Vaccines and vaccine-preventable diseases in international travellers

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Infectious Diseases & Tropical Medicine Unit
University Hospital of Marseille France
EuroTravNet
The ECDC collaborative Network for Tropical and Travel Medicine

ESCMID Conference on The Impact of Vaccines on Public Health, Prague, 2011
Outline of the presentation

- Global travel and travel medicine
- Individual consequences of travel-associated VPD
  - Global epidemiology of VPD in travellers
  - Epidemiology of VPD in European travellers
- Introduction of VPD by returned travellers into susceptible populations
  - Hajj and meningitis
  - The spread of poliomyelitis via international travellers
  - Imported measles
  - Influenza A H1N1 global spread
- Vaccination rates in travellers
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- Global travel and travel medicine

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- Vaccination rates in travellers
Worldwide, 25 people/second cross national borders

935 million international arrivals in 2010

≈ 80 million persons from industrialized nations travel to the developing world each year

>200 million persons now reside outside their country of birth
2010: + 7%

2010: Multi-speed recovery

International tourist arrivals, 1995-2010*

WTO website, 2011
Globally Mobile Populations

Travel Medicine, a specialty on the move
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Vaccines for travellers

Yellow fever
Hepatitis A
Typhoid fever
Rabies
Japanese Encephalitis...

but not only...
Vaccine preventable diseases in returned international travelers: Results from the GeoSentinel Surveillance Network

Andrea K. Boggild, Francesco Castelli, Philippe Gautret, Joseph Torresi, Frank von Sonnenburg, Elizabeth D. Barnett, Christina A. Greenaway, Poh-Lian Lim, Eli Schwartz, Annelies Wilder-Smith, Mary E. Wilson, for the GeoSentinel Surveillance Network

What is **GeoSentinel**?

- **Provider-based Surveillance** of international travelers and migrants.
- Does not cover endemic diseases in local populations
  - 49 travel/tropical medicine clinics globally (since 1996)
  - & 198 Network Members on all 6 continents (since 2002)
Display of Complete Patient Record

<table>
<thead>
<tr>
<th><strong>BIR-619</strong></th>
</tr>
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<tbody>
<tr>
<td><strong>Site:</strong></td>
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<tr>
<td><strong>Record Created Date:</strong></td>
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<table>
<thead>
<tr>
<th><strong>Demographic Information</strong></th>
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<tbody>
<tr>
<td><strong>Gender:</strong></td>
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<tr>
<td><strong>Age:</strong></td>
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<tr>
<td><strong>Clinic Visit Date:</strong></td>
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<tr>
<td><strong>Country of Birth:</strong></td>
</tr>
<tr>
<td><strong>Primary Country of Residence Before Age 10:</strong></td>
</tr>
<tr>
<td><strong>Country of Citizenship:</strong></td>
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<tr>
<td><strong>Country of Current Residence:</strong></td>
</tr>
<tr>
<td><strong>Immigrant:</strong></td>
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<tr>
<td><strong>Date First Arrived:</strong></td>
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<tr>
<th><strong>History of Recent Travel</strong></th>
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<tr>
<td><strong>Trip Start Date</strong></td>
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<tr>
<td>13-Sep-2007</td>
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<table>
<thead>
<tr>
<th><strong>History of Previous Travel</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Country</strong></td>
</tr>
<tr>
<td>Australia</td>
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<table>
<thead>
<tr>
<th><strong>Exposure Details</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Country of Exposure/Other:</strong></td>
</tr>
<tr>
<td><strong>More specific place of exposure:</strong></td>
</tr>
<tr>
<td><strong>Reason for Travel Related to Current Illness:</strong></td>
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<tr>
<td><strong>Risk Level Qualifier:</strong></td>
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<tr>
<td><strong>Clinical Setting:</strong></td>
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<tr>
<td><strong>Patient Type:</strong></td>
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<tr>
<td><strong>Did the patient have a pre-travel encounter with a health care provider?</strong></td>
</tr>
<tr>
<td><strong>Main Presenting Symptoms:</strong></td>
</tr>
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<table>
<thead>
<tr>
<th><strong>Diagnoses</strong></th>
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<tbody>
<tr>
<td><strong>Final</strong></td>
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<tr>
<td><strong>Diagnosis</strong></td>
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<td>115 - CAMPYLOBACTER</td>
</tr>
</tbody>
</table>
GeoSentinel Dataset, Sept 2010

