Canadian Cardiovascular Outcomes Research Team

CCORT

Quality of Cardiac Care in Ontario

EFFECT (Enhanced Feedback for Effective Cardiac Treatment)

Phase 1. Report 1—January 2004

ICES Institute for Clinical Evaluative Sciences

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HEART AND STROKE FOUNDATION

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About the organizations involved in the EFFECT Study

Canadian Cardiovascular Outcomes Research Team (CCORT)

CCORT is a national group of leading researchers from five provinces (Nova Scotia, Quebec, Ontario, Alberta, and British Columbia) who have come together to study cardiovascular disease in Canada—specifically how disease risk-factors, mortality rates and care outcomes may differ across provinces, health regions and hospitals.

Established in 2001, CCORT is funded by operating grants from the Canadian Institutes for Health Research Interdisciplinary Health Research Team program and the Heart and Stroke Foundation of Canada. The CCORT national coordinating centre is located at the Institute for Clinical Evaluative Sciences in Toronto.

CCORT's innovative studies focus primarily on improving quality of care for acute myocardial infarction and congestive heart failure patients in Canada, and improving outcomes of patients undergoing invasive cardiac procedures such as cardiac catheterization, percutaneous coronary interventions, and coronary artery bypass graft surgery.

Institute for Clinical Evaluative Sciences (ICES)

ICES is an independent, non-profit organization that uses population-based health information to produce research on a broad range of health care issues. Our unbiased evidence provides fact-based measures of health system performance; a clearer understanding of the shifting health care needs of Ontarians; and a stimulus for discussion of practical solutions to optimize scarce resources.

Highly regarded in Canada and abroad, ICES knowledge is widely used by governments, hospitals, planners and practitioners, to make decisions about care delivery and develop policy. ICES research findings are also profiled in the media to bring health-related problems and potential solutions to the public's attention.

To ensure research and policy relevance, ICES collaborates with experts from a diverse network of institutions, government agencies, professional organizations and patient groups.

Heart and Stroke Foundation (HSF)

The Heart and Stroke Foundation is a federation of 10 independent provincial foundations and one national foundation, the Heart and Stroke Foundation of Canada (HSFC), led and supported by a force of more than 250,000 volunteers. The HSF is a leading funder of heart and stroke research in Canada.

The mission of the HSFC is to improve the health of Canadians by preventing and reducing disability and death from heart disease and stroke through research, health promotion and advocacy. The HSFC is Canada's international cardiovascular health ambassador, working with similar organizations worldwide to fight the growing threat of heart disease and stroke in all countries.

Working with Canada's cardiovascular health community to provide the tools it needs to give Canadians the best care in the world is another priority of the HSFC. Through the HSFC's many partnerships, including the Canadian Institutes for Health Research, Surveillance of Cardiovascular Disease in Canada, Canadian Cardiovascular Outcomes Research Team and the Canadian Heart Health Network, to name a few, the Foundation is helping shape the future of health research in Canada.

Canadian Institutes of Health Research (CIHR)

CIHR is Canada's major federal funding agency for health research. Its objective is to excel, according to internationally accepted standards of scientific excellence, in the creation of new knowledge and its translation into improved health for Canadians, more effective health services and products and a strengthened Canadian health care system.

CIHR is organized according to 13 "virtual" research institutes, which are organizational units that bring together and support researchers across Canada, according to their research focus. The research institutes are based on the four pillars of health research which include: biomedical sciences, clinical sciences, health services, and population health.

CCORT's home institute is the Institute for Circulatory and Respiratory Health, although CCORT's research is of relevance to many of the CIHR institutes.

Enhanced Feedback for Effective Cardiac Treatment (EFFECT) Study

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Executive Summary

Background

Cardiovascular disease continues to claim the lives of many Canadians and creates enormous disability for those who survive. While considerable progress has been made in developing effective treatment and therapies, significant opportunities remain to improve the quality of cardiac care provided for the benefit of all Canadians.

It is well known that there is an unacceptable delay between the availability of conclusive clinical trial evidence and its application to patient care. At the same time, it is challenging for clinicians to stay current due to the rapidly increasing volume of available information. Improving the quality of care increasingly rests on the ability to efficiently translate research knowledge into practice, so that patients may benefit sooner from the available scientific evidence.

Many jurisdictions, including Canada, have identified goals for improving the quality of cardiac care by improving the use of evidence-based therapies. The **Enhanced Feedback For Effective Cardiac Treatment (EFFECT) Study** focuses on a number of well-defined quality indicators demonstrated to improve patient outcomes and can provide direction and focus to quality improvement efforts for cardiac care. The investigators hope that the EFFECT Study will assist Ontario health care organizations to reduce the gap between research and practice and to continue to improve the quality of cardiac care for all Ontarians.

EFFECT Study

The EFFECT Study is one of the largest and most comprehensive initiatives in the world to measure and improve the quality of cardiac care. Using a randomized trial of cardiac care report cards, the study's objective is to determine whether developing and publishing report cards based on clinical data collected from patient charts leads to greater use of evidence-based therapy at hospitals that receive them.

The three-phase study focuses on acute myocardial infarction (AMI) and congestive heart failure (CHF) and involves 85 hospital corporations (consisting of 103 acute care hospitals) in Ontario.

Phase I. A retrospective chart review of hospitalizations for clinical data from 1999/00 and 2000/01 is being conducted for the 85 Ontario hospital corporations, which were randomized to two groups: Group A, early feedback (44 hospital corporations/53 hospitals) and Group B, delayed feedback (41 hospital corporations/50 hospitals).
Report 1. Report Cards on Group A. Released January 2004
Report 2. Report Cards on Group B. Data collection is still ongoing, and following analysis, will be released to hospitals in the fall of 2004.

The Phase I. Report 1 study sample consists of 5,958 AMI charts and 5,296 CHF charts for the Group A hospitals. In addition to demographic and treatment information, data also focus on two sets of quality indicators (one for AMI care and one for CHF care) specifically developed for use in this study by two expert panels whose membership included clinical leaders in cardiology, internal medicine, family practice, nursing, pharmacy and epidemiology.

Phase II. Report Cards for Group A & B (Release in 2005/2006)
Group A. Retrospective chart review for 2004/05 hospitalizations
Group B. Retrospective chart review for 2003/04 hospitalizations

Phase III. Final Report (Release in 2006)
Impact Assessment: A comparison of results/improvement from Phase I to Phase II.

Key Findings

Discussion of key findings includes the term "ideal" patients. An ideal patient is one who has the condition of interest e.g., AMI, has no contraindications to the specified intervention and is alive at the time of intervention.

AMI Care

- **Most (80%) Ontario AMI patients have at least one modifiable cardiac risk factor**—similar to the rates reported in a recent U.S. study.[1] Thirty-three percent of AMI patients in the EFFECT Study were current smokers, 44% were hypertensive, 31% had hyperlipidemia and 26% were diabetic.
- **Median "door to needle" time** for thrombolytic reperfusion therapy in Ontario hospitals is 37 minutes and approaching the target of $\leq$ 30 minutes.[2] The "door to needle" times were 11 minutes less when the Emergency physician made the decision to administer thrombolytic therapy and 10 minutes less when thrombolytic therapy was administered in the Emergency Department rather than in CCU/ICU.
- **Aggregate secondary prevention rate of 79%** in ideal patients is good overall (target is $\geq$ 85%). However, approximately one in five Ontario AMI patients did not receive acetylsalicylic acid (ASA), beta-blockers, angiotensin converting enzyme (ACE) inhibitors or statins at hospital discharge when they were clinically indicated.
- **Potential to save 178–250 lives** of the approximately 17,000 new AMI patients in Ontario each year, if we can further improve the secondary prevention rate, by ensuring all appropriate patients receive ASA, beta-blockers, ACE inhibitors and statins at hospital discharge.
- **The 30-day mortality rate was 12% and the one-year-mortality rate was 20%** for AMI patients in the EFFECT Study. The one-year AMI re-admission rate was 11%.

AMI Care Areas Identified for Continued Improvement

- **Reperfusion therapy** could be made available to more patients—41% of patients presenting with ST-segment elevation MI (STEMI) did not receive this therapy.
- **"Door to needle" time** could be improved at a number of hospitals by ensuring thrombolytic therapy is initiated by the Emergency physician in the Emergency department rather than by a consultant or after transfer to CCU/ICU.
- **Lipid testing within the first 24 hours** of admission could be improved from the current level of 36%—target level is $\geq$ 85%.
- **Early administration of ASA and beta-blockers** in ideal patients warrants improvement, as does the rate of secondary prevention (ASA, beta-blockers, ACE inhibitors and statins) at many Ontario hospitals. Increased use of standard admitting orders and/or discharge plans could lead to higher utilization rates.

Key Findings

CHF Care

- **Most (71%) Ontario CHF patients have at least one modifiable cardiac risk factor**. Twelve percent of CHF patients were current smokers, 48% were hypertensive, 19% had hyperlipidemia and 34% were diabetic.
- **Most (82%) ideal CHF patients are receiving ACE inhibitor medications** which serve to improve survival and reduce hospitalization rates. The target level is ≥ 85%.
- **Less than half (39%) of ideal CHF patients are receiving beta-blockers at hospital discharge,** which improve survival and reduce hospitalization rates.
- **Potential to save 70–156 lives** of the 14,000 new CHF patients in Ontario each year, if all ideal CHF patients received ACE inhibitors and beta-blockers at hospital discharge.
- **The 30-day mortality rate was 12% and the one-year mortality rate was 33%** for CHF patients in the EFFECT Study. The one-year CHF re-admission rate was 26%.

CHF Care Areas Identified for Continued Improvement

- **More Ontario CHF patients could benefit from beta-blocker medications**, as current utilization of 39% among ideal patients at hospital discharge is below the target of ≥ 50%.
- **Improved access to and greater utilization of echocardiography** to measure left ventricular (LV) function would improve management of patients with CHF. Study data indicate 52% of patients had documented LV function measurement, whereas the target level is ≥ 75%.
- **More patients with atrial fibrillation could benefit from Warfarin therapy** as current utilization among ideal patients at discharge is 55% compared to the target level of ≥ 85%.
- **Provision and documentation of counselling (on topics such as diet, medications, symptoms, daily weights) for more CHF patients** could lead to improved patient outcomes. The current rate is 66% whereas the target is ≥ 90%.

EFFECT Study Phase I. Report 1 Overview

The report includes six sections and seven appendices.

1. Introduction—provides an overview of the burden of cardiac disease in Canada as well as a brief history of the use of report cards in health care.

2. Methods—provides an overview of the EFFECT Study, a major initiative of the Canadian Cardiovascular Outcomes Research Team (CCORT) and a description of the manner in which the data for the EFFECT Study were obtained and utilized.

3. Findings—provides the AMI and CHF report cards for the 44 organizations receiving clinical data feedback at this time and a discussion of the major findings of the study.

4. Quality Improvement—provides a brief description of quality improvement activities and identifies resources that may be of assistance to the study hospitals.

5. Interpretive Cautions—outlines the strengths and limitations of the EFFECT Study and some of the challenges encountered to support interpretation of the data.

6. Conclusion—briefly outlines the timeline for the EFFECT Study, including the next phase of data collection that will begin in 2004.

Appendices

Appendix A—References

Appendix B—Participating Hospitals

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Appendix E—Analysis of Potential Lives Saved with Maximal Use of AMI and CHF Therapies

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Attachments: AMI Report Card Summary Pull-out Table
CHF Report Card Summary Pull-out Table

Additional information on the EFFECT Study is available at www.ccort.ca/effect.asp.

EFFECT is one of the largest initiatives of CCORT. The study is funded by operating grants from the Canadian Institutes for Health Research (CIHR) Interdisciplinary Health Research Team program and the Heart and Stroke Foundation (HSF). CCORT's host institution is the Institute for Clinical Evaluative Sciences (ICES), located in Toronto.

1. Introduction

Cardiovascular Disease

Cardiovascular disease (CVD) is the leading cause of death in Canada, claiming over 78,000 lives (roughly 36% of all deaths) in Canada each year.[3] CVD accounts for 18% of all hospitalizations among men and women—more than any other health problem.[4]

Approximately 38,000 Canadians were hospitalized with acute myocardial infarction (AMI/heart attack) in 1996—of these about 15% died within 30 days of the event and 23% died within one year.[5] Many AMI patients who survive their index hospitalization go on to develop congestive heart failure (CHF). Heart failure patients* have an even worse prognosis, with a one-year mortality rate of 33%—worse than that of most malignancies.[6]

At present, approximately 3% of all Canadians aged 35 to 64 years report having heart disease. CVD also represents enormous disability, with over 30% of those who report they have heart disease being unable to work due to their illness.[7]

The economic burden on the health care system is considerable and growing. In 1998, the estimated costs were approximately $19 billion, comprised of $6.8 billion in direct costs, plus $11.6 billion in indirect costs.[8] This figure is expected to increase as the population continues to age.

Despite these sobering statistics, there have been tremendous advances in the treatment of cardiac disease over the past two decades. The combined results of laboratory and clinical research have identified specific clinical strategies that are beneficial for both initial treatment and secondary prevention of AMI[9] and for the management of patients with CHF. These therapies include the use of acetylsalicyclic acid (ASA), thrombolytics, beta-blockers, angiotensin converting enzyme (ACE) inhibitors and statins for AMI[10–16] and beta-blockers and ACE inhibitors for treatment of CHF.[13,17,18] However, these proven therapies are often being under utilized in routine clinical practice in Ontario and Canada[19] and there is wide inter-hospital variation in their use. Increasing use of these therapies could lead to significant reduction in the mortality rate associated with these conditions.

Health Care Report Cards

The modern era of "scorecard cardiovascular medicine" began in the early 1990s.[20] A well-known example, initiated in 1991, involved the publication of hospital and surgeon-specific report cards on in-hospital mortality after coronary artery bypass graft (CABG) surgery in New York State. The publication of this information stimulated quality improvement initiatives in several New York hospitals, and was associated with a 41% decline in the risk-adjusted in-hospital mortality rate after CABG surgery (from 4.14% to 2.45%).[21] Critics have charged that the mortality rate decline was, in part, the result of avoidance of high-risk patients and "gaming" of the data by involved physicians.[22,23] Other researchers have noted that CABG mortality rates were also declining in jurisdictions that had not instituted public reporting systems.[24] However, subsequent studies by Duke University researchers documented that mortality rates after CABG surgery declined fastest in New York State with its public reporting system and Northern New England with its confidential data feedback program.[25] There are conflicting studies as to whether patients preferentially migrated to low-mortality hospitals and surgeons in New York State.[26,27]

Report cards on hospital-specific AMI mortality rates have been developed in several jurisdictions including the United States (California, Pennsylvania), Scotland and Sweden.[28–31] These report cards have all been generated using routinely collected hospital discharge administrative data.

*Refers to hospitalized heart failure patients

Critics have questioned the accuracy of these administrative data, the quality of the risk-adjustment methods, the lack of associated process of care data, the timeliness of the data, and the level of disclosure (which has been physician-specific in some jurisdictions).[31–33]

The impact of these report cards on quality improvement activities appears to be limited, although few evaluative studies have been done.[34,35] Most AMI report cards have reported solely on AMI outcomes, rather than on the processes of care that contribute to the outcomes.

In spite of these controversies, report cards are gaining increasing favour in Canada and elsewhere as a method to respond to the strong demand for public accountability and improved quality of care by stakeholders, including the public, the media and policymakers. The Romanow Commission has called for the addition of accountability as a new pillar of the Canada Health Act and for regular reporting on the quality and performance of the health care system.[36]

The Ontario Experience

In February 1999, the Institute for Clinical Evaluative Sciences (ICES) and the Heart & Stroke Foundation of Ontario released the first public cardiac report card entitled *Cardiovascular Health & Services in Ontario: An ICES Atlas*.[37] This report was developed primarily using **administrative data** and demonstrated wide, unexplained regional and inter-hospital variations in all aspects of cardiac care in Ontario. For example, the 30-day mortality rate after an AMI varied from 11.2% to 22.2% among teaching and large-volume hospitals in the province. The variations among medium and small hospitals were even greater.[38]

Due to the absence of clinical data in the *ICES Cardiovascular Atlas*, in-hospital process of care measurements such as ASA use, thrombolytic use and thrombolytic door to needle times, which may have contributed to, or explained, hospital-specific outcomes, could not be reported.

To determine the impact of the *ICES Cardiovascular Atlas* report card, a follow-up survey was sent to participating Ontario hospitals. This survey found that the majority of responding hospitals had implemented one or more quality improvement activities in direct response to information contained in the *ICES Cardiovascular Atlas*. These results are encouraging given the negative view of report cards in the United States.[39]

In addition to the *ICES Cardiovascular Atlas*, there have been a number of other health care report card initiatives including the Ontario Hospital Association's *Hospital Report* series and the Canadian Institute for Health Information's (CIHI) annual report on health care in Canada. Accordingly, hospitals in Ontario are becoming increasingly accustomed to public report cards.

Enhanced Feedback for Effective Cardiac Treatment (EFFECT) Study

Building on the work of the *ICES Cardiovascular Atlas*, one of the major initiatives being conducted by the Canadian Cardiovascular Outcomes Research Team (CCORT) is the EFFECT Study. This study was developed to further improve the quality of cardiac care in Ontario, and is a randomized trial of cardiac report cards—the first such trial in the world. Its objective is to determine whether publishing report cards based on **clinical data** collected from patient charts leads to greater use of evidence-based therapy at hospitals that receive them.

CCORT is a national group of leading researchers from five provinces (Nova Scotia, Quebec, Ontario, Alberta, and British Columbia) who have come together to study cardiovascular disease in Canada—specifically how disease risk-factors, mortality rates and care outcomes may differ across provinces, health regions and hospitals. CCORT researchers from Ontario, based at ICES, conducted the EFFECT Study.

The EFFECT Study consists of two phases of retrospective chart review focused on AMI and CHF. The report cards consist of multiple quality indicators providing information on in-hospital process of care measurements, such as the use of ASA, beta-blockers, and thrombolytic door to needle times, clinical information that has not been available previously. The quality indicators were developed by two expert panels (one for AMI and one for CHF) co-sponsored by CCORT and the Canadian Cardiovascular Society (CCS).

While EFFECT is an Ontario-focused study, other CCORT projects are examining cardiac care nationally, including the CCORT Canadian Cardiovascular Atlas project.

Value of Clinical Data

To support further improvement in cardiac care in Ontario, the EFFECT Study was initiated with a focus on gathering clinical information. Most previous report cards were developed using available administrative data. Administrative data have limitations when used to assess health care quality—not unexpected, given that this is not the primary purpose nor function of administrative data.[9] In contrast, data abstracted from health records can provide detailed clinical information not available in administrative data, which is more useful for quality improvement and may have greater acceptance among clinicians.

Funding

The EFFECT Study, under the CCORT initiative, is funded by operating grants from the Canadian Institutes for Health Research (CIHR) Interdisciplinary Health Research Team program and the Heart and Stroke Foundation. CCORT and EFFECT's host institution is ICES. *It should be noted that no pharmaceutical or biomedical companies were involved in the study.*

Additional Information

In addition to this report, the following additional information is available on the CCORT web site:

- EFFECT Study data slide show
- EFFECT Study data summary tables

Use of this Report

This report's purpose is to document current performance and to serve as a guidepost for continued improvement in cardiac care, and is not intended for use as a consumer guide to selecting a hospital. Many cardiac conditions require urgent treatment and patients should continue to seek cardiac treatment at their local hospital.

References and Glossary of Terms

A list of references is provided in Appendix A and a Glossary of Terms follows in Appendix D.

2. Methods

Study Design

The EFFECT Study includes two phases of retrospective chart review of AMI and CHF hospitalizations. Phase I data collection involves AMI and CHF hospitalizations from 1999/01–2000/01 in 85 Ontario hospital corporations.

Randomization

As part of the study design, the 85 hospital corporations were randomized into two groups: Group A, early feedback with the AMI/CHF report cards in Phase I Report 1 (44 hospital corporations/53 hospitals) and Group B, delayed feedback (41 hospital corporations/50 hospitals) with results scheduled for release to hospitals in the fall of 2004. A computer-generated randomization schedule was utilized and hospital corporations were stratified by type: teaching, community and small.

The investigators randomized the participating hospital corporations to different stages of feedback to allow evaluation of the effectiveness of this form of quality improvement activity. The research team understands that some participating hospitals may be disappointed to be receiving delayed feedback but hope that they will understand the rationale for this type of study design and the need for careful evaluation of the usefulness of health care report cards.

The information in this report is based on the 44 hospital corporations randomized to receive **early** clinical data feedback. Data are still being collected from the 41 hospital corporations randomized to receive delayed feedback and will be released in the fall of 2004.

Preliminary Data

All Group A (early feedback) hospitals included in the report card tables were provided with an individual preliminary report in the fall of 2003 (EFFECT Study Phase I—Preliminary Findings) for review before inclusion in this report. The report included an overview of the EFFECT Study and the organization's individual data along with the appropriate overall and group averages. For example, teaching hospitals received the average for the teaching hospitals, community hospitals received the average for the community hospitals, and small hospitals received the average for the small hospitals. The preliminary report was couriered to the hospitals on November 7, 2003.

Participating Hospitals

All hospitals in Ontario that treated 30 or more AMI and CHF patients in fiscal 1999/00 and 2000/01 were invited to participate in the EFFECT Study. A letter of invitation was sent to the CEO and Chief of Staff at each of these hospitals. Eighty-five hospital corporations, consisting of 103 individual hospital sites, met these criteria. All consented to participate. The CEO at each hospital corporation identified a clinical and an administrative contact to act as CCORT/EFFECT liaisons during the study. Appendix B provides a list of the participating hospital corporations.

Hospital Peer Groups

The participating hospitals are grouped according to the Ontario Joint Policy and Planning Committee (JPPC)* defined peer groups of:

- Teaching Hospitals
- Community Hospitals
- Small Hospitals

**The JPPC now refers to Community Hospitals as Large Hospitals*

Data Collection/Chart Abstraction

Study Sample

The patient cohort consists of a target sample of approximately 125 AMI and 125 CHF patients per hospital. The final sample size varies across hospitals, due to the number of available cases and the fact that some patient charts could not be located at the time of abstraction. For hospitals that had over 125 cases per diagnosis, a random sample was selected. For hospitals with less than or equal to 125 cases per diagnosis, all cases were selected.

At the start of the study, the target sample size was higher (n=200) at each hospital. The sample size was subsequently reduced due to escalation in the cost of chart abstraction.

All patients were identified based on 1999/2000 and 2000/2001 hospital discharges in the Canadian Institute for Health Information (CIHI) Discharge Abstract Database (DAD) with a most responsible diagnosis of AMI (ICD-9 code 410) or CHF (ICD-9 code 428). Approximately 13,000 charts were identified from the CIHI DAD for abstraction of clinical data as part of the early clinical feedback for Group A hospitals in the EFFECT Study Phase I. Report 1 (6,727 AMI charts and 6,450 CHF charts). Applying the exclusion criteria defined in Table 1 further refined the sample.

Table 1. Patient Identification Criteria *(based on CIHI administrative data)*

EFFECT Study—Patient Identification Criteria		
#	**AMI**	**CHF**
Inclusion Criteria		
1.	Most responsible diagnosis of acute myocardial infarction (ICD-9 code 410)	Most responsible diagnosis of heart failure (ICD-9 code 428)
Exclusion Criteria		
1.	Not admitted to an acute care hospital	Not admitted to an acute care hospital
2.	Age < 20 or > 105 years	Age < 20 or > 105 years
3.	Invalid health card number	Invalid health card number
4.	Admitted to non-cardiac surgical service	Admitted to surgical service
5.	Transferred from another acute care facility	Transferred from another acute care facility
6.	AMI coded as an in-hospital complication	CHF coded as an in-hospital complication
7.	AMI admission within the past year	CHF admission within the past three years

The exclusion criteria are similar to those used in the 1999 *ICES Cardiovascular Atlas*.[6,38] The rationale for these criteria are described in the literature.[40]

Additional criteria shown in Table 2 were applied to further confirm the diagnosis of AMI or CHF and its timing as part of the chart abstraction process.

