Foodborne Illness & Travel

Dr Bernie Hudson
Microbiology & Infectious Diseases, Royal North Shore Hospital, Sydney
A/Professor, James Cook University, Townsville

Hepatitis A

- "Hepatitis A is the Most Common Vaccine-Preventable Illness in Travellers"
- Highly immunogenic
- Virtually 100% seroconversion
- Risk areas are everywhere except:
  - Nth America
  - ANZ
  - Western Europe

*Influenza and TD probably are the most common

Hepatitis A: who is most at risk?

- Hepatitis A causes significant morbidity with an estimated 1.5 million annual clinical cases worldwide
- However, the uptake of immunisation among Australian travellers going to endemic areas is low
- The changing incidence of hepatitis A in NSW was assessed in a retrospective analysis of reported case data risk factors between 2002 and 2006
Travel to endemic areas associated with highest risk of infection

Table 1: Frequency of all factors reported by hepatitis A cases, 2002 to 2005

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel to endemic area</td>
<td>23%</td>
</tr>
<tr>
<td>Male sex</td>
<td>23%</td>
</tr>
<tr>
<td>History of unexplained acute liver disease</td>
<td>15%</td>
</tr>
<tr>
<td>Close contact with unexplained acute liver disease</td>
<td>15%</td>
</tr>
</tbody>
</table>

Geographical regions: risk of hepatitis A infection

Figure 3. Relative risk of hepatitis A by geographical region

Table 2: Global region of birth for NSW hepatitis A cases associated with travel, 2002 to 2005 (n = 253)

<table>
<thead>
<tr>
<th>Region of birth</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South America</td>
<td>31%</td>
</tr>
<tr>
<td>Asia</td>
<td>22%</td>
</tr>
<tr>
<td>Europe</td>
<td>14%</td>
</tr>
<tr>
<td>Africa</td>
<td>6%</td>
</tr>
<tr>
<td>Oceania</td>
<td>2%</td>
</tr>
<tr>
<td>Australia</td>
<td>1%</td>
</tr>
</tbody>
</table>

Hepatitis A Endemicity


Hepatitis A Vaccine: Which Travellers?

Australia = low-endemicity pattern for hepatitis A
- Lack of childhood (and adult) exposure
- At risk of hepatitis A infection when travelling to regions of higher endemicity

Hepatitis A vaccination recommended for travellers to moderate/highly endemic areas for hepatitis A


Hepatitis A & B

- “Hepatitis A & B are the most common Vaccine-Preventable Illnesses in Travellers”
- Most Travellers don’t allow enough time for Hepatitis B schedule:
  - ~ 70% Travellers who see an MD do so < 1 month before leaving

*Influenza and TD probably are the most common

Hepatitis A vaccines

All inactivated vaccines (Avaxim, Havrix, VAQTA)
- Safe, highly immunogenic
- Primary course 1 dose + 2nd dose at 6–12 months for long term protection – almost 100% sero-conversion
- Ideally give 1st dose at least 2 weeks prior to anticipated exposure, but 1st dose can be given any time up to (even after) anticipated exposure (77 days) i.e. “last minute traveller”
- After 2 doses, further doses not needed in healthy individuals

Twinrix 0,7, 21 days

- 1 week after 3rd dose:
  - > 80 % protected HBV
  - 100 % high levels of protective anti-HAV
- But......
  - give 4th dose @ 12 months for almost 100% SC (& antiHBs +++)

Hepatitis E

- Hepatitis E virus (HEV)
  - Single stranded RNA virus (Hepeviridae)
  - Viral hepatitis (incubation period 3-8 weeks)
  - Majority asymptomatic
  - Mortality in pregnant women 3rd trimester up to 25%
  - Genotypes 1-4

- Genotypes 1 & 2
  - Only infect humans
  - Asia & Africa
  - Faeco-oral transmission

- Genotypes 3 & 4
  - Infect humans & animals
  - South East Asia, Europe, USA
  - Mainly acquired from animal contact especially eating undercooked meat (especially pork, pork products such as pate, liver, wild boar)
  - Can also be faeco-oral
  - Chronic viraemia (months) in immunesuppressed & transplants

Hepatitis E virus infections in travellers: assessing the threat to the Australian blood supply

- Travel-related cases
  - Nepal & Bangladesh highest rates
  - India most cases

- Threat to blood supply?
- Blood Bank screening strategy
  - Exclusion strategy for malaria reduces risk

- Travellers
  - Food and water precautions
  - No vaccine
  - Pregnant women - may acquire if still travelling before prevented from air travel
  - > 3-8 week incubation may present in 3rd trimester

Typhoid
**Typhoid – The Illness**

**Faeco-oral spread**
- Usually food, but waterborne outbreaks occur
- Incubation period 7-21 days (range 3-60 days)

**“Enteric Fever” Presentation**
- Fever, headache, dry cough, myalgias, rose spots
- Usually constipated - diarrhoea not common in travellers
- Preferred diagnostic sample is blood culture, stool negative early

**Complications**
- Increase if untreated after 2 weeks, but may be the initial presentation
- Perforation (SB), massive GI bleeding (SB), seeding to foci bone, artery wall, “typhoid state” = encephalopathy/psychosis

