City mouse, country mouse

The trauma experience in a rural African environment

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• No conflict of interest to declare

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• Trip also supported by the attending surgeons, my co-fellow and my family…
Outline

• Comparison of Canada and Kenya
  – Demographics
  – Geo-Politics
  – Trauma statistics

• Comparison of the delivery of trauma care at the MCH and BKKH
  – Tour of Kijabe
  – Tour of BKKH

• Review of a Kenyan refugee camp
Patient X

• 3 year old ♀ transferred with GSW
  – Ø PMHx
  – Village attacked by cattle raiders (carry AK-47s)
  – 6 family members killed
    • Thru-&thru L temporal wound
    • Fractured R humerus + Tib/Fib (open)
  – Wounds 36 hours old, all closed w 0-Silk
  – Given ABX, arrived by bus with villager with note in hand:
Patient X
Background
Background

- **Kenya**: (Swahili): “God's resting place”
- **Motto**: "Harambee" (Swahili): "Let us all pull together"

- Lies directly on the equator
- Home to Homo habilis (1.8 and 2.5 million years ago) and Homo erectus (1.8 million to 350 000 years ago)
Background

- On the Arab trade route (slaves, spices)
- German then British Colony (1880-1960s)
- 50s-60s: Rebellion
- 1964: the Republic of Kenya was proclaimed (Kenyatta)
• Extreme religious and tribal diversity
  - Kikuyu 22%, Luhya 14%, Luo 13%, Kalenjin 12%, other African 15%, non-African 1%
  - Kikuyu President Mbaki (2007)
  - Elections contested: 800–1,500 killed 180,000-250,000 displaced
Background

Canada

- Area: 9 million km²
- Population: 34 million
- Literacy: 99%
- GDP per capita: $38,400
- Unemployment: 6%
- Life expectancy: 81 years

Kenya

- Area: 0.5 million km²
- Population: 38 million
- Literacy: 85%
- GDP per capita: $1,700
- Unemployment: 40%
- Life expectancy: 47-55 years
HDI

– Composite statistic used as an index to rank countries by level of "human development"

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>HDI</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Iceland</td>
<td>0.969</td>
<td>▲ 0.002</td>
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<tr>
<td>4</td>
<td>Canada</td>
<td>0.966</td>
<td>▲ 0.001</td>
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<td>Ireland</td>
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<tr>
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<td>▲ 0.006</td>
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<tr>
<td>148</td>
<td>Papua New Guinea</td>
<td>0.541</td>
<td>▲ 0.005</td>
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</table>
Kijabe

– **Swahili**: “place of the wind”
Kijabe
Kijabe
The town
ВККН
Background

Founded 1904
144 beds
12 bed PICU
Lang: Eng, Fre + translators

Whole Hospital founded 1915
BKKH: 2001
36 beds
? PICU ? NICU
Lang: Eng, Kiswahili, etc…
BKKH and clinics
BKKH – a tour
BKKH – a tour
BKKH – a tour
BKKH – a tour
BKKH – a tour
BKKH – a tour
BKKH – a tour
The town

Rate of unintentional injuries per 100,000 children, by WHO region and country income level, World, 2004

<table>
<thead>
<tr>
<th>Africa</th>
<th>Americas</th>
<th>South-East Asia</th>
<th>Europe</th>
<th>Eastern Mediterranean</th>
<th>Western Pacific</th>
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<td>HIC</td>
<td>LMIC</td>
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<tr>
<td>53.1</td>
<td>14.4</td>
<td>21.8</td>
<td>49.0</td>
<td>7.9</td>
<td>41.6</td>
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<tr>
<td></td>
<td></td>
<td></td>
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<td>25.4</td>
<td>45.7</td>
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<td>7.8</td>
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<td>33.8</td>
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</table>

These data refer to those under the age of 20 years.
HIC = High-income countries; LMIC = low-income and middle-income countries.