Number of Patients in GeoSentinel ($n = 130,310$)

Place of Likely Exposure in Patients Seen After Travel
580 VPD cases out of 37542 returned travellers March 97-Dec 2007 (1.5%)
General characteristics of travellers with VPD versus other diseases

- Younger (30 years vs. 34 years)
- Over re-presentation of men (OR=1.7 [95% CI 1.4, 2.0])
- Longer trip duration (median duration 32 days vs. 28 days, p = 0.003)
- Less pre-travel advice 29% vs. 50% (OR =0.3 [95% CI 0.2, 0.4])
- VFR 18% vs. 10% (OR=2.0 [95%CI 1.6, 2.4])
- South-Central Asia (OR=3.9[95% CI 3.2, 4.6])
- Birth of residence in Italy or Japan
- **Higher rate of hospitalization (55% vs. 10%)**
Demographic predictors of common specific VPD

<table>
<thead>
<tr>
<th>Vaccine preventable disease</th>
<th>Independent predictor</th>
<th>OR [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteric Fever due to <em>S. typhi</em></td>
<td>VFR travel</td>
<td>3.3 [2.3, 4.6]</td>
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<tr>
<td></td>
<td>Travel to South Central Asia</td>
<td>6.5 [4.8, 8.9]</td>
</tr>
<tr>
<td></td>
<td>Birth in India</td>
<td>9.8 [5.9, 16.1]</td>
</tr>
<tr>
<td>Acute hepatitis A virus</td>
<td>Male sex</td>
<td>1.9 [1.3, 3.0]</td>
</tr>
<tr>
<td></td>
<td>Longer trip duration (&gt;30 days)</td>
<td>5.6 [3.5, 8.9]</td>
</tr>
<tr>
<td></td>
<td>Birth in Italy</td>
<td>27.7 [17.6, 41.8]</td>
</tr>
<tr>
<td>Acute hepatitis B virus</td>
<td>Male sex</td>
<td>3.9 [2.0, 7.8]</td>
</tr>
<tr>
<td></td>
<td>Older age (Age &gt;30 years)</td>
<td>2.3 [1.2, 4.4]</td>
</tr>
<tr>
<td></td>
<td>Residence in Italy</td>
<td>37.3 [10.4, 134]</td>
</tr>
<tr>
<td>Influenza</td>
<td>Male sex</td>
<td>1.5 [1.0, 2.3]</td>
</tr>
<tr>
<td></td>
<td>Business travel</td>
<td>3.1 [1.8, 5.3]</td>
</tr>
<tr>
<td></td>
<td>Travel to North Asia</td>
<td>9.9 [5.6, 17.3]</td>
</tr>
<tr>
<td></td>
<td>Travel to Southeast Asia</td>
<td>3.7 [2.3, 5.9]</td>
</tr>
<tr>
<td>Varicella virus</td>
<td>Younger age (Age &lt;25 years)</td>
<td>2.0 [1.0, 4.0]</td>
</tr>
</tbody>
</table>
VPD by region of exposure
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European travelers represent most of the international travelers, with Germany, United Kingdom, France, and Italy the leading countries of origin. N = 509 millions, 55% (2008).

Europe = the world’s largest destination region
N = 490 million, 53% (2008)
Travel and migration associated infectious diseases morbidity in Europe, 2008

Vanessa Field¹, Philippe Gautret², Patricia Schlagenhauf³, Gerd-Dieter Burchard⁴, Eric Caumes⁵, Mogens Jensenius⁶, Francesco Castelli⁷, Effrossyni Gkrania-Klotsas⁸, Lesa Weld⁹, Rogello Lopez-Velez¹⁰, Peter de Vries¹¹, Frank von Sonnenburg¹², Louis Loutan¹³, Philippe Parola¹⁴, the EuroTravNet network

Abstract

Background: Europeans represent the majority of international travellers and clinicians encountering returned patients have an essential role in recognizing, and communicating travel-associated public health risks.

