernés et cotés. Après
assessment of blood chemistry indicators, chest radiography, patient education, in-hospital use of angiotensin-converting enzyme inhibitors or angiotensin-receptor blockers, assessment of left ventricular function, and 30-day hospital readmission. The short-list QIs were selected as being important for quality assurance and because the patient information, for the most part, can be captured during the inpatient setting, which would allow these QIs to be adopted more easily. These 6 QIs were subjected to a feasibility test that found that even within the inpatient setting, there is a significant gap between the existing knowledge infrastructure and the necessary information-tracking processes to measure QIs. Only 1 QI (30-day hospital readmission) can currently be measured comparatively across Canada, although the other 5 of 6 short-list QIs can be measured using other data collected by jurisdictions. Standardization and enhancements to knowledge infrastructure are essential to provide the comprehensive patient data necessary to evaluate the quality of HF care across Canada.

Quality assurance is a process whereby health care organizations can ensure the care delivered for an illness meets accepted standards.1 Quality-of-care indicators can be derived from the CPGs for the illness of interest. A good quality indicator (QI) should be based on strong clinical evidence, and thus failure to perform the action defined by the QI will reduce the likelihood of optimal patient outcomes.

Heart failure (HF) was selected for QI development because it imposes a significant burden on patients and the health care system, and there is significant variation in management as well as outcomes achieved.2 There are multiple evidence-based therapies that have been demonstrated to reduce clinical event rates.3 Measurement of QIs would be important to identify whether patients with HF were managed appropriately according to CPGs.

**Methods**

The approach to develop QIs consisted of 3 phases: (1) plan and organize QI development, (2) develop and select QIs, and (3) operationalize QIs.2 The main objectives were to develop QIs based on recent Canadian Cardiovascular Society (CCS) CPGs and involve stakeholders in the development process to encourage provincial adoption.

**Plan and organize the QI development initiative**

The QI Development Committee was multidisciplinary with pan-Canadian representation.2 Members included 5 clinicians (fields of cardiology and geriatrics) and 5 data holders who were guided by 2 cochairs with HF expertise. Subtheme groups were created focusing on acute hospitalization for HF, discharge/transition, outpatient care, and palliative care/end-of-life planning. Members of subtheme groups provided expertise/recommendations but did not have input on QI rating, ranking, or the final selection of key indicators.

**Development and selection of the QIs**

A literature review of relevant publications was conducted (Supplemental Appendix S1) to ensure that the QIs were consistent with the recommendations in the CCS HF CPGs.4 Also reviewed was a recent international environmental scan of QIs. A preliminary “long list” of QIs was created. The technical note for each QI was developed, including definitions of numerator, denominator, calculation method, rationale, clinical recommendations, data sources, and possible implementation challenges. QIs were rated using a 7-point Likert scale that evaluated importance, scientific acceptability, feasibility, and overall rating. Three different strategies were applied to the QI ratings (Supplemental Appendix S2). Strategy 1 selected QIs with an overall rating ≥ 5. Strategy 2 selected QIs in which ≥ 70% of the respondents assigned an overall rating score of 5, 6, or 7. Strategy 3 selected QIs in the top third of each domain.2

The committee, in conjunction with stakeholders and the Canadian cardiovascular community (through web consultation) developed a QI short list. This short list was thought to be manageable for initial operationalization.

**QI operationalization**

The Committee identified a preliminary list of administrative and clinical database holders to initiate the operationalization process. The identified database holders completed a feasibility questionnaire and follow-up interview to evaluate whether the selected short-listed QIs would impose unreasonable effort, cost, and collection time. A summary of the methodology and questionnaire used are available in Supplemental Appendices S3 and S4.
Results

Selection of QIs

A total of 49 QIs were rated on the Likert scale (full list in Supplemental Appendix S2). Strategy 1 selected 29 QIs from 7 of 9 clinical domains. Strategy 2 selected 18 QIs from 4 of 9 clinical domains. Strategy 3 selected 20 QIs representing all clinical domains. The committee then selected 6 “short-list” QIs, including 2 safety, 3 process, and 1 outcome (Table 1).

Safety indicators. These indicators included daily assessments of blood chemistry panels and chest radiography. HF and its treatment can result in significant abnormalities of electrolytes and renal function. These chemical parameters need to be monitored closely, because significant abnormalities can occur quickly.