Table 2. Additional Selection Criteria *(based on chart review)*

EFFECT Study—Additional Selection Criteria		
#	**AMI**	**CHF**
Inclusion Criteria		
1.	European Society of Cardiology/American College of Cardiology (ESC/ACC) clinical criteria indicating an MI[41] (ECG changes, symptoms, enzymes)	Meet Framingham criteria for CHF[42]
2.	Timing of the MI—must have occurred before the patient arrived at hospital	Timing of CHF—must have occurred before the patient arrived at hospital
Exclusion Criteria		
1.	Transferred from another acute care facility	Transferred from another acute care facility

After removal of cases determined not to be AMI or CHF according to the pre-defined study inclusion/ exclusion criteria identified in Tables 1 and 2, the final AMI sample size was 5,958 (89% of the original AMI charts identified from the CIHI DAD), and the final CHF sample size was 5,296 (82% of the original CHF charts identified from the CIHI DAD).

The investigators focused on achieving a high level of specificity (i.e. 100%) in constructing the cohort for the study. Hospitals with a low percentage of qualifying patients should consider reviewing their coding practices as this may indicate some patients coded as having an AMI or CHF did not in fact merit this diagnosis according to conventional clinical criteria. For example, if a hospital's study sample consisted of 135 charts but the percentage of qualifying charts was significantly lower, a review of coding practices may be warranted.

Clinical Data Collection via Chart Abstraction

CCORT cardiac research nurses completed the chart abstraction of the clinical data for Group A (early feedback) during May 2002 through August 2003. To assist the nurse abstractors in the collection of data, the EFFECT Study team developed a detailed EFFECT chart abstraction manual. The nurse abstractors (24 in total) were trained to abstract demographic and clinical information by the lead EFFECT nurse research coordinators. In preparation for the training session, nurse abstractors reviewed the EFFECT chart abstraction manual. They then completed an intensive three-day EFFECT training program in Toronto. A number of the nurse abstractors had also worked on the prior pilot studies. New abstractors were then assigned in the field with experienced abstractors for two to four days. Inter-rater reliability testing was performed for all abstractors on a common set of charts and demonstrated high reliability for all the indicators included in this report.

The abstracted information was directly entered into a notebook computer using the EFFECT Microsoft ACCESS application and was compiled and analyzed by EFFECT Study statisticians. Data quality assessments were performed to ensure consistency of abstracted data elements.

Privacy and Data Security

In addition to obtaining approval from the CEO and the Chief of Staff to participate in the study, participating hospitals' Research Ethics Boards (REB) were approached to review and approve the study where required.

Data confidentiality and security were safeguarded throughout the EFFECT Study. To ensure patient confidentiality, **no** patient specific identifiers were abstracted. Each nurse abstractor utilized a password-protected notebook computer. All data obtained from chart review were entered directly into a password-protected, computer-based electronic data collection tool. Collected data were kept strictly confidential. All data were retrieved and maintained on a secure server at ICES.

The importance of maintaining the privacy and security of the collected data was emphasized within the EFFECT chart abstraction manual, during the abstractors' training program, and throughout the course of the study. Nurse abstractors were also required to sign an ICES confidentiality agreement before commencing work on the study.

Quality Indicators

Many of the variables documented within the EFFECT report cards consist of quality indicators. Quality indicators are defined as measurement tools for assessing structure, processes and outcomes of care.[43] In this context, structure refers to static or technical aspects of care (e.g. attributes of service providers or organizational characteristics), processes refer to the steps taken in caring for the patient and outcomes refer to the impact on the health status of patients or populations.[44] It should be noted that indicators are distinct from practice guidelines. Indicators are intended to measure aggregate patterns; guidelines suggest optimal practice for individual patients.[44]

Quality indicators may be defined on the basis of scientific evidence or by clinical experts in the field and should be ultimately linked to improved patient outcomes.[45] They can be used to identify strengths and weaknesses in existing practice patterns and serve as a foundation for interprovincial, interregional and

interhospital comparative studies of the quality of care. Selected indicators may also assist in local hospital quality improvement initiatives and guide physician education programs.

Expert Panels

For this study, two national, multi-disciplinary expert panels were assembled to develop a set of Canadian AMI and CHF quality indicators—the CCORT/Canadian Cardiovascular Society (CCS) AMI Quality Indicator panel and the CCORT/CCS CHF Quality Indicator panel. The resulting quality indicators form the basis of the EFFECT AMI and CHF report cards. The nominating societies for the expert panels included the HSF, the Canadian Society of Internal Medicine, the College of Family Physicians of Canada, the Canadian Society of Hospital Pharmacists and the CCS. The AMI panel consisted of nine members including cardiologists, an internist, a family practitioner and a clinical pharmacist and was supported by two co-chairs. The CHF panel consisted of eleven members including cardiologists (with an interest in CHF), an internist, a family physician, a heart failure nurse and a clinical pharmacist and was supported by two co-chairs.

The AMI and CHF Quality Indicator expert panels were initiated in April 2001 and were convened over a 10-month period. Potential quality indicators were identified by a detailed search of published guidelines, randomized trials and outcomes studies. The panels followed a two-step Delphi process with an initial screening round of indicator ratings, followed by a national quality indicator panel meeting, where definitions of the indicators were developed using consensus methods.

The quality indicators used in the EFFECT Study are **process of care indicators,** not outcome indicators. Process of care indicators were selected because they are readily modifiable and are within the clinical team's control and influence. Process of care indicators are also more sensitive to variations in the quality of care across hospitals as compared to outcome indicators. Outcome indicators such as mortality rates may reflect factors outside clinical team's control (i.e. time to hospital arrival, socio-economic status and random variation).

The process of care quality indicators developed by the two panels are documented in Tables 3 and 4 and have been published in the *Canadian Journal of Cardiology*. The indicators were designed to be measurable using retrospective chart review and/or linkage with existing administrative databases.[44] For each quality indicator the expert panel also determined the benchmark/target utilization level for ideal patients. These targets are set at less than 100% in recognition of the fact that contraindications to an intervention are not always captured in the indicator definitions. Further, it is recognized that suggested target levels may not be achievable at all hospitals. For example, lack of access to a service such as echocardiography or cardiac catheterization facilities may limit performance of some hospitals for some indicators. Benchmarks for appropriate levels of utilization may assist in identifying outlier organizations that require improvement and may help increase our understanding of factors contributing to variations in disease outcomes.[44]

Table 3. CCORT/CCS AMI Process of Care Quality Indicators

CCORT/CCS AMI Process of Care Quality Indicators		
#	Process of Care Quality Indicator*	Benchmark/Target Level for **Ideal Patients****
1.	ASA within six hours of hospital admission	≥ 90%
2.	ASA prescribed at hospital discharge	≥ 90%
3.	Reperfusion with thrombolytics	≥ 85%
4.	Median "door to needle" time for thrombolytics	≤ 30 minutes
5.	Beta-blocker within 12 hours of admission	≥ 85%
6.	Beta-blocker prescribed at discharge	≥ 85%
7.	ACE inhibitors prescribed at discharge	≥ 85%
8.	Lipid measurement within 24 hours of admission	≥ 85%
9.	Statin prescribed at discharge	≥ 70%

* Quality Indicators are defined in the data dictionary found in Appendix C.

** Ideal patients are those without contraindications to the intervention—for more detail refer to the section entitled "Patient Groups" found later in this section.

Table 4. CCORT/CCS CHF Process of Care Quality Indicators

CCORT/CCS CHF Process of Care Quality Indicators		
#	Process of Care Quality Indicator*	Benchmark/Target Level for **Ideal Patients****
1.	ACE inihibitor prescription at discharge	≥ 85%
2.	Beta-blocker at hospital discharge	≥ 50%
3.	Warfarin for atrial fibrillation at hospital discharge	≥ 85%
4.	LV function evaluation before or during admission	≥ 75%
5.	Weights measured/recorded ≥ 50% of in-hospital days	≥ 90%
6.	Discharge instructions re discharge medications‡	≥ 90%
7.	Discharge instructions re salt/fluid restriction‡	≥ 90%
8.	Discharge instructions re daily weight monitoring‡	≥ 90%
9.	Discharge instructions re symptoms of worsening heart failure‡	≥ 90%
10.	Discharge instructions re follow up appointment‡	≥ 90%

* Quality Indicators are defined in the data dictionary found in Appendix C.

** Ideal patients are those without contraindications to the intervention—for more detail refer to the section entitled "Patient Groups" found later in this chapter.

‡ Indicators #6–#10 were combined to form a single indicator in the EFFECT Study entitled Documented Counselling.

EFFECT Technical Advisory Committee

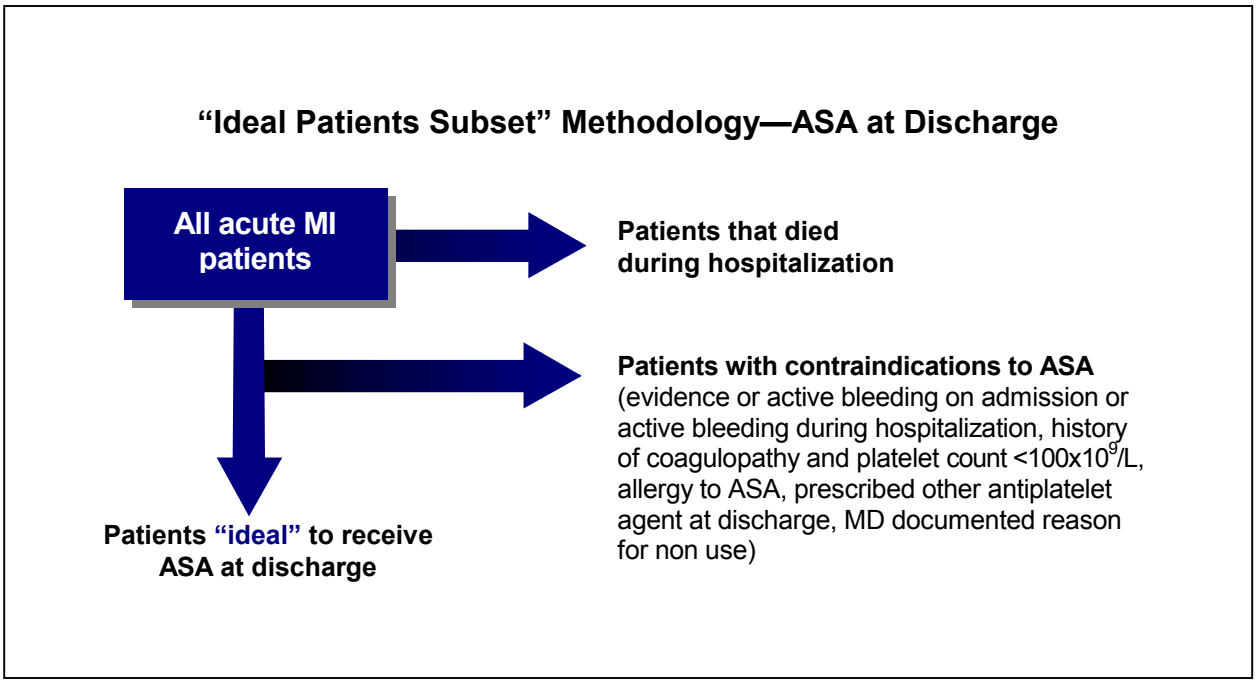
A Technical Advisory Committee was established in November 2002 to provide feedback on preliminary data findings and to provide input on the AMI and CHF quality indicators and their usefulness for Ontario physicians and hospitals. The Committee reviewed all of the AMI and CHF quality indicators and recommended a final list of indicators for inclusion in the EFFECT report cards. The committee was comprised of eight physician representatives of hospitals participating in the EFFECT Study and four ICES physician scientists. (See page ii.)

Patient Groups

Discussion of the quality indicators incorporates two patient groups. (See Figure 1.)

- **All patients**: Patients who have the particular condition of interest, e.g. AMI or CHF, and are alive at the point of intervention.
- **Ideal patients**: Patients who have the particular condition of interest, are without contraindications for a specific intervention, treatment or measured outcome and are alive at the point of intervention.

Figure 1. An Example of the "Ideal Patients Subset" Methodology Applied to the ASA at Discharge Indicator for AMI



Each of these patient groups is further described in the following example in Table 5 of AMI patients who received ASA at discharge.

Table 5. Patient Groups—AMI Example

AMI Patients Who Received ASA at Discharge	
All Patients	All patients who had an AMI according to the study inclusion criteria excluding those patients who died during hospitalization
Ideal Patients	All AMI patients who qualified per the inclusion criteria, were alive at discharge, and were without contraindications to ASA therapy, e.g. excludes patients with active bleeding and patients with a sensitivity/allergy to ASA.

Detailed information regarding each quality indicator, the definitions for "all" and "ideal" patients and the exclusion criteria are provided in the data dictionary in Appendix C.

Report Card Contents

The AMI and CHF report cards are comprised of the components outlined in Table 6.

Table 6. EFFECT Report Card Contents

#	AMI	CHF
1.	Demographics	Demographics
2.	Cardiac Risk Factors	Cardiac Risk Factors
3.	Standard Admitting Orders	Past Medical History
4.	Reperfusion Therapy*	Left Ventricular Function*
5.	Left Ventricular Function	Medication Utilization*
6.	Lipid Testing*	Daily Weights*
7.	Troponin Testing	Documented Counselling*
8.	Medication Utilization*	Hospital Care
9.	Hospital Care	Follow up Care
10.	Length of Stay	Length of Stay

* Denotes this section includes identified quality indicators

While additional data were collected as part of the chart review process, the data presented in the report cards were determined to be the most relevant and useful by the EFFECT Technical Advisory Committee and the practising physicians on the EFFECT Study team. Additional data will be reported from the study database in peer reviewed journals and other publications. Definitions of each report card variable are provided in Appendix C and a Glossary of Terms is provided in Appendix D.

Reperfusion Therapy

In the AMI Report Card, the quality indicators for Reperfusion Therapy focus specifically on the subset of patients who suffered an ST-segment Elevation MI (STEMI). The admitting and diagnostic ECGs were read by the nurse abstractors and were considered STEMIs if there was $\geq$ 1mm of ST-segment elevation in two or more contiguous leads. All other AMI indicators refer to all AMI patients in the cohort.

Statistical Analysis

To improve readability of the report, confidence intervals have not been provided.

3. Findings

This section outlines the results of the analysis of the clinical data collected from the chart abstraction process for the 44 organizations randomized to receive early feedback. These findings are summarized in the accompanying AMI and CHF report card tables. For multi-site organizations, the data are presented at the corporate level only. The information is presented collectively for the AMI portion of the cohort in the AMI Report Card, followed by the CHF portion of the cohort in the CHF Report Card.

AMI Report Card

The AMI Report Card consists of ten topics presented in the following four sections:

- Demographics, Cardiac Risk Factors and Standard Admitting Orders
- Reperfusion Therapy and Diagnostic Testing
- Medication Utilization
- Hospital Care and Length of Stay

Three topics involve quality indicators: Reperfusion Therapy, Lipid Testing and Medication Utilization.

The key findings for AMI are presented below, followed by a description of each component of the AMI Report Card and the associated data.

Key Findings—AMI Care

- **Most (80%) Ontario AMI patients have at least one modifiable cardiac risk factor**—similar to the rates reported in a recent U.S. study.[1] Thirty-three percent of AMI patients in the EFFECT Study were current smokers, 44% were hypertensive, 31% had hyperlipidemia and 26% were diabetic.
- **Median "door to needle" time** for thrombolytic reperfusion therapy in Ontario hospitals is 37 minutes and approaching the target of $\leq$ 30 minutes.[2] The "door to needle" times were 11 minutes less when the Emergency physician made the decision to administer thrombolytic therapy and 10 minutes less when thrombolytic therapy was administered in the Emergency Department rather than in CCU/ICU.
- **Aggregate secondary prevention rate of 79%** in ideal patients is good overall (target is $\geq$ 85%). However, approximately one in five Ontario AMI patients did not receive acetylsalicylic acid (ASA), beta-blockers, angiotensin converting enzyme (ACE) inhibitors or statins at hospital discharge when they were clinically indicated.
- **The 30-day mortality rate was 12% and the one-year-mortality rate was 20%** for AMI patients in the EFFECT Study. The one-year AMI re-admission rate was 11%.

AMI Care Areas Identified for Continued Improvement

- **Reperfusion therapy** could be made available to more patients—41% of patients presenting with ST-segment elevation MI (STEMI) did not receive this therapy.
- **"Door to needle" time** could be improved at a number of hospitals by ensuring thrombolytic therapy is initiated by the Emergency physician in the Emergency department rather than by a consultant or after transfer to CCU/ICU.
- **Lipid testing within the first 24 hours** of admission could be improved from the current level of 36%—target level is $\geq$ 85%.
- **Early administration of ASA and beta-blockers** in ideal patients warrants improvement, as does the rate of secondary prevention (ASA, beta-blockers, ACE inhibitors and statins) at many Ontario hospitals. Increased use of standard admitting orders and/or discharge plans could lead to higher utilization rates.

The AMI Report Card findings are presented in Tables 7 to 10. **The AMI Report Card summary table including all variables and all 44 Group A organizations randomized to receive early feedback is provided in Table 11 (pull-out), following Appendix G** and is also available on the CCORT web site (www.ccort.ca/effect.asp) as a four-page document entitled Exhibit 1.

Demographics, Cardiac Risk Factors and Standard Admitting Orders

The first set of variables for AMI is presented in Table 7.

1. Demographics

In terms of demographics, the median age of the AMI cohort was 69 years, and 35% were female with relative similarities among the 44 hospital corporations.

2. Cardiac Risk Factors

Of the four major cardiac risk factors, 33% of these Ontario AMI patients were current smokers, 44% were hypertensive, 31% had hyperlipidemia and 26% were diabetic. Overall, 80% of the AMI patients had one or more modifiable cardiac risk factors. This is similar to that reported in two recent *JAMA* articles.[1,46]

3. Standard Admitting Orders

On average 71% of AMI patients were managed using Standard Admitting Orders. The rate of utilization was lowest among the teaching hospitals and highest among the community hospitals. Eleven organizations used standard admitting orders for $\geq$ 90% of their AMI patients. In this study, increased use of standard admitting orders is associated with increased a) use of lipid testing and b) administration of beta-blockers, and could help increase compliance with quality indicators. Lipid testing was on average 8% higher in patients admitted with standard admitting orders. Beta-blocker usage on admission was on average 7% higher in patients admitted with standard admitting orders and beta-blocker usage at discharge was 8% higher.

Table 7. AMI Report Card—Demographics, Cardiac Risk Factors and Standard Admitting Orders

CCORT EFFECT Study — AMI Report Card — January, 2004													
		1		2	3	4	5	6	7	8	9	10	11
						Patient Demographics		Cardiac Risk Factors (%)					
#	Hospital	Study Sample (n)		Qualified (n)	Qualified (%)	Age (Median)	Female (%)	Current Smoker	Hypertension	Hyperlipidemia	Diabetes	Patients with ≥ 1 Cardiac Risk Factor	Standard Admitting Orders Used (%)
Teaching Hospitals													
1	*Hamilton Health Sciences Corporation	401		371	93	72	38	30	51	38	26	82	42
2	Kingston General Hospital	136		109	80	68	33	30	50	23	23	80	72
3	Mount Sinai Hospital, Toronto	131		120	92	75	35	28	47	38	23	85	3
4	St. Joseph's Healthcare, Hamilton	129		122	95	69	34	28	52	37	29	83	64
5	St. Michael's Hospital, Toronto	127		108	85	69	38	36	44	38	25	81	57
	Teaching Hospitals Total/Average	**924**		**830**	**90**	**71**	**36**	**30**	**49**	**36**	**25**	**82**	**45**
Community Hospitals													
6	Brantford General Hospital	134		124	93	68	37	36	43	31	31	81	77
7	Brockville General Hospital	133		113	85	67	34	35	47	31	25	81	50
8	Cambridge Memorial Hospital	136		129	95	68	31	30	54	40	26	84	94
9	Credit Valley Hospital, The, Mississauga	135		132	98	66	36	30	44	31	23	77	65
10	*Grey Bruce Health Services	198		183	92	72	38	25	43	31	28	75	67
11	*Halton Healthcare Service Corporation	288		264	92	66	30	39	40	35	23	81	81
12	Headwaters Health Care Centre, Orangeville	137		122	89	70	32	27	40	45	17	81	77
13	Hôpital Montfort, Ottawa	133		112	84	70	45	37	44	27	25	80	44
14	*Hôpital Regional de Sudbury Regional Hospital	131		99	76	66	38	45	54	40	26	84	29
15	Hotel Dieu Hospital, Cornwall	137		113	82	67	37	27	44	19	30	76	85
16	*Lakeridge Health Corporation	265		240	91	69	37	38	45	30	24	78	59
17	Norfolk General Hospital, Simcoe	136		121	89	72	38	31	48	27	21	79	93
18	North Bay General Health Centre	136		120	88	68	41	31	50	33	28	83	88
19	Orillia Soldiers' Memorial Hospital	137		112	82	70	36	49	40	33	21	85	85
20	Pembroke General Hospital	134		110	82	68	35	29	47	26	17	78	35
21	Peterborough Regional Health Ctr/Civic Hospital	135		122	90	72	47	26	36	31	19	73	91
22	*Quinte Healthcare Corporation	351		302	86	67	36	34	42	29	27	78	69
23	Ross Memorial Hospital, Lindsay	133		124	93	72	37	23	45	31	22	73	77
24	*Rouge Valley Health System	259		241	93	65	33	45	35	31	30	82	88
25	*Scarborough Hospital, The	395		358	91	69	32	33	48	32	27	83	75
26	South Muskoka Memorial Hospital, Bracebridge	134		114	85	69	31	34	35	30	21	78	100
27	St. Mary's General Hospital, Kitchener	131		124	95	70	31	30	37	23	27	79	93
28	Stratford General Hospital	134		131	98	73	40	21	44	21	29	72	43
29	Strathroy Middlesex General Hospital	129		119	92	69	34	25	40	15	31	70	87
30	Timmins and District General Hospital	134		106	79	64	35	48	54	42	19	86	79
31	Trillium Health Centre, Mississauga	127		122	96	66	34	25	46	28	30	77	92
32	West Lincoln Memorial Hospital, Grimsby	137		128	93	70	30	27	56	34	20	82	89
33	West Parry Sound Health Centre	98		88	90	66	31	30	43	34	32	77	100
34	Winchester District Memorial Hospital	131		120	92	65	28	34	29	26	28	77	90
35	Windsor Hotel-Dieu Grace Hospital	134		106	79	67	37	37	40	33	29	85	86
36	Windsor Regional Hospital	136		117	86	65	36	50	38	31	24	83	97
37	Woodstock General Hospital	140		138	99	73	42	25	53	23	30	82	80
	Community Hospitals Total/Average	**5,208**		**4,654**	**89**	**69**	**35**	**33**	**44**	**30**	**26**	**79**	**77**
Small Hospitals													
38	Alexandra Marine & General Hospital, Goderich	95		77	81	73	38	23	48	36	35	78	87
39	Arnprior District Memorial Hospital, The	80		70	88	71	29	36	40	19	23	77	3
40	Espanola General Hospital	59		51	86	61	49	33	37	27	33	82	2
41	Haldimand War Memorial Hospital, Dunnville	64		57	89	70	30	35	28	11	26	68	51
42	Hanover and District Hospital	69		60	87	74	40	22	40	17	20	63	83
43	Lennox and Addington County General Hospital	94		73	78	68	34	37	44	27	26	86	95
44	Stevenson Memorial Hospital, Alliston	134		86	64	64	30	47	33	21	22	78	93
	Small Hospitals Total/Average	**595**		**474**	**80**	**69**	**35**	**34**	**39**	**23**	**26**	**77**	**63**
	Overall Total/Average	**6,727**		**5,958**	**89**	**69**	**35**	**33**	**44**	**31**	**26**	**80**	**71**

Report card based on 1999-2001 data.
Hospital Groupings: Categories as per JPPC peer groups. Multi-site organizations reported at the corporate level.
* indicates a multi-site corporation.
Study Sample: The number of charts reviewed as part of the chart abstraction process.
Qualified: The number of charts in the study sample that met the ESC/ACC & EFFECT AMI inclusion criteria.