## Background

<table>
<thead>
<tr>
<th>Rank</th>
<th>Under 1 year</th>
<th>1–4 years</th>
<th>5–9 years</th>
<th>10–14 years</th>
<th>15–19 years</th>
<th>Under 20</th>
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<tbody>
<tr>
<td>1</td>
<td>Perinatal causes</td>
<td>Lower respiratory infections</td>
<td>Lower respiratory infections</td>
<td>Lower respiratory infections</td>
<td>Road traffic injuries</td>
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<td>Road traffic injuries</td>
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<td>Self-inflicted injuries</td>
<td>Lower respiratory infections</td>
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<tr>
<td>3</td>
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<td>Malaria</td>
<td>Drowning</td>
<td>Violence</td>
<td>Drownings</td>
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<tr>
<td>5</td>
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<td>HIV/AIDS</td>
<td>Meningitis</td>
<td>Meningitis</td>
<td>Drowning</td>
<td>Measles</td>
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<tr>
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<td>Congenital anomalies</td>
<td>Drowning</td>
<td>HIV/AIDS</td>
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<td>Fire-related burns</td>
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<td>Tuberculosis</td>
<td>Protein–energy malnutrition</td>
<td>Leukaemia</td>
<td>Pertussi</td>
</tr>
<tr>
<td>10</td>
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<td>Meningitis</td>
<td>HIV/AIDS</td>
<td>Self-inflicted injuries</td>
<td>Meningitis</td>
<td>Meningitis</td>
</tr>
<tr>
<td>11</td>
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<td>Fire-related burns</td>
<td>Fire-related burns</td>
<td>Leukaemia</td>
<td>Maternal haemorrhage</td>
<td>Drowning</td>
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<tr>
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<td>Syphilis</td>
<td>Pertussi</td>
<td>Falls</td>
<td>Fire-related burns</td>
<td>Falls</td>
<td>Protein–energy malnutrition</td>
</tr>
<tr>
<td>13</td>
<td>Endocrine disorders</td>
<td>Tuberculosis</td>
<td>Congenital anomalies</td>
<td>War</td>
<td>Poisonings</td>
<td>Tetanus</td>
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<tr>
<td>14</td>
<td>Tuberculosis</td>
<td>Upper respiratory infections</td>
<td>Epilepsy</td>
<td>Violence</td>
<td>Abortion</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>15</td>
<td>Upper respiratory infections</td>
<td>Syphilis</td>
<td>Leukaemia</td>
<td>Trypanosomiasis</td>
<td>Epilepsy</td>
<td>Fire-related burns</td>
</tr>
</tbody>
</table>

Background

Distribution of global child injury deaths by cause, 0–17 years, World, 2004

- Other unintentional\(^a\) 31.1%
- Road traffic injuries 22.3%
- Drowning 16.8%
- Fire-related burns 9.1%
- Falls 4.2%
- Poisoning 3.9%
- Homicide 5.8%
- Self-inflicted injuries 4.4%
- War 2.3%

\(^a\) “Other unintentional” includes categories such as smothering, asphyxiation, choking, animal and venomous bites, hypothermia and hyperthermia as well as natural disasters.

Background

• In Africa:
  – 830,000 children die every year as a result of unintentional injury
  – Leading cause of death for children over 9 years
  – Road traffic injuries and drowning account for half of all unintentional child injuries
  – Tens of millions of children require hospital care every year for non-fatal injuries
  – Road traffic injuries and falls are the main causes of injury-related child disabilities
  – 95% of child injuries occur in low-income and middle-income countries

WHO 2008
MVAs - Kenya

*Figure 1.* Road traffic fatality trends in Kenya, 1965–1998.

Highlight statistics from *deaths* among motor vehicle collision injury cases in the 2007–2008 NTR CDS (Appendix G, Table 5):

- There were 416 deaths (representing 36% of all injury deaths). These represented cases who died in the emergency department or who were admitted and later died in hospital.
- The mean age was 46 (median = 45).
- The mean LOS was 10 days (median = 1).
- The mean ISS was 38 (median = 38).
- All had a blunt injury as the most serious injury.

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**Note**
Includes data from 39 hospitals across 6 jurisdictions.

**Source**
National Trauma Registry Comprehensive Data Set, 2007–2008, Canadian Institute for Health Information.
Heartache...
Hope...
The complications also depended upon the extent of TBSA and depth of burn. For TBSA of 30 per cent and above, the incidence of complications was:

- Contractures 100%
- Dermal changes 80%
- Sepsis 60%
- Delayed healing 40%
- Anaemia 20%
Burns - Canada

Note
Includes data from 39 hospitals across 6 jurisdictions.

Source
National Trauma Registry Comprehensive Data Set, 2007–2008. Canadian Institute for Health Information.
Burns
Burns
Trauma as a chronic disease

• Delay in care is multi-factorial:
  – No established EMS Service
  – Roads considered unsafe for driving at night
  – Long distances between Villages
  – Low SES barrier to seeking medical attention

• ∴ Patients present with survivable injuries and chronic disabilities
Trauma as a chronic disease

• Other Challenges:
  – Lack of human resources and expertise
    • No Radiologist
  – Lack of equipment and supplies
    • No Central Access/ TPN
  – Blood Products :
    – Blood Gas
    – Biochem
    – Hematology
    – Micro
    – Blood Bank
      (Donors+Testing)
Dadaab
Dadaab

• Built in 1993 after Battle of Mogadishu in Somalia, original capacity: 90,000
• Now contains 300-350,000 refugees
• 3-4,000/month across Somali border
• Now considered the largest refugee camp on the planet
Al-Shabaab

al-Shabaab: (Arabic: الشباب, "The Youth")
Al-Shabaab

Map showing territorial gains made by al-Shabaab since January 31, 2009, when the civil war with Sharif Ahmed started.
The Camp
The Camp
Wound contracture after Snakebite
Burn Contracture
GSWs with EC fistulae
The Camp
The Camp
The Camp
The Camp
Take home message

Be thankful for what you have; you'll end up having more. If you concentrate on what you don't have, you will never, ever have enough.

Oprah Winfrey