Improved Care for Acute Myocardial Infarction

The Key Components of Reliable, Evidence-Based AMI Care

Studies have shown that patients with AMI should receive specified components of care in order to reduce morbidity and mortality. The total number and type of care components a patient receives during the hospital course and post-discharge may vary based on clinical condition and other co-morbidities. However, there is strong evidence in the literature to support that the following seven key care components should be provided to all AMI patients except where contraindicated:

1. Early administration of aspirin
2. Aspirin at discharge
3. Beta-blocker at discharge
4. Timely initiation of reperfusion (thrombolysis or percutaneous intervention)
5. ACE-inhibitor or angiotensin receptor blockers (ARB) at discharge for patients with systolic dysfunction
6. Smoking cessation intervention (counseling / nicotine replacement / serotonin uptake inhibitor / referral to cardiac rehabilitation program)
7. Statins at discharge

Documentation that each component of care was provided or contraindicated should be in the medical record for each AMI patient. These are “process measures”. Improvement in an individual measure indicates that the processes surrounding that care element have improved. However, if it is identified that care components are not at a predetermined goal level, a change in practice is necessary and improvement strategies need to be developed.

The Saint John Regional Hospital (SJRH) Experience

In September of 2005, following corporate and quality risk management leadership from the Atlantic Health Sciences Corporation (AHSC), a multidisciplinary team of health care professionals under the direct leadership of the NB Heart Centre (NBHC) was established. The team’s mandate was to develop a strategy that identified current practice while simultaneously developing a Safer Health Care Now! (SHN) Improvement Charter based on four key concepts:

1. What are we trying to accomplish?
2. How will we know a change is an improvement?
3. What changes can we make that will result in an improvement?
4. How will we manage the improvement project?

The project was divided into three phases. Phase 1 included performing a retrospective chart audit to determine baseline AMI care at the SJRH. The second phase identified...
change concepts that could be tested using an evidenced based Improvement Model and fine-tuning the Improvement Charter based on the baseline data. Phase 3 was designed to identify opportunities to spread the project to other care areas. Some overlap has occurred across the phases.

**Retrospective Baseline Analysis**

Identifying change concepts requires knowing where to begin. A retrospective analysis of AMI patients admitted through the emergency department at the SJRH from September 2004 to June 2005 was performed and provided baseline data for analysis of the components for AMI care. Other data collected for information purposes included the number of appropriate patients prescribed lipid-lowering therapy on discharge and the number of patients referred to cardiac rehabilitation. It should be noted that prescribing statins at discharge was added as a seventh care component in April 2007. Care components that did not meet SHN goals included timely initiation of reperfusion (thrombolysis and percutaneous coronary intervention [PCI]), smoking cessation intervention, and perfect care (percentage of patients that received all care components, if not contraindicated) (Table 1).

**Key Factors Identified**

Performing the chart audit and retrospective analysis helped identify key factors from which the Improvement Charter could be further defined. These included:

1. Lack of ‘easy to find’ documentation of all care components.
2. Documentation discrepancies between the exact times electrocardiograms (ECG) were performed, physicians were notified and treatment initiated in the emergency department (ED).
3. Unclear reasons why patients may or may not have been discharged on certain types of medications (i.e. beta blockers and ACE inhibitors).
4. Lack of evidence that smoking cessation interventions were initiated unless referral to cardiac rehabilitation programs had occurred.
5. Lack of availability of Nicotine Replacement Therapy through the hospital formulary.
6. Although 40% of patients arrived by ambulance to the ED, 60% of patients arrived by other means.
7. The average time from arrival to physician assessment for patients with ST elevation myocardial infarctions (STEMI) was 12 minutes.
8. Although 40% of ECG’s in the ED were signed by a physician, 60% were not.