Reperfusion Therapy and Diagnostic Testing

The second set of variables, focusing on reperfusion therapy and diagnostic testing are summarized in Table 8.

1. Reperfusion Therapy

Reperfusion Therapy (treatment aimed at restoring blood flow through an acutely blocked coronary artery) data focuses specifically on those patients with an ST-segment elevation myocardial infarction (STEMI). Timely administration of reperfusion therapy is associated with a substantial reduction in AMI patient mortality. Reperfusion therapy methods include:

- Thrombolytic therapy: administration of a medication intravenously to dissolve a blockage/blood clot in a coronary artery;
- Percutaneous Coronary Intervention (PCI also known as angioplasty or Percutaneous Transluminal Coronary Angioplasty): insertion of a balloon catheter into the blocked coronary artery to restore blood flow.

Fifty-nine percent of patients with a STEMI received acute reperfusion therapy. Of these patients, 99% received thrombolytics and 3% received PCI within 24 hours of admission. It should be noted that a relatively small number of Ontario hospitals have the capability to provide PCI. The PCI rates in Table 8 include patients who received PCI as the only reperfusion method (primary PCI) and those who received rescue PCI following failed thrombolytic therapy.

The remaining 41% of STEMI patients did not receive reperfusion therapy. This could reflect later hospital arrival after symptom onset or contraindications to reperfusion therapy, concern about its use in the elderly, or missed opportunities to provide this therapy. Hospital-specific reperfusion rates in STEMI patients are not reported as it was not always possible to determine the timeframe of symptom onset to hospital arrival from the chart review process, and thus, identification of ideal candidates who should have received this therapy.

As a comparison, the Global Registry of Acute Coronary Events (GRACE) registry involving 94 hospitals in 14 countries, found that 30% of AMI patients with STEMI did not receive reperfusion therapy.[47] These investigators found that under-use of reperfusion therapy occurred in those who might have benefited most, including the elderly (age > 75 years), and patients with diabetes, CHF or prior bypass surgery.[48]

The National Registry for Myocardial Infarction (NRMI) from the United States, reported that 30% of STEMI patients did not receive reperfusion therapy.[49]

The rates reported in these two registries (GRACE, NRMI) may be higher than in Ontario as they involve highly selected institutions and may not have captured all AMI patients (e.g., non-CCU/ICU patients which represent approximately 15% of AMI patients in Ontario).

Thrombolytic therapy is time-sensitive, with better outcomes being achieved with shorter “door to needle” times. The quality indicator for thrombolytic therapy is known as door to needle time representing the time period initiated by the patient’s arrival in the Emergency department (door) and completed at the time the thrombolytic medication is administered (needle) with the target being a median time of $\leq$ 30 minutes.[2]

The median hospital door to needle time for thrombolytic therapy was 37 minutes, with a range of 27 minutes to 78 minutes. Four organizations achieved a median door to needle time of less than 30 minutes with another eight hospitals achieving a median door to needle time of 30 minutes. As noted in Table 8, the overall median time **is above** the recommended time frame of less than or equal to 30 minutes, and represents an opportunity for some organizations to implement initiatives to improve delivery of this important therapy.

In approximately two-thirds of the cases (64%), the Emergency physician made the decision to administer the thrombolytics. The majority of these patients (82%) received thrombolytic therapy within the Emergency Department.

Table 8. AMI Report Card—Reperfusion Therapy and Diagnostic Testing

CCORT EFFECT Study — AMI Report Card — January, 2004										
		1	2	3	4	5	6	7	8	9
		Quality Indicators								
		Reperfusion Therapy								Lab
		Method** (%)		Thrombolytics Decided By (%)	Thrombolytics Location (%)	Thrombolytics "Door to Needle" Time (Median)	Left Ventricular (LV) Function (%)		Lipid Testing	
#	Hospital	Thrombolytics	PCI	Emergency MD	Emergency		LV Function Determined	Patients with Low LV Function	Lipid Sample Obtained within 24 hrs of Admission (%)	Troponin Done (%)
	Quality Indicator Benchmark/Target					**≤ 30**	**≥ 75%**		**≥ 85%**	
Teaching Hospitals										
1	*Hamilton Health Sciences Corporation	97	10	75	100	0:37	67	42	54	99
2	Kingston General Hospital	80	40	100	100	0:41	79	44	52	62
3	Mount Sinai Hospital, Toronto	88	24	82	95	0:30	71	38	50	21
4	St. Joseph's Healthcare, Hamilton	100	0	83	94	0:50	43	31	48	100
5	St. Michael's Hospital, Toronto	75	35	27	100	0:44	80	37	46	99
	Teaching Hospitals Total/Average	**91**	**17**	**77**	**98**	**0:38**	**67**	**40**	**51**	**83**
Community Hospitals										
6	Brantford General Hospital	100	0	34	13	0:44	65	23	20	70
7	Brockville General Hospital	100	0	56	77	0:30	12	11	56	0
8	Cambridge Memorial Hospital	100	0	63	97	0:30	54	36	84	22
9	Credit Valley Hospital, The, Mississauga	100	0	76	88	0:27	61	32	61	92
10	*Grey Bruce Health Services	100	0	66	97	0:35	36	16	17	89
11	*Halton Healthcare Service Corporation	100	0	74	100	0:28	71	33	55	63
12	Headwaters Health Care Centre, Orangeville	100	0	0	3	0:46	54	35	50	67
13	Hôpital Montfort, Ottawa	100	0	46	100	0:37	41	14	34	22
14	*Hôpital Regional de Sudbury Regional Hospital	93	27	84	100	0:44	64	37	13	0
15	Hotel Dieu Hospital, Cornwall	100	0	58	58	0:47	30	29	28	78
16	*Lakeridge Health Corporation	100	0	54	89	0:33	47	40	38	85
17	Norfolk General Hospital, Simcoe	100	0	16	3	0:41	29	24	12	21
18	North Bay General Health Centre	100	0	86	97	0:27	83	37	86	22
19	Orillia Soldiers' Memorial Hospital	100	0	75	78	0:30	33	14	4	92
20	Pembroke General Hospital	100	0	45	100	0:38	73	13	54	22
21	Peterborough Regional Health Ctr/Civic Hospital	100	0	50	97	0:35	2	0	1	16
22	*Quinte Healthcare Corporation	100	0	70	95	0:35	24	46	13	3
23	Ross Memorial Hospital, Lindsay	100	0	64	88	0:30	34	29	5	96
24	*Rouge Valley Health System	100	0	57	97	0:36	63	34	61	79
25	*Scarborough Hospital, The	100	0	84	94	0:41	65	37	43	84
26	South Muskoka Memorial Hospital, Bracebridge	100	0	32	60	0:35	46	27	33	32
27	St. Mary's General Hospital, Kitchener	100	0	84	97	0:30	73	49	51	29
28	Stratford General Hospital	100	0	39	9	0:32	2	0	57	77
29	Strathroy Middlesex General Hospital	100	0	33	0	0:38	2	100	16	5
30	Timmins and District General Hospital	100	0	78	100	0:27	47	23	47	62
31	Trillium Health Centre, Mississauga	100	0	45	100	0:35	85	32	23	62
32	West Lincoln Memorial Hospital, Grimsby	100	0	33	60	0:30	34	13	2	2
33	West Parry Sound Health Centre	100	0	86	95	0:34	43	11	27	0
34	Winchester District Memorial Hospital	100	0	15	83	0:50	19	31	15	18
35	Windsor Hotel-Dieu Grace Hospital	100	0	88	91	0:39	67	51	26	100
36	Windsor Regional Hospital	100	0	82	97	0:38	57	36	26	16
37	Woodstock General Hospital	100	0	42	48	1:00	39	35	44	12
	Community Hospitals Total/Average	**100**	**1**	**59**	**79**	**0:37**	**47**	**32**	**36**	**49**
Small Hospitals										
38	Alexandra Marine & General Hospital, Goderich	100	0	90	100	0:45	62	38	47	90
39	Arnprior District Memorial Hospital, The	100	0	100	100	0:50	54	18	39	56
40	Espanola General Hospital	100	0	83	92	1:18	6	67	18	100
41	Haldimand War Memorial Hospital, Dunnville	100	0	90	100	0:36	2	0	19	33
42	Hanover and District Hospital	100	0	95	74	0:30	15	17	17	23
43	Lennox and Addington County General Hospital	100	0	100	100	0:40	12	33	1	3
44	Stevenson Memorial Hospital, Alliston	100	0	84	97	0:40	44	24	2	0
	Small Hospitals Total/Average	**100**	**0**	**92**	**95**	**0:40**	**31**	**28**	**20**	**41**
	Overall Total/Average	**99**	**3**	**64**	**82**	**0:37**	**48**	**33**	**36**	**53**

* indicates a multi-site corporation

Reperfusion Therapy refers only to patients with ST-segment Elevation MI (STEMI)

- Reperfusion Method: **Refers to patients who received Thrombolytics and/or PCI within 24 hours of arrival. Numbers may add to greater than 100 as some patients receive both thrombolytics and PCI

- Thrombolytics door to needle time: Refers only to patients who received Thrombolytics in ≤ 4 hours of arrival.

PCI: Percutaneous Coronary Intervention

Reperfusion Therapy *(continued)*

The door to needle times were:

- 11 minutes less when the Emergency physician made the decision to administer thrombolytic therapy
- 10 minutes less when thrombolytic therapy was administered in the Emergency Department rather than in CCU/ICU

All hospitals should consider creating a policy to ensure that Emergency physicians have the authority and training to initiate thrombolytic therapy within the Emergency Department.

Primary PCI was used infrequently among the cohort, even though recent studies suggest it offers better outcomes than thrombolytic therapy. This likely reflects the regionalization of PCI in Ontario, with relatively few hospitals having this capability.

2. Diagnostic Testing

Left Ventricular Function

Forty-eight percent of patients had a documented Left Ventricular (LV) function measurement. LV function is most commonly measured using echocardiography. Of those with documented LV function results, 33% have depressed LV function defined as Ejection Fraction of $\leq$ 40% or Grade II-III, III, IV LV function or narrative description of moderate to severe ventricular dysfunction. Measurement of LV function is an important step for initiation of ACE inhibitors, a medication that is identified as a quality indicator for AMI care. The target level for documented LV function measurement is $\geq$ 75%.

Selected Blood Values—Lipid and Troponin Testing

Lipid status within 24 hours of patient admission to hospital was determined in 36% of patients. This is significantly less than the target level of $\geq$ 85% and represents an area for quality improvement initiatives in Ontario. Two organizations had lipid testing rates of over 80%. Teaching hospitals were the most likely to perform lipid testing with an average utilization rate of 51%.

Troponin testing was performed in 53% of cases. Troponin testing, in addition to CK (creatine kinase) has become increasingly common in Ontario, and provides a significant improvement in terms of diagnostic accuracy for AMI due to its specificity for myocyte necrosis. Troponin testing was most commonly used in teaching hospitals in Ontario, where the average utilization rate was 83%.

Lower levels of echocardiography, lipid testing and troponin testing at some hospitals may reflect resource constraints.

Medication Utilization

The third set of AMI variables are presented in Table 9.

For medication utilization in AMI patients, the focus is on two key time periods:

- on admission
- at discharge

The use of medications was examined in terms of two patient groups: a) all patients and b) ideal patients. As described in Methods, Table 5, *ideal patients* are those who are eligible to receive the process of care and do not have any contraindications or other reasons not to receive the process of care.

The use of ASA, ACE inhibitors, beta-blockers and statins are associated with substantial benefits in coronary heart disease patients. See Appendix E for a list of meta-analyses documenting the effectiveness of these interventions. A composite rating based on utilization of these four medications among ideal patients entitled the Secondary Prevention rate was also derived.

Please note that data have been suppressed where the number of ideal patients was less than ten in a given hospital.

1. Medications on Admission

Approximately 70% of all patients received ASA within 6 hours of admission and 25% received beta-blockers within 12 hours of admission. Among ideal patients, ASA use within 6 hours of admission rose to 76% (target ≥ 90%) and beta-blocker usage within 12 hours of admission rose to 30% (target ≥ 85%).

Eighty-nine percent of patients received ASA during their hospital stay, and this figure rose to 91% for ideal patients. Seventy-seven percent of patients received beta-blockers during their hospital stay, and this figure rose to 79% for ideal patients.

These data suggest that more timely administration of ASA and beta-blockers is needed within Ontario hospitals.

2. Medications at Discharge

ASA was prescribed at discharge in 82% of all patients, beta-blockers in 74% of all cases, ACE inhibitors in 61% of all cases and statins were prescribed at discharge in 37% of all cases.

Among ideal patients, ASA was prescribed in 85% of ideal cases, a figure approaching the recommended level of ≥ 90%. Ten organizations had utilization rates of ≥ 90%.

Beta-blockers were prescribed in 78% of ideal cases. On average, the hospitals are approaching the target level of ≥ 85% but some hospitals require additional improvement. Nine organizations met or exceeded the target level of ≥ 85% utilization.

For ACE inhibitors, 72% of ideal cases (with documented Left Ventricular dysfunction) received a prescription, which is significantly below the target level of ≥ 85%. Five organizations met the target of ≥ 85% utilization.

Statins were prescribed at discharge in 61% of ideal cases. The target level is ≥ 70% among patients who have a documented total cholesterol level of ≥ 5.2 mmol/L or LDL cholesterol level of > 3.4 mmol/L. Fifteen organizations achieved the target of ≥ 70% utilization of statins in ideal patients at discharge. It is possible that some physicians chose to give some of their patients a trial of dietary modification before initiating statin therapy, which would be a reasonable course of action in patients with moderately elevated cholesterol levels. However, for patients with high levels of cholesterol, dietary treatment is likely insufficient and should be coupled with statin therapy.

It is important to note that in order to qualify as an ideal patient for ACE inhibitor therapy, the patient needed to have an echocardiogram to determine LV function. For patients to qualify as ideal for statin therapy, the patient needed to have lipid testing to determine cholesterol levels. Thus, the true number of ideal candidates is likely under estimated in the data.

Secondary Prevention Rate

The secondary prevention rate is a composite rating based on the percentage of ideal patients receiving any of the four medications indicated (ASA, beta-blockers, ACE inhibitors, statins). This indicator is 79% on average. Although this rate is encouraging, by improving appropriate utilization of these four medications to maximal levels 178–250 lives could be saved in Ontario—See Appendix E for more details. Hospitals could likely improve their secondary prevention rates by adopting standardized discharge orders/plans for their AMI patients and/or developing reminder systems.

Table 9. AMI Report Card—Medication Utilization

CCORT EFFECT Study — AMI Report Card — January, 2004														
		1	2	3	4	5	6	7	8	9	10	11	12	13
		Quality Indicators												
		Medication Utilization (%)												
		All Patients		Ideal Patients		All Patients				Ideal Patients				Secondary Prevention Rate (%)
#	Hospital	ASA within 6 hours of Admission	Beta-blocker within 12 hours of Admission	ASA within 6 hours of Admission	Beta-blocker within 12 hours of Admission	ASA prescribed at Discharge	Beta-blocker prescribed at Discharge	ACEI prescribed at Discharge	Statin prescribed at Discharge	ASA prescribed at Discharge	Beta-blocker prescribed at Discharge	ACEI prescribed at Discharge	Statin prescribed at Discharge	
	Quality Indicator Benchmark/Target			**≥ 90%**	**≥ 85%**					**≥ 90%**	**≥ 85%**	**≥ 85%**	**≥ 70%**	**≥ 85%**
Teaching Hospitals														
1	*Hamilton Health Sciences Corporation	73	34	82	40	84	78	79	51	89	81	85	74	84
2	Kingston General Hospital	67	20	71	27	90	75	60	37	86	80	66	70	76
3	Mount Sinai Hospital, Toronto	67	36	77	42	92	90	71	54	96	95	77	90	92
4	St. Joseph's Healthcare, Hamilton	80	40	84	53	88	73	82	50	92	77	91	91	89
5	St. Michael's Hospital, Toronto	73	32	83	40	93	80	74	50	95	81	83	81	87
	Teaching Hospitals Total/Average	**72**	**33**	**80**	**40**	**88**	**79**	**75**	**49**	**91**	**83**	**80**	**78**	**85**
Community Hospitals														
6	Brantford General Hospital	77	5	84	7	81	78	73	46	86	85	67	82	81
7	Brockville General Hospital	68	7	76	8	89	72	31	22	90	77	81	21	74
8	Cambridge Memorial Hospital	68	17	81	19	89	83	61	67	93	86	70	82	87
9	Credit Valley Hospital, The, Mississauga	70	37	73	41	75	75	55	53	77	73	76	56	73
10	*Grey Bruce Health Services	70	9	81	13	90	79	53	39	92	79	71	46	85
11	*Halton Healthcare Service Corporation	64	34	67	40	82	84	64	38	85	85	70	63	80
12	Headwaters Health Care Centre, Orangeville	70	14	79	18	83	76	62	49	84	78	70	67	79
13	Hôpital Montfort, Ottawa	63	23	70	29	81	77	56	34	83	84	79	71	81
14	*Hôpital Regional de Sudbury Regional Hospital	73	43	81	48	83	78	55	42	85	77	61	83	77
15	Hotel Dieu Hospital, Cornwall	73	7	82	8	74	65	57	34	80	71	67	64	75
16	*Lakeridge Health Corporation	68	13	71	13	82	79	65	30	83	78	69	59	79
17	Norfolk General Hospital, Simcoe	72	20	83	22	76	68	51	25	81	74	89	54	75
18	North Bay General Health Centre	70	48	77	59	85	78	78	41	88	82	86	64	82
19	Orillia Soldiers' Memorial Hospital	75	11	81	19	83	87	42	36	84	92	64		84
20	Pembroke General Hospital	80	25	89	32	86	63	63	50	90	68	53	65	78
21	Peterborough Regional Health Ctr/Civic Hospital	63	17	70	27	81	73	42	20	86	77	52		79
22	*Quinte Healthcare Corporation	66	24	76	26	73	68	50	26	75	70	63	57	72
23	Ross Memorial Hospital, Lindsay	61	8	69	10	83	56	63	32	83	64	81		77
24	*Rouge Valley Health System	71	36	77	41	80	77	57	55	83	86	64	73	80
25	*Scarborough Hospital, The	69	27	74	36	77	76	72	37	81	78	74	49	76
26	South Muskoka Memorial Hospital, Bracebridge	84	34	89	34	89	80	61	27	89	80	82	44	82
27	St. Mary's General Hospital, Kitchener	70	25	76	36	84	81	68	33	89	85	81	63	83
28	Stratford General Hospital	75	25	78	30	85	77	75	49	87	85	67	79	83
29	Strathroy Middlesex General Hospital	66	23	73	27	82	68	43	17	83	72	72	31	76
30	Timmins and District General Hospital	83	44	90	53	89	76	50	37	91	80	59	60	83
31	Trillium Health Centre, Mississauga	63	29	72	36	81	71	57	26	84	69	78	40	78
32	West Lincoln Memorial Hospital, Grimsby	72	19	79	24	70	68	65	25	71	73	77		73
33	West Parry Sound Health Centre	90	36	94	38	94	79	70	44	96	77		74	87
34	Winchester District Memorial Hospital	64	10	67	8	72	61	67	35	74	60	100	75	73
35	Windsor Hotel-Dieu Grace Hospital	61	19	59	20	81	80	67	49	81	81	77	82	82
36	Windsor Regional Hospital	72	28	73	33	77	77	74	31	79	78	79	61	74
37	Woodstock General Hospital	74	16	79	18	83	63	48	14	83	72	65	6	73
	Community Hospitals Total/Average	**70**	**24**	**76**	**28**	**81**	**74**	**59**	**36**	**84**	**78**	**72**	**60**	**79**
Small Hospitals														
38	Alexandra Marine & General Hospital, Goderich	76	17	89	25	81	62	85	47	81	85	82	80	83
39	Arnprior District Memorial Hospital, The	77	21	79	29	73	81	31	13	75	83	50	25	72
40	Espanola General Hospital	60	23	62	25	84	67	25	27	89	64			77
41	Haldimand War Memorial Hospital, Dunnville	54	18	69	17	83	53	62	17	86	60			71
42	Hanover and District Hospital	62	22	59	21	70	47	47	10	70	50	54		63
43	Lennox and Addington County General Hospital	52	26	50	33	82	72	53	15	86	74	64		76
44	Stevenson Memorial Hospital, Alliston	64	18	66	25	88	75	42	12	90	74	56		81
	Small Hospitals Total/Average	**64**	**21**	**67**	**26**	**80**	**67**	**49**	**20**	**83**	**71**	**62**	**35**	**75**
	Overall Total/Average	**70**	**25**	**76**	**30**	**82**	**74**	**61**	**37**	**85**	**78**	**72**	**61**	**79**

* indicates a multi-site corporation
ASA: aspirin
ACEI: angiotensin converting enzyme inhibitor
Data suppressed where the number of ideal patients was less than 10 in a given hospital

Hospital Care and Length of Stay (Days)

The fourth and final set of AMI variables is presented in Table 10.

1. Hospital Care

During the hospital course, the most responsible physician overseeing the AMI patient was a general practitioner/family physician (34%), cardiologist (32%), or a general internist (30%). Another type of internist physician (e.g. respirologist, nephrologist, etc.) was responsible in 4% of cases. These data highlight the need for physicians of all specialties to be aware of current guidelines and advances in cardiac care.

2. Length of Stay (Days)

The median length of stay for AMI cases was six days, with modest inter-hospital variation.

AMI Related Data

For Ontario AMI patients in the EFFECT Study, the 30-day mortality rate was 12%; the one-year mortality rate was 20%. Related outcome data, such as in-hospital mortality rates at the hospital-specific level, are not reported for several reasons.

First, the small sample size at some hospitals leads to wide statistical uncertainty around the mortality rate estimate. Second, the sample of patients abstracted at each hospital may not reflect the overall mortality rate for all AMI patients at that hospital.

For example, the 30-day mortality rate for AMI at one hospital may have been 15% based on the sample of 125 charts abstracted, whereas the hospital's actual mortality rate may have been 10% for all 500 patients treated by that hospital in the same time period. The one-year AMI re-admission rate was 11% among patients that survived the index hospitalization.

