Coronary Revascularization Rates in Ontario: Which rate is right?

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ICES
Outline

• To review previous studies of cardiac procedure rates in different jurisdictions

• To review in detail 2 previous US - Canada comparison studies
  • CABG in Ontario vs. New York
  • AMI in Ontario vs. United States
Which rate is right?


- Wide variations in rates of use of common medical and surgical procedures in different geographical areas

- May reflect overuse, underuse, or differences in the underlying prevalence of disease
The Institute for Clinical Evaluative Sciences (ICES) is a non-profit research corporation funded by the Ontario Ministry of Health. The ICES mandate is to conduct applied research that contributes to the effectiveness, quality, and efficiency of health care in the province of Ontario.
Factors influencing cardiac procedure rates

DEMAND
• Patient preferences
• Physician practice styles
• Burden of disease

SUPPLY
• Number of hospitals offering cardiac procedures
• Number of cardiac surgeons and invasive cardiologists
Hospital care for elderly patients with diseases of the circulatory system: A comparison of hospital use in the United States and Canada

Anderson et al. NEJM 1989; 321;1443-8

1985 Discharge rates and case mix for ischemic heart disease (Per 100 000)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>United States</th>
<th>Manitoba and Ontario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial infarction</td>
<td>1052</td>
<td>1163</td>
</tr>
<tr>
<td>Heart failure</td>
<td>1631</td>
<td>1341</td>
</tr>
<tr>
<td>Artherosclerosis</td>
<td>179</td>
<td>917</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>777</td>
<td>583</td>
</tr>
<tr>
<td>Angina</td>
<td>1253</td>
<td>1150</td>
</tr>
<tr>
<td>Total</td>
<td>4892</td>
<td>5154</td>
</tr>
</tbody>
</table>
Coronary Artery Bypass Surgery in Ontario and New York State: Which rate is right?

Jack V. Tu, C. David Naylor, Dinesh Kumar, Barbara A. DeBuono, Barbara J. McNeil, Edward L. Hannan

Steering Committee of the Cardiac Care Network of Ontario

Cardiac Advisory Committee of New York State

Study Questions

1. Are there differences in the annual volume of isolated CABG surgery performed by hospitals and cardiac surgeons in New York State and Ontario?

2. Are there differences in the relative rate of coronary angiography, PTCA, and isolated CABG surgery between New York State and Ontario?

3. Are there differences in the clinical characteristics of patients having CABG surgery in Ontario and New York State? What are the rates of use by coronary anatomy?

4. What would be the number of additional procedures required in Ontario if Ontario was to increase its CABG rate to New York State’s CABG
Data Sources

• Year 1993

• Ontario: Cardiac Care Network (CCN) of Ontario

• New York: Cardiac Surgery Reporting System
## Demographic characteristics and CABG volumes

<table>
<thead>
<tr>
<th></th>
<th>New York State</th>
<th>Ontario</th>
<th>Ratio (NY/ON)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993 Adult Population (millions)</td>
<td>13.2</td>
<td>7.9</td>
<td>-</td>
</tr>
<tr>
<td>CABG hospitals</td>
<td>31</td>
<td>9</td>
<td>2.06</td>
</tr>
<tr>
<td>Cardiac surgeons</td>
<td>145</td>
<td>42</td>
<td>2.07</td>
</tr>
<tr>
<td>Volume of CABG surgery</td>
<td>16690</td>
<td>5517</td>
<td>-</td>
</tr>
<tr>
<td>Mean (SE) hospital volume</td>
<td>538 (300)</td>
<td>613 (323)</td>
<td>-</td>
</tr>
<tr>
<td>Mean (SE) surgeon volume</td>
<td>115 (81)</td>
<td>131 (45)</td>
<td>-</td>
</tr>
</tbody>
</table>

Ratios are population-adjusted.
Rates of Coronary Angiography, PTCA, and CABG surgery in New York and Ontario, 1993

