The burden of acute coronary syndrome: The second leading cause of death in Canada

Acute Coronary Syndrome or ACS comprises a set of life-threatening health conditions affecting the heart. In ACS, the blood supply to the heart is suddenly blocked due to cholesterol build-up and the formation of a blood clot in the heart’s arteries. The resulting undersupply of oxygen to the heart can lead to a spectrum of heart conditions from chest pain (unstable angina) to a heart attack (myocardial infarction), during which the heart is damaged. An unstable angina episode results in a heart attack within 3 months in about 30% of patients.1

Figure 1 Estimated number of hospitalisations and deaths due to ACS in Canada in 2008-09 split by province / territory

Source: CRA estimates based on CIHI data
ACS events and the resulting 100,000 hospitalisations each year represent a significant direct cost to the Canadian health care system. Approximately one in fifteen patients hospitalised for a heart attack is readmitted within 6 months and about 40% of patients die within 4 years. In fact, ACS is the second leading cause of death in Canada after cancer.

**Occurrence of ACS in Canada**

In a 12-month period in 2008-09, there were 109,109 hospitalisations due to ACS in Canada. 84,069 (77%) of hospitalisations were due to heart attacks and 25,040 (23%) were due to chest pain.

A number of risk factors contribute to the high occurrence of ACS. These include diabetes, dyslipidemia, hypertension, obesity, smoking, and ageing. Although the number of smokers appears to be declining in Canada, the number of people with other risk factors like diabetes, hypertension and obesity is rising. As Canada’s population ages and grows, the number of Canadians suffering from ACS continues to rise.

**The treatment cost of ACS in Canada**

Depending on the severity of the ACS event, patients undergo a series of diagnostic tests and medical procedures in hospital. Unstable angina patients are monitored for several days to ensure that their condition does not progress to a heart attack. Patients diagnosed with heart damage caused by a heart attack often require an operation to clear and prevent further blockage of the blood supply to the heart. One common procedure for patients who have suffered a heart attack is a coronary angioplasty with stent placement. Following an ACS event, physicians recommend that patients participate in a cardiac rehabilitation programme, adhere to a medication regimen and undergo regular monitoring to prevent further life threatening events.

Patients with chest pain and heart attack need to be admitted to hospital as early as possible to receive adequate care. Hospitalisations due to ACS events are frequent in Canada and incur significant costs. Days in the ward, staff salaries, diagnostic tests and medical procedures contribute to the overall cost. A range of factors including the patient’s diagnosis and condition, availability of medical procedure at the treatment location and local clinical practice will determine what resources are utilised. Therefore the average hospitalisation cost for ACS patients differs by province.

In 2008-09, the average hospitalisation costs for a heart attack varied between $8,900 in Manitoba and $11,500 in Saskatchewan. The national average hospitalisation cost for a heart attack was around $10,000, whereas treating a patient with acute chest pain incurred on average around $4,500. Figure 2 shows the hospitalisation cost associated with ACS quantified for each Canadian province.

In 2008-09, heart attack and chest pain were the cause for 109,109 hospitalisations in Canada and have resulted in over 21,000 deaths. In comparison, less than 3,000 people die in motor vehicle accidents in Canada each year.

A large proportion of deaths from ACS in Canada are likely to occur before patients ever reach a hospital and about one in ten die within 30 days of being admitted to hospital for a heart attack. The number of Canadians who died from ACS rose to 21,474 in 2009.

As the prevalence of risk factors and patients’ access to care differs significantly across Canada, so do the occurrence of ACS and the number of people dying from it. Figure 1 shows the estimated number of ACS events and resulting deaths in each Canadian province / territory for 2008-09.
Acute and chronic treatment of ACS requires specialist consultations as well as regular visits to the family doctor. Physician consultations due to ACS amount to approximately 2.5% of all visits to physicians in Canada in a year. At $448 million they represent a significant share (27%) of total annual direct cost associated with ACS.