Table 10. AMI Report Card—Hospital Care and Length of Stay

CCORT EFFECT Study — AMI Report Card — January, 2004							
		1	2	3	4	5
		Most Responsible Physician (%)				Outcomes
#	Hospital	Cardiologist	Family Practitioner/GP	Internist	Other	Length of Stay (Days - Median)
Teaching Hospitals						
1	*Hamilton Health Sciences Corporation	36	0	55	9	7
2	Kingston General Hospital	94	0	6	0	5
3	Mount Sinai Hospital, Toronto	78	0	18	3	6
4	St. Joseph's Healthcare, Hamilton	90	1	4	4	7
5	St. Michael's Hospital, Toronto	96	0	4	0	6
	Teaching Hospitals Total/Average	**65**	**0**	**29**	**5**	**6**
Community Hospitals						
6	Brantford General Hospital	0	26	73	2	6
7	Brockville General Hospital	9	74	15	2	6
8	Cambridge Memorial Hospital	44	7	49	0	6
9	Credit Valley Hospital, The, Mississauga	95	4	0	2	7
10	*Grey Bruce Health Services	5	30	64	0	5
11	*Halton Healthcare Service Corporation	33	59	6	2	8
12	Headwaters Health Care Centre, Orangeville	0	2	98	0	7
13	Hôpital Montfort, Ottawa	42	10	47	0	6
14	*Hôpital Regional de Sudbury Regional Hospital	49	15	15	20	6
15	Hotel Dieu Hospital, Cornwall	0	76	24	0	6
16	*Lakeridge Health Corporation	17	47	33	2	6
17	Norfolk General Hospital, Simcoe	0	20	80	0	6
18	North Bay General Health Centre	0	10	90	0	5
19	Orillia Soldiers' Memorial Hospital	0	28	45	27	5
20	Pembroke General Hospital	0	88	12	0	5
21	Peterborough Regional Health Ctr/Civic Hospital	41	6	24	30	5
22	*Quinte Healthcare Corporation	18	53	29	0	6
23	Ross Memorial Hospital, Lindsay	2	35	63	0	6
24	*Rouge Valley Health System	49	4	44	1	5
25	*Scarborough Hospital, The	90	0	8	2	6
26	South Muskoka Memorial Hospital, Bracebridge	0	93	4	4	6
27	St. Mary's General Hospital, Kitchener	78	3	2	15	5
28	Stratford General Hospital	0	40	60	0	4
29	Strathroy Middlesex General Hospital	0	90	10	0	7
30	Timmins and District General Hospital	0	15	76	8	5
31	Trillium Health Centre, Mississauga	66	2	10	22	9
32	West Lincoln Memorial Hospital, Grimsby	0	95	5	0	5
33	West Parry Sound Health Centre	0	10	89	1	5
34	Winchester District Memorial Hospital	0	98	2	0	7
35	Windsor Hotel-Dieu Grace Hospital	92	6	0	2	7
36	Windsor Regional Hospital	85	3	0	13	7
37	Woodstock General Hospital	0	45	55	0	6
	Community Hospitals Total/Average	**29**	**34**	**33**	**4**	**6**
Small Hospitals						
38	Alexandra Marine & General Hospital, Goderich	0	100	0	0	6
39	Arnprior District Memorial Hospital, The	0	94	6	0	6
40	Espanola General Hospital	0	100	0	0	4
41	Haldimand War Memorial Hospital, Dunnville	0	100	0	0	4
42	Hanover and District Hospital	0	100	0	0	6
43	Lennox and Addington County General Hospital	0	95	5	0	5
44	Stevenson Memorial Hospital, Alliston	0	98	2	0	6
	Small Hospitals Total/Average	**0**	**98**	**2**	**0**	**5**
	Overall Total/Average	**32**	**34**	**30**	**4**	**6**

* indicates a multi-site corporation

CHF Report Card

The CHF Report Card consists of ten topics presented in the following three sections:

- Demographics, Cardiac Risk Factors and Past Medical History
- Left Ventricular Function and Medication Utilization
- Hospital Care, Follow-up Care and Length of Stay

Four topics involve quality indicators: Left Ventricular Function, Medication Utilization, Daily Weights and Documented Counselling.

The key findings for CHF are presented below, followed by a description of each component of the CHF Report Card and the associated data.

Key Findings—CHF Care

- **Most (71%) Ontario CHF patients have at least one modifiable cardiac risk factor**. Twelve percent of CHF patients were current smokers, 48% were hypertensive, 19% had hyperlipidemia and 34% were diabetic.
- **Most (82%) ideal CHF patients are receiving ACE inhibitor medications** which serve to improve survival and reduce hospitalization rates. The target level is ≥ 85%.
- **Less than half (39%) of ideal CHF patients are receiving beta-blockers at hospital discharge,** which improve survival and reduce hospitalization rates.
- **Potential to save 70–156 lives** of the 14,000 new CHF patients in Ontario each year, if all ideal CHF patients received ACE inhibitors and beta-blockers at hospital discharge.
- **The 30-day mortality rate was 12% and the one-year mortality rate was 33%** for CHF patients in the EFFECT Study. The one-year CHF re-admission rate was 26%.

CHF Care Areas Identified for Continued Improvement

- **More Ontario CHF patients could benefit from beta-blocker medications**, as current utilization of 39% among ideal patients at hospital discharge is below the target of ≥ 50%.
- **Improved access to and greater utilization of echocardiography** to measure left ventricular (LV) function would improve management of patients with CHF. Study data indicate 52% of patients had documented LV function measurement, whereas the target level is ≥ 75%.
- **More patients with atrial fibrillation could benefit from Warfarin therapy** as current utilization among ideal patients at discharge is 55% compared to the target level of ≥ 85%.
- **Provision and documentation of counselling (on topics such as diet, medications, symptoms, daily weights) for more CHF patients** could lead to improved patient outcomes. The current rate is 66% whereas the target is ≥ 90%.

The CHF Report Card findings are presented in Tables 12 to 14. **The CHF Report Card summary table including all variables and all 44 Group A organizations randomized to receive early clinical feedback is provided in Table 15 (pull-out), following Appendix G,** and is also available on the CCORT web site (www.ccort.ca/effect.asp) as a three-page document entitled Exhibit 2.

Demographics, Cardiac Risk Factors and Past Medical History

The first set of variables presented for CHF is presented in Table 12.

1. Demographics

For the CHF cohort, the median age of the cohort was 77 years and 51% were female.

2. Cardiac Risk Factors

Of the four modifiable cardiac risk factors, 12% of CHF patients were current smokers, 48% were hypertensive, 19% had hyperlipidemia and 34% were diabetic; with 71% having at least one of these risk factors.

3. Past Medical History—Cardiac and Vascular Disease

Fifty percent of the study patients suffer from coronary disease, (described as one or more of angina, previous PCI, or coronary artery bypass graft {CABG}), and just over one-third, or 35%, have had a previous MI. Twenty-nine percent of the sample patients suffer from atrial fibrillation and 16% have heart valve disease involving the aortic or mitral valves. Eleven percent of the CHF patients also have some form of cancer.

Table 12. CHF Report Card—Demographics, Cardiac Risk Factors and Past Medical History

CCORT EFFECT Study — CHF Report Card — January, 2004																
	1		2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Patient Demographics		Cardiac Risk Factors (%)					PMH--Cardiac & Vascular Disease (%)				
# Hospital	Study Sample (n)		Qualified (n)	Qualified (%)	Age (Median)	Female (%)	Current Smoker	Hypertension	Hyperlipidemia	Diabetes	Patients with ≥ 1 Cardiac Risk Factor (%)	Coronary Disease	Previous MI	Atrial Fib	Valve Disease	Cancer
Teaching Hospitals																
1 *Hamilton Health Sciences Corporation	395		365	92	78	53	12	61	27	37	77	55	41	28	28	12
2 Kingston General Hospital	135		118	87	76	51	20	57	18	30	76	58	42	27	18	15
3 Mount Sinai Hospital, Toronto	130		110	85	77	56	16	51	20	29	72	49	36	37	21	14
4 St. Joseph's Healthcare, Hamilton	134		115	86	77	57	10	50	27	37	76	54	37	33	28	10
5 St. Michael's Hospital, Toronto	126		96	76	75	50	13	65	25	33	79	55	45	35	28	10
Teaching Hospitals Total/Average	**920**		**804**	**87**	**77**	**53**	**14**	**58**	**24**	**34**	**76**	**54**	**40**	**31**	**25**	**12**
Community Hospitals																
6 Brantford General Hospital	133		117	88	77	55	17	48	24	32	75	51	36	36	27	10
7 Brockville General Hospital	133		86	65	77	44	12	49	26	34	78	62	42	24	9	15
8 Cambridge Memorial Hospital	133		114	86	75	47	13	54	28	35	78	45	32	32	26	13
9 Credit Valley Hospital, The, Mississauga	127		105	83	75	48	6	49	30	43	79	59	49	21	18	17
10 *Grey Bruce Health Services	199		166	83	78	52	8	42	21	35	71	38	28	24	16	5
11 *Halton Healthcare Service Corporation	226		181	80	77	51	9	41	24	33	65	45	33	38	17	10
12 Headwaters Health Care Centre, Orangeville	135		114	84	79	58	11	39	12	29	58	42	29	30	11	3
13 Hôpital Montfort, Ottawa	127		96	76	77	57	18	51	22	38	76	61	35	34	13	11
14 *Hôpital Regional de Sudbury Regional Hospital	126		100	79	76	49	7	66	21	47	82	60	41	37	11	11
15 Hotel Dieu Hospital, Cornwall	131		85	65	76	48	13	35	12	35	64	44	27	21	7	13
16 *Lakeridge Health Corporation	263		223	85	79	53	6	45	13	35	64	48	34	27	13	9
17 Norfolk General Hospital, Simcoe	135		129	96	77	52	9	67	28	40	86	61	40	31	15	15
18 North Bay General Health Centre	129		113	88	76	55	12	57	20	39	72	66	49	22	9	13
19 Orillia Soldiers' Memorial Hospital	128		104	81	76	50	17	42	21	35	74	59	47	35	17	14
20 Pembroke General Hospital	134		84	63	78	54	18	46	17	38	71	54	26	29	4	2
21 Peterborough Regional Health Ctr/Civic Hospital	124		109	88	78	48	18	38	24	28	67	57	39	36	16	17
22 *Quinte Healthcare Corporation	368		296	80	78	50	14	48	18	34	73	52	35	27	13	9
23 Ross Memorial Hospital, Lindsay	131		112	85	79	46	13	37	18	26	62	54	46	34	10	13
24 *Rouge Valley Health System	258		217	84	76	52	11	43	14	36	71	45	29	24	14	11
25 *Scarborough Hospital, The	379		330	87	78	54	8	42	17	32	64	46	27	25	16	10
26 South Muskoka Memorial Hospital, Bracebridge	119		92	77	78	37	15	38	20	26	62	52	43	33	15	9
27 St. Mary's General Hospital, Kitchener	130		119	92	77	59	12	47	12	37	71	37	30	30	21	5
28 Stratford General Hospital	130		112	86	80	46	6	56	21	39	72	44	38	38	13	18
29 Strathroy Middlesex General Hospital	134		87	65	78	48	13	48	11	29	69	52	36	34	26	7
30 Timmins and District General Hospital	134		118	88	75	47	16	55	25	38	81	65	31	31	17	15
31 Trillium Health Centre, Mississauga	124		99	80	77	59	10	61	18	28	73	48	36	31	21	11
32 West Lincoln Memorial Hospital, Grimsby	118		104	88	80	49	11	43	15	27	64	48	39	29	14	13
33 West Parry Sound Health Centre	100		88	88	77	53	19	48	18	26	74	34	23	32	20	5
34 Winchester District Memorial Hospital	85		70	82	78	56	14	34	6	41	71	37	20	29	11	7
35 Windsor Hotel-Dieu Grace Hospital	135		113	84	76	50	16	50	27	33	72	45	30	23	12	16
36 Windsor Regional Hospital	131		101	77	77	52	17	52	13	32	72	45	31	27	6	19
37 Woodstock General Hospital	135		117	87	78	56	8	38	9	30	64	45	30	26	19	15
Community Hospitals Total/Average	**4,994**		**4,101**	**82**	**77**	**51**	**12**	**47**	**19**	**34**	**70**	**50**	**34**	**29**	**15**	**11**
Small Hospitals																
38 Alexandra Marine & General Hospital, Goderich	86		71	83	78	46	7	54	32	27	73	68	44	24	11	20
39 Arnprior District Memorial Hospital, The	52		29	56	79	45	10	34	10	28	66	55	31	28	14	10
40 Espanola General Hospital	32		26	81	75	62	12	42	8	35	65	54	31	27	4	8
41 Haldimand War Memorial Hospital, Dunnville	65		53	82	80	38	11	28	2	26	55	51	42	13	11	4
42 Hanover and District Hospital	66		43	65	80	56	5	23	5	23	51	35	23	19	7	16
43 Lennox and Addington County General Hospital	101		65	64	78	49	23	29	17	38	74	49	26	29	14	8
44 Stevenson Memorial Hospital, Alliston	134		104	78	77	51	17	40	9	33	66	36	27	23	10	2
Small Hospitals Total/Average	**536**		**391**	**73**	**78**	**49**	**13**	**37**	**13**	**30**	**65**	**48**	**32**	**23**	**10**	**9**
Overall Total/Average	**6,450**		**5,296**	**82**	**77**	**51**	**12**	**48**	**19**	**34**	**71**	**50**	**35**	**29**	**16**	**11**

Report card based on 1999-2001 data
Hospital Groupings: Categories as per JPPC peer groups. Multi-site corporations reported at the corporate level.
* indicates multi-site corporation
Study Sample: The number of charts reviewed as part of the chart abstraction process
Qualified: The number of charts in the study sample that met the EFFECT CHF inclusion criteria and the Framingham CHF criteria
PMH: Past Medical History MI: Myocardial Infarction

Left Ventricular Function, Medication Utilization, Daily Weights and Documented Counselling

The second set of CHF variables is summarized in Table 13.

1. Left Ventricular Function

Over half (52%) of the CHF patients had a documented Left Ventricular (LV) function assessment or documentation of a similar study done within the previous six months. However, this rate is low when compared to the target level of ≥ 75%. Of those patients with documented LV function assessment, 57% had low LV function—defined as Ejection Fraction of less than 40%, or Grade II–III, III, IV or a narrative description of moderate to severe ventricular dysfunction. Assessment of LV function is important for diagnosis of the underlying etiology of CHF as well as a key prognostic factor for CHF patients. As such, the rate of LV assessment should be improved. While it is recognized that access to echocardiography is a key issue with both human and capital resource implications, the lack of LV function data is an impediment to effective, evidence-based management of CHF patients.

2. Medication Utilization

The mainstay of CHF therapy is pharmacologic, and thus the focus for CHF patients is on medications prescribed at discharge. The identified medications—ACE inhibitors, beta-blockers and warfarin for patients with atrial fibrillation—were determined by the expert panel as having a very significant impact on CHF patient outcomes.

The patient sample was assessed in terms of two groups: a) all patients and b) ideal patients. As described in Methods, Table 5, ideal patients are those who are eligible to receive the process of care and do not have any contraindications to the process of care.

Please note that data have been suppressed where the number of ideal patients was less than ten at a given hospital.

ACE inhibitors were prescribed in 69% of all cases at discharge and beta-blockers were prescribed in 29% of all cases. Warfarin was prescribed for 53% of patients who suffered from atrial fibrillation.

Among ideal patients (those patients with LV function documented in the chart and without contraindications), the rate of utilization of ACE inhibitors was 82%—this rate is very close to the target level of ≥ 85%. Sixteen organizations met the target of ≥ 85% utilization among ideal patients.

Beta-blockers were prescribed in 39% of ideal cases versus the target level of ≥ 50%. The expert panel recognized that some patients may legitimately have beta-blockers started after discharge, as outpatients. Nevertheless, the hospital stay represents an ideal setting to initiate beta-blockers, as it provides for a controlled environment. Thirteen organizations met the target of ≥ 50%. Beta-blocker use, overall, was highest among teaching hospitals where the average utilization rate was 50%.

The utilization rate of warfarin in patients with atrial fibrillation was 55%. As the target level is ≥ 85% there is room for improvement. However, it should be noted that the sample size for this indicator is small in many hospitals, and the data should be interpreted with caution. Furthermore, physicians may have had legitimate, undocumented concerns about initiating this therapy in some patients.

Maximal use of ACE inhibitors and beta-blockers in CHF patients at discharge could save an estimated 70–156 patient lives in Ontario—see Appendix E for more details.

3. Daily Weights

Daily weights (recorded on at least half of the days the patient was in hospital excluding ICU days) were documented in only 14% of CHF patients. Clearly, performance on this indicator can be improved in order to meet the target level in ideal patients of ≥ 90%. These results are concerning, given that daily monitoring of body weight serves as an important factor in monitoring effective management of CHF.

However, lack of nursing staff and time may explain the low rate of measurement as may failure to document this information.

4. Documented Counselling

In 66% of cases, patient counselling was documented on the chart by at least one health care professional (e.g., physician, dietician, pharmacist, nurse) on at least one of the following topics:

- Symptoms of worsening heart failure
- Discharge medications
- Daily weights
- Diet

The target level for documented counselling is $\geq$ 90% in ideal patients. While eight organizations met the target level, there is room for improvement at most hospitals in Ontario. Patient counselling is a key component of care for CHF patients. It is recognized that physicians or other health care providers may have counselled patients but not documented this information within the patient charts.

Table 13. CHF Report Card—LV Function, Medication Utilization, Daily Weights and Documented Counselling

CCORT EFFECT Study — CHF Report Card — January, 2004											
		1	2	3	4	5	6	7	8	9	10
		Quality Indicators									
		Left Ventricular (LV) Function (%)		Medication Utilization (%)							
				All Patients			Ideal Patients				
#	Hospital	LV Function measured this admission or in previous 6 mos	Patients with Low LV Function (This adm or prev. 6 mos)	ACEI at Discharge	Beta-blocker at Discharge	Warfarin at Discharge in pts with Atrial Fib	ACEI at Discharge	Beta-blocker at Discharge	Warfarin at Discharge in pts with Atrial Fib	Daily Weights recorded > 50% of days (%)	Documented Counselling: Counselling on at least one topic (%)*
	Quality Indicator Benchmark/Target	**≥ 75%**					**≥ 85%**	**≥ 50%**	**≥ 85%**	**≥ 90%**	**≥ 90%**
Teaching Hospitals											
1	*Hamilton Health Sciences Corporation	65	56	67	37	57	75	52	63	15	74
2	Kingston General Hospital	83	54	56	28		75	31		26	28
3	Mount Sinai Hospital, Toronto	78	55	65	40	59	85	64	56	28	52
4	St. Joseph's Healthcare, Hamilton	44	48	69	33	44	67	50	47	25	86
5	St. Michael's Hospital, Toronto	75	66	72	49		93	60		34	67
	Teaching Hospitals Total/Average	**68**	**56**	**65**	**37**	**54**	**79**	**50**	**55**	**22**	**65**
Community Hospitals											
6	Brantford General Hospital	45	50	74	31	58	76	39	58	21	77
7	Brockville General Hospital	17	77	62	22	20				8	63
8	Cambridge Memorial Hospital	46	62	73	40	79	80	45	79	0	41
9	Credit Valley Hospital, The, Mississauga	77	72	68	43		73	60		7	97
10	*Grey Bruce Health Services	37	41	74	23	38	94	6		20	73
11	*Halton Healthcare Service Corporation	84	56	66	41	50	85	62	48	11	48
12	Headwaters Health Care Centre, Orangeville	43	63	73	19	46	83	22	50	18	53
13	Hôpital Montfort, Ottawa	54	65	74	43		83	65		17	37
14	*Hôpital Regional de Sudbury Regional Hospital	60	55	78	37	48	90	29	53	20	88
15	Hotel Dieu Hospital, Cornwall	55	30	62	26		75	38		6	69
16	*Lakeridge Health Corporation	33	52	70	28	29	83	67	31	4	46
17	Norfolk General Hospital, Simcoe	46	69	61	19	50	88	19	50	7	94
18	North Bay General Health Centre	66	46	67	47	64	84	60	64	3	71
19	Orillia Soldiers' Memorial Hospital	64	42	60	40	59	77	50	60	9	97
20	Pembroke General Hospital	42	26	58	19					2	50
21	Peterborough Regional Health Ctr/Civic Hospital	21	83	74	23	56	80	40	56	6	85
22	*Quinte Healthcare Corporation	29	76	69	23	56	95	24	58	6	22
23	Ross Memorial Hospital, Lindsay	45	53	72	12	55	86	18	55	0	73
24	*Rouge Valley Health System	66	58	68	26	73	80	40	78	18	72
25	*Scarborough Hospital, The	96	59	60	24	49	73	27	45	11	62
26	South Muskoka Memorial Hospital, Bracebridge	41	66	76	32	67	100	45		3	91
27	St. Mary's General Hospital, Kitchener	71	66	73	21		85	18		3	59
28	Stratford General Hospital	14	53	69	29	57			58	26	56
29	Strathroy Middlesex General Hospital	15	80	81	11	65			68	22	73
30	Timmins and District General Hospital	47	52	81	40	74	89	54	72	20	94
31	Trillium Health Centre, Mississauga	68	54	74	16	60	69	20		9	80
32	West Lincoln Memorial Hospital, Grimsby	38	53	75	8	45	100		40	4	38
33	West Parry Sound Health Centre	66	47	72	30	47	86	43	50	70	63
34	Winchester District Memorial Hospital	16	60	74	21	54			54	17	49
35	Windsor Hotel-Dieu Grace Hospital	61	57	71	32	38	88	52	50	37	91
36	Windsor Regional Hospital	52	65	65	27	35	81	32	38	13	77
37	Woodstock General Hospital	36	69	69	25	16	82	73	12	17	82
	Community Hospitals Total/Average	**51**	**57**	**70**	**27**	**52**	**83**	**38**	**54**	**13**	**65**
Small Hospitals											
38	Alexandra Marine & General Hospital, Goderich	51	62	68	27	73	85	20	73	31	93
39	Arnprior District Memorial Hospital, The	28	63	72	45					28	79
40	Espanola General Hospital	15	100	79	21					19	76
41	Haldimand War Memorial Hospital, Dunnville	11	83	88	20					2	94
42	Hanover and District Hospital	2	100	61	21					9	54
43	Lennox and Addington County General Hospital	17	27	65	35					3	51
44	Stevenson Memorial Hospital, Alliston	48	41	82	15		90			0	74
	Small Hospitals Total/Average	**30**	**55**	**74**	**25**	**60**	**87**	**26**	**64**	**11**	**75**
	Overall Total/Average	**52**	**57**	**69**	**29**	**53**	**82**	**39**	**55**	**14**	**66**

* indicates multi-site corporation
LV: Left Ventricular
ACEI: angiotensin converting enzyme inhibitor
Data suppressed where the number of ideal patients was less than 10 in a given hospital

Hospital Care, Follow-up Care and Length of Stay

The third and final set of variables for CHF is presented in Table 14.

1. Hospital Care

During the hospital stay the most responsible physician (MRP) overseeing the CHF patient was most likely to be a general practitioner/family physician (49%), followed by a general internist (32%) and a cardiologist (18%). These data highlight the key role played by primary care physicians in the treatment of CHF patients.

2. Follow-up Care

Just over three quarters of all patients (76%) had follow-up care arranged with a general practitioner/family physician, whereas approximately 1 in 5 patients had follow-up care arranged with a cardiologist or a general internist. Few patients (2%) had planned follow-up care at a CHF clinic.

3. Length of Stay

The median length of stay for CHF cases was five days.

CHF Related Data

For Ontario CHF patients in the EFFECT Study, the 30-day mortality rate was 12% and the one-year mortality rate was 33%. Related outcome data, such as in-hospital mortality rates at the hospital-specific level are not reported due to the small sample of cases at some hospitals and because the mortality rate in the abstracted sample may not reflect the overall CHF mortality rate at that hospital. The one-year CHF re-admission rate was 26% for patients that survived the index hospitalization.

