THE ROLE OF COMMUNICABLE DISEASES IN PRESENT MIGRATIONS

Natalia Rakislova M.D., Ph.D.
Department of Pathology
IsGlobal/Hospital Clínic
Barcelona, Spain
rakislova@clinic.cat
WHAT IS GLOBALISATION?
“A SMALL WORLD BECOMING SMALLER”

- A process by which...

- “the world is becoming increasingly interconnected due to increased trade and cultural exchange”
Human migrations/movements

- International movements started to increase since the start of commercial aviation..
First transatlantic non-stop flight: 1938; Berlin-Brooklyn

- The plane landed the afternoon of August 11, 1938 in Brooklyn, after taking off about 25 hours earlier from Berlin on a 3,728-mile flight.
- Lufthansa; 26 passengers on board
International Tourist Arrivals by World Region

2010-...
“Golden Age” of Flying?

“Golden Age” of Flying

OurWorldInData.org/tourism/ • CC BY
TYPES OF HUMAN MOVEMENT
TRAVEL VS MIGRATION

Travel

• To be on journey
  - Business
  - Pleasure

Small part of human movements

Migration

• Moving to live in another place with the intention to settle

Bigger part of human movements
HUMAN MIGRATIONS TO EUROPE

2017: International migrants: 10% of European population

MAP BY RYAN WILLIAMS, NATIONAL GEOGRAPHIC
Human migrations to Europe

Do migrants pose infectious diseases threat to Europe?

2017:

MAP BY RYAN WILLIAMS, NATIONAL GEOGRAPHIC
Migrants are the threat of infectious diseases in Europe?

- The risk of an outbreak of infectious diseases because of the migrations is extremely low (WHO)
- A number of factors may influence immigrants’ health:
  - biological factors, exposure to endemic diseases in country of origin, migration routes, etc
- Refugees and migrants are exposed to the infectious diseases that are common in Europe, independently of migration
Migrants are the threat of infectious diseases?

- Historically, they were the threat on multiple occasions..

- Migrations has long been associated with the spread of infectious diseases...
Black Death (Bubonic Plague) in Europe

- Yersinia pestis
- Fleas lived on rodents
- Began in Asia with those who traveled the trade routes (the silk road)
- The "Black Death" was carried to Mediterranean by infected sailors and rats on the ships
- >200 million people killed (14th-17th centuries)
INTRODUCTION OF INFECTIOUS DISEASES DURING COLONIZATION OF AMERICAS: VIRGIN SOIL EFFECT (15TH CENTURY)

- Europeans brought with them smallpox, measles, yellow fever, malaria
  - The Native Americans with no natural immunities
- 90% of the indigenous population was wiped out within 75 years
Migrants and the threat of infectious diseases

- Travelers/migrants could play a role and even could be a sentinel for major epidemics...
- A risk with variable consequences...

HIV 1959  
DR of Congo  
80’s Worldwide dissemination

Ebola Virus 1976  
DR of Congo  
No outbreaks outside of Africa
Infectious diseases associated with travel/migrations

- Common infections
  - respiratory tract infections, etc
- Transmissible diseases (measles, rubella, HIV; syphilis)
- Tropical infections (malaria, Chagas diseases, typhoid fever)
Travel-related risk factors for communicable diseases

- Mode of transport
- Destination
- Duration and season of travel
- Purpose of travel
- Behaviour of the travellers
- Underlying health of the travellers
AIR TRAVEL AND RISK OF INFECTIOUS DISEASES

- Our understanding of the spread of infections on aircraft is very limited
  - Limited studies

- A person with a contagious illness to travel to virtually any part of the world within just 24h...

AIR TRAVEL AND RISK OF INFECTIOUS DISEASES

- TB, influenza, SARS, measles
- Coughing, sneezing, direct contact, food or vectors

Quality of cabin air:
- 50% outside air and 50% recirculated air
- The recirculated air: high efficiency particulate air filters (HEPA)

Major risk factors: seating within 2 rows from infected passenger; flight time >8 hours

SARS and Air Travel

- On February 2003 a Chinese doctor treated atypical pneumonia cases.
- Checked in into Hong Kong hotel.
  - 24 hours: 12 guests became SARS-infected.