Methods: To investigate the morbidity of travel associated infectious diseases in European travellers, we analysed diagnoses with demographic, clinical and travel-related predictors of disease, in 6957 ill returned travellers who presented in 2008 to EuroTravNet centres with a presumed travel associated condition.

Results: Gastro-intestinal (GI) diseases accounted for 33% of illnesses, followed by febrile systemic illnesses (20%),
166 VPD cases out of 6957 ill returned European travellers 2008 (2.4%)

- **Hepatitis B** (chronic carrier): 66%
- **Hepatitis B** (acute): 4%
- Hepatitis A: 14%
- **Influenza**: 6%
- Typhoid fever: 2.5%
- **Varicella**: 2.5%
- **Haemophilus influenzae B**: 2.5%
- Pertussis: 3 cases
- Measles; 2 cases, Meningitis: 2 cases, Diphtheria: 2 cases, TBE: 1 cases
Slide withheld at request of author
• VPDs are significant contributors to morbidity and potential mortality in travellers.

• High rates of hospitalization make them an attractive target for pre-travel intervention.

• Cosmopolitan VPD are not unfrequent in travellers
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Hajj-Related meningitis outbreaks

- Meningitis Outbreaks at Hajj 1987: Large outbreak of meningitis subgroup A prompted prevention strategies (serogroups A +/-C)
- 1999: Requirement lifted
- 2000 and 2001: 1300 and 1109 meningitis cases. More than 50% of cases confirmed as Neisseria meningitidis serogroup W135, which had previously not played a major role in epidemics
- 2002: compulsory vaccination (A, C, Y, W135)

- Spread to home countries worldwide
  - Substantial transmission from vaccinated Hajj returnees to their unvaccinated household contacts
  - 18 and 28 cases per 100,000 contacts in 2000 and 2001, respectively
  - In 2000, 400 cases of meningococcal disease caused by W135 were identified worldwide
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The spread of poliomyelitis via international travel

Ex: WHO, June 2010:
Cases imported from Angola

Tadjikistan 2010: outbreak imported from India
Russia 2010: 7 cases including 7 imported cases
The spread of poliomyelitis via international travel

Imported Case of Poliomyelitis, Melbourne, Australia, 2007

Andrew J. Stewardson, Jason A. Roberts, Carolyn L. Beckett, Hayden T. Prime, Poh-Sien Loh, Bruce R. Thorley, and John R. Daffy

Wild poliovirus–associated paralytic poliomyelitis has not been reported in Australia since 1977. We report type 1 wild poliovirus infection in a man who had traveled from Pakistan to Australia in 2007. Poliomyelitis should be considered for patients with acute flaccid paralysis or unexplained...
The spread of poliomyelitis via international travel

Public Health Response to Imported Case of Poliomyelitis, Australia, 2007

John A. Carnie, Rosemary Lester, Rodney Moran, Lynne Brown, Julian Meagher, Jason A. Roberts, and Bruce R. Thorley

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 15, No. 11, November 2009
1 case in a travellers returning from Pakistan (Pakistani university student vaccinated with OPV, visited family in Kharian)

Quarantine and or vaccination:
- 7 household contacts
- 235 airplane contacts and 7 airport workers
- 39 medical clinic contacts
- 123 hospital contacts

1 case and > 400 contacts
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Imported measles in the US

2001-2008: 557 confirmed cases, 42% imported from outside the US (South-East Asia, Europe, India)
Measles circulation in Europe

**Rapid communications**

**AN UPDATE ON AN ONGOING MEASLES OUTBREAK IN BULGARIA, APRIL-NOVEMBER 2009**

1. L Marinova (lmarinova@ncipd.org[1]–[2]), M Muscat[3], Z Mihneva[4], M Kefouhoreva[1]
2. National Centre of Infectious and Parasitic Diseases, Sofia, Bulgaria
3. These authors contributed equally to this work.
4. EUVACNET hub, Department of Epidemiology, Statens Serum Institut, Copenhagen, Denmark