Table 14. CHF Report Card—Hospital Care, Follow-up Care and Length of Stay

CCORT EFFECT Study — CHF Report Card — January, 2004									
		1	2	3	4	5	6	7	8
		Most Responsible Physician (%)			Follow Up (%)				Outcomes
#	Hospital	Cardiologist	Family Practitioner/GP	Internist	Family Practitioner/GP	Cardiologist	Internist	CHF Clinic	Length of Stay (Days - Median)
Teaching Hospitals									
1	*Hamilton Health Sciences Corporation	13	1	85	69	23	28	2	6
2	Kingston General Hospital	52	0	48	89	22	20	5	6
3	Mount Sinai Hospital, Toronto	18	0	82	71	39	34	6	6
4	St. Joseph's Healthcare, Hamilton	55	2	43	69	46	22	2	6
5	St. Michael's Hospital, Toronto	60	1	39	67	44	29	5	6
	Teaching Hospitals Total/Average	**31**	**1**	**68**	**72**	**31**	**27**	**3**	**6**
Community Hospitals									
6	Brantford General Hospital	0	59	40	61	4	25	0	6
7	Brockville General Hospital	10	85	5	88	29	9	0	5
8	Cambridge Memorial Hospital	28	39	32	76	25	32	0	6
9	Credit Valley Hospital, The, Mississauga	75	18	6	47	47	4	1	6
10	*Grey Bruce Health Services	5	52	43	85	5	20	0	6
11	*Halton Healthcare Service Corporation	22	69	9	70	13	8	2	6
12	Headwaters Health Care Centre, Orangeville	0	22	78	97	5	42	1	5
13	Hôpital Montfort, Ottawa	15	53	32	67	36	13	1	6
14	*Hôpital Regional de Sudbury Regional Hospital	11	64	25	76	25	14	1	6
15	Hotel Dieu Hospital, Cornwall	0	96	4	74	1	40	0	6
16	*Lakeridge Health Corporation	10	61	29	81	14	29	2	5
17	Norfolk General Hospital, Simcoe	0	43	57	81	4	21	0	5
18	North Bay General Health Centre	0	44	56	52	3	30	1	6
19	Orillia Soldiers' Memorial Hospital	0	72	24	86	9	34	10	5
20	Pembroke General Hospital	0	93	7	86	4	13	1	4
21	Peterborough Regional Health Ctr/Civic Hospital	23	50	28	68	26	21	0	5
22	*Quinte Healthcare Corporation	18	60	22	80	21	12	0	4
23	Ross Memorial Hospital, Lindsay	0	85	15	95	4	19	0	7
24	*Rouge Valley Health System	36	31	32	59	25	34	0	6
25	*Scarborough Hospital, The	53	1	46	48	39	27	15	5
26	South Muskoka Memorial Hospital, Bracebridge	0	98	2	88	15	19	0	4
27	St. Mary's General Hospital, Kitchener	44	34	22	64	35	13	0	4
28	Stratford General Hospital	0	46	53	75	5	24	0	5
29	Strathroy Middlesex General Hospital	0	92	8	97	1	28	0	6
30	Timmins and District General Hospital	0	88	9	88	9	16	1	4
31	Trillium Health Centre, Mississauga	42	11	46	87	33	12	11	8
32	West Lincoln Memorial Hospital, Grimsby	1	96	3	88	0	27	0	3
33	West Parry Sound Health Centre	0	52	48	95	5	40	0	5
34	Winchester District Memorial Hospital	0	99	1	85	7	12	0	4
35	Windsor Hotel-Dieu Grace Hospital	40	58	2	80	33	12	12	6
36	Windsor Regional Hospital	37	36	28	70	27	11	1	6
37	Woodstock General Hospital	0	72	28	79	4	37	0	5
	Community Hospitals Total/Average	**18**	**54**	**28**	**75**	**17**	**22**	**2**	**5**
Small Hospitals									
38	Alexandra Marine & General Hospital, Goderich	0	99	0	94	14	12	0	6
39	Arnprior District Memorial Hospital, The	7	86	7	76	10	10	0	6
40	Espanola General Hospital	0	96	0	76	16	12	0	2
41	Haldimand War Memorial Hospital, Dunnville	0	100	0	96	20	0	0	4
42	Hanover and District Hospital	0	100	0	80	7	10	0	4
43	Lennox and Addington County General Hospital	0	97	3	95	2	7	0	4
44	Stevenson Memorial Hospital, Alliston	0	100	0	89	8	8	0	6
	Small Hospitals Total/Average	**1**	**98**	**1**	**89**	**10**	**8**	**0**	**5**
	Overall Total/Average	**18**	**49**	**32**	**76**	**19**	**22**	**2**	**5**

* indicates multi-site corporation

4. Performance Improvement

As indicated in these report cards the care of AMI and CHF patients is multi-faceted. While many hospitals are performing well in some areas, almost all Ontario hospitals have opportunities to improve processes of care and patient outcomes. The EFFECT investigators hope these data will help participating hospitals continue to improve the quality of AMI/CHF care.

Although the focus of the EFFECT Study is in-hospital care, it is important to note that 80% of AMI patients and 71% of CHF patients in the study have at least one modifiable cardiac risk factor. This suggests that continuing attention needs to be paid to primary prevention in the community setting.

Continuous quality improvement is a fundamental objective of many health care organizations and a growing body of knowledge is available to guide them. Utilizing data from the EFFECT Study and other sources, the following suggestions are provided to support continuing quality and performance improvement efforts for cardiac care.

It is worth noting that other jurisdictions, including the United States, the United Kingdom, Germany, and Australia, have identified many of the same quality indicators used in this study and have major quality improvement programs underway for cardiac care.[50–53] The EFFECT investigators suggest Canadian health care providers need to undertake similar coordinated ongoing quality initiatives to continually improve cardiac care and patient outcomes.

Sample High-level Work Plan to Operationalize the Data in this Study

1. Establish a lead team to review the EFFECT data and other relevant data for your organization. Charter this team to:
   - Identify the two to three key areas where you will focus your efforts.
   - Follow up with the EFFECT Study team for questions related to the EFFECT data.
   - Review your data, identify gaps between current and best practice and quantify improvement opportunities.
2. For each improvement effort:
   - Establish a multi-disciplinary performance improvement team with a Physician/Clinician leader.
   - Review the data and conduct a literature review if necessary, including literature regarding Change Management.
   - Review and document current processes and technology.
   - Consult with other Ontario hospitals that performed particularly well in areas of interest and are achieving identified targets.
   - Identify goals and methods for improvement e.g. create or modify standard admitting and discharge orders, pathways, guidelines, reminders, information sheets, and address access barriers such as Echocardiography and Troponin testing.
   - Redesign work processes and metrics, incorporating available tools and new methods such as secondary prevention or CHF clinics.
   - Train care providers: methods may include conducting continuing medical education (CME) and/or grand rounds.
   - Implement new processes.
   - Measure results and perform ongoing monitoring and maintenance to ensure tools still reflect best practice and are evidence-based.
   - Explore opportunities to utilize your organization's clinical information systems to support your performance improvement efforts.
   - Participate in the Phase II of the EFFECT Study, where the second round of chart review will be conducted with accompanying re-measurement of quality indicators in 2004/2005, with public release of results in 2005/06.

Investigate opportunities to leverage or collaborate with peer or related quality improvement efforts. Some active American organizations with relevant performance improvement models include the Institute of Health Improvement (IHI) and the Joint Commission for Accreditation of Healthcare Organizations (JCAHO).

Other Resources

Additional references for improving cardiac care for consideration include:

- The Canadian Cardiovascular Society Heart Failure Guidelines[54]
- The Center for Medicare and Medicaid Services' (CMS) Cooperative Cardiovascular Project conducted in the United States and its related publications[50,55]
- The American College of Cardiology/American Heart Association Guidelines for the Management of Patients with Acute Myocardial Infarction and Congestive Heart Failure[56,57]
- The American College of Cardiology (ACC) Guidelines Applied in Practice (GAP) initiative[58] and the related tool kit available at www.acc.org consisting of:
  - AMI standard orders
  - Clinical pathway
  - Pocket guide/pocket card
  - Patient information form
  - Patient discharge form
  - Chart stickers
  - Hospital performance charts

Appendix F provides additional quality improvement information and resources.

5. Interpretive Cautions

The EFFECT Study is one of the largest chart abstraction exercises ever undertaken in Canada. Considerable time, resources and cooperative effort by participating hospitals and the study team are required for data abstraction in a study of this size—85 participating hospital corporations/103 individual hospitals. We would have preferred to provide more timely feedback (originally planned for spring 2003), however, the magnitude of the undertaking and the impact of various factors including geography, winter weather, SARS, and power failures all had an impact on the data collection time period. Nevertheless, the data should still prove to be of value to hospitals and other relevant stakeholders.

The following is a list of important limitations regarding Phase I of the EFFECT Study:

Retrospective chart review: Retrospective chart review presents some challenges. For example, as the charts are reviewed some time after the fact, not all documentation may be available at the time of review (some may not be filed on the chart). In other instances, not all care may be documented within the chart. Given that the review is retrospective, there is no opportunity to inquire or clarify unclear or missing information with clinicians.

Chart format/media: The format and media of the patient chart can affect accessibility of information and ease of use. For example, the majority of patient charts abstracted consisted of traditional paper charts, which may have legibility and completeness issues. In fact, concerns regarding legibility are well documented in the literature.

Charts converted to microfilm/fiche may exclude some components of the charts, for example, nurses' notes, medication administration records, diagnostic test results or discharge summaries. In some instances, a portion of the patient charts had been converted to microfilm/fiche; in other instances, the patient charts consisted of a combination of paper-based information and electronic information residing on the hospital's information system. In instances where paper charts have been converted to scanned images stored in the information system, the accessibility of information can be dependent upon the information system's indexing capability.

Time period: The charts reviewed for the study are based on patient hospitalizations from fiscal 1999/00 and fiscal 2000/01. They represent the clinical practice of the period—essentially providing a "snapshot" of the clinical care at that time. As clinical practice and the evidence base continue to change over time, performance on some indicators has likely improved at many Ontario hospitals.

Sample size: The sample size was determined by available case volumes, study size and available funding. Some hospitals treated lower patient volumes (e.g., under 100 cases), and as such the sample size of those hospitals is small. Most hospitals were able to provide the full target sample of 125 cases. However, the power of the sample may not reflect the performance of that hospital among all its cases even with the larger sample size.

Content: Although this report covers many important aspects of AMI and CHF care that may improve patient outcomes, certain topics were not addressed due to time, data and other considerations. For example, access to elective coronary revascularization, cardiac rehabilitation, implantable defibrillators, and utilization of spironolactone/digoxin, etc. It is anticipated that many of these other topics will be covered in other publications from the EFFECT investigators.

Although the EFFECT investigators have taken many steps to ensure the accuracy of the data, it is possible that residual undetected errors may remain as a number of steps are involved in processing the data for this report. Any concerns about data quality should be addressed to the CCORT research team.

6. Conclusion

We commend all 85 Ontario hospital corporations for their participation in this important study and their demonstrated commitment to public accountability and quality improvement. We encourage organizations that receive this report to use it in support of continued quality improvement efforts.

We also welcome any feedback readers may have regarding this report. Please complete and return the Reader Feedback survey provided in Appendix G or use the online version available on the CCORT web site (www.ccort.ca/effect.asp). All comments will be carefully reviewed and will be taken into consideration in improving future reports from the study.

The fundamental purpose of this study is to assist in designing mechanisms to reduce the delay between the acquisition of health research and evidence and its application in the care of patients. The intent of the study is to raise awareness and provide information in a useful manner. By identifying areas of high quality and areas for improvement, the study can serve to support continued improvement in care as we strive for clinical excellence for the citizens of Ontario.

The EFFECT Study investigators hope that participating hospitals will view the EFFECT Study as a positive and constructive tool for change and would be pleased to assist in ongoing efforts to use the data for quality improvement initiatives. Hospitals that wish to receive additional analyses or clarification of the data should contact the EFFECT research team for assistance.

EFFECT Phase II, involving a second round of chart abstraction, will begin in 2004 and the findings will be released in 2005/06. All quality indicators will be reviewed and/or revised as needed to ensure they still to reflect current evidence-based practice.

Phase III, the impact assessment and comparison of improvement level between Phase I and II will be released in 2006.

In addition to this report, the research team anticipates that the EFFECT database will prove useful for generating related reports and peer-reviewed publications on the state of cardiac care delivery in Ontario. Readers who are interested in learning about these documents as they are published, are encouraged to join the CCORT email list by sending an email to ccort@ices.on.ca.

Longer term, the EFFECT investigators believe that it will only be through ongoing “real-time” coordinated collection and provision of high quality clinical data that evidence-based practice, and thereby patient outcomes in Ontario, will be optimized.

The research team is grateful to the CIHR and the HSF for funding this study, and hopes to obtain ongoing funding to support and expand these types of quality improvement initiatives in the future. Many countries such as the United States, United Kingdom, and Australia have invested heavily in recent years in clinical quality improvement efforts and databases to improve cardiac care, and it is vital that Canadian policymakers, funding agencies and clinicians increase their investments in this area if Canadians are to achieve the best possible health outcomes.

Appendix A—References

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Appendix B—Participating Hospitals

Hospital name in italics indicate hospital corporations randomized to the early data feedback group.

#	Hospital Name
1	*Alexandra Marine & General Hospital (Goderich)*
2	*Arnprior District Memorial Hospital, The*
3	*Brantford General Hospital*
4	*Brockville General Hospital*
5	*Cambridge Memorial Hospital*
6	Campbellford Memorial Hospital
7	Carleton Place and District Memorial Hospital
8	Chatham-Kent Health Alliance:
	Public General Hospital (Chatham); Sydenham District Hospital (Wallaceburg)
9	Cornwall General Hospital
10	*Credit Valley Hospital, The (Mississauga)*
11	*Espanola General Hospital (Espanola)*
12	Grand River Hospital Corporation (Kitchener)
13	*Grey Bruce Health Services: Meaford site; Owen Sound site*
14	Groves Memorial Hospital (Fergus)
15	Guelph General Hospital
16	*Haldimand War Memorial Hospital (Dunnville)*
17	*Halton Healthcare Services Corporation: Oakville-Trafalgar Memorial Hospital; Milton District Hospital*
18	*Hamilton Health Sciences Corporation:*
	Hamilton General Hospital; Hamilton Henderson Hospital; McMaster Medical Centre
19	*Hanover and District Hospital*
20	Hawkesbury and District General Hospital
21	*Headwaters Healthcare Centre (Orangeville)*
22	*Hôpital Montfort Hospital, (Ottawa)*
23	*Hôpital Regional de Sudbury Regional Hospital*
24	*Hotel Dieu Hospital (Cornwall)*
25	Hotel Dieu Health Sciences Hospital (St. Catharines)
26	Humber River Regional Hospital (Toronto)
27	Huntsville District Memorial Hospital
28	Huronia District Hospital (Midland)
29	Joseph Brant Memorial Hospital (Burlington)
30	*Kingston General Hospital*
31	Kirkland and District Hospital (Kirkland Lake)
32	*Lakeridge Health Corporation: Lakeridge Health Oshawa; Lakeridge Health Bowmanville*
33	Leamington District Memorial Hospital
34	*Lennox and Addington County General Hospital (Napanee)*
35	London Health Sciences Centre

#	**Hospital Name (Cont'd)**
36	Markham Stouffville Hospital
37	*Mount Sinai Hospital (Toronto)*
38	Niagara Health System:
	Douglas Memorial Hospital (Fort Erie); Greater Niagara General Hospital; Port Colborne General
39	*Norfolk General Hospital (Simcoe)*
40	*North Bay General Health Centre*
41	North York General Hospital
42	Northumberland Health Care Corporation (Cobourg)
43	*Orillia Soldiers' Memorial Hospital*
44	Ottawa Hospital, The—Civic Campus; General Campus; University of Ottawa Heart Institute
45	*Pembroke General Hospital*
46	Perth and Smiths Falls District Hospital
47	*Peterborough Regional Health Centre/Civic Hospital*
48	Queensway-Carleton Hospital (Ottawa)
49	*Quinte Healthcare Corporation:*
	Belleville General Hospital; Prince Edward County Memorial (Picton); Trenton Memorial
50	Renfrew Victoria Hospital
51	*Ross Memorial Hospital (Lindsay)*
52	*Rouge Valley Health System: Rouge Valley Centenary (Toronto); Rouge Valley Ajax and Pickering*
53	Royal Victoria Hospital, The (Barrie)
54	Lambton Hospitals Group: Sarnia General Hospital
55	Sault Area Hospitals
56	*South Muskoka Memorial Hospital (Bracebridge)*
57	Southlake Regional Health Centre; York County Hospital (Newmarket)
58	St. Joseph's General Hospital (Elliot Lake)
59	St. Joseph's Health Centre (Toronto)
60	*St. Joseph's Healthcare (Hamilton)*
61	*St. Mary's General Hospital (Kitchener)*
62	*St. Michael's Hospital (Toronto)*
63	St. Thomas-Elgin General Hospital
64	*Stevenson Memorial Hospital (Alliston)*
65	*Stratford General Hospital*
66	*Strathroy Middlesex General Hospital*
67	Sunnybrook and Women's College Health Sciences Centre (Toronto)
68	Temiskaming Hospital (New Liskeard)
69	*The Scarborough Hospital: General Division; Grace Division (Toronto)*
70	Thunder Bay Regional Hospital

#	**Hospital Name (Cont'd)**
71	Tillsonburg District Memorial Hospital
72	*Timmins and District General Hospital*
73	Toronto East General Orthopaedic Hospital
74	*Trillium Health Centre (Mississauga)*
75	University Health Network (Toronto)
76	West Haldimand General Hospital (Hagersville)
77	*West Lincoln Memorial Hospital (Grimsby)*
78	West Nipissing General Hospital (Sturgeon Falls)
79	*West Parry Sound Health Centre*
80	William Osler Health Centre: Etobicoke site, Georgetown site, Brampton site
81	*Winchester District Memorial Hospital*
82	*Windsor Hotel-Dieu Grace Hospital*
83	*Windsor Regional Hospital*
84	*Woodstock General Hospital*
85	York Central Hospital (Richmond Hill)

Appendix C—Data Dictionary

In this appendix we provide the EFFECT data dictionary with definitions for each variable, including those identified as Quality Indicators.[1,2] *Note: *denotes Quality Indicators*

Data Dictionary—AMI		
VARIABLE		**DEFINITION**
Study Sample		
1.1	**Study Sample**	Number of charts reviewed as part of the chart abstraction process.
1.2	**Qualified Charts (N)**	Number of patient charts reviewed, where patient met European Society of Cardiology/ American College of Cardiology (ESC/ACC) criteria for AMI, the AMI occurred before hospital arrival and the patient was not transferred from another acute care facility. Inclusion criteria: most responsible diagnosis of AMI ICD-9 code 410.
1.3	**Qualified Charts (%)**	Percent of patient charts reviewed, where the patient met the ESC/ACC criteria for AMI, the AMI occurred prior to hospital arrival and the patient was not transferred from another acute care facility. Inclusion criteria: most responsible diagnosis of AMI ICD-9 code 410.
Patient Demographics		
2.1	**Age (Median)**	Median age, in years, of the patients in the study cohort who satisfied the inclusion criteria.
2.2	**Female**	Percent of female patients in the study cohort who satisfied the inclusion criteria.
Cardiac Risk Factors		
3.1	**Current smoker**	Percent of patients who smoked at least one cigarette per day in the month prior to admission as documented in the chart.
3.2	**Hypertension**	Percent of patients who had a documented history of hypertension.
3.3	**Hyperlipidemia**	Percent of patients who had a documented history of hyperlipidemia (e.g., total cholesterol > 5.2 mmol/L.)
3.4	**Diabetes**	Percent of patients who had a documented history of diabetes.
3.5	**Patients with ≥ 1 risk factor**	Percent of patients who had a documented history of one or more of the identified risk factors of current smoker, hypertension, hyperlipidemia, diabetes.
Past Medical History–Comorbid Conditions		
4.1	**Coronary Disease**	Percent of patients who had a documented history of coronary artery disease (including angina, previous myocardial infarction, previous coronary artery bypass graft and/or percutaneous coronary intervention).
Hospital Care		
5.1	**Standard Admitting Orders Used**	Percent of patients where pre-printed standardized admission orders were utilized.
Reperfusion Therapy*		
6.1	**Method–Thrombolytics**	Percent of STEMI patients who received reperfusion therapy in the form of thrombolysis (e.g., tPA, Streptokinase, rPA) in the emergency department or CCU/ICU within 24 hours of arrival.
6.1.1	**Thrombolytics decided by an Emergency MD**	Percent of STEMI patients who received thrombolytic therapy as decided by the physician on duty in the emergency department in the absence of a consult from another physician (i.e., General Internist, Cardiologist).
6.1.2	**Thrombolytics provided in Emergency Department**	Percent of STEMI patients who started receiving thrombolytic therapy while still in the emergency department.

1. Tran CTT, Lee DS, Flintoft VF, et al. CCORT/CCS quality indicators for acute myocardial infarction care. *Can J Cardiol* 2003; 19(1):38-45.
2. Lee DS, Tran C, Flintoft V, Grant FC, Liu PP, Tu JV. CCORT/CCS quality indicators for congestive heart failure care. *Can J Cardiol* 2003; 19(4):357-364.

Data Dictionary—AMI (Cont'd)		
VARIABLE		**DEFINITION**
Reperfusion Therapy* (cont'd)		
6.1.3	**Thrombolytics door to needle time (Median)**	For STEMI patients, median time in hours:minutes from arrival in emergency department (door) to when thrombolysis infusion (needle) was started. Note: only includes cases where thrombolysis was started in ≤ 4 hours of the patient's arrival in the emergency department.
6.2	**Method–Percutaneous Coronary Intervention**	Percent of STEMI patients who received reperfusion therapy in the form of percutaneous coronary intervention (e.g., angioplasty, stent, rotoblading) within 24 hours of arrival. Note: Some patients receive both PCI and thrombolytic therapy.
Left Ventricular Function*		
7.1	**Left ventricular function determined/measured**	Percent of patients who had their left ventricular ejection fraction or grade measured by ECHO, MUGA/RNA (See Appendix D—Glossary of Terms for explanation) or cardiac catheterization this admission.
7.2	**Patients with low ejection fraction (EF)**	Percent of patients with low ejection fraction, measured and documented as EF ≤ 40% or Grade III, IV, V or Moderate or Severe. Normal ejection fraction is > 50%.
Lipid Measurement*		
8.1	**Lipid sample obtained within 24 hours of admission**	Percent of patients who had a blood lipid test within 24 hours of admission.
Laboratory–Cardiac Measures		
9.1	**Troponin done**	Percent of patients who had a Troponin I or Troponin T value measured within the first 48 hours of admission.
Medication Utilization on Admission (All and Ideal Patients)*		
10.1.1	**ASA within 6 hours of admission–All patients**	Percent of patients who were admitted to hospital and received aspirin just prior to or within 6 hours of admission.
10.1.2	**Beta blocker within 12 hours of admission –All patients**	Percent of patients who were admitted to hospital and received beta blockers within the first 12 hours of admission.
10.2.1	**ASA within 6 hours of admission–Ideal patients**	Percent of patients who were admitted to hospital and received aspirin just prior to or within 6 hours of admission, without contraindications to aspirin (active bleeding on admission, history of coagulopathy, first platelet count < $100x10^9$/L drawn within 24 hours of admission, allergy to ASA, documentation of ASA administration before hospital arrival, physician documented reason for non-use of ASA {e.g., patient refusal}).
10.2.2	**Beta blocker within 12 hours of admission–Ideal patients**	Percent of patients who received beta blockers within 12 hours of admission, without contraindications to beta blockers (allergy or intolerance to beta blocker, bradycardia {heart rate < 60 beats/min} on admission and not on beta-blocker, symptomatic heart failure on admission, systolic blood pressure < 100 mmHg at admission, PR interval > 0.24s on admission ECG, second or third degree heart block on admission ECG, bifascicular block on admission ECG, severe chronic obstructive pulmonary disease, asthma, taking beta blocker pre-admission, physician documented reason for non-use of beta-blocker {e.g. patient refusal, symptomatic hypotension}).