**Table 1: Retrospective Baseline Results: 10 month period from Sept 2004 – June 2005 (n=95)**

<table>
<thead>
<tr>
<th>AMI Indicators</th>
<th>Goals</th>
<th>SJRH Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASA at Arrival</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>ASA at Discharge</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>Beta Blocker at Discharge</td>
<td>90%</td>
<td>97.6%</td>
</tr>
<tr>
<td>Thrombolytic Agent within 30 min</td>
<td>85%</td>
<td>*72.4%</td>
</tr>
<tr>
<td>PCI within 90 minutes</td>
<td>90%</td>
<td>*77.8%</td>
</tr>
<tr>
<td>ACE/ARB on Discharge (EF &lt;40%)</td>
<td>85%</td>
<td>86.9%</td>
</tr>
<tr>
<td>Adult Cigarette Smoking Cessation Advice</td>
<td>100%</td>
<td>*78.7%</td>
</tr>
<tr>
<td>Perfect Care</td>
<td>95%</td>
<td>*74.5%</td>
</tr>
</tbody>
</table>

**Other data collected**

- Cardiac Rehab Referrals: **NA** 60%
- Lipid Lowering Med on discharge: **NA** Until April 2007 86.5%

* Components of care not at Safer Health Care Now! goals on the Retrospective Baseline Analysis. ** Not applicable

**Using the Model for Improvement**

Four areas of improvement were identified following analysis of the baseline data.

1. Improve ‘door to thrombolysis time’ (optimally less than 30 minutes).
2. Improve ‘door to PCI time’ (optimally less than 90 minutes).
3. Improve smoking cessation interventions for identified smokers.
4. Improve documentation for all elements.

Safer Health Care Now! strategists have adopted a Model for Improvement called the Plan-Do-Study-Act (PDSA) Cycle (Figure 1). Developed by Associates in Process Improvement, this model is a simple yet powerful tool for accelerating improvement that has been used successfully by hundreds of health care organizations to improve many different health care processes and outcomes. The model has two parts. The first is designed to set clear aims; establish measures that will tell if changes are leading to improvement; and identify changes that are likely to lead to improvement. The second part is designed to conduct small-scale tests of change in real work settings. This is accomplished by identifying a change then implementing Plan-Do-Study-Act (PDSA) cycles. After testing a change on a small scale, learning from each test, and refining the change through several PDSA cycles.
cycles, the team can implement the change on a broader scale. This scientific method is used for action-oriented learning.

A challenge at the SJRH was to coordinate an action plan between the emergency department, interventional cardiology, the coronary care unit and the coronary stepdown unit. Raising awareness was the first PDSA cycle established with presentation of the baseline data made to multiple stakeholders in all areas involved. Simultaneously, a data collection form that included the seven components of care was developed (Appendix A). This AMI documentation tool was also designed to collect data for Acute Coronary Syndrome (ACS) patients as the care team felt it was necessary to analyze care across this population as well. The form was designed to be completed by health care professionals in each care area from the patient’s arrival in the ED to the cardiac catheterization lab if indicated, to the coronary care unit and finally for completion in the coronary stepdown unit at time of discharge. The inclusion of the question “If not, why not?” in the discharge medication section was designed as a specific intervention to improve documentation.

Multiple small PDSA cycles performed from March to May 2006 involved using, analyzing and finalizing the documentation form resulted in full implementation of this useful tool in June 2006. Improvement has been seen in components of care (Table 2) with reperfusion times for STEMI patients increased by 22% for both thrombolysis and PCI interventions and 11% for lipid lowering therapy across all populations. As well, for patients who use a tobacco product, smoking cessation interventions have increased by 13%. Documentation has become a succinct process with usage of the data collection form. Raising awareness of baseline versus concurrent practice was the key factor for improvement. Small changes such as improvement in the time patients received the first ECG (Figure 2) and time to physician assessment for STEMI patients (Figure 3) in the ED helped improve outcomes. The significant increase in the number of signed ECG’s in the ED (Figure 4) was evidence of increased awareness and accountability. To recognize and celebrate the successes of improved outcomes, run charts were posted in each of the clinical areas involved and results shared at department meeting. A “Believe & Succeed” slogan was adapted as a motivational tool with posters displayed in key care areas (Appendix B).

**Spinoffs:** Opportunities for Improvement

There have been significant opportunities for improvement in unexpected areas through the process of implementing the AMI improvement model of care. A committee has been established to discuss the feasibility of paramedics initiating electrocardiograms in ambulances with the intention of early provision of thrombolysis supported by emergency department physicians. As well, referral to cardiac rehabilitation programs has increased by 20% and discharge teaching practices have improved.