957 notified cases, 90% Roma ethnic population

**Rapid communications**

**Spotlight on measles 2010: Ongoing measles outbreak in Greece, January–July 2010**

1. D Pervanidou (pervanidou@gmail.com), E Horefti[5], S Patrinos[5], T Lytras[5], E Triantaflilou[5], A Menti[5], S Bonovas[5]
2. National Centre for Disease Control and Prevention, Athens, Greece
3. Department of Child Health, National School of Public Health, Athens, Greece

126 notified cases: 63% Traveller community (29% Roma community from Bulgaria, 34% Roma community from Greece)
Measles circulation in Europe

Rapid Communications

Spotlight on measles 2010: Measles outbreak in Ireland, 2009-2010

S Gee, S Cotter (suzanne.cotter@hse.ie), D O’Flanagan*, on behalf of the national incident management team
1. HSE-Health Protection Surveillance Centre, Dublin, Ireland
2. The members of the team are listed at the end of the article.

www.eurosurveillance.org

320 notified cases,
Early stages: substantial number of cases linked to Traveller community (Roma ethnic population)

Index case: resident of Ireland (Traveller community)
2 secondary cases
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Influenza A (H1N1) global spread

New Influenza A (H1N1),
Number of laboratory confirmed cases and deaths as reported to WHO

Status as of 22 May 2009
06:00 GMT

Total: 11,168 cases
86 deaths
Proportion of travel-associated pandemic influenza cases

- 100% in week 16
- decreased progressively to 50% after week 25
- remained above 50% until week 37.
At the start of the pandemic, during weeks 16 to 23, almost all travel-associated cases (≥92%) were linked to travel to North America, and this was gradually replaced by travel within EU/EEA countries after week 24 and, from week 31 to week 38, almost all travel-associated cases were reported within EU/EEA countries (>83%).
Epidemiology of Travel-associated Pandemic (H1N1) 2009 Infection in 116 Patients, Singapore

Pratik Mukherjee, Poh Lian Lim, Angela Chow, Timothy Barkham, Eillyne Seow, Mar Kyaw Win, Arlene Chua, Yee Sin Leo, and Mark I-Cheng Chen

Emerging Infectious Diseases • www.cdc.gov/ eid • Vol. 16, No. 1, January 2010

Figure 1. Sources of exposure, by region and country, among 116 patients in Singapore infected with pandemic (H1N1) 2009 virus identified during epidemiologic weeks 21–25, 2009. A) Asia compared with other regions; B) the Philippines; C) Thailand; D) Indonesia; E) other Asian countries. Week 21, May 24–30; week 22, May 30–June 6; week 23, June 7–13; week 24, June 14–20; week 25, June 21–27.
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Vaccination rates in travellers

Vaccination against seasonal flu: 13.7%
Vaccination against pandemic influenza A/H1N1: 14.2%

A cross-sectional survey to evaluate knowledge, attitudes and practices (KAP) regarding seasonal influenza vaccination among European travellers to resource-limited destinations.

Pfeil et al. BMC Public Health 2010, 10:402
http://www.biomedcentral.com/1471-2458/10/402
Protective Measures Against Acute Respiratory Symptoms in French Pilgrims Participating in the Hajj of 2009

Philippe Gautret, MD, PhD, Vinh Vu Hai, MD, Seydou Sani, MD, Mahamadou Doutchi, MD, Philippe Parola, MD, PhD, and Philippe Brouqui, MD, PhD

EuroTravNet, the European CDC Collaborative Network for Travel and Tropical Medicine, Service des Maladies Infectieuses et Tropicales, Hôpital Nord, Marseille, France

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Journal of Travel Medicine 2010

Vaccination against pandemic influenza A/H1N1: 5.8%
REVIEW

Vaccination against tetanus, diphtheria, pertussis and poliomyelitis in adult travellers

Philippe Gautret a,*, Annelies Wilder-Smith b
Conclusions

- Lack of vaccine uptake in travellers (costs, personal beliefs regarding vaccines from both travellers and health-care providers)
- Cosmopolitan and tropical VPDs can be acquired during travel
- Returned travellers can also introduce infections into susceptible populations.
- Travel-associated VPDs are costly at both an individual and societal level
Thank you for your attention...