Data Dictionary—AMI (Cont'd)		
VARIABLE		**DEFINITION**
Medication Utilization at Discharge (All and Ideal Patients)*		
10.3.1	**ASA prescribed at discharge–All patients**	Percent of patients alive at discharge who received prescriptions for aspirin at the time of discharge or transfer.
10.3.2	**Beta blocker prescribed at discharge–All patients**	Percent of patients alive at discharge who received prescriptions for beta blockers at the time of discharge or transfer.
10.3.3	**ACE inhibitor prescribed at discharge–All patients**	Percent of patients alive at discharge who received prescriptions for ACE inhibitors at the time of discharge or transfer.
10.3.4	**Statin prescribed at discharge–All patients**	Percent of patients alive at discharge who received prescriptions for statins at the time of discharge or transfer.
10.4.1	**ASA prescribed at discharge–Ideal patients**	Percent of patients alive at discharge who received prescriptions for aspirin at the time of discharge or transfer without contraindications to aspirin (evidence of active bleeding on admission or active bleeding during hospitalization; history of coagulopathy and platelet count < $100x10^9$/L, allergy to ASA, prescribed other antiplatelet agent at discharge {e.g., clopidogrel, ticlopidine} physician documented reason for nonuse of ASA {e.g. patient refusal}).
10.4.2	**Beta-blocker prescribed at discharge–Ideal patients**	Percent of patients alive at discharge who received prescriptions for beta-blockers at the time of discharge or transfer without contraindications to beta-blockers (congestive heart failure and on diuretic {unless measured left ventricular ejection fraction > 50%}, systolic blood pressure < 100 mmHg at discharge, severe chronic obstructive pulmonary disorder, asthma, bradycardia {heart rate < 60 beats per min} at discharge, conduction disorder defined as: first degree atrioventricular block {PR interval > 0.24s on last ECG}; second or third degree heart block on last ECG; and bifascicular block on last ECG, allergy or intolerance to beta- blocker, physician documented reason for non-use of beta-blocker {e.g. symptomatic hypotension, patient refusal}).
10.4.3	**ACE inhibitor prescribed at discharge–Ideal patients**	Percent of patients alive at discharge who received prescriptions for ACE inhibitors at the time of discharge or transfer, with past or current clinical features of heart failure, anterior infarction, ejection fraction < 40% or left ventricular grade $\geq$ III out of IV and without contraindications to ACE inhibitors (moderate or severe aortic stenosis, allergy or intolerance to ACE inhibitors, severe renal dysfunction {i.e., peak or last pre-hospital discharge serum creatinine level > 200 umol/L}, systolic blood pressure < 100 mmHg at discharge, bilateral renal artery stenosis, hyperkalemia {i.e., peak or last pre-hospital discharge K+ > 5.5 mmol/L}, physician documented reason for non-use of ACE inhibitor at discharge {e.g. patient refusal, symptomatic hypotension}).
10.4.4	**Statin prescribed at discharge–Ideal patients**	Percent of patients alive at discharge who received prescriptions for statins at the time of discharge or transfer, with total serum cholesterol level on admission > 5.2 mmol/L or LDL > 3.4 mmol/L, and not already on lipid-lowering agents pre-admission, without contraindications to statins (liver disease, patients with cholestasis, patients on fibrates at risk of rhabdomyolysis, physician documented reason for non-use of statin {e.g. patient refusal}).
10.4.5	**Secondary Prevention Rate**	Percent of ideal patients who received $\geq$1 of the four identified medications: ASA, beta-blocker, ACE inhibitor, statin at discharge.

Data Dictionary—AMI (Cont'd)		
VARIABLE		**DEFINITION**
Most Responsible Physician		
11.1	**Cardiologist**	Percent of patients who had a Cardiologist responsible for the majority of their care during their hospital stay.
11.2	**General Practitioner/Family Physician**	Percent of patients who had a General Practitioner/Family Physician responsible for the majority of their care during their hospital stay.
11.3	**Internist**	Percent of patients who had a General Internist responsible for the majority of their care during their hospital stay.
11.4	**Other**	Percent of patients who had an internist who has qualified in a sub-specialty other than Cardiology (i.e., Respirology, Nephrology, Neurology etc.) responsible for the majority of their care during their hospital stay.
Outcomes		
12.1	**Length of stay**	Median length of stay in hospital measured in days from date of admission to date of discharge.

Data Dictionary—CHF		
VARIABLE		**DEFINITION**
Study Sample		
1.1	**Study Sample**	Number of charts reviewed as part of the chart abstraction process.
1.2	**Qualified Patients (N)**	Number of charts reviewed where the patients met the EFFECT inclusion criteria (CHF occurred before arrival, patient was not transferred from another acute care facility) and the Framingham criteria for CHF. Inclusion criteria: most responsible diagnosis of CHF ICD-9 code 428.
1.3	**Qualified Patients (%)**	Percent of charts reviewed where the patients met the EFFECT inclusion criteria (CHF occurred before arrival, patient was not transferred from another acute care facility) and the Framingham criteria for CHF. Inclusion criteria: most responsible diagnosis of CHF ICD-9 code 428.
Patient Demographics		
2.1	**Age (Median)**	Median age, in years, of the patients in the study cohort who satisfied the inclusion criteria.
2.2	**Female**	Percent of female patients in the study cohort who satisfied the inclusion criteria.
Cardiac Risk Factors		
3.1	**Current smoker**	Percent of patients who smoked at least one cigarette per day in the month prior to admission as documented in the chart.
3.2	**Hypertension**	Percent of patients who had a documented history of hypertension.
3.3	**Hyperlipidemia**	Percent of patients who had a documented history of hyperlipidemia (e.g., total cholesterol > 5.2 mmol/L.)
3.4	**Diabetes**	Percent of patients who had a documented history of diabetes.
3.5	**Patients with ≥ 1 risk factor**	Percent of patients who had a documented history of one or more of the identified risk factors of current smoker, hypertension, hyperlipidemia, diabetes.
Past Medical History–Cardiac and Vascular Disease		
4.1	**Coronary Disease**	Percent of patients who had a documented history of coronary artery disease (including angina, previous myocardial infarction, previous coronary artery bypass graft and/or percutaneous coronary intervention).
4.2	**Previous myocardial infarction**	Percent of patients who had a documented history of a previous myocardial infarction.
4.3	**Atrial fibrillation**	Percent of patients who had a documented history of atrial fibrillation as documented on any ECG.
4.4	**Valve disease**	Percent of patients who had a documented history of valve disease involving the aortic valve and/or mitral valve.
4.5	**Cancer**	Percent of patients who had a prior or concurrent documented history of cancer.

Data Dictionary—CHF Patients		
VARIABLE		**DEFINITION**
Left Ventricular Function*		
5.1	**Left ventricular function determined/measured**	Percent of patients who had their left ventricular Ejection Fraction measured by ECHO or MUGA/RNA (See Appendix D—Glossary of Terms for explanation) during this admission or within the 6 months prior to this admission as either an inpatient or an outpatient documented on this admission.
5.2	**Patients with low ejection fraction**	Percent of patients who had their ejection fraction measured by ECHO and recorded as ≤ 40% or Grade III, IV, V or moderate or severe during this admission or within the 6 months prior to this admission. Normal Ejection Fraction is > 50%.
Medication Utilization at Discharge (All and Ideal Patients)*		
6.1.1	**ACE inhibitors at discharge – All patients**	Percent of patients alive at discharge who received prescriptions for ACE inhibitors at the time of discharge or transfer.
6.1.2	**Beta blockers at discharge – All patients**	Percent of patients alive at discharge who received prescriptions for beta blockers at the time of discharge or transfer.
6.1.3	**Warfarin at discharge in patients with atrial fibrillation – All patients**	Percent of patients alive at discharge with atrial fibrillation who received prescriptions for warfarin at the time of discharge or transfer.
6.2.1	**ACE inhibitors at discharge – Ideal patients**	Percent of ideal patients alive at discharge with LV systolic dysfunction (EF < 40% or equivalent grade), who received prescriptions for ACE inhibitors at the time of discharge or transfer and without contraindications to ACE inhibitors (moderate or severe aortic stenosis, bilateral renal artery stenosis, angioedema, hives, severe rash, other allergy or intolerance to ACE inhibitor use, hyperkalemia {K+ > 5.5 mEq/L}, hypotension {SBP < 90mmHg}, renal dysfunction {creatinine > 200 ummol/L}, and physician documented reason for non-use {e.g. patient refusal}, enrolled in a clinical trial testing alternatives to ACEI).
6.2.2	**Beta blockers at discharge – Ideal patients**	Percent of ideal patients alive at discharge with LV systolic dysfunction (EF < 40% or equivalent grade), who received prescriptions for beta blockers at the time of discharge or transfer and without contraindications to beta blockers (conduction system disease: symptomatic bradycardia {heart rate < 60} not on beta-blocker; bifascicular block; PR interval prolongation {> 0.24s}; and 2nd or 3rd degree AV block, hypotension, asthma, severe obstructive lung disease, physician documentation of reason for non-use {e.g. patient refusal}, allergy or intolerance to beta-blocker).
6.2.3	**Warfarin at discharge in patients with atrial fibrillation–Ideal patients**	Percent of ideal patients alive at discharge with atrial fibrillation during the index admission documented in chart, who received prescriptions for warfarin at time of discharge or transfer and without contraindications to warfarin (any documented bleeding episode, liver disease, uncontrolled seizure disorder, history of frequent falls, inability to cooperate, pregnancy, physician documented reason for non use {e.g. patient refusal}, allergy or intolerance to warfarin).
Hospital Care - Daily Weights*		
7.1	**Daily weights recorded > 50% of days**	Percent of patients whose daily weights were recorded by the nursing staff on more than 50% of the hospital stay days excluding days spent in the CCU/ICU.

Data Dictionary—CHF (Cont'd)		
VARIABLE		**DEFINITION**
Hospital Care – Counselling*		
8.1	**Documented counselling on at least one topic**	Percent of patients who received counselling on at least one of the following topics: i) symptoms of worsening heart failure; ii) daily weight monitoring; iii) diuretic titration; iv) fluid restriction; v) smoking cessation; vi) diet; vii) medication; and/or viii) activity level.
Most Responsible Physician (MRP)		
9.1	**Cardiologist**	Percent of patients who had a Cardiologist responsible for the majority of their care during their hospital stay.
9.2	**General Practitioner/Family Physician**	Percent of patients who had a General Practitioner/Family Physician responsible for the majority of their care during their hospital stay.
9.3	**Internist**	Percent of patients who had a General Internist or an Internist trained in another subspecialty responsible for the majority of their care during their hospital stay.
Physician Follow-up		
10.1	**General Practitioner/Family Physician**	Percent of patients where follow-up with their General Practitioner/Family Physician was documented.
10.2	**Cardiologist**	Percent of patients where planned follow-up with a Cardiologist was documented.
10.3	**Internist**	Percent of patients where planned follow-up with an Internist or general medical clinic was documented.
10.4	**CHF Clinic**	Percent of patients where planned follow-up at a CHF outpatient clinic was documented.
Outcomes		
11.1	**Length of stay**	Median length of stay in hospital measured in days, from date of admission to date of discharge.

Appendix D—Glossary of Terms

Acetylsalicylic Acid (ASA, Aspirin)
Acetylsalicylic acid, or ASA, is used for many different reasons, including headache, fever, arthritis pain and swelling. For people with coronary artery disease, it is used to prevent heart attacks and strokes by making platelets “slippery” so they do not form clots in partially obstructed coronary arteries.

Acute Coronary Syndromes (ACS)
Refers to any constellation of clinical symptoms compatible with acute myocardial ischemia. ACS encompasses both acute myocardial infarction and unstable angina.

Acute Myocardial Infarction (AMI)
Heart attack; occurs when a blood clot obstructs a coronary artery supplying blood to the heart. This obstruction causes inadequate flow of oxygen- and nutrient-rich blood, and results in the death of a portion of the heart muscle.

Administrative Data
Information that is primarily collected for record keeping, finances or other health administration purposes.

Angina
Tightness, pressure or pain in the chest due to a lack of oxygenated blood in the heart muscle, generally occurring when there is a significant but incomplete blockage of a coronary artery.

Angioplasty (or Percutaneous Transluminal Coronary Angioplasty, PTCA)
An invasive technique performed under X-ray guidance that helps to improve blood circulation for patients with hardening of the arteries and chest pain; a catheter is inserted through the blood vessels to the affected area of the identified coronary artery(s) and a balloon at the end of the catheter is inflated/deflated several times to flatten the plaque build-up so blood can flow more freely.

Angiotensin Converting Enzyme (ACE) Inhibitors
A class of drugs used to treat high blood pressure and congestive heart failure by interfering with the body’s production of angiotensin, a chemical that adds stress to the heart by causing small arteries to constrict.

Atrial Fibrillation
A complex atrial arrhythmia that has no definitive cause, characterized as a storm of electrical energy that travels in spinning "wavelets" throughout the atria, causing the upper chambers to quiver or to fibrillate.

Beta-blocker
A class of drugs that are used for the treatment of hypertension, heart attacks or angina. These drugs reduce stress on the heart by slowing down the heart rate, thus reducing the oxygen requirements.

Canadian Institute for Health Information (CIHI)
A federally chartered, but independent, non-profit organization that collects and processes health data from a number of sources, particularly from hospitals.

Cardiac Care Network (CCN)
Established in 1991 as a partnership among government, doctors, and hospitals that provide acute cardiac care, for planning, coordinating and monitoring the provision of cardiac care services in Ontario.

Cardiologist
A physician certified to treat problems of the cardiovascular system—the heart, arteries, and veins. Cardiology is classified as an Internal Medicine subspecialty.

Cardiovascular Disease (CVD)
Any disease that affects the heart or blood vessels by restricting the flow of blood. This occurs when a build-up of cells, fat and cholesterol, often referred to as “plaque”, clogs the arteries, impeding the free flow of blood. Over time, the blood vessels become blocked, and a heart attack or stroke can occur.

Chart Abstraction
Retrieval of information from patient charts, including demographic information, risk factors, clinical process of care measurements, medication utilization, and discharge information.

Clinical Data
Data obtained from chart abstraction. Differs from administrative data in that it includes in-hospital processes of care such as thrombolytic use or time to hospital presentation, or data on important prognostic variables such as location of infarct and vital signs at presentation.

Congestive Heart Failure (CHF)
A condition where the heart pumps inefficiently due to conditions that affect the heart or lungs; may cause fluid back-up in the lungs and/or legs and shortness of breath.

Coronary Angiography
The X-ray visualization of the internal anatomy of the heart and blood vessels after a dye is injected into the coronary arteries.

Coronary Artery Bypass Graft Surgery (CABG)
Most commonly an open-heart surgical procedure that helps to improve blood circulation for patients with hardening of arteries or blockages. A heart to lung bypass pump is used to re-route the blood from the heart while surgery is taking place. Grafts are taken from arteries or veins elsewhere in the body (i.e., legs) and attached above and below the blocked area of the coronary artery so that blood can be re-routed to the heart. It is usually reserved for patients with left mainstem disease or with two or more blocked vessels and/or if angioplasty or medication are not treatment options.

Coronary Artery Disease (CAD)
Any form of pathology of the coronary arteries; condition may or may not be symptomatic.

Coronary Disease
Blockage of the vessels that supply the heart with blood. This disease process is called "arteriosclerosis", or commonly "hardening of the arteries". In this process, cholesterol and other fats are deposited in the layers of the arteries, narrowing the channel for blood to flow.

Diabetes
Common, chronic condition in which the body does not produce or properly use insulin; imposes a heavy burden of morbidity and early mortality on affected patients. The cause of diabetes continues to be a mystery, although both genetics and environmental factors such as obesity and lack of exercise appear to play roles.

Enhanced Feedback for Effective Cardiac Treatment (EFFECT)
Randomized trial of cardiac report cards with the aim of determining whether collecting and publishing report cards with high quality clinical data on acute myocardial infarction and congestive heart failure quality indicators leads to greater quality of cardiac care in Ontario.

Echocardiography (also known as Echocardiogram)
Diagnostic ultrasound test to examine the function of the heart muscle and valves commonly used to assess the extent of damage to the heart; the 2-D echo is often accompanied by Doppler examinations which allow the clinician to measure blood flow through the heart and valves.

Ejection Fraction
The proportion, or fraction, of blood pumped out of the heart with each beat. A normal heart pumps out a little more than half the heart's volume of blood with each beat.

General Practitioner (Family Physician/Primacy Care Physician)
Family physicians specialize in caring for the physical, mental, and emotional well-being of their patients and their families.

Health Care Report Cards
Public disclosure of performance indicators for various aspects of the health care system.

Hyperlipidemia
A general term for elevated concentrations of lipids or fat substances in the blood.

Hypertension
Elevated blood pressure; elevated systolic/diastolic readings.

Institute for Clinical Evaluative Sciences (ICES)
An independent, non-profit organization, whose objective is to conduct research that contributes to the effectiveness, quality, equity and efficiency of health care and health services in the province of Ontario.

Internist
An internal medicine physician who focuses on adult medicine.

International Classification of Diseases, 9th Revision (ICD-9)
A set of internationally accepted codes for classification of medical diagnoses, conditions and procedures; medical records staff use these codes when transcribing from physician written medical charts to the hospital database that is submitted to the Canadian Institute for Health Information (CIHI).

Left Ventricular (LV) Function
A measurement to assess the outflow of blood and thereby the pumping function of the left ventricle of the heart. Ventricular function is an important prognostic indicator for patients with AMI and CHF. Often used to determine the risk of various kinds of surgery, the need for medicines that can help the heart pump better, and a patient's susceptibility to other medical problems. Typically measured using echocardiography.

Length of Stay (LOS)
Number of days spent in hospital.

Lipid Testing
A blood test to measure a patient's blood lipid levels including total cholesterol, High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL) and Triglyceride levels.

Modifiable Risk Factor
A risk factor for a disease whose impact can potentially be modified or altered. For example a smoker could stop smoking and thus reduce their risk of developing smoking related illnesses such as a heart attack.

Multiple Uptake Gated Acquisition, Radionuclide Angiography (MUGA/RNA)
A nuclear medicine scan used to evaluate the wall motion of the heart and how well the heart is contracting. Calculations are made to determine how much blood is pumped out of the heart per minute (the ejection fraction or EF).

Myocyte Necrosis
Myocardial muscle cells are termed cardiomyocytes. Necrosis refers to cell death. Myocyte necrosis refers to the death of muscle cells. In the context of cardiovascular disease, myoctye necrosis refers to the death of cardiac muscle cells as a result of a lack of blood flow secondary to blockage or occlusion of an artery that feeds the heart.

Percutaneous Coronary Intervention (PCI)
An important group of technologies used for the treatment of patients with cardiovascular disease. Although initially limited to balloon angioplasty and termed percutaneous transluminal coronary angioplasty (PTCA), PCI now includes other new techniques capable of relieving coronary narrowing.

Primary PCI
Primary PCI is the term used when PCI is performed in patients with AMI as emergent reperfusion therapy.

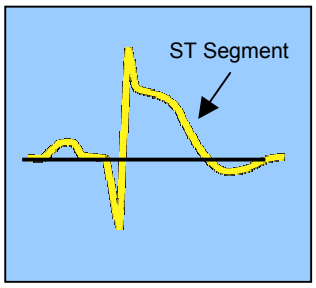
Quality Indicators
Performance measures that assess health care structure, processes and outcomes. These measures may be defined on the basis of scientific evidence or by clinical experts in the field, and are ultimately linked to improved patient outcomes.

Secondary Prevention
In the context of heart disease, secondary prevention refers to interventions or therapies such as life style changes or medications aimed as slowing or reversing the progression of disease.

Standard Admitting Orders
Guidelines developed and used by physicians for use in admitting patients. These orders reduce unnecessary variability in physicians' approaches to similar disease processes and thereby improve the quality of care.

Statins
Synthetically derived cholesterol lowering agents; the principal metabolites of these drugs are specific inhibitors of 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA reductase).

ST-Segment Elevation Myocardial Infarction (STEMI)
A type of myocardial infarction or heart attack where the ST portion of the QRST waveform is elevated at least 1mm above the baseline.



Thrombolysis
Emergency therapy given during a heart attack which involves the injection of a drug to dissolve the clot in a coronary artery and restore blood flow to the heart muscle; the sooner the therapy is administered, the better the outcome.

Troponins
Cardiac biomarkers found in both skeletal and cardiac muscle that are involved with actin and myosin in muscle contraction. Troponin T and Troponin I are relatively specific for cardiac muscle. They are released during acute myocardial ischemia and can be measured.

Warfarin
Agent used to prevent blood clots from forming or growing larger. It is often prescribed for patients with certain types of irregular heartbeat and after a heart attack or heart valve replacement surgery. It works by stopping the formation of substances that cause clots.

Sources:

Naylor CD, Slaughter PM (Eds) Cardiovascular Health and Services in Ontario. An ICES Atlas. Toronto: Institute for Clinical Evaluative Sciences, 1999.

Lee DS, Tran C, Flintoft V, Grant FC, Liu PP, Tu JV; Canadian Cardiovascular Outcomes Research Team/Canadian Cardiovascular Society Heart Failure Quality Indicator Panel. CCORT/CCS quality indicators for congestive heart failure care. *Can J Cardiol.* 2003; 19(4):357-64.

Tran CT, Lee DS, Flintoft VF, Higginson L, Grant FC, Tu JV, Cox J, Holder D, Jackevicius C, Pilote L, Tanser P, Thompson C, Tsoi E, Warnica W, Wielgosz A. Canadian Cardiovascular Outcomes Research Team/Canadian Cardiovascular Society; Acute Myocardial Infarction Quality Indicator Panel. CCORT/CCS quality indicators for acute myocardial infarction care. *Can J Cardiol.* 2003; 19(1):38-45.

Terrence Donnelly Heart Centre, Cardiac Prevention and Rehabilitation Centre, St. Michael's Hospital. Available from: http://www.stmichaelshospital.com/content/programs/cardiac/treatment/medications

Appendix E—Analysis of Potential Lives Saved with Maximal Use of AMI and CHF Therapies

This appendix describes the potential lives saved if:

- All ideal AMI patients received the recommended secondary prevention therapy; and
- All ideal CHF patients received identified therapies.

Analyses

Table E-1 provides an overview of the clinical evidence for the indicated medications, the number needed to treat (NNT), and the required treatment duration.

Table E-1. Meta-Analyses of Major Trials for AMI Secondary Prevention & CHF Treatment

#	Diagnosis	Medication	Meta-Analyses Reference	Number Needed to Treat (NNT)
1	**AMI**	**ASA**	Antithrombotic Trialists' Collaboration Collaborative meta-analysis of randomized trials of antiplatelet therapy for prevention of death, myocardial infarction, and stroke in high-risk patients. *BMJ* 2002; 324:71-86.	83 patients treated for a mean duration of 27 months to avoid 1 death
2		**Beta-blockers**	Freemantle JC, Young P, Mason J, Harrison J. Beta blockade after myocardial infarction: systematic review and meta regression analysis. *BMJ* 1999; 18:1730-7.	42 patients treated for 2 years to avoid 1 death
3		**ACE inhibitors**	Flather MD, Yusuf S, Kober L, Pfeffer M, Hall A, Murray G, Torp-Pederson C, et al. Long-term ACE inhibitor therapy in patients with heart failure or left-ventricular dysfunction: a systematic overview of data from individual patients. *Lancet* 2000; 355:1575-1581.	15 patients treated for 2.5 years to avoid one death
4		**Statin**	LaRosa JC, He J, Vupputuri S. Effect of statins on risk of coronary disease: A meta-analysis of randomized controlled trials *JAMA* 1999; 282:2340-2346.	61 patients treated for mean duration of 5.4 years to avoid one death
1	**CHF**	**Beta-blockers**	Brophy JM, Joseph L, Rouleau JL. Beta-blockers in congestive heart failure. A Bayesian meta-analysis. *Ann Intern Med* 2001; 134:550-560	26 patients treated for 1 year to prevent 1 death
2		**ACE inhibitor**	Garg, R, Yusuf S. Overview of randomized trials of angiotensin-converting enzyme inhibitors on mortality and morbidity in patients with heart failure: collaborative group on ACE inhibitor trials. *JAMA* 1995; 273:1450-1456	25 patients treated for at least 3 months to avoid 1 death

To estimate the potential effect of the maximal use of evidence-based therapies on the number of lives that could be saved in Ontario, EFFECT investigators attempted to identify high quality meta-analyses that summarize the effectiveness of each medication from major clinical trials as indicated in Table E-1. From each reference, we determined the number needed to treat in order to prevent one death and the duration

of therapy required. We then calculated the number of lives that might be saved with maximal rates (i.e., 100%) of utilization of these therapies as compared with the current utilization rate in ideal EFFECT patients. These analyses do not include thrombolytics as we were unable to identify ideal candidates for reperfusion therapy.