A chest radiograph is a widely available investigation that is important for the assessment of acute dyspnea. The diagnosis of acute HF should be established as soon as possible after initial assessment. Therefore, a chest radiograph should be completed within 2-8 hours of initial assessment.

Process indicators. These included assessment of left ventricular (LV) function, in-hospital angiotensin-converting enzyme inhibitor (ACEI) or angiotensin-receptor blocker (ARB) therapy, and patient education. Assessment of LV function is fundamental for decisions on diagnosis, prognosis, therapy, and referral. Assessment is widely available and low risk and is usually repeated over time to evaluate response to therapy or a change in clinical status.

ACEIs or ARBs have been shown to improve outcomes for eligible patients with HF with reduced LV function. A higher rate of use at hospital separation is associated with greater long-term use. Therefore, eligible patients should be prescribed 1 of these agents at the time of hospital discharge. The primary barrier to measurement will be determining eligible patients.

Patient education is an important component of HF management, because HF is a chronic condition requiring patients to be actively involved in their monitoring. Although it was recognized that there are potential issues regarding the feasibility of measuring this QI, its clinical importance warrants inclusion among the short-listed QIs.

Outcomes. This indicator consisted of 30-day hospital readmission. Effective discharge planning, transitional care, and close follow-up after discharge should decrease the probability of early hospital readmission.

Table 1. Canadian Cardiovascular Society “short list” quality indicators for heart failure

<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
<th>Description</th>
<th>Importance</th>
<th>Scientific acceptability</th>
<th>Feasibility</th>
<th>Overall rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>Daily assessment of blood chemistry levels: electrolytes, blood urea nitrogen, creatinine</td>
<td>The percentage of inpatients with a diagnosis of acute HF who receive electrolytes and renal function assessment as part of their daily assessment</td>
<td>6.0 ± 1.7</td>
<td>6.0 ± 1.5</td>
<td>5.2 ± 1.9</td>
<td>5.3 ± 2.0</td>
</tr>
<tr>
<td>Safety</td>
<td>Chest radiograph</td>
<td>The percentage of patients seen in the ED or admitted to the hospital (or both) with acute HF who undergo chest radiography as part of their initial evaluation</td>
<td>5.8 ± 1.7</td>
<td>5.6 ± 1.4</td>
<td>5.1 ± 1.6</td>
<td>5.1 ± 1.7</td>
</tr>
<tr>
<td>Process</td>
<td>Patient education</td>
<td>The percentage of patients with HF and family members who receive at least 1 session of education regarding HF management (education may have been conducted in the hospital, in the clinic, or through Telehealth)</td>
<td>5.2 ± 1.9</td>
<td>5.0 ± 1.7</td>
<td>4.5 ± 1.5</td>
<td>4.7 ± 1.8</td>
</tr>
<tr>
<td>Process</td>
<td>In-hospital use of ACEIs or ARBs</td>
<td>The percentage of inpatients with a documented history of HF or newly diagnosed HF resulting from poor LV systolic function who are prescribed an ACEI or ARB during the hospital stay and at hospital discharge, unless a contraindication or known drug intolerance exists</td>
<td>6.2 ± 1.7</td>
<td>6.3 ± 1.5</td>
<td>5.5 ± 1.7</td>
<td>5.8 ± 1.8</td>
</tr>
<tr>
<td>Process</td>
<td>Assessment of LV function</td>
<td>The percentage of patients with a documented history or a diagnosis of HF seen in the ED or admitted to the hospital (or both) for HF who receive an assessment of LV function within 18 mos before admission date or within 30 d from ED visit</td>
<td>6.3 ± 1.6</td>
<td>6.1 ± 1.4</td>
<td>5.3 ± 1.4</td>
<td>5.8 ± 1.7</td>
</tr>
<tr>
<td>Outcome</td>
<td>Documentation of 30-d readmission rate</td>
<td>The percentage of documented patients with HF who are readmitted for any cause within 30 d after discharge</td>
<td>5.9 ± 1.8</td>
<td>5.8 ± 1.4</td>
<td>5.5 ± 1.6</td>
<td>5.7 ± 1.6</td>
</tr>
</tbody>
</table>

± indicates a scale from 1 (strongly disagree) to 7 (strongly agree). Full technical specifications for quality indicators (QIs) for HF are available in Supplemental Appendix S5 and at www.CCS.ca.

ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin-receptor blocker; ED, emergency department; HF, heart failure; LV, left ventricular.
the 30-day readmission rate is an overall QI assessing overall system effectiveness of managing HF before and after discharge from the hospital.

Results of feasibility assessment

Eighteen questionnaires were sent to data holders across Canada. These sites included 6 provincial/clinical registries, 2 provincial evaluative agencies, 2 government agencies, and 2 hospital-based HF clinics (Table 2). Twelve surveys were returned (67% response rate), and a follow-up telephone interview was conducted with each to confirm or complete (or both) survey responses.

Results indicated that only 30-day hospital readmission rate may currently be measured nationally. Daily assessment of blood chemistry panels could be measured by the Alberta Provincial Project for Outcome Assessment in Coronary Heart Disease (APPROACH). However, this database captures only patients enrolled in the registry, which is a small subset of the overall HF population. HF clinics, using electronic medical records (EMRs), were able to measure all the QIs except in-hospital ACEI or ARB use.

Discussion

Of the 6 QIs that were selected for assessment of feasibility, 5 were measurable during the in-hospital stay. The sixth measure examined a postdischarge outcome of the 30-day hospital readmission rate. These 6 QIs were selected, in part, because it was thought that they would be feasible to measure nationally. However, despite 5 of the 6 QIs being obtained during the hospital stay, it is not feasible to systematically collect this information across Canada. The major barriers to QI measurement are information collection processes and knowledge infrastructure. The Canadian Institute for Health Information (CIHI) routinely collects health administrative data in a standardized way across Canada; however, there is no national collection of data on chronic diseases that are managed in primary care settings. Administrative data are structured to capture information on health procedures but the design is not adequate to capture data on chronic diseases, such as patient education for HF. Provincial/clinical registries collect more comprehensive patient data; however, they often include only a subset of the HF population, thus limiting their use for interprovincial comparison.

EMRs in HF clinics offer the most potential for comprehensively capturing data required for QIs, at least in the outpatient setting and also for the inpatient setting if linked to the hospital file. There are 2 major limitations to using EMR data for indicator measurement. First, HF clinics manage only a small percentage of all patients with HF, so this method still falls short of a comprehensive picture of HF care across Canada. Second, a lack of standardization in EMRs is a major barrier to national level comparisons.

Perhaps the most important finding from this initiative is that there is no system in place to routinely measure these HF QIs across Canada. The proposed QIs reflect care only during the hospital and early discharge phases of HF management. There are other important aspects of care that need evaluation (eg, stable HF) that may be even more difficult to document. Assessing only 1 aspect of HF management may not be sufficient to improve overall outcomes for patients with HF.

Interdisciplinary teams are essential to the success of this project. Routinely obtaining excellent QI data will require collaborative efforts by a multidisciplinary group of clinicians, methodologists, administrators, and information technology personnel and the availability of adequate funding from sources across Canada.

At this stage, even a restricted set of HF QIs cannot be measured in a consistent fashion across the country. The QIs that have been developed are those that most appropriately assess the quality of care provided to patients with HF. It is important for Canada to develop strategies that will facilitate the standardized collection of these QIs. Data holders should pilot test these QIs to verify the validity and reliability of the results. Going forward, the QIs will need to be reviewed and updated in an iterative process to ensure that they reflect the most recent knowledge about clinical practices as well as changes in knowledge infrastructure across Canada.

Acknowledgements

The Heart Failure Data Definitions Working Group and the other authors would like to thank the Quality Indicators Steering Committee and the Heart Failure subtheme working groups for their contributions to this initiative. The authors also wish to thank the Quality Indicators Subcommittee, the Steering Committee and the Heart Failure subtheme working groups for their contributions to this initiative.
groups for their contributions. Committee member lists can be found in Supplemental Appendix S5.

Funding Sources

The Canadian Cardiovascular Society gratefully acknowledges the financial contribution of the Public Health Agency of Canada in the preparation of this article. The views expressed herein do not necessarily represent the views of the Public Health Agency of Canada.

Disclosures

The authors have no conflicts of interest to disclose.

References


Supplementary Material

To access the supplementary material accompanying this article, visit the online version of the Canadian Journal of Cardiology at www.onlinecjc.ca and at http://dx.doi.org/10.1016/j.cjca.2015.12.027.