Vaccine Preventable Diseases in Adult Immigrants and Refugees

Jay Keystone MD
Tropical Disease Unit, Toronto General Hospital
Professor of Medicine, University of Toronto
My agenda

- Canadian immigration
- Immunization issues re: immigrants/refugees
- Susceptibility of immigrants to selected vaccine preventable diseases (VPDs)
- Transmission of VPDs by immigrants and refugees
- Barriers to health care and immunization by immigrants
- VFRs and VPDs
“There is nowhere in the world from which we are remote and no one from whom we are disconnected”
Proportion of immigrants born in Europe and Asia by period of immigration, Canada, 2001 (Stats Can)
Canadian Immigration by Source Area – 2003

Source CIC – Annual Report to Parliament 2004

- Africa
- Mid East
- Asia Pacific
- S & C America
- USA
- Europe
Foreign-born as a proportion of total population in selected international metropolitan areas (Statistics Canada)

Sources: Statistics Canada 2001 Census; U.S. Bureau of the Census; Australian Bureau of Statistics
The Changing and Growing Immigrant Population in Canada

- 5.6 million in Canada (18.5% of the population)
- Canada receives ~250,000 new immigrants/yr.
- 90% settle in Ontario, BC and Quebec
- >75% settle in Toronto, Vancouver and Montreal
- Since 1990 >70% of immigrants have originated from countries where vaccination may be sub-optimal
"I'm second from the left, back row."
Pre-immigration screening of immigrants and refugees

- History to rule out costly chronic diseases (vaccination status is not asked about)
- Physical exam
- Chest X-Ray (≥ 11 years of age)
- VDRL (≥ 15 years of age)
- Urinalysis (≥ 5 years of age)
- HIV (began in Jan 2002)
What are the issues concerning adult immunizations for immigrants and refugees?
Immunization issues wrt. immigrants/refugees

- Language issues
- Incomplete records
- Incomplete immunization
- Differing schedules in other countries
- Vaccine quality control
- Reliability of history/documentation
**Immunization Documentation**

**Minnesota 1998**
- Adult refugees low rates of documentation of receipt of vaccination
- dT- 5.6%, Measles 6.8%, Hepatitis B- 0.2%
- Lowest for refugees from Sub-Saharan Africa

Lifson 2001 J Immigr Health;1:47-52

**CDC 1993-1995**
- Refugee Health Assessments 7/93-6/95
  - Not current- 52%, Vaccinated 70%

Walker 1999 Med Clin NA;83:1103-20
IS IT CONTAGIOUS?
Is it true that immigrants coming from developing countries are probably immune to most vaccine preventable diseases?

NO!
Diphtheria and tetanus immunity among blood donors in Toronto

Lilian Yuan, MD, MSc; Wendy Lau, MD; John Thipphawong, MD; Margareth Kasenda, MD, MSc; Fang Xie, MSc; Joan Bevilacqua, MSc

Abstract

Objective: To determine the diphtheria and tetanus antitoxin levels among blood donors in Toronto.
Design: Cross-sectional seroprevalence study.
Setting: Two fixed-site blood-donation clinics in Toronto from September to No-

Susceptibility to: (n=710 donors)
Tetanus: 27% foreign vs. 18% CDN
Diphtheria 27 % foreign vs. 12% CDN

Results: Among the participants, 147 (20.7%) had a diphtheria antitoxin level in the nonprotective range, and 124 (17.5%) had a tetanus antitoxin level that was nonprotective. Increasing age and lack of written vaccination records were associated with susceptibility to the 2 diseases. Birth outside Canada was significantly related to tetanus susceptibility.

Evidence

Dr. Yuan, Dr. Kasenda and Mr. Xie are with the Department of Preventive Medicine and Biostatistics, University of Toronto.