Using the CIHI hospital discharge abstract database (DAD) to perform the calculation, we determined the total number of new AMI and CHF patients discharged alive in 1999/2000 from Ontario hospitals. We then determined the proportion of patients who would be considered ideal candidates for each medication in the EFFECT data and extrapolated that to the total population of new AMI and CHF patients in Ontario.

To calculate the number of lives saved, we multiplied the difference between the current rate and the maximal rate (100%) of medication use, by the NNT to calculate the total number of lives that may be saved with more therapy in ideal candidates. (See Tables E-2 and E-4.)

To estimate the maximal possible number of ideal candidates for ACE inhibitors and statins, we assumed that each patient in Ontario received LV function assessment and/or lipid testing, and that the distribution of results were similar to that seen with those patients who actually received these tests. This provided a maximum estimate of the number of lives saved in actual and potential ideal candidates. (See Tables E-3 and E-5.)

Several caveats should be noted with this analysis. First, it assumes that the medications will have additive effects in patients, and that the NNT observed in clinical trials can be generalized to the real world. Compliance and dosing of drugs may be lower in the community setting, but this may be partially offset by higher absolute event rates (and thus lower NNTs) such that the real world NNT is uncertain. Second, these medications may have benefit in non-ideal candidates, even though they are not included in these calculations. For example, the clinical trial evidence for these medications continues to change. More recent data suggest that ACE inhibitors may have benefits in patients with preserved LV systolic function (i.e., Heart Outcomes Prevention Evaluation-HOPE)[1] and that statins benefit patients with cholesterol levels within normal range—as defined by current guidelines—(i.e., Heart Protection Study).[2] Third, this analysis assumes that ideal candidates who did not receive the therapy in hospital did not receive the therapy after discharge.

Despite these caveats, we hope these analyses will allow readers to put into perspective the overall gain that might be achieved by maximal utilization rates of evidence-based therapies in high-risk cardiac patients. They also highlight the need for the discovery of new therapies if we hope to achieve substantial reductions in death rates associated with these conditions.

As described in Tables E-2 and E-3 many additional lives could be saved if all ideal AMI patients received the indicated medications: ASA, beta-blockers, ACE inhibitors and statins. The estimated number of lives that could be saved ranges from 178 to 250.

[1] Yusuf S, Sleight P, Pogue K, Bosch J, Davies R, Dagenais G. Effects of angiotensin-converting-enzyme inhibitor, ramipril, on cardiovascular events in high risk-patients. The Heart Outcomes Prevention Evaluation Study Investigators. *N Eng J Med* 2000; 20; 342(3):145-53.

[2] Collins R, Armitage J, Parish S, Sleigh P, Peto R. Heart Protection Study Collaborative Group. *Lancet* 2003 14; 361(9374):2005-16.

Table E-2. Estimated Number of Lives Saved with Maximal Utilization of AMI Secondary Prevention Medications, 1999–2000
(Minimal estimated benefits of medical therapies on AMI death rates in Ontario)

#	Calculations			Medications				Total
				ASA	Beta-blockers	ACEI	Statins	
1	**AMI**							
1.1	Average Annual Live Discharges following AMI in Ontario	**17,061**						
1.2	Number Needed to Treat (NNT) to prevent 1 death			**83**	**42**	**15**	**61**	
2	**Ideal AMI Patients**							
2.1	Percent of EFFECT patients identified as Ideal			**81%**	**58%**	**25%**	**19%**	
2.2	Estimated number of ideal patients in Ontario			**13,820**	**9,896**	**4,266**	**3,242**	
2.3	Current utilization of the medication in EFFECT study population			**85%**	**78%**	**72%**	**61%**	
2.4	Estimated number of ideal patients currently not receiving indicated therapy			**2,073**	**2,177**	**1,194**	**1,264**	
2.5	**Maximum potential lives saved if 100% of ideal patients received secondary prevention medications**			**25**	**52**	**80**	**21**	**178**

Table E-3. Estimated Number of Lives Saved with Maximal Utilization of AMI Secondary Prevention and Maximum Number of Ideal Candidates, 1999–2000
(Maximal estimated benefits of medical therapies on AMI death rates in Ontario)

#	Calculations			Medications				Total
				ASA	Beta-blockers	ACEI	Statins	
1	**AMI**							
1.1	Average Annual Live Discharges in Ontario	**17,061**						
1.2	Number Needed to Treat (NNT) to prevent 1 death			**83**	**42**	**15**	**61**	
2	**Ideal AMI Patients**							
2.1	*Maximum estimated percentage of EFFECT patients that could be or are ideal candidates*			**81%**	**58%**	***41%***	***39%***	
2.2	Estimated number of ideal patients in Ontario			**13,820**	**9,896**	**6,995**	**6,654**	
2.3	Current utilization of medication in EFFECT study population			**85%**	**78%**	**72%**	**61%**	
2.4	Estimated number of ideal patients currently not receiving indicated therapy			**2,073**	**2,177**	**1,959**	**2,595**	
2.5	**Maximum potential lives saved if 100% of ideal patients received secondary prevention medications**			**25**	**52**	**131**	**43**	**250**

A similar approach to that used for the AMI patient analysis was used to estimate the number of lives that might be saved with optimal use of CHF therapies. As depicted in Tables E-4 and E-5 many patient lives could be saved if all ideal CHF patients received the indicated medications: beta-blockers and ACE inhibitors. The potential number of lives that could be saved ranges from 70 to 156.

Table E-4. Estimated Number of Lives Saved with Maximal Utilization of CHF Therapy, 1999–2000
(Minimal estimated benefits of medical therapies on CHF death rates in Ontario)

#	Calculations			Medications		Total
				Beta-blockers	ACEI	
1	**CHF**					
1.1	Average Annual Live Discharges in Ontario	13,903				
1.2	Number Needed to Treat (NNT) to prevent 1 death			26	25	
2	**Ideal CHF Patients**					
2.1	Percent of EFFECT patients that are or could be ideal			16%	17%	
2.2	Estimated number of ideal patients in Ontario			2,174	2,374	
2.3	Current utilization of medication in EFFECT study population			39%	82%	
2.4	Estimated number of ideal patients currently not receiving indicated therapy			1,326	427	
2.5	**Potential lives saved if 100% of ideal patients received these medications**			52	18	70

Table E-5. Estimated Number of Lives Saved with Maximal Utilization of CHF Therapy and Maximum Number of Ideal Candidates, 1999–2000
(Maximal estimated benefits of medical therapies on CHF death rates in Ontario)

#	Calculations			Medications		Total
				Beta-blockers	ACEI	
1	**CHF**					
1.1	Average Annual Live CHF Discharges in Ontario	13,903				
1.2	Number Needed to Treat (NNT) to prevent 1 death			26	25	
2	**Ideal CHF Patients**					
2.1	*Maximal percent of EFFECT patients that could be or are ideal candidates*			*36%*	*39%*	
2.2	Estimated number of ideal patients in Ontario			5,005	5,422	
2.3	Current utilization of medication in EFFECT study population			39%	82%	
2.4	Estimated number of ideal patients currently not receiving indicated therapy			3,053	976	
2.5	**Maximal potential lives saved if 100% of ideal patients received these medications**			117	39	156

Appendix F—Quality Improvement Resources

This appendix provides additional resources on quality improvement initiatives in and outside of Canada for your reference.

1. National Service Framework for Coronary Heart Disease—United Kingdom

The National Service Framework for Coronary Heart Disease sets out the standards and services which should be available throughout England to address heart disease. The Framework incorporates modern prevention and primary care as well as the more specialized services such as diagnosis, ambulance and emergency services, medical and surgical nursing care and specialist services including heart surgery and rehabilitation.

http://www.doh.gov.uk/nsf/coronarych1.htm

2. Cooperative Cardiovascular Project (CCP)—United States

The Centers for Medicare & Medicaid Services' (previously known as Health Care Financing Administration) Cooperative Cardiovascular Project (CCP) is a health care quality improvement initiative started in 1992. It involves the use of evidence-based guidelines for the care of heart attack patients.

The CCP has developed quality indicators based on clinical practice guidelines developed by the American College of Cardiology and the American Heart Association. As part of the CCP initiative, information on over 200,000 Medicare patients admitted to hospitals for treatment of heart attacks was obtained from clinical records. Patients were classified as "eligible" or "ideal" for the specific therapies described by the quality indicators.

http://www.ndhcri.org/ami/ami.htm

3. National Registry of Myocardial Infarction (NRMI)—United States

The National Registry of Myocardial Infarction (NRMI) is one of the largest observational studies of AMI. NRMI has collected data since 1990 on over two million AMI patients, and assisted over 1,600 participating hospitals assess their approach to AMI treatment and identify trends in patient outcomes. NRMI is sponsored by Genentech.

NRMI is involved in evaluation of treatment procedures, monitoring resource utilization, identifying patient-selection issues, and monitoring outcomes.

http://www.nrmi.org/index.html

4. Improving Cardiovascular Outcomes in Nova Scotia (ICONS)—Canada

Improving Cardiovascular Outcomes in Nova Scotia (ICONS) was a five-year study focusing on cardiovascular disease. The premise was to determine if a disease management approach to care could improve health outcomes for citizens with cardiovascular disease. Persons with a history of heart failure, heart attack, unstable angina, atrial fibrillation, previous angioplasty or bypass surgery, known coronary artery disease, stroke or peripheral vascular diseases were eligible to participate in the study.

http://www.icons.ns.ca

5. Global Registry of Acute Coronary Events (GRACE)

GRACE is an international observational database of outcomes for patients who are hospitalized with acute coronary syndrome (ACS). GRACE includes 100 hospitals in 14 countries that will enroll a total of 10,000 patients per year. Participating physicians receive confidential quarterly reports showing their outcomes side-by-side with the aggregate outcomes of all participating hospitals. GRACE was launched at the annual meeting of the European Society of Cardiology in Barcelona on August 31, 1999.

http://www.umassmed.edu/outcomes/grace/index.cfm?action=overview

6. Berlin Myocardial Infarction Registry/Berline Herzinfarktregister (BHIR)—Germany

The Berlin Myocardial Infarction Registry/Berline Herzinfarktregister (BHIR) was founded in September 2000. It aims to support hospitals as well as other institutions within the public health sector in improving the prevention, diagnosis and treatment of heart disease, in particular, acute myocardial infarction. It also includes a focus on raising public awareness regarding the prevention of heart disease. BHIR is a joint effort of Berlin Hospitals, the Berlin Chamber of Physicians and the Department of Public Health at the Technical University of Berlin.

BHIR has recently begun its second phase of operation (October 1, 2003 – September 30, 2005). Since 2001 it has been financially supported by the Boehr Pharma KG.

More information on BHIR and its related publications can be found at its web site http://www.herzinfarktregister.de

7. Brisbane Cardiac Consortium—Australia

The Brisbane Cardiac Consortium is a collaborative group of hospital and primary care clinicians from Royal Brisbane, Princess Alexandra and Queen Elizabeth II Hospitals, and Brisbane North and Southside Central Divisions of General Practice. The group's aim is to improve the quality of care for people who have been hospitalized with angina, heart attack or heart failure. Approximately 1,600 patients with angina, or who have suffered a heart attack and 1,000 patients with congestive heart failure were involved in the program between October 2000 and August 2002.

The project was sponsored by the Royal Australasian College of Physicians and Queensland Health with funding of one million dollars provided by the Commonwealth Department of Health and Aged Care. The Brisbane Cardiac Consortium is part of the national Clinical Support Systems Program (CSSP).

For more information regarding the Brisbane Cardiac Consortium see the following links:

http://www.health.qld.gov.au/bcc/clinical_indicators.asp

8. Joint Commission on Accreditation of Healthcare Organizations (JCAHO)—United States

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) evaluates and accredits over 16,000 health care organizations and programs in the United States. JCAHO has developed standards and evaluated the compliance of health care organizations against these benchmarks since the 1950s.

In 1997, JCAHO introduced the ORYX initiative to integrate outcomes and other performance measurement data into its hospital accreditation process. Since July 2002, many acute care hospitals have been required to collect data on one or two of four Core Measures Sets (AMI, Heart Failure, Community-acquired Pneumonia, or Pregnancy and Related Conditions). Core Measures are specific ORYX indicators chosen for a given core therapeutic area. A group of core measures bundled together forms a core measure set. Core measures relate to a disease or process of care. For example, the AMI core measure set

is composed of nine core measures and the Heart Failure core measures set consists of four core measures. Many of the EFFECT quality indicators are similar to the JCAHO core measures.

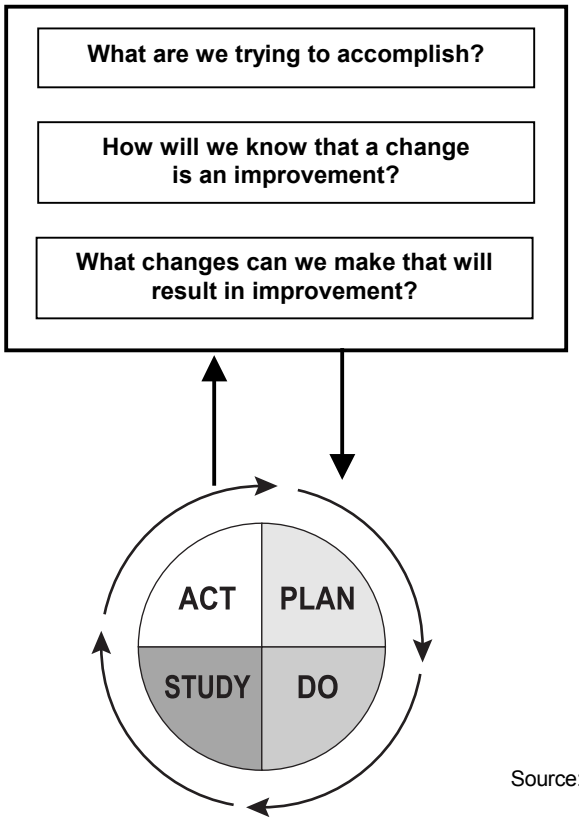
Additional information can be found at: http://www.jcaho.org/pms/core+measures/ami-overview.htm
http://www.jcaho.org/pms/core+measures/hf_overview.htm

9. Institute for Healthcare Improvement—United States

A not-for-profit entity, the Institute for Healthcare Improvement (IHI) works to improve health by advancing the quality and value of health care. Based in Boston, IHI was founded in 1991. It provides a range of tools and resources for health care organizations interested in performance improvement.

A performance improvement methodology referred to by the IHI is "PDSA," short for "Plan, Do, Study, Act." This methodology is described by the IHI as "The PDSA Cycle," as it is known, is shorthand for testing a change: planning it, trying it out, observing the results, and acting on what is learned. Introduced by improvement gurus W. Edwards Deming and William Shewart, and later enhanced by Langley, Nolan, Nolan, Norman and Provost in their book, *The Improvement Guide*, it is a well-established scientific method for achieving change. (See Figure 1.) Source: http://www.ihi.org/resources/qi/index.asp

Figure 1. Plan—Do—Study—Act Cycle



Source: *The Improvement Guide,* by Langley, Nolan, Nolan, Norman and Provost; Jossey Bass, 1996.

Additional information regarding IHI is available at:
http://www.ihi.org

Appendix G—Reader Feedback Survey

We welcome your feedback on this report and your comments and suggestions on ways to improve subsequent reports. All feedback will be kept confidential. Please complete this survey and send it and your comments by mail or fax to:

Linda Donovan c/o EFFECT Study
Institute for Clinical Evaluative Sciences (ICES)
G1 06, 2075 Bayview Avenue, Toronto, Ontario M4N 3M5
Fax: 416 480-6048

Please check (☑) the appropriate box.

1. Please indicate if you are associated with:
   - ☐ A hospital in the early feedback group of the EFFECT Study
   - ☐ A hospital in the delayed feedback group of the EFFECT Study
   - ☐ Neither

2. How did you obtain your copy of the report?
   - ☐ It was mailed to me
   - ☐ From a colleague
   - ☐ From the web site
   - ☐ I requested a copy
   - ☐ Other: please specify:_____

3. To what extent have you read through the report?
   - ☐ I read through the entire document
   - ☐ I read specific chapters
   - ☐ I read specific chapters and browsed through the entire document
   - ☐ I browsed through the entire document

4. Please indicate how you rate each section of the report in terms of its usefulness:

Section	Rating			
Executive Summary	❍ Very Useful	❍ Somewhat useful	❍ Not Useful	❍ Not read
Introduction	❍ Very Useful	❍ Somewhat useful	❍ Not Useful	❍ Not read
Methods	❍ Very Useful	❍ Somewhat useful	❍ Not Useful	❍ Not read
Findings	❍ Very Useful	❍ Somewhat useful	❍ Not Useful	❍ Not read
Performance Improvement	❍ Very Useful	❍ Somewhat useful	❍ Not Useful	❍ Not read
Interpretive Cautions	❍ Very Useful	❍ Somewhat useful	❍ Not Useful	❍ Not read
Conclusion	❍ Very Useful	❍ Somewhat useful	❍ Not Useful	❍ Not read
Appendices	❍ Very Useful	❍ Somewhat useful	❍ Not Useful	❍ Not read

5. How would you rate the following aspects for the report?

Item	Rating			
Clarity/readability	❍ Excellent	❍ Good	❍ Fair	❍ Poor
Organization/format	❍ Excellent	❍ Good	❍ Fair	❍ Poor
Use of tables and figures	❍ Excellent	❍ Good	❍ Fair	❍ Poor
Quality of analysis	❍ Excellent	❍ Good	❍ Fair	❍ Poor
Level of detail presented	❍ Excellent	❍ Good	❍ Fair	❍ Poor
Other:_____	❍ Excellent	❍ Good	❍ Fair	❍ Poor

A key objective of the EFFECT study and the report is to assist in designing mechanisms to support quality improvement efforts for cardiac care.

6. In your opinion, how useful was this document in supporting your organization's efforts in cardiac care?

 Very useful Useful Somewhat useful Not useful Not applicable

7. In your opinion, how useful were the data provided in this document?

 Very useful Useful Somewhat useful Not useful Not applicable

8. How do you plan to use the information presented in this report?

_____
_____
_____
_____

9. How would you improve this report?

_____
_____
_____
_____

10. What are your suggestions for improving future reports?

_____
_____
_____
_____

11. What is your main position/role?

 Health care provider—please specify type: _____
 Health services manager or administrator
 Other hospital staff—please specify type: _____
 Researcher
 Policy analyst
 Elected official
 Student
 Other: _____

12. Would you be interested in being notified about future studies/reports published by the CCORT investigators? You may terminate this notification service at any time.

 Yes, my email address is _____
 No

Thank you for taking the time to provide us with your feedback.

