Comparison of traumatic brain injury (TBI) between Aboriginal communities of Northern Quebec and the general Quebec population

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No Disclosures
The term “Aboriginal” in Canada refers to Métis, First Nation and Inuit Peoples, as recognized in section 35 of the Constitution Act, 1982.
# Health Status of Canadian Aboriginal Peoples

## Table 1

### Health Status:
- Life Expectancy, Infant Mortality, Deaths by Suicide and Self-Rated Health

<table>
<thead>
<tr>
<th></th>
<th>Aboriginal Peoples (non-reserve)</th>
<th>Canada</th>
<th>First Nations (on-reserve) Status Indians</th>
<th>Inuit (Nunavut)</th>
<th>Métis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Life Expectancy at Birth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>n.a.</td>
<td>82 d</td>
<td>77 l</td>
<td>70 d</td>
<td>n.a.</td>
</tr>
<tr>
<td>Male</td>
<td>n.a.</td>
<td>76 d</td>
<td>69 l</td>
<td>68 d</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Infant Mortality (per 1,000 live births)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n.a.</td>
<td>5.3 l</td>
<td>8.0 g</td>
<td>15 l</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Deaths by Suicide (deaths per 100,000)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n.a.</td>
<td>13 g</td>
<td>28 g</td>
<td>79 m</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Self-rated Health Status (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent/Very Good</td>
<td>56 b</td>
<td>61 e</td>
<td>40 f</td>
<td>56 b</td>
<td>58 b</td>
</tr>
<tr>
<td>Good</td>
<td>26 b</td>
<td>27 e</td>
<td>33 f</td>
<td>32 b</td>
<td>25 b</td>
</tr>
<tr>
<td>Fair/Poor</td>
<td>17 b</td>
<td>12 e</td>
<td>27 f</td>
<td>12 b</td>
<td>17 b</td>
</tr>
</tbody>
</table>

All data are crude rates. Data sources are referenced at the end of the chapter.
Potential Years of Life Lost (PYLL)

Improving Health Care of Canadians 2004, Canadian Population Health Initiative, Canadian Institute of Health Information

What about TBI??

Source: Health Canada, First Nations Inuit Health Branch in-house statistics. 1999

<table>
<thead>
<tr>
<th>Variable</th>
<th>Native North Americans</th>
<th>Non-native North Americans</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial GCS score</td>
<td>Mean 8.06 (SD 3.64)</td>
<td>Mean 9.61 (SD 3.77)</td>
<td>0.135</td>
</tr>
<tr>
<td>(Length of PTA (days)</td>
<td>Mean 16.80 (SD 7.98)</td>
<td>Mean 24.95 (SD 31.57)</td>
<td>0.577</td>
</tr>
<tr>
<td>Acute care length of stay (days)</td>
<td>Mean 33.33 (SD 22.99)</td>
<td>Mean 35.23 (SD 19.41)</td>
<td>0.734</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cause</th>
<th>Number</th>
<th>Per cent</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVA</td>
<td>8</td>
<td>44.4</td>
<td>34</td>
<td>65.4</td>
</tr>
<tr>
<td>Fall</td>
<td>5</td>
<td>27.8</td>
<td>10</td>
<td>19.2</td>
</tr>
<tr>
<td>Assault</td>
<td>1</td>
<td>5.6</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>2</td>
<td>11.1</td>
<td>3</td>
<td>5.8</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>11.1</td>
<td>3</td>
<td>5.8</td>
</tr>
<tr>
<td>None</td>
<td>3</td>
<td>16.7</td>
<td>47</td>
<td>90.4</td>
</tr>
<tr>
<td>Alcohol</td>
<td>13</td>
<td>72.2</td>
<td>5</td>
<td>9.6</td>
</tr>
<tr>
<td>Alcohol and drugs</td>
<td>2</td>
<td>11.1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Retrospective chart review of 70 patients in a rehab center following TBI
Native (18) vs Non-Native (52)
• No difference in sex, age, mechanism, GCS, LOS in hospital.
• Natives had greater association with alcohol/drugs vs non-natives (83.3% vs 9.6%)
• Natives had less discharge follow-up arranged vs non-natives (33.3% vs 90.4%)

Limitations: Small numbers; biased to only those patients that end up in Rehab.
Completed suicides among the **Inuit of northern Quebec, 1982–1996**: a case–control study


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**Fig. 1:** Suicide rate and number of suicides by year from 1982 to 1996 among the Inuit in Nunavik, northern Quebec. Linear (rate) refers to the simple linear regression line showing trend in suicide rate.