CMAJ 1997;156:985-90
Susceptibility to Vaccine Preventable Diseases in Newly Arrived Immigrants and Refugees in Montreal, Canada


- Adults ≥18 years of age; n=1480
- Living in Canada ≤ 5 years
- Had not any of the diseases or received vaccines for MMR, DPT or Hepatitis A vaccination since arrival in Canada

Recruited from
- CLSC Cote de Neiges
- JGH Hospital
- St. Justine Hospital
- Clinic Diamant
- Clinique VMS
<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percentage of Immigrants/Refugees Seronegative for at least one of Measles, Mumps or Rubella</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>95%CI</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>1480</td>
<td>36%</td>
<td>(33-38)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;35 years</td>
<td>1026</td>
<td>39%</td>
<td>(36-42)</td>
</tr>
<tr>
<td>≥35 years</td>
<td>454</td>
<td>28%</td>
<td>(23-32)</td>
</tr>
<tr>
<td><strong>Immigration Class</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immigrants</td>
<td>829</td>
<td>37%</td>
<td>(34-40)</td>
</tr>
<tr>
<td>Refugees</td>
<td>651</td>
<td>34%</td>
<td>(31-38)</td>
</tr>
<tr>
<td><strong>Region of Origin</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Asia and the Pacific</td>
<td>221</td>
<td>45%</td>
<td>(39-52)</td>
</tr>
<tr>
<td>South Asia</td>
<td>318</td>
<td>41%</td>
<td>(35-46)</td>
</tr>
<tr>
<td>Latin America/the Caribbean</td>
<td>356</td>
<td>38%</td>
<td>(33-44)</td>
</tr>
<tr>
<td>Eastern Europe and Central Asia</td>
<td>157</td>
<td>36%</td>
<td>(28-43)</td>
</tr>
<tr>
<td>N Africa/Middle East</td>
<td>172</td>
<td>28%</td>
<td>(21-35)</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>256</td>
<td>23%</td>
<td>(18-29)</td>
</tr>
</tbody>
</table>

## Susceptibility to one of MMR in immigrants/refugees to Quebec

*Greenaway Ann Int Med 2007;124:20-24*

<table>
<thead>
<tr>
<th>parameter</th>
<th>Number</th>
<th>% Susc. m</th>
<th>%Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1480</td>
<td>36</td>
<td>33-38</td>
</tr>
<tr>
<td>&lt;35 yrs</td>
<td>1036</td>
<td>39</td>
<td>36-42</td>
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<tr>
<td>&gt;35 yrs</td>
<td>454</td>
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<td>refugees</td>
<td>651</td>
<td>34</td>
<td>31-38</td>
</tr>
</tbody>
</table>
## Susceptibility to MMR in immigrants and refugees to Quebec (%)


<table>
<thead>
<tr>
<th>Region</th>
<th>No.</th>
<th>m</th>
<th>Measles</th>
<th>Mumps</th>
<th>Rubella</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.Asia</td>
<td>221</td>
<td>45</td>
<td>10</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td>S. Asia</td>
<td>318</td>
<td>41</td>
<td>1</td>
<td>33</td>
<td>10</td>
</tr>
<tr>
<td>L.Am ,Car.</td>
<td>356</td>
<td>38</td>
<td>12</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>E.Eu, CAs</td>
<td>157</td>
<td>36</td>
<td>11</td>
<td>26</td>
<td>8</td>
</tr>
<tr>
<td>N.Afr ,ME</td>
<td>172</td>
<td>28</td>
<td>3</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>SS Africa</td>
<td>256</td>
<td>23</td>
<td>3</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>6 (1-12)</strong></td>
<td><strong>24(16-33)</strong></td>
<td><strong>12(6-24)</strong></td>
</tr>
</tbody>
</table>
Seroprevalence of Measles, Rubella, and Varicella in Refugees

Elizabeth D. Barnett, Demian Christiansen, and Marisol Figueira

Maxwell Finland Laboratory for Infectious Diseases, Boston Medical Center, and Data Coordinating Center, Boston University School of Public Health, Massachusetts

669 refugees 0-20yrs susceptible:
18% to measles, and rubella,
36% to varicella

To determine the seroprevalence of antibodies to these diseases in this group of immigrants. Five hundred forty-nine (82%) of 669 patients had antibody to measles, 545 (82%) of 668 had antibody to rubella, and 430 (64%) of 668 had antibody to varicella. Antibody to all 3 diseases increased with increasing age. No clinically significant differences in presence of antibody were noted by region of origin.
Table 1. Seroprevalence of varicella IgG antibodies by region of origin and age.