Finally, Canadian treatment guidelines suggest that patients are prescribed a range of medications to address risk factors for ACS like dyslipidemia, high blood pressure and blood clotting (thrombosis). Expenditure on pharmaceuticals for the long-term management of ACS totalled to $227 million in 2009, which represents 14% if the annual healthcare expenditure on ACS. The total direct healthcare expenditure on the treatment of ACS amounted to over $1.6 billion.

The economic cost of ACS

In 2009, Canadians missed an estimated 1.3 million days of work, that is over 3,500 years, due to poor health associated with ACS. Productivity losses due to ACS are worth almost $1.8 billion to the Canadian economy. That represents 0.12% of the 2009 gross domestic product of Canada.

Direct costs associated with treatment of heart attack and chest pain vary substantially across Canada. The national healthcare expenditure on the treatment of ACS was estimated to over $1.6 billion. This means on average it costs $15,000 to treat an ACS event. Expenditure of ACS hospitalisations represents the biggest cost component representing 59% of the cost.
The total burden of disease associated with ACS

Adding direct healthcare expenditure and economic losses, ACS has caused costs of approximately $3.4 billion in Canada in 2008-09. However, the costs from a societal perspective go beyond this. There is considerable burden associated with Canadians experiencing loss in both length and quality of their life. This burden of disease amounted to 177,905 disability adjusted life years lost (DALYs) in 2008-09. Assuming a willingness to pay to reduce this burden (of around $86,000 per DALY) the societal cost of ACS for Canada amounts to $15.3 billion in 2008-09.

Figure 3 The direct and economic cost of ACS in Canada in 2008-09 (in Thousands Canadian Dollars)

<table>
<thead>
<tr>
<th>Cost category</th>
<th>Chest pain</th>
<th>Heart attack</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct costs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalisation costs</td>
<td>110,815</td>
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<tr>
<td>Physician costs</td>
<td>219,520</td>
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<td>Pharmaceutical costs</td>
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<td>226,762</td>
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<td><strong>Economic costs – Lost value to Canadian economy</strong></td>
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<td></td>
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<tr>
<td>Productivity losses (Morbidity)</td>
<td>5,624</td>
<td>969,403</td>
</tr>
<tr>
<td>Productivity losses (Mortality)</td>
<td>0</td>
<td>803,554</td>
</tr>
</tbody>
</table>

Source: CRA analysis

ACS in summary

- Every 5 minutes someone is admitted to hospital suffering from a heart attack or chest pain event in Canada, totalling over 100,000 hospitalisations in a year.
- Each day approximately 58 Canadians die from a heart attack amounting to over 21,000 deaths in Canada in 2009.
- 1.3 million days work are lost because Canadians require time off work to recuperate from heart attacks or chest pain events.
- Almost 178,000 disability adjusted life years are lost due to ACS each year signifying the burden individuals and their families have to suffer through a reduction in their quality of life.

Adding direct healthcare expenditure and economic losses, ACS has caused costs of approximately $3.4 billion in Canada in 2008-09. However, the costs from a societal perspective go beyond this. There is considerable burden associated with Canadians experiencing loss in both length and quality of their life. This burden of disease amounted to 177,905 disability adjusted life years lost (DALYs) in 2008-09. Assuming a willingness to pay to reduce this burden (of around $86,000 per DALY) the societal cost of ACS for Canada amounts to $15.3 billion in 2008-09.

Footnotes
2 Migliaccio-Walle K et al. Pharmacoeconomics 2005. Costs and medical care consequences associated with the diagnosis of peripheral arterial disease.
6 Canadian Institute for Health Information (CIHI) 2010. Health Indicators 2010.

About the Report

Charles River Associates’ Life Sciences Practice was commissioned by AstraZeneca to investigate the economic and societal burden associated with Acute Coronary Syndrome (ACS). This short paper represents a summary of the full report which can be accessed from www.crai.com. The information and conclusions set forth herein are based on independent research, and publicly available material. For further questions on the report, please contact Roby Kanichay (rkanichay@crai.com; +44-(0)20-7959-1417) or write to:

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We would like to thank the Canada Institute for Health Information for providing recent hospitalisation discharge data and IMS/Brogan for providing information on pharmaceutical expenditure.