30% due to gunshot wounds; >70% males aged 15-24yrs
Our Present Study

Comparison of TBI between Aboriginal communities of Northern Quebec and the general Quebec population
Purpose

To compare different aspects of TBI between aboriginal and non-aboriginal people living Quebec.

Long-term Goal

To explore how the specific needs of northern aboriginal Quebec population could be met, in terms of TBI prevention and management.
Hypothesis

There would be significant differences in the demographics, mechanism, severity, and outcomes of TBI in the aboriginal Quebec population versus the general Quebec population.
Population Studied
Northern Region 10
(Nunavik, Cree Territories of James Bay, Nord-du-Quebec)
Northern Region 10  
“Aboriginal”  

VS  

Region 6, 7, 16  
(Outaouais, ½ Monteregie, ½ Montreal)  
“General Population”
Methods

Montreal General Hospital (Level One Trauma Center)  
Traumatic Brain Injury Database Review 2005-2010  
Moderate & Severe TBI (GCS<13)

Two Groups
“General Population” (Outaouais, ½ Monteregie, ½ Montreal)  
VS  
Northern Region 10 (Nunavik, James Bay, Nord-du-Quebec)

Outcomes Measures
TBI Prevalence  
Age, Sex  
Injury Severity Score (ISS)  
Glasgow Coma Scale (GCS)  
Length of stay (LOS) in hospital  
Glasgow Outcome Score (GOS)  
Mechanism of TBI  
Association with Alcohol (Blood tests or chart documentation)  
Association with Drugs (Urine tests* or chart documentation)  
*Urine test includes cocaine, opiates, cannabis, benzos
## Injury Severity Score (ISS)

(Using Abbreviated Injury Scale (AIS))

<table>
<thead>
<tr>
<th>Injury</th>
<th>AIS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Serious</td>
</tr>
<tr>
<td>4</td>
<td>Severe</td>
</tr>
<tr>
<td>5</td>
<td>Critical</td>
</tr>
<tr>
<td>6</td>
<td>Unsurvivable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>Injury Description</th>
<th>AIS</th>
<th>Square Top Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head &amp; Neck</td>
<td>Cerebral Contusion</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Face</td>
<td>No Injury</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Chest</td>
<td>Flail Chest</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Abdomen</td>
<td>Minor Contusion of Liver</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complex Rupture Spleen</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Extremity</td>
<td>Fractured femur</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>External</td>
<td>No Injury</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Injury Severity Score:** 50
Montreal General Hospital (Level One Trauma Center)  
Traumatic Brain Injury Database Review 2005-2010  
Moderate & Severe TBI (GCS<13)

Two Groups
“General Population” (Outaouais, ½ Monteregie, ½ Montreal)  
VS  
Northern Region 10 (Nunavik, James Bay, Nord-du-Quebec)

Outcomes Measures
TBI Prevalence
Age, Sex
Injury Severity Score (ISS)
Glasgow Coma Scale (GCS)
Length of stay (LOS) in hospital
Glasgow Outcome Score (GOS)
Mechanism of TBI
Association with Alcohol (Blood tests or chart documentation)
Association with Drugs (Urine tests* or chart documentation)
*Urine test includes cocaine, opiates, cannabis, benzos
## Glasgow Outcome Score (GOS)

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DEATH</td>
</tr>
</tbody>
</table>
| 2     | PERSISTENT VEGETATIVE STATE  
Patient exhibits no *obvious cortical* function. |
| 3     | SEVERE DISABILITY  
(Conscious but disabled). Patient depends upon others for daily support due to mental or physical disability or both. |
| 4     | MODERATE DISABILITY  
(Disabled but independent). Patient is independent as far as daily life is concerned. The disabilities found include varying degrees of dysphasia, hemiparesis, or ataxia, as well as intellectual and memory deficits and personality changes. |
| 5     | GOOD RECOVERY  
Resumption of normal activities even though there may be minor neurological or psychological deficits. |
Montreal General Hospital (Level One Trauma Center)
Traumatic Brain Injury Database Review 2005-2010
Moderate & Severe TBI (GCS<13)