Within weeks 8000 people infected in 26 countries across 5 continents.
SARS AND AIR TRAVEL

The speed and extent of SARS highlighted the potential of air travel to spread infectious diseases.
West Nile Virus and Air Travel

- Discovered in Uganda in 1937
- First detected in North America in 1999
  - It’s believed that virus reached US via mosquitoes that crossed oceans by aircraft wheel wells
SEA TRAVEL/Cruise Tourism and Risk of Infectious Diseases

- 1000 persons; in a “closed” space
- Contaminated food; water
  - Gastroenteritis
  - Person to person spread
  - Norovirus (“cruise ship” virus)
- Exposure to Spa water (inhalation)
  - One-third of cruise ships are positive for Legionella

Legionella control: Controlling Legionella on Ships, Ferries & Other Maritime Vessels
LAND TRANSPORT AND RISK OF INFECTIOUS DISEASES

➢ The correlation between the use of public transport and the spread of infectious diseases is something that has always been assumed and generally accepted but has never been proved...

➢ London underground:
  ➢ Transmission of influenza-like cases (rhinoviruses, RSV, adenoviruses, parainfluenza)
  ➢ Higher numbers of viral infections arise in those districts where the population spend more time in the underground

EMERGING DISEASES ASSOCIATED WITH MIGRATION/TRAVELLING

➢ Published studies on migrations and infectious diseases:
  ➢ Re-emergence of diseases imported by travelers in Europe (low number of cases)
    (Chikungunya and Dengue in France and Italy)
  ➢ The majority were non-emergent infectious diseases
    ➢ Exception: MDR-TB and multi-drug resistant bacteria..

Vignier N, et al. Travel, Migration and Emerging Infectious Diseases. EJIFCC 2018; 7;29(3):175-179
Accidents/cardiovascular diseases are the most frequent cause of death in travelers to developing countries...

## Infectious diseases among travellers and migrants in Europe, EuroTravNet 2010

P Gautret¹, J P Cramer², V Field³, E Caumes⁴, M Jensenius⁵, E Okrania-Klotsas⁶, P J de Vries⁷, M P Grobusch⁷, R Lopez-Velez⁸, F Castelli⁹, P Schlagenhauer¹⁰, H Hervius Asking¹¹, F von Sonnenburg¹², D G Laloo¹³, L Loutan¹⁴, C Rapp¹⁵, F Basto¹⁶, F Santos O'Connor¹⁷, L We for the EuroTravNet Network¹⁸