Table 11. AMI Report Card Summary

CCORT EFFECT Study — AMI Report Card — January, 2004

#	Hospital	Study Sample (n)		Qualified (n)	Qualified (%)	Patient Demographics: Age (Median)	Patient Demographics: Female (%)	Cardiac Risk Factors (%): Current Smoker	Cardiac Risk Factors (%): Hypertension	Cardiac Risk Factors (%): Hyperlipidemia	Cardiac Risk Factors (%): Diabetes	Cardiac Risk Factors (%): Patients with ≥ 1 Cardiac Risk Factor	Standard Admitting Orders Used (%)	Quality Indicators: Reperfusion Therapy: Method** (%): Thrombolytics	Quality Indicators: Reperfusion Therapy: Method** (%): PCI	Quality Indicators: Reperfusion Therapy: Thrombolytics Decided By (%): Emergency MD	Quality Indicators: Reperfusion Therapy: Thrombolytics Location (%): Emergency	Quality Indicators: Reperfusion Therapy: Thrombolytics "Door to Needle" Time (Median)	Quality Indicators: Left Ventricular Function (%): LV Function Determined	Quality Indicators: Left Ventricular Function (%): Patients with Low LV Function	Quality Indicators: Lipid Testing: Lipid Sample Obtained within 24 hrs of Admission (%)	Lab: Troponin Done (%)	Quality Indicators: Medication Utilization (%): All Patients: ASA within 6 hours of Admission	Quality Indicators: Medication Utilization (%): All Patients: Beta-blocker within 12 hours of Admission	Quality Indicators: Medication Utilization (%): Ideal Patients: ASA within 6 hours of Admission	Quality Indicators: Medication Utilization (%): Ideal Patients: Beta-blocker within 12 hours of Admission	Quality Indicators: Medication Utilization (%): All Patients: ASA prescribed at Discharge	Quality Indicators: Medication Utilization (%): All Patients: Beta-blocker prescribed at Discharge	Quality Indicators: Medication Utilization (%): All Patients: ACEI prescribed at Discharge	Quality Indicators: Medication Utilization (%): All Patients: Statin prescribed at Discharge	Quality Indicators: Medication Utilization (%): Ideal Patients: ASA prescribed at Discharge	Quality Indicators: Medication Utilization (%): Ideal Patients: Beta-blocker prescribed at Discharge	Quality Indicators: Medication Utilization (%): Ideal Patients: ACEI prescribed at Discharge	Quality Indicators: Medication Utilization (%): Ideal Patients: Statin prescribed at Discharge	Secondary Prevention Rate (%)	Most Responsible Physician (%): Cardiologist	Most Responsible Physician (%): Family Practitioner/GP	Most Responsible Physician (%): Internist	Most Responsible Physician (%): Other	Outcomes: Length of Stay (Days - Median)
	Quality Indicator Benchmark/Target																	≤ 30	≥ 75%		≥ 85%			≥ 90%	≥ 85%					≥ 90%	≥ 85%	≥ 85%	≥ 70%	≥ 85%					
	Teaching Hospitals																																								
1	*Hamilton Health Sciences Corporation	401		371	93	72	38	30	51	38	26	82	42	97	10	75	100	0:37	67	42	54	99	73	34	82	40	84	78	79	51	89	81	85	74	84	36	0	55	9	7
2	Kingston General Hospital	136		109	80	68	33	30	50	23	23	80	72	80	40	100	100	0:41	79	44	52	62	67	20	71	27	90	75	60	37	86	80	66	70	76	94	0	6	0	5
3	Mount Sinai Hospital, Toronto	131		120	92	75	35	28	47	38	23	85	3	88	24	82	95	0:30	71	38	50	21	67	36	77	42	92	90	71	54	96	95	77	90	92	78	0	18	3	6
4	St. Joseph's Healthcare, Hamilton	129		122	95	69	34	28	52	37	29	83	64	100	0	83	94	0:50	43	31	48	100	80	40	84	53	88	73	82	50	92	77	91	91	89	90	1	4	4	7
5	St. Michael's Hospital, Toronto	127		108	85	69	38	36	44	38	25	81	57	75	35	27	100	0:44	80	37	46	99	73	32	83	40	93	80	74	50	95	81	83	81	87	96	0	4	0	6
	Teaching Hospitals Total/Average	**924**		**830**	**90**	**71**	**36**	**30**	**49**	**36**	**25**	**82**	**45**	**91**	**17**	**77**	**98**	**0:38**	**67**	**40**	**51**	**83**	**72**	**33**	**80**	**40**	**88**	**79**	**75**	**49**	**91**	**83**	**80**	**78**	**85**	**65**	**0**	**29**	**5**	**6**
	Community Hospitals																																								
6	Brantford General Hospital	134		124	93	68	37	36	43	31	31	81	77	100	0	34	13	0:44	65	23	20	70	77	5	84	7	81	78	73	46	86	85	67	82	81	0	26	73	2	6
7	Brockville General Hospital	133		113	85	67	34	35	47	31	25	81	50	100	0	56	77	0:30	12	11	56	0	68	7	76	8	89	72	31	22	90	77	81	21	74	9	74	15	2	6
8	Cambridge Memorial Hospital	136		129	95	68	31	30	54	40	26	84	94	100	0	63	97	0:30	54	36	84	22	68	17	81	19	89	83	61	67	93	86	70	82	87	44	7	49	0	6
9	*Credit Valley Hospital, The, Mississauga	135		132	98	66	36	30	44	31	23	77	65	100	0	76	88	0:27	61	32	61	92	70	37	73	41	75	75	55	53	77	73	76	56	73	95	4	0	2	7
10	*Grey Bruce Health Services	198		183	92	72	38	25	43	31	28	75	67	100	0	66	97	0:35	36	16	17	89	70	9	81	13	90	79	53	39	92	79	71	46	85	5	30	64	0	5
11	*Halton Healthcare Service Corporation	288		264	92	66	30	39	40	35	23	81	81	100	0	74	100	0:28	71	33	55	63	64	34	67	40	82	84	64	38	85	85	70	63	80	33	59	6	2	8
12	Headwaters Health Care Centre, Orangeville	137		122	89	70	32	27	40	45	17	81	77	100	0	0	3	0:46	54	35	50	67	70	14	79	18	83	76	62	49	84	78	70	67	79	0	2	98	0	7
13	Hôpital Montfort, Ottawa	133		112	84	70	45	37	44	27	25	80	44	100	0	46	100	0:37	41	14	34	22	63	23	70	29	81	77	56	34	83	84	79	71	81	42	10	47	0	6
14	*Hôpital Regional de Sudbury Regional Hospital	131		99	76	66	38	45	54	40	26	84	29	93	27	84	100	0:44	64	37	13	0	73	43	81	48	83	78	55	42	85	77	61	83	77	49	15	15	20	6
15	Hotel Dieu Hospital, Cornwall	137		113	82	67	37	27	44	19	30	76	85	100	0	58	58	0:47	30	29	28	78	73	7	82	8	74	65	57	34	80	71	67	64	75	0	76	24	0	6
16	*Lakeridge Health Corporation	265		240	91	69	37	38	45	30	24	78	59	100	0	54	89	0:33	47	40	38	85	68	13	71	13	82	79	65	30	83	78	69	59	79	17	47	33	2	6
17	Norfolk General Hospital, Simcoe	136		121	89	72	38	31	48	27	21	79	93	100	0	16	3	0:41	29	24	12	21	72	20	83	22	76	68	51	25	81	74	89	54	75	0	20	80	0	6
18	North Bay General Health Centre	136		120	88	68	41	31	50	33	28	83	88	100	0	86	97	0:27	83	37	86	22	70	48	77	59	85	78	78	41	88	82	86	64	82	0	10	90	0	5
19	Orillia Soldiers' Memorial Hospital	137		112	82	70	36	49	40	33	21	85	85	100	0	75	78	0:30	33	14	4	92	75	11	81	19	83	87	42	36	84	92	64		84	0	28	45	27	5
20	Pembroke General Hospital	134		110	82	68	35	29	47	26	17	78	35	100	0	45	100	0:38	73	13	54	22	80	25	89	32	86	63	63	50	90	68	53	65	78	0	88	12	0	5
21	Peterborough Regional Health Ctr/Civic Hospital	135		122	90	72	47	26	36	31	19	73	91	100	0	50	97	0:35	2	0	1	16	63	17	70	27	81	73	42	20	86	77	52		79	41	6	24	30	5
22	*Quinte Healthcare Corporation	351		302	86	67	36	34	42	29	27	78	69	100	0	70	95	0:35	24	46	13	3	66	24	76	26	73	68	50	26	75	70	63	57	72	18	53	29	0	6
23	Ross Memorial Hospital, Lindsay	133		124	93	72	37	23	45	31	22	73	77	100	0	64	88	0:30	34	29	5	96	61	8	69	10	83	56	63	32	83	64	81		77	2	35	63	0	6
24	*Rouge Valley Health System	259		241	93	65	33	45	35	31	30	82	88	100	0	57	97	0:36	63	34	61	79	71	36	77	41	80	77	57	55	83	86	64	73	80	49	4	44	1	5
25	*Scarborough Hospital, The	395		358	91	69	32	33	48	32	27	83	75	100	0	84	94	0:41	65	37	43	84	69	27	74	36	77	76	72	37	81	78	74	49	76	90	0	8	2	6
26	South Muskoka Memorial Hospital, Bracebridge	134		114	85	69	31	34	35	30	21	78	100	100	0	32	60	0:35	46	27	33	32	84	34	89	34	89	80	61	27	89	80	82	44	82	0	93	4	4	6
27	St. Mary's General Hospital, Kitchener	131		124	95	70	31	30	37	23	27	79	93	100	0	84	97	0:30	73	49	51	29	70	25	76	36	84	81	68	33	89	85	81	63	83	78	3	2	15	5
28	Stratford General Hospital	134		131	98	73	40	21	44	21	29	72	43	100	0	39	9	0:32	2	0	57	77	75	25	78	30	85	77	75	49	87	85	67	79	83	0	40	60	0	4
29	Strathroy Middlesex General Hospital	129		119	92	69	34	25	40	15	31	70	87	100	0	33	0	0:38	2	100	16	5	66	23	73	27	82	68	43	17	83	72	72	31	76	0	90	10	0	7
30	Timmins and District General Hospital	134		106	79	64	35	48	54	42	19	86	79	100	0	78	100	0:27	47	23	47	62	83	44	90	53	89	76	50	37	91	80	59	60	83	0	15	76	8	5
31	Trillium Health Centre, Mississauga	127		122	96	66	34	25	46	28	30	77	92	100	0	45	100	0:35	85	32	23	62	63	29	72	36	81	71	57	26	84	69	78	40	78	66	2	10	22	9
32	West Lincoln Memorial Hospital, Grimsby	137		128	93	70	30	27	56	34	20	82	89	100	0	33	60	0:30	34	13	2	2	72	19	79	24	70	68	65	25	71	73	77		73	0	95	5	0	5
33	West Parry Sound Health Centre	98		88	90	66	31	30	43	34	32	77	100	100	0	86	95	0:34	43	11	27	0	90	36	94	38	94	79	70	44	96	77		74	87	0	10	89	1	5
34	Winchester District Memorial Hospital	131		120	92	65	28	34	29	26	28	77	90	100	0	15	83	0:50	19	31	15	18	64	10	67	8	72	61	67	35	74	60	100	75	73	0	98	2	0	7
35	Windsor Hotel-Dieu Grace Hospital	134		106	79	67	37	37	40	33	29	85	86	100	0	88	91	0:39	67	51	26	100	61	19	59	20	81	80	67	49	81	81	77	82	82	92	6	0	2	7
36	Windsor Regional Hospital	136		117	86	65	36	50	38	31	24	83	97	100	0	82	97	0:38	57	36	26	16	72	28	73	33	77	77	74	31	79	78	79	61	74	85	3	0	13	7
37	Woodstock General Hospital	140		138	99	73	42	25	53	23	30	82	80	100	0	42	48	1:00	39	35	44	12	74	16	79	18	83	63	48	14	83	72	65	6	73	0	45	55	0	6
	Community Hospitals Total/Average	**5,208**		**4,654**	**89**	**69**	**35**	**33**	**44**	**30**	**26**	**79**	**77**	**100**	**1**	**59**	**79**	**0:37**	**47**	**32**	**36**	**49**	**70**	**24**	**76**	**28**	**81**	**74**	**59**	**36**	**84**	**78**	**72**	**60**	**79**	**29**	**34**	**33**	**4**	**6**
	Small Hospitals																																								
38	Alexandra Marine & General Hospital, Goderich	95		77	81	73	38	23	48	36	35	78	87	100	0	90	100	0:45	62	38	47	90	76	17	89	25	81	62	85	47	81	85	82	80	83	0	100	0	0	6
39	Arnprior District Memorial Hospital, The	80		70	88	71	29	36	40	19	23	77	3	100	0	100	100	0:50	54	18	39	56	77	21	79	29	73	81	31	13	75	83	50	25	72	0	94	6	0	6
40	Espanola General Hospital	59		51	86	61	49	33	37	27	33	82	2	100	0	83	92	1:18	6	67	18	100	60	23	62	25	84	67	25	27	89	64			77	0	100	0	0	4
41	Haldimand War Memorial Hospital, Dunnville	64		57	89	70	30	35	28	11	26	68	51	100	0	90	100	0:36	2	0	19	33	54	18	69	17	83	53	62	17	86	60			71	0	100	0	0	4
42	Hanover and District Hospital	69		60	87	74	40	22	40	17	20	63	83	100	0	95	74	0:30	15	17	17	23	62	22	59	21	70	47	47	10	70	50	54		63	0	100	0	0	6
43	Lennox and Addington County General Hospital	94		73	78	68	34	37	44	27	26	86	95	100	0	100	100	0:40	12	33	1	3	52	26	50	33	82	72	53	15	86	74	64		76	0	95	5	0	5
44	Stevenson Memorial Hospital, Alliston	134		86	64	64	30	47	33	21	22	78	93	100	0	84	97	0:40	44	24	2	0	64	18	66	25	88	75	42	12	90	74	56		81	0	98	2	0	6
	Small Hospitals Total/Average	**595**		**474**	**80**	**69**	**35**	**34**	**39**	**23**	**26**	**77**	**63**	**100**	**0**	**92**	**95**	**0:40**	**31**	**28**	**20**	**41**	**64**	**21**	**67**	**26**	**80**	**67**	**49**	**20**	**83**	**71**	**62**	**35**	**75**	**0**	**98**	**2**	**0**	**5**
	Overall Total/Average	**6,727**		**5,958**	**89**	**69**	**35**	**33**	**44**	**31**	**26**	**80**	**71**	**99**	**3**	**64**	**82**	**0:37**	**48**	**33**	**36**	**53**	**70**	**25**	**76**	**30**	**82**	**74**	**61**	**37**	**85**	**78**	**72**	**61**	**79**	**32**	**34**	**30**	**4**	**6**

Report card based on 1999-2001 data

Hospital Groupings: Categories as per JPPC peer groups. Multi-site corporations reported at the corporate level

***** indicates multi-site corporation, participating sites are noted in Appendix B.

Study Sample: The number of charts reviewed as part of the chart abstraction proces

Qualified: The number of charts in the study sample that met the ESC/ACC and EFFECT AMI inclusion criter

Reperfusion Therapy: Refers only to patients with ST-segment Elevation MI (STEMI).

- **Reperfusion Method**: ******Patient may receive both Thrombolytics and PCI.**PCI:** Percutaneous Coronary Intervention also known as angioplasty/PTCA
- **Thrombolytics in ≤ 30 minutes/Thrombolytics Door to Needle Time**: Refers only to patients who received Thrombolytics in≤ 4 hours of arrival.

Medication Utilization: Values suppressed where the number of ideal patients was less than 10 in a given hospital**ASA**: Asprin, **ACEI**: Angiotensin-Converting Enzyme Inhibitor

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Table 15. CHF Report Card Summary

CCORT EFFECT Study — CHF Report Card — January, 2004

#	Hospital	Study Sample (n)		Qualified (n)	Qualified (%)	Patient Demographics: Age (Median)	Patient Demographics: Female (%)	Cardiac Risk Factors (%): Current Smoker	Cardiac Risk Factors (%): Hypertension	Cardiac Risk Factors (%): Hyperlipidemia	Cardiac Risk Factors (%): Diabetes	Cardiac Risk Factors (%): Patients with ≥ 1 Cardiac Risk Factor	PMH - Cardiac & Vascular Disease (%): Coronary Disease	PMH - Cardiac & Vascular Disease (%): Previous MI	PMH - Cardiac & Vascular Disease (%): Atrial Fib	PMH - Cardiac & Vascular Disease (%): Valve Disease	PMH - Cardiac & Vascular Disease (%): Cancer	Quality Indicators: Left Ventricular (LV) Function (%): LV Function measured this admission or in previous 6 mos	Quality Indicators: Left Ventricular (LV) Function (%): Patients with Low LV Function (This adm or prev. 6 mos)	Quality Indicators: Medication Utilization (%): All Patients: ACEI at Discharge	All Patients: Beta-blocker at Discharge	All Patients: Warfarin at Discharge in pts with Atrial Fib	Ideal Patients: ACEI at Discharge	Ideal Patients: Beta-blocker at Discharge	Ideal Patients: Warfarin at Discharge in pts with Atrial Fib	Daily Weights recorded > 50% of days (%)	Documented Counselling: Counselling on at least one topic (%)*	Most Responsible Physician (%): Cardiologist	Most Responsible Physician (%): Practitioner/GP	Most Responsible Physician (%): Internist	Follow Up (%): Family Practitioner/GP	Follow Up (%): Cardiologist	Follow Up (%): Internist	Follow Up (%): CHF Clinic	Outcomes: Length of Stay (Days - Median)
	Quality Indicator Benchmark/Target																	**≥ 75%**					**≥ 85%**	**≥ 50%**	**≥ 85%**	**≥ 90%**	**≥ 90%**									
	Teaching Hospitals																																			
1	*Hamilton Health Sciences Corporation	395		365	92	78	53	12	61	27	37	77	55	41	28	28	12	65	56	67	37	57	75	52	63	15	74	13	1	85	69	23	28	2	6
2	Kingston General Hospital	135		118	87	76	51	20	57	18	30	76	58	42	27	18	15	83	54	56	28		75	31		26	28	52	0	48	89	22	20	5	6
3	Mount Sinai Hospital, Toronto	130		110	85	77	56	16	51	20	29	72	49	36	37	21	14	78	55	65	40	59	85	64	56	28	52	18	0	82	71	39	34	6	6
4	St. Joseph's Healthcare, Hamilton	134		115	86	77	57	10	50	27	37	76	54	37	33	28	10	44	48	69	33	44	67	50	47	25	86	55	2	43	69	46	22	2	6
5	St. Michael's Hospital, Toronto	126		96	76	75	50	13	65	25	33	79	55	45	35	28	10	75	66	72	49		93	60		34	67	60	1	39	67	44	29	5	6
	Teaching Hospitals Total/Average	**920**		**804**	**87**	**77**	**53**	**14**	**58**	**24**	**34**	**76**	**54**	**40**	**31**	**25**	**12**	**68**	**56**	**65**	**37**	**54**	**79**	**50**	**55**	**22**	**65**	**31**	**1**	**68**	**72**	**31**	**27**	**3**	**6**
	Community Hospitals																																			
6	Brantford General Hospital	133		117	88	77	55	17	48	24	32	75	51	36	36	27	10	45	50	74	31	58	76	39	58	21	77	0	59	40	61	4	25	0	6
7	Brockville General Hospital	133		86	65	77	44	12	49	26	34	78	62	42	24	9	15	17	77	62	22	20				8	63	10	85	5	88	29	9	0	5
8	Cambridge Memorial Hospital	133		114	86	75	47	13	54	28	35	78	45	32	32	26	13	46	62	73	40	79	80	45	79	0	41	28	39	32	76	25	32	0	6
9	Credit Valley Hospital, The, Mississauga	127		105	83	75	48	6	49	30	43	79	59	49	21	18	17	77	72	68	43		73	60		7	97	75	18	6	47	47	4	1	6
10	*Grey Bruce Health Services	199		166	83	78	52	8	42	21	35	71	38	28	24	16	5	37	41	74	23	38	94	6		20	73	5	52	43	85	5	20	0	6
11	*Halton Healthcare Service Corporation	226		181	80	77	51	9	41	24	33	65	45	33	38	17	10	84	56	66	41	50	85	62	48	11	48	22	69	9	70	13	8	2	6
12	Headwaters Health Care Centre, Orangeville	135		114	84	79	58	11	39	12	29	58	42	29	30	11	3	43	63	73	19	46	83	22	50	18	53	0	22	78	97	5	42	1	5
13	Hôpital Montfort, Ottawa	127		96	76	77	57	18	51	22	38	76	61	35	34	13	11	54	65	74	43		83	65		17	37	15	53	32	67	36	13	1	6
14	*Hôpital Regional de Sudbury Regional Hospital	126		100	79	76	49	7	66	21	47	82	60	41	37	11	11	60	55	78	37	48	90	29	53	20	88	11	64	25	76	25	14	1	6
15	Hotel Dieu Hospital, Cornwall	131		85	65	76	48	13	35	12	35	64	44	27	21	7	13	55	30	62	26		75	38		6	69	0	96	4	74	1	40	0	6
16	*Lakeridge Health Corporation	263		223	85	79	53	6	45	13	35	64	48	34	27	13	9	33	52	70	28	29	83	67	31	4	46	10	61	29	81	14	29	2	5
17	Norfolk General Hospital, Simcoe	135		129	96	77	52	9	67	28	40	86	61	40	31	15	15	46	69	61	19	50	88	19	50	7	94	0	43	57	81	4	21	0	5
18	North Bay General Health Centre	129		113	88	76	55	12	57	20	39	72	66	49	22	9	13	66	46	67	47	64	84	60	64	3	71	0	44	56	52	3	30	1	6
19	Orillia Soldiers' Memorial Hospital	128		104	81	76	50	17	42	21	35	74	59	47	35	17	14	64	42	60	40	59	77	50	60	9	97	0	72	24	86	9	34	10	5
20	Pembroke General Hospital	134		84	63	78	54	18	46	17	38	71	54	26	29	4	2	42	26	58	19					2	50	0	93	7	86	4	13	1	4
21	Peterborough Regional Health Ctr/Civic Hospital	124		109	88	78	48	18	38	24	28	67	57	39	36	16	17	21	83	74	23	56	80	40	56	6	85	23	50	28	68	26	21	0	5
22	*Quinte Healthcare Corporation	368		296	80	78	50	14	48	18	34	73	52	35	27	13	9	29	76	69	23	56	95	24	58	6	22	18	60	22	80	21	12	0	4
23	Ross Memorial Hospital, Lindsay	131		112	85	79	46	13	37	18	26	62	54	46	34	10	13	45	53	72	12	55	86	18	55	0	73	0	85	15	95	4	19	0	7
24	*Rouge Valley Health System	258		217	84	76	52	11	43	14	36	71	45	29	24	14	11	66	58	68	26	73	80	40	78	18	72	36	31	32	59	25	34	0	6
25	*Scarborough Hospital, The	379		330	87	78	54	8	42	17	32	64	46	27	25	16	10	96	59	60	24	49	73	27	45	11	62	53	1	46	48	39	27	15	5
26	South Muskoka Memorial Hospital, Bracebridge	119		92	77	78	37	15	38	20	26	62	52	43	33	15	9	41	66	76	32	67	100	45		3	91	0	98	2	88	15	19	0	4
27	St. Mary's General Hospital, Kitchener	130		119	92	77	59	12	47	12	37	71	37	30	30	21	5	71	66	73	21		85	18		3	59	44	34	22	64	35	13	0	4
28	Stratford General Hospital	130		112	86	80	46	6	56	21	39	72	44	38	38	13	18	14	53	69	29	57			58	26	56	0	46	53	75	5	24	0	5
29	Strathroy Middlesex General Hospital	134		87	65	78	48	13	48	11	29	69	52	36	34	26	7	15	80	81	11	65			68	22	73	0	92	8	97	1	28	0	6
30	Timmins and District General Hospital	134		118	88	75	47	16	55	25	38	81	65	31	31	17	15	47	52	81	40	74	89	54	72	20	94	0	88	9	88	9	16	1	4
31	Trillium Health Centre, Mississauga	124		99	80	77	59	10	61	18	28	73	48	36	31	21	11	68	54	74	16	60	69	20		9	80	42	11	46	87	33	12	11	8
32	West Lincoln Memorial Hospital, Grimsby	118		104	88	80	49	11	43	15	27	64	48	39	29	14	13	38	53	75	8	45	100		40	4	38	1	96	3	88	0	27	0	3
33	West Parry Sound Health Centre	100		88	88	77	53	19	48	18	26	74	34	23	32	20	5	66	47	72	30	47	86	43	50	70	63	0	52	48	95	5	40	0	5
34	Winchester District Memorial Hospital	85		70	82	78	56	14	34	6	41	71	37	20	29	11	7	16	60	74	21	54			54	17	49	0	99	1	85	7	12	0	4
35	Windsor Hotel-Dieu Grace Hospital	135		113	84	76	50	16	50	27	33	72	45	30	23	12	16	61	57	71	32	38	88	52	50	37	91	40	58	2	80	33	12	12	6
36	Windsor Regional Hospital	131		101	77	77	52	17	52	13	32	72	45	31	27	6	19	52	65	65	27	35	81	32	38	13	77	37	36	28	70	27	11	1	6
37	Woodstock General Hospital	135		117	87	78	56	8	38	9	30	64	45	30	26	19	15	36	69	69	25	16	82	73	12	17	82	0	72	28	79	4	37	0	5
	Community Hospitals Total/Average	**4,994**		**4,101**	**82**	**77**	**51**	**12**	**47**	**19**	**34**	**70**	**50**	**34**	**29**	**15**	**11**	**51**	**57**	**70**	**27**	**52**	**83**	**38**	**54**	**13**	**65**	**18**	**54**	**28**	**75**	**17**	**22**	**2**	**5**
	Small Hospitals																																			
38	Alexandra Marine & General Hospital, Goderich	86		71	83	78	46	7	54	32	27	73	68	44	24	11	20	51	62	68	27	73	85	20	73	31	93	0	99	0	94	14	12	0	6
39	Arnprior District Memorial Hospital, The	52		29	56	79	45	10	34	10	28	66	55	31	28	14	10	28	63	72	45					28	79	7	86	7	76	10	10	0	6
40	Espanola General Hospital	32		26	81	75	62	12	42	8	35	65	54	31	27	4	8	15	100	79	21					19	76	0	96	0	76	16	12	0	2
41	Haldimand War Memorial Hospital, Dunnville	65		53	82	80	38	11	28	2	26	55	51	42	13	11	4	11	83	88	20					2	94	0	100	0	96	20	0	0	4
42	Hanover and District Hospital	66		43	65	80	56	5	23	5	23	51	35	23	19	7	16	2	100	61	21					9	54	0	100	0	80	7	10	0	4
43	Lennox and Addington County General Hospital	101		65	64	78	49	23	29	17	38	74	49	26	29	14	8	17	27	65	35					3	51	0	97	3	95	2	7	0	4
44	Stevenson Memorial Hospital, Alliston	134		104	78	77	51	17	40	9	33	66	36	27	23	10	2	48	41	82	15		90			0	74	0	100	0	89	8	8	0	6
	Small Hospitals Total/Average	**536**		**391**	**73**	**78**	**49**	**13**	**37**	**13**	**30**	**65**	**48**	**32**	**23**	**10**	**9**	**30**	**55**	**74**	**25**	**60**	**87**	**26**	**64**	**11**	**75**	**1**	**98**	**1**	**89**	**10**	**8**	**0**	**5**
	Overall Total/Average	**6,450**		**5,296**	**82**	**77**	**51**	**12**	**48**	**19**	**34**	**71**	**50**	**35**	**29**	**16**	**11**	**52**	**57**	**69**	**29**	**53**	**82**	**39**	**55**	**14**	**66**	**18**	**49**	**32**	**76**	**19**	**22**	**2**	**5**

Report card based on 1999-2001 Data

Hospital Groupings: Categories as per JPPC peer groups. Multi-site corporations reported at the corporate level.

***** indicates multi-site corporation, participating sites are noted in Appendix B.

Study Sample: The number of charts reviewed as part of the chart abstraction process.

Qualified: The number of charts in the study sample that met the EFFECT CHF inclusion criteria and Framingham CHF criteria

PMH: Past Medical History

Medication Utilization: Values suppressed where the number of ideal patients was less than 10 in a given hospital.

ACEI: Angiotensin-Converting Enzyme Inhibitor.

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