<table>
<thead>
<tr>
<th>Region of origin</th>
<th>All</th>
<th>≤35 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of subjects</td>
<td>Seroprevalence (95% CI)</td>
</tr>
<tr>
<td>United States&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3116</td>
<td>98.9 (98.2–99.3)</td>
</tr>
<tr>
<td>Immigrants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>1480</td>
<td>92 (91–94)</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>254</td>
<td>95 (92–98)</td>
</tr>
<tr>
<td>Northern Africa and the Middle East</td>
<td>185</td>
<td>97 (95–100)</td>
</tr>
<tr>
<td>South Asia</td>
<td>326</td>
<td>89 (85–92)</td>
</tr>
<tr>
<td>East Asia and the Pacific</td>
<td>213</td>
<td>93 (90–96)</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>358</td>
<td>93 (90–96)</td>
</tr>
<tr>
<td>Eastern Europe and Central Asia</td>
<td>144</td>
<td>93 (89–98)</td>
</tr>
<tr>
<td>US scenario&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td>93</td>
</tr>
</tbody>
</table>

Greenaway unpublished
Table 1. Prevalence of measles, rubella, and varicella antibodies among 669 refugees aged 0–20 years, by age group.

<table>
<thead>
<tr>
<th>Antibody</th>
<th>&lt;1 year</th>
<th>1–20 years</th>
<th>1–12 years</th>
<th>13–20 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles</td>
<td>15/31 (48)</td>
<td>534/638 (84)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Rubella</td>
<td>18/31 (58)</td>
<td>527/637 (83)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Varicella</td>
<td>13/31 (42)</td>
<td>—</td>
<td>242/420 (58)</td>
<td>175/217 (81)</td>
</tr>
</tbody>
</table>

NOTE. Data are no. of children positive for antibody/no. of children who were tested (%).
Varicella Seroepidemiology


Age in Years

% Seropositive

S.Asia
L.America
U.S.
From a public health perspective, does it really matter if immigrants/refugees are susceptible to VPDs?
Varicella

- Outbreaks in US primarily in Asian and Central and South American closed populations
  - Army recruits from Puerto Rico
  - Mexican immigrants in a poultry processing plant
  - Tamil refugees in Denmark
  - Filipino nurses
Imported Measles USA
The Journal of Infectious Diseases 2004; 189:S48–53

1997-2001: 11% adopted children; 3% refugees; 2% immigrants
What is the problem? Why are immigrants not immunized even when they arrive in Canada?
Gaps in Immigrant Health

Immigrants have overall lower *all cause* mortality but important health disparities, DesMeules 2005

*Due to*
- differing disease exposures
- Suboptimal access to vaccination in homeland
- Suboptimal access to health services in Canada due to social, cultural, ethnic, demographic, economic barriers
- Canadian health care workers under recognize NB health issues in immigrant population.
- Inadequate infrastructure in Canada to deliver culturally competent care (ie interpreters etc).
New Check-in Requirements
Purpose of International Travel USA Percent : 1998-2002

- Leisure
- VFR Only
- VFR
- Business
- Study
Differing Disease Diagnosis Profiles in Immigrant-VFRs vs. Traveler-VFRs (1997-2004)

Typhoid fever in travellers 1994-99

Source: 50% of cases from 3 countries
  India  30%
  Pakistan  13%
  Bangladesh  6%

Reason for travel: Quebec: 86% of 21 cases

Age: 25% < 10 years

Why are VFR’s at more risk of infectious disease?

**Travel:**
- Higher risk, remote areas
- Eat home-prepared “contaminated” food
- Close contact with locals

**Traveler:**
- **↓** utilization of pre-travel health advice (risk perception)
- **↓** appropriate advice by HCP’s
- **↓** adherence to health advice recommendations
What’s the Bottom Line?

[Image: A man sitting on the ground, his buttocks covered with duct tape.]

The patient, not the healthcare provider, should make the decision on which agent to use!!!
Barriers to Adult Immunization in Immigrants/refugees

1. Language
2. Lack of culturally sensitive care
3. Perception of need
4. Lack of primary HCP
5. Lack of knowledge by HCPs of their specific needs and how to manage the problem
6. Cost
Solutions for both HCPs and target populations?

- Practical, scenario driven guidelines for HCP re: immigrant/refugee immunization
- Community outreach and education that is ethnicity and culturally specific
- Focus groups with member of immigrant HCPs and community leaders
- Increased availability of interpreter services
- Specialized public health centres for immigrant/refugee health
All good people agree,
And all good people say
All nice people like us are we
And everyone else is they!
But if you cross over the sea,
Instead of over the way,
You may end by (think of it:),
Looking on we
As only a sort of they.

Rudyard Kipling
Acknowledgements and thanks for assistance with this presentation:

- Dr. Chris Greenaway
- Dr. Brain Gushulak