### Short trip travels outside of Europe

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>2008 Excluding new sites¹² n=831</th>
<th>2009 excluding new sites¹² n=880</th>
<th>2010 excluding new sites¹² n=846</th>
<th>2010 all sites n=942</th>
<th>P value</th>
<th>2008 Excluding new sites¹² n=4,991</th>
<th>2009 excluding new sites¹² n=4,555</th>
<th>2010 excluding new sites¹² n=4,594</th>
<th>2010 all sites n=5,144</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>P. falciparum</em> malaria</td>
<td>169 (26)</td>
<td>192 (24)</td>
<td>243 (29)</td>
<td>277 (29)</td>
<td>0.001</td>
<td>73 (2)</td>
<td>88 (2)</td>
<td>119 (3)</td>
<td>136 (3)</td>
<td>0.001</td>
</tr>
<tr>
<td><em>P. vivax</em> malaria</td>
<td>9 (1)</td>
<td>3 (1)</td>
<td>20 (2)</td>
<td>21 (2)</td>
<td>0.001</td>
<td>17 (1)</td>
<td>27 (1)</td>
<td>30 (1)</td>
<td>55 (1)</td>
<td>0.078</td>
</tr>
<tr>
<td>Severe malaria</td>
<td>1 (1)</td>
<td>6 (1)</td>
<td>14 (2)</td>
<td>15 (2)</td>
<td>0.003</td>
<td>8 (1)</td>
<td>4 (1)</td>
<td>15 (1)</td>
<td>17 (1)</td>
<td>0.027</td>
</tr>
<tr>
<td>Non-falciparum malaria (includes <em>P. vivax</em>)</td>
<td>36 (4)</td>
<td>25 (3)</td>
<td>42 (5)</td>
<td>43 (6)</td>
<td>0.166</td>
<td>59 (1)</td>
<td>43 (1)</td>
<td>65 (1)</td>
<td>94 (2)</td>
<td>0.114</td>
</tr>
<tr>
<td>Dengue fever</td>
<td>16 (2)</td>
<td>22 (3)</td>
<td>25 (3)</td>
<td>27 (3)</td>
<td>0.368</td>
<td>108 (2)</td>
<td>144 (3)</td>
<td>250 (6)</td>
<td>319 (6)</td>
<td>0.001</td>
</tr>
<tr>
<td>Chikungunya</td>
<td>2 (1)</td>
<td>0 (0)</td>
<td>4 (1)</td>
<td>4 (1)</td>
<td>0.149</td>
<td>8 (1)</td>
<td>17 (1)</td>
<td>23 (1)</td>
<td>25 (1)</td>
<td>0.015</td>
</tr>
<tr>
<td>Giardia</td>
<td>10 (1)</td>
<td>8 (1)</td>
<td>10 (1)</td>
<td>11 (1)</td>
<td>0.913</td>
<td>169 (3)</td>
<td>165 (4)</td>
<td>172 (4)</td>
<td>190 (4)</td>
<td>0.630</td>
</tr>
<tr>
<td>Campylobacter</td>
<td>3 (1)</td>
<td>14 (2)</td>
<td>8 (1)</td>
<td>11 (1)</td>
<td>0.019</td>
<td>82 (2)</td>
<td>82 (2)</td>
<td>118 (3)</td>
<td>160 (3)</td>
<td>0.003</td>
</tr>
<tr>
<td>Salmonella</td>
<td>13 (2)</td>
<td>17 (2)</td>
<td>24 (3)</td>
<td>27 (3)</td>
<td>0.202</td>
<td>59 (1)</td>
<td>55 (1)</td>
<td>72 (2)</td>
<td>93 (2)</td>
<td>0.189</td>
</tr>
<tr>
<td>Active tuberculosis (all cases)</td>
<td>28 (3)</td>
<td>39 (5)</td>
<td>24 (3)</td>
<td>26 (3)</td>
<td>0.076</td>
<td>12 (1)</td>
<td>6 (1)</td>
<td>15 (1)</td>
<td>17 (1)</td>
<td>0.154</td>
</tr>
<tr>
<td>Pulmonary tuberculosis</td>
<td>11 (1)</td>
<td>24 (3)</td>
<td>16 (2)</td>
<td>17 (2)</td>
<td>0.053</td>
<td>2 (1)</td>
<td>3 (1)</td>
<td>8 (1)</td>
<td>10 (1)</td>
<td>0.075</td>
</tr>
<tr>
<td>Schistosomiasis</td>
<td>18 (2)</td>
<td>23 (3)</td>
<td>23 (3)</td>
<td>24 (3)</td>
<td>0.635</td>
<td>85 (2)</td>
<td>76 (2)</td>
<td>70 (2)</td>
<td>75 (2)</td>
<td>0.767</td>
</tr>
<tr>
<td>Chronic Chagas disease</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>2 (1)</td>
<td>2 (1)</td>
<td>0.387</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>-</td>
</tr>
<tr>
<td>Cutaneous larva migrans</td>
<td>2 (1)</td>
<td>4 (1)</td>
<td>4 (1)</td>
<td>4 (1)</td>
<td>0.659</td>
<td>93 (2)</td>
<td>103 (2)</td>
<td>96 (2)</td>
<td>106 (20)</td>
<td>0.390</td>
</tr>
</tbody>
</table>
### Migrants to Europe