A Tobacco Reduction Strategy for patients has been developed and spread region wide. The strategy has involved the hospital formulary inclusion of nicotine replacement therapy for inpatients and implementation of a Clinical Tobacco Intervention “Train the Trainer” program that addresses the issue of every inpatient and outpatient being offered assistance through an “Ask, Advise and Assist” program. Cessation materials can be ordered through a central repository located in the health regions’...
Health Sciences Library at the SJRH for dissemination within the region. Through this one example a culture of awareness has helped move the SHN campaign to a level where impact is increased by spreading interventions across patient populations, not only to those requiring AMI care. Other issues have included a closer evaluation of clopidogrel usage, development of a patient discharge tool that incorporates SHN care components, and improved communication and documentation.

Other Spread Opportunities

The goal of having at least 90% of AMI patients receive identified care components has been accomplished. A three-pronged process to spread the initiative further includes implementing the documentation tool in another SJRH intensive care unit that receives a small number of AMI patients, as well as to three other hospital facilities in the region. Efforts are ongoing to continue to foster collaborative relationships with other hospitals in New Brunswick currently involved in SHN processes. The goal is to work together to improve linkages that ultimately support improved patient care.

Creating a Culture for Change and Quality Improvement

Successful improvement in AMI care cannot occur without dedicated teams and defined steps for quality improvement. The following eight steps for improvement, as defined by SHN, have helped shape the success of this campaign at the SJRH. These steps include:

1. Know your system by mapping it out while recognizing and respecting the busy health care environment in which health care professionals work.
2. Collect baseline data to identify areas for improvement.
3. Improve leadership awareness and approval by using data for support.
4. Form a multidisciplinary team – people involved in the day-to-day process with effective leadership skills (Figure 5).
5. Use the Improvement Model to find out what works – SMALL TESTS of CHANGE.
6. Communicate widely your learning.
7. Spread proven changes and change principles to other areas seeking input from those involved, especially those affected by the change. Show appreciation for their efforts.
8. Build on your successes!

Atlantic and National Support

Much has been accomplished since the SHN campaign was launched in 2005 and a ‘chord of caring’ has been struck across Canada. With its goal to improve healthcare delivery by focusing on patients and their safety while in the care of health care providers, SHN teams have evoked a collaborative effort that has proven to be successful. Part of that success involves the creation of a supportive infrastructure that includes four groups of people distributed across Canada within Western, Ontario, Quebec and Atlantic Nodes. The purpose of each node is to:

- Raise awareness of the SHN Campaign.
- Facilitate and promote enrollment.
- Facilitate and provide educational opportunities for Campaign participants related to interventions, measurement, and quality improvement.
- Share Campaign updates.
- Coordinate and provide intervention-related clinical, quality improvement and measurement assistance.
- Facilitate communication between and among: teams, nodes, working groups, clinical supports, partners, funders, the Node Steering Committee and the National Steering Committee.

Atlantic Node leader Theresa Fillatre, and Safety and Improvement Advisor Dannie Currie, have been instrumental in moving the campaign forward in Atlantic
Canada. As data is collected it is forwarded by secure website to the University of Toronto where the Central Measurement Team under the direction of Virginia Flintoft provides analysis. Quarterly reports are forwarded to teams involved in SHN improvement projects that help teams evaluate progress in relation to other groups regionally and nationally (Figure 6). The process of ongoing support and feedback is therefore evident locally, provincially, regionally and nationally. SHN is a grassroots campaign designed to link multiple levels of people involved in patient care – to the benefit of all!

Summary

Implementing SHN has resulted in improvement in reperfusion care and smoking cessation interventions at the SJRH. Additional benefits have been an increase in the administration of lipid lowering therapy, referral to cardiac rehabilitation programs and improved access times to ECGs and physician assessment in the emergency department. Spinoffs have resulted in discussion that will potentially lead to earlier delivery of care by paramedics and a tobacco reduction strategy that has spread throughout the Atlantic Health Sciences Corporation area of care delivery. NB Heart Centre strategies for spreading the SHN campaign include enhancing local, regional and provincial partnerships. The success of the campaign and improved patient care are best described by the simple fact that better outcomes can be achieved in small steps designed to happen over time. As a result, patients benefit from both Safer Health Care and improved outcomes.