Age-adjusted rates, per 100,000

- New York:
  - Angiography: 601.2
  - PTCA: 127.8
  - CABG: 120.6

- Ontario:
  - Angiography: 272.8
  - PTCA: 57.2
  - CABG: 67.4
<table>
<thead>
<tr>
<th>Age group, y</th>
<th>New York State</th>
<th>Ontario</th>
<th>Relative rate (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-64</td>
<td>65.5</td>
<td>44.8</td>
<td>1.46 (1.40-1.53)</td>
</tr>
<tr>
<td>65-74</td>
<td>451.6</td>
<td>239.5</td>
<td>1.89 (1.79-1.99)</td>
</tr>
<tr>
<td>&gt;75</td>
<td>266.3</td>
<td>79.8</td>
<td>3.34 (3.01-3.71)</td>
</tr>
<tr>
<td>Total</td>
<td>120.6</td>
<td>67.4</td>
<td>1.79 (1.74-1.85)</td>
</tr>
</tbody>
</table>

Rates are per 100,000
Relative rate of CABG surgery in New York to Ontario

- One vessel, Two vessel without PLAD
  - Age 20-64: 7.3
  - Age 65-74: 10.8
  - Age ≥75: 16.8

- Two vessel with PLAD, Three vessel
  - Age 20-64: 0.8
  - Age 65-74: 1.2
  - Age ≥75: 2.2

- Left main
  - Age 20-64: 2.0
  - Age 65-74: 2.5
  - Age ≥75: 4.5
Increasing Ontario’s CABG to New York’s CABG rate. How many additional CABGs would be required?

<table>
<thead>
<tr>
<th>Age group, y</th>
<th>1 vessel, 2 vessel-PLAD</th>
<th>2 vessel+PLAD, 3 vessel</th>
<th>Left main</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-64</td>
<td>1300 (30)</td>
<td>--</td>
<td>435 (10)</td>
<td>1735 (40)</td>
</tr>
<tr>
<td>65-74</td>
<td>880 (20)</td>
<td>260 (6)</td>
<td>497 (12)</td>
<td>1637 (38)</td>
</tr>
<tr>
<td>≥75</td>
<td>284 (7)</td>
<td>344 (8)</td>
<td>312 (7)</td>
<td>940 (22)</td>
</tr>
<tr>
<td>Total</td>
<td>2464 (57)</td>
<td>604 (14)</td>
<td>1244 (29)</td>
<td>4312 (100)</td>
</tr>
</tbody>
</table>

N (% of total)
1995 CCN Steering Committee Recommendations

- minimum target rate of 100 CABGs per 100,000 adults for each county in Ontario

- minimum target rate of 100 PTCAAs per 100,000 adults

- minimum target rate of 357
Use of cardiac procedures and outcomes in elderly patients with myocardial infarction in the United States and Canada

Jack V. Tu, Chris L. Pashos, C. David Naylor,
Erluo Chen, Sharon-Lise Normand,
Joseph P. Newhouse, Barbara J. McNeil

Institute for Clinical Evaluative Sciences
University of Toronto, Harvard Medical School

NEJM 1997; 336: 1500-1505.
Study Questions

1. What are the rates of use of coronary angiography, PTCA, and CABG surgery in elderly patients after an AMI in Ontario, Canada vs. the United States?

2. Are there differences in the availability of cardiac procedures in Ontario vs. the United States?

3. Are there short-term or long-term outcome differences for elderly AMI patients in Ontario vs. the United States?
## Characteristics of Hospitals in the United States and Ontario, 1991

<table>
<thead>
<tr>
<th>Area</th>
<th>No. of Hospitals</th>
<th>Availability of Procedures</th>
<th>No. of Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PTCA</td>
<td>CATH</td>
</tr>
<tr>
<td>United States</td>
<td>5075</td>
<td>55.4</td>
<td>24.6</td>
</tr>
<tr>
<td>Ontario</td>
<td>193</td>
<td>91.7</td>
<td>3.1</td>
</tr>
</tbody>
</table>
CONCLUSIONS

• Elderly, AMI patients in the United States are *five* times more likely to receive a cardiac procedure than those in Canada.

• However, 1-year survival rates after an AMI are similar in the two countries.

• Further studies of quality of life issues are needed.
CONCLUSIONS

• There are wide regional variations in cardiac procedure rates throughout North America.

• Many factors have been identified that contribute to these variations (patient, physician, hospital, system factors).

• Probably cannot determine an ‘optimal’ rate but can define reasonable target rates using available data.

• Collaborative outcomes research (interprovincial, international) will be very important in improving the evidence base for determining procedure rates.