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>2008 excluding new sites&lt;sup&gt;a&lt;/sup&gt;</th>
<th>2009 excluding new sites&lt;sup&gt;a&lt;/sup&gt;</th>
<th>2010 excluding new sites&lt;sup&gt;a&lt;/sup&gt;</th>
<th>2010 all sites&lt;sup&gt;a&lt;/sup&gt;</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasmodium falciparum malaria</td>
<td>13 (2)</td>
<td>6 (1)</td>
<td>20 (3)</td>
<td>21 (3)</td>
<td>0.080</td>
</tr>
<tr>
<td>P. vivax malaria</td>
<td>2 (0)</td>
<td>9 (2)</td>
<td>3 (1)</td>
<td>3 (1)</td>
<td>0.008</td>
</tr>
<tr>
<td>Severe malaria&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0 (0)</td>
<td>2 (1)</td>
<td>2 (1)</td>
<td>2 (1)</td>
<td>0.294</td>
</tr>
<tr>
<td>Non-falciparum malaria (includes P. vivax)</td>
<td>3 (1)</td>
<td>10 (2)</td>
<td>6 (1)</td>
<td>6 (1)</td>
<td>0.033</td>
</tr>
<tr>
<td>Dengue fever</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (1)</td>
<td>2 (1)</td>
<td>0.163</td>
</tr>
<tr>
<td>Chikungunya</td>
<td>0 (0)</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0.268</td>
</tr>
<tr>
<td>Giardia</td>
<td>6 (1)</td>
<td>5 (1)</td>
<td>4 (1)</td>
<td>4 (1)</td>
<td>0.755</td>
</tr>
<tr>
<td>Campylobacter</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>-</td>
</tr>
<tr>
<td>Salmonella&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>4 (1)</td>
<td>4 (1)</td>
<td>0.103</td>
</tr>
<tr>
<td><strong>Active tuberculosis (all cases)</strong></td>
<td><strong>60 (9)</strong></td>
<td><strong>90 (18)</strong></td>
<td><strong>155 (25)</strong></td>
<td><strong>156 (24)</strong></td>
<td><strong>&lt;0.001</strong></td>
</tr>
<tr>
<td><strong>Pulmonary tuberculosis</strong></td>
<td><strong>26 (4)</strong></td>
<td><strong>51 (10)</strong></td>
<td><strong>93 (15)</strong></td>
<td><strong>94 (15)</strong></td>
<td><strong>&lt;0.001</strong></td>
</tr>
<tr>
<td>Schistosomiasis</td>
<td>11 (2)</td>
<td>18 (4)</td>
<td>23 (4)</td>
<td>24 (4)</td>
<td>0.057</td>
</tr>
<tr>
<td>Chronic Chagas disease</td>
<td>93 (14)</td>
<td>30 (6)</td>
<td>58 (9)</td>
<td>58 (9)</td>
<td><strong>&lt;0.001</strong></td>
</tr>
<tr>
<td>Cutaneous larva migrans</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (1)</td>
<td>2 (1)</td>
<td>0.163</td>
</tr>
</tbody>
</table>
TB AND MIGRATIONS IN DEVELOPED COUNTRIES

- TB rates on arrival are low
- Most cases are diagnosed 1-5 years after arrival
  - majority reactivation of latent infection acquired pre-entry
- Spread of TB from immigrants to natives:
  - low risk

GLOBAL DECREASE OF TB INCIDENCE
Proportion of cases of TB of foreign origin increased between 2013-2017 (27.1 to 33.1)

- Bulgaria: <1%
- Croatia: >80%
- Malta: <1%
- Norway: >80%
- Sweden: <1%
MDR-TB AND MIGRATIONS

- Worldwide: 3.6% of TB are MDR-TB

47%: China, India and Russia
MDR-TB AND MIGRATIONS

- Migrations seem to have a clear influence on the spread of MDR-TB....