Two Groups
“General Population” (Outaouais, Monteregie, parts of Montreal)
VS
Northern Region 10 (Nunavik, James Bay, Nord-du-Quebec)

Outcomes Measures
TBI Prevalence
Age, Sex
Injury Severity Score (ISS)
Glasgow Coma Scale (GCS)
Length of stay (LOS) in hospital
Glasgow Outcome Score (GOS)
Mechanism of TBI
Association with Alcohol (Blood tests or chart documentation)
Association with Drugs (Urine tests* or chart documentation)

*Urine test includes cocaine, opiates, cannabis, benzos
Results
# Demographics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>General Population</th>
<th>Northern Region 10</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>792</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Adult population base*</td>
<td>3,249,179</td>
<td>30,612</td>
<td></td>
</tr>
<tr>
<td>TBI 5yr Prevalence (per 10,000)</td>
<td>2.4</td>
<td>9.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Age at admission</td>
<td>54.2</td>
<td>33.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>% Females</td>
<td>25.5</td>
<td>33.3</td>
<td>0.454</td>
</tr>
<tr>
<td>ISS</td>
<td>29.1</td>
<td>26.9</td>
<td>0.604</td>
</tr>
<tr>
<td>GCS</td>
<td>8.5</td>
<td>6.4</td>
<td>0.007</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>23.1</td>
<td>30.5</td>
<td>0.154</td>
</tr>
<tr>
<td>GOS</td>
<td>3.8</td>
<td>4.5</td>
<td>0.052</td>
</tr>
</tbody>
</table>

*Sources: Statistique Canada, Division de la démographie et Institut de la statistique du Québec, Direction des statistiques sociodémographiques 2010*
Mechanism of TBI

Mechanism of TBI

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>General Population</th>
<th>Northern Region 10</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVA</td>
<td>263</td>
<td>17</td>
<td>p=0.036</td>
</tr>
<tr>
<td>Fall</td>
<td>383</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>GSW &amp; Stabbing</td>
<td>15</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Blunt &amp; Sharp Object</td>
<td>96</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>26</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Assault
Alcohol Use

Association with Alcohol Use

Chi-Square Test
p<0.001

Percent (%)

- General Population
- Northern Region 10

Positive Blood Test
Positive Chart no blood test
Negative Blood Test
No Data
Association with Drug Use

- General Population
- Northern Region 10

Percent (%)

- Positive Blood Test
- Positive Chart no blood test
- Negative Blood Test
- No Data
Seatbelts, Helmets, and Airbags

Not a single aboriginal patient had seatbelts, helmets, or airbags recorded in the database.

Only 5.9%, 4.4%, 3.8% of general population had these recorded in the database, respectively.

We could not assess these parameters!

We plan to look at this more closely in the MGH General Trauma Database.
Other Limitations

Bias toward only those patients who are transferred to the MGH.
- Certainly other mod-severe traumas occurred
- Patients may have died before transfer
- Patients may have been managed without transfer

All limitations of Retrospective Database Review
- Limited to what was recorded in the database
- Incomplete, poorly recorded, or missing data
- Difficult to control bias and confounders
Conclusions

• Aboriginal people of northern Quebec have a 4 times increased risk of mod-severe TBI.

• Aboriginal TBIs involve much younger victims (20yrs younger).

• These patients have more severe TBIs (GCS) than the general population.

• TBI much more due to MVA, than falls (younger population).

• Their outcomes are as good as general population, likely because younger age.

• Alcohol may play a role, at least by chart documentation.
Implications
(Long-term Goals)

1. We have a specific demographic group to address
   • Young aboriginal people

2. Preventable mechanisms (MVA) can potentially be altered.
   • All terrain vehicle (ATV) safety
   • Helmets
   • Seat belts

3. Alcohol use/abuse can potentially be altered.

4. These issues must be addressed at the community level with aboriginal people involvement.
Future....
Thank You

Mitra Feyz
Mohammed Maleki
Judith Marcoux

NeuroTrauma Neurosurgery & Traumatic Brain Injury Team, Montreal General Hospital