References
1. Safer Health Care Now! Website: www.saferhealthcarenow.ca
COLLABORATIVE PLAN FOR IMPROVED AMI & ACS CARE

PATIENT IDENTIFICATION

AFFIX PATIENT LABEL or
Name: __________________________
PPRN #: ________________________
Medicare #: ______________________
Registration Date to ED: __________

PERMANENT PATIENT RECORD

Transferred in from another ED/UCC  □Yes  □No
Transferred out to another ED/UCC  □Yes  □No
Admitted to:  □CCU  □ICU  □Ward  □_________
Age > 18 years old  □Yes  □No
History of tobacco use in past year:  □Yes  □No

EMS

POINT OF ENTRY: EMS (EMERGENCY MEDICAL SERVICE)

Patient contact at ___ hrs.
Onset of relevant cardiac symptoms at ___ hrs.
Arrived hospital at ___ hrs.
1st 12-lead ECG at ___ hrs. Sent or reported to ED at ___ hrs.
2nd 12-Lead ECG at ___ hrs. Sent or reported to ED at ___ hrs.
ASA administered at home □by patient at ___ hrs. □by Paramedic at ___ hrs. □Contraindications

ED

EMS Master Incident # __________________________
Section Completed by: __________________________
ECG Interpreting Physician __________________________
Lytic Eligible?  □Yes  □No

ED

POINT OF ENTRY: EMERGENCY DEPARTMENT

Onset of relevant cardiac symptoms at ___ hrs.
*Time seen by Triage/Charge/ED Nurse ___ hrs.
Time of 1st Hospital 12-lead ECG ___ hrs.
Signed by physician  □Yes
Time from arrival to 1st ECG ___ min.
Time of Initial Assessment By Physician ___ hrs.
Time of diagnostic (STEMI) ECG if not the 1st ECG ___ hrs.
ASA within 24 hours  □Yes  □No. Given in ED  □Yes  □No
If not, why not?  □Already taken  □Contraindicated
Thrombolytic Therapy given?  □Yes  □No
If not, why not?  □NSTEMI  □Late Presentation  □To Cath Lab
□Refused  □Other  Time started ___ hrs.
Initial Nursing Assessment time (**) to needle time (Lytics) mins.
Less than 30 min.  □Yes  □No
To Cath Lab Date: __________________________
Time: ___ hrs.