  - <80% of MDR-TB and XDR-TB were diagnosed in foreign-born patients in California (1993-2006)

Vignier N, et al. Travel, Migration and Emerging Infectious Diseases. EJIFCC 2018; 7;29(3):175-179
THE BEIJING FAMILY OF *M. TUBERCULOSIS*

- Large outbreaks
- Increased risk of drug resistance (waves of MDR-TB in Europe and Asia)
- Spread from Asia in several waves
- Gran Canaria (Spain) 1993:
  - 1 Liberian immigrant: 75 secondary cases

HIV INFECTION WORLDWIDE

Number of HIV-related deaths

- 2000: 1.4 million
- 2018: 770,000
- Target for 2020: < 500,000
- Target for 2030: < 400,000

Source: UNAIDS/WHO estimates
HIV AND MIGRATIONS IN DEVELOPED COUNTRIES

- EU/EEA: >1/3 of all newly-diagnosed HIV cases in the area are reported to be in migrants.
- Traditionally thought that majority was acquired in the country of origin...
- Post-migration HIV acquisition of 63%
  - Post-migration HIV acquisition in migrants from Europe (71%), Latin America and the Caribbean (71%), compared with migrants from sub-Saharan Africa (45%)

MEASLES WORLDWIDE

Countries with the biggest increases in measles cases in 2018

1. Ukraine: 30,338
2. Philippines: 13,192
3. Brazil: 10,262
4. Yemen: 6,641
5. Sudan: 3,496
6. Serbia: 4,355
7. Madagascar: 4,307
8. Italy: 2,599
9. Thailand: 2,758
10. US: 372

Many of the cases occurred in members of the migrant Roma population (low coverage in vaccination).
MEASLES AND MIGRATIONS IN DEVELOPED COUNTRIES

- Unvaccinated adults and children (anti-vaxxers)
- Outbreaks following:
  - Tourism, travel for internation adoption, unvaccinated students from developing countries, specific migrant populations
- European Region “loses ground” in effort to eliminate measles:
  - The surge in cases began in 2018 and has continued into 2019, with 90 000 cases reported for the first half of the 2019 (more than that recorded for the whole of 2018 (84 462))
  - The ongoing circulation of measles in the European Region continues to be internally classified within WHO as a Grade 2 emergency
MEASLES AND MIGRATIONS

- Outbreaks in Bulgaria in 2009-2011
- Clusters of cases reported in Poland, Slovenia, Ireland, Italy, Germany, Greece, France

Nearly 90% of cases in members of the migrant Roma population (low coverage in vaccination)

Preliminary findings indicate nosocomial transmission and Roma population as most affected group in ongoing measles B3 genotype outbreak in Bulgaria, March to August 2017
Rubella and Migrations

- Remains endemic in many areas of the world such as Latin America (start of vaccination in the late 1990s)

Many adult immigrants from Latin American countries will not be immunized

Outbreaks in Madrid in 2003, 2004 and 2005 in non-vaccinated populations from Latin America
VIRAL HEPATITIS AND MIGRATIONS

- Chronic HBV is a major health problem in sub-Saharan Africa and Asia (prevalence over 8%)

EU/EEA:

- Prevalence in general population is around 0.9%
- Prevalence in migrant population is around 5.5%
- Migrants from China and Romania contribute to the largest number of infections, followed by Turkey, Albania and Russia

MULTIGRUD RESISTANT BACTERIA AND MIGRATIONS

- A recent global awareness
Available National Data* on Resistance for Nine Selected Bacteria/Antibacterial Drug Combinations, 2013
MULTIDRUG RESISTANT BACTERIA AND MIGRATIONS

- Few studies
- The pooled prevalence in European Migrants of ATB resistance or infection: **25%**
  - higher in refugees and asylum seekers compared with other migrants
  - higher in high migrant community settings than in hospitals
  - antibiotic-resistant organisms are being acquired during and following migration
  - little evidence of onward transmission to host populations

CONCLUSIONS: COMMUNICABLE DISEASES AND MIGRATIONS

- Air travel (popularity+efficiency) perhaps represents more risk than any other means of transport
- Migrants/travellers play a little role in the spread of infectious diseases (except for TB, MDR-TB, measles?, rubella?)
- Risk of high-risk emerging infectious diseases: variable; very low
- Risk of other non-high-risk emerging infectious disease: variable; low
- Carriage of multiresistant bacteria by travellers/migrants
  - Apparently important but understudied
  - Consequences? Evolution?
THANK YOU FOR YOUR ATTENTION!!!