Admitting Dx.
□ STEMI
□ NSTEMI
□ Angina
□ Other

Section completed by: __________________________

3/15/07 (May 07)
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<thead>
<tr>
<th><strong>CARDIAC CATH LAB</strong></th>
<th><strong>FROM INPATIENT UNIT</strong></th>
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<tbody>
<tr>
<td><strong>FROM ED</strong></td>
<td>PCI performed? ☐ Yes ☐ No</td>
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<tr>
<td>Arrived in Cath Lab</td>
<td>Date: ___________ Time: ___________</td>
</tr>
<tr>
<td>Time of 1st coronary intervention (aspiration cath, balloon inflation, primary stent deployment)</td>
<td>Hrs. PCI performed? ☐ Yes ☐ No. *FOR STEMI PATIENTS: Time seen by nurse in ED to 1st coronary intervention time mins. Less than 90 min? ☐ Yes ☐ No</td>
</tr>
<tr>
<td><strong>PHYSICIAN RX AT DISCHARGE FROM CCU/SDU/ICU/OTHER CARE AREA</strong></td>
<td>Date: ___________ Time: ___________ Section Completed by:</td>
</tr>
<tr>
<td><strong>PHYSICIAN</strong></td>
<td></td>
</tr>
<tr>
<td>ASA</td>
<td>Ordered: ☐ Yes ☐ No ☐ If not, why not? ☐ Allergy</td>
</tr>
<tr>
<td></td>
<td>☐ Active bleeding ☐ Warfarin ☐ Other</td>
</tr>
<tr>
<td>Beta Blocker</td>
<td>Ordered: ☐ Yes ☐ No ☐ If not, why not? ☐ Allergy ☐ Bradycardia</td>
</tr>
<tr>
<td></td>
<td>☐ LV failure ☐ SBP &lt; 90 mm Hg ☐ PR-interval &gt; 0.24 sec.</td>
</tr>
<tr>
<td></td>
<td>☐ Active asthma/reactive Airways disease ☐ Other</td>
</tr>
<tr>
<td>ACE Inhibitor/ARB</td>
<td>Ordered: ☐ Yes ☐ No ☐ If not, why not? ☐ Allergy or intolerance</td>
</tr>
<tr>
<td>Echo done ☐ Yes ☐ No</td>
<td>☐ Mod. Or severe AS ☐ Creatinine &gt;200 μmol/L ☐ Not Indicated</td>
</tr>
<tr>
<td>LVEF &lt; 40% ☐ Yes ☐ No</td>
<td>☐ SBP &lt;100 mmHg ☐ Bilateral renal artery stenosis ☐ K+ &gt;4.5 mmol/L</td>
</tr>
<tr>
<td></td>
<td>☐ Other</td>
</tr>
<tr>
<td>Lipid Lowering Medication</td>
<td>Ordered: ☐ Yes ☐ No ☐ If not, why not? ☐ At Target Level ☐ Intolerance</td>
</tr>
<tr>
<td></td>
<td>☐ CK &gt; 10 x upper limit ☐ ALT/AST &gt; 3 x upper limit ☐ Other</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>Ordered: ☐ Yes ☐ No ☐ If not, why not? ☐ Allergy or intolerance</td>
</tr>
<tr>
<td></td>
<td>☐ Not indicated ☐ Other</td>
</tr>
<tr>
<td>Nitroglycerine PRN</td>
<td>Ordered on D/C: ☐ Yes ☐ No ☐ If not, why not?</td>
</tr>
<tr>
<td>Nicotine Replacement Therapy</td>
<td>Given as inpatient ☐ Yes ☐ No</td>
</tr>
<tr>
<td></td>
<td>Ordered on D/C: ☐ Yes ☐ No ☐ If not, why not? ☐ Non-smoker</td>
</tr>
<tr>
<td></td>
<td>☐ Allergy or intolerance ☐ Refused ☐ Other cessation medication given</td>
</tr>
<tr>
<td></td>
<td>☐ Smoking Cessation Counseling given ☐ Yes ☐ No</td>
</tr>
<tr>
<td>Cardiac Rehab</td>
<td>Ordered: ☐ Yes ☐ No ☐ If not, why not?</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>☐ STEMI ☐ NSTEMI ☐ Angina ☐ CABG ☐ Other</td>
</tr>
<tr>
<td><strong>NURSING COUNSELLING INPATIENT AND ON DISCHARGE</strong></td>
<td></td>
</tr>
<tr>
<td>Inpatient Dietary information given?</td>
<td>☐ Yes ☐ No ☐ Refused</td>
</tr>
<tr>
<td>Inpatient Cardiac Teaching Done?</td>
<td>☐ Yes ☐ No ☐ Refused</td>
</tr>
<tr>
<td>Has patient used a tobacco product in the past 12 months?</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>If 'yes' was the following offered to the patient?</td>
<td>☐ Clinical Tobacco Intervention (Ask, Advise &amp; Assist) initiated? ☐ Yes ☐ No ☐ Refused</td>
</tr>
<tr>
<td>DISCHARGE INFORMATION</td>
<td></td>
</tr>
<tr>
<td>Date of Discharge: mm_dd_yr</td>
<td>Transferred Out ☐ Yes ☐ No</td>
</tr>
<tr>
<td>To home hospital ☐ Yes ☐ No Transfer Date mm_dd_yr</td>
<td></td>
</tr>
<tr>
<td>Left Against Medical Advice ☐ Yes ☐ No Deceased ☐ Yes ☐ No Complied by: ____________________________</td>
<td></td>
</tr>
<tr>
<td>Contact 648-6201 with questions. For Study Coordinator Use: ASA on Arrival ☐ Yes ☐ No ☐ NA/ ASA on D/C ☐ Yes ☐ No ☐ NA/ BB on D/C ☐ Yes ☐ No ☐ NA/ ACE/ARB on D/C ☐ Yes ☐ No ☐ NA/ Lytics or PCI ☐ Yes ☐ No ☐ NA/ Smoking couns. ☐ Yes ☐ No ☐ NA Perfect Care ☐</td>
<td></td>
</tr>
</tbody>
</table>
Believe & Succeed!

Improving AMI Care Together

Collaborative Team:
SJRH Emergency Dept • Emergency Medical Services • Quality Risk Management
NB Heart Centre • Cardiac Rehab • Cardiac Cath Lab • CCU/SDU • Cardiac Surgery
ICU • Electrodiagnostics Dept • Physicians • Nurse Clinicians • Nurse Associates

www.saferhealthcarenow.ca