**Typhoid Cases Notified in Australia**
- Average around 120 – 150/year
  - All (virtually) have travel history
- Indian sub-continent and South East Asia most cases
  - India
  - Nepal
  - Bangladesh
  - Pakistan
  - Indonesia
- VFRs (visiting friends and relatives) high risk
  - Less likely to seek pretravel health advice
  - Greater exposure

**Typhoid Treatment**

**Compromised by Multi-Drug Resistant Strains**
- Resistant to Ciprofloxacin, Chloramphenicol, Ampicillin
- FQ resistance not always predicted by Nalidixic Acid resistance

**Treatment options (10-14 days or more)**
- Ceftriaxone >60mg/kg/day
- Azithromycin 500mg/day
- Some in vitro antagonism ? significance

**Deaths likely to occur**
Perforation, GIT Bleeding, Septicemia, Focal (bone, artery wall)
**Typhoid Vaccine: Which Travellers?**

- Travellers to endemic regions, where food hygiene may be suboptimal and drinking water may not be adequately treated
  - Travellers to endemic regions to visit friends and relatives (VFR) have considerably greater risk
  - Endemicity data may be unreliable
  - Some areas of countries higher risk than others
  - Popular Oceanic destinations may have MDR strains

**Immigrant VFR**

Compared with traveller VFRs and tourist travellers, immigrant VFR travellers are:
- at greater risk of serious, potentially preventable travel-related illnesses
- much more likely to require in-patient treatment
- much less likely to seek pre-travel medical advice

* p<0.001 compared with traveller VFRs and tourist travellers
† p<0.001 compared with tourist travellers

1. Leder K et al. Clin Infect Diseases 2006;43:1185-93

**High Risk: Immigrant VFRs**

Compared with Traveller VFRs and Tourist Travellers, Immigrant VFRs have:
- 7 x the odds of typhoid
- 2 x the odds of febrile illness
- 2 x the odds of malaria

1. Leder K et al. Clin Infect Diseases 2006;43:1185-93

**Other Traveller Disease Risks**

Compared with Traveller VFRs and Tourist Travellers, Immigrant VFRs have:
- 16 x the odds of TB
- 7.5 x the odds of a STI

1. Leder K et al. Clin Infect Diseases 2006;43:1185-93

**Typhim Vi, Typherix, Vivaxim**

- Stimulate antibodies to Vi antigen of S.typhi
  - Killed, IM/SC (0.5 cc), VICPS
  - Lower age limit (must be aged over 2 years)
  - 1 dose, boost at 3 years
  - 60-80% protection (70% @ 18mths, 50% @36mths)
- Vivaxim for vaccine "virgins" vs TwinRix (for HepA)
  - depends on itinerary/risk/time for course
- Injectables preferred to oral typhoid vaccine
  - Compliance
  - Handling issues
  - No interactions

**Oral Typhoid Vaccine (OTV) (Vivotif)**

- Oral live attenuated Ty21a vaccine: Vivotif Oral
  - 3 (or 4) doses swallowed (whole) on D1, D3, D5, (D7)
  - Contraindicated if immunosuppressed
  - Can have simultaneously with mefloquine, Malarone
  - Antibiotics – avoid 7 days pre-D1 to at least 3 days post-D5(D7)
  - Protection =Vi injectables (but lower age limit = 6 years)
  - Duration of protection: 3 doses (1-3 years), 4 doses (5-7 years)
  - Booster (full course): 1 year or 3 years or 5-7 years (USA/Canada)
- Salmonella paratyphoid B protection
  - Chile & Israel OTV studies not replicated Indonesia
  - Immunological investigation 2012 – no explanation ?true effect*
  - No data for other S.paratyphi (A, C)

*Wahid R et al CVI 2012
**Cholera**

**Acute diarrhoeal disease**
- Enterotoxin-producing *Vibrio cholerae*
- Serogroups O1 & O139
- In food or water contaminated with *Vibrio cholerae*

**Not everyone is sick**
- ~75% asymptomatic / ~25% symptomatic

**But .... if symptomatic**
- ~20% > profuse watery diarrhoea > severe dehydration
- Severe cholera can be rapidly fatal if left untreated
- Focus of treatment is rehydration

**Cholera: Endemic in Africa, Asia, South America & Central America**

Adapted from WHO WER No. 31, 2013, 88, 321 – 336

**Cholera: Who to Vaccinate?**

- If considerable risk of exposure to/of acquiring cholera
  - e.g. Humanitarian disaster workers
- If at risk of severe or complicated diarrhoeal disease
  - e.g. Poorly controlled diabetes, inflammatory bowel disease
- If at risk of acquiring diarrhoeal disease
  - e.g. Patients with achlorhydria

**Dukoral – For Cholera**

- Oral inactivated vaccine
  - For immunisation against cholera caused by serogroup O1 *Vibrio cholerae* (not against O139)
- For adults & children ≥2 years of age
  - Demonstrated 85% protective efficacy against cholera at 6 months after primary course
- Administer doses at an interval of 1-6 weeks:
  - Children 2 – 6 years: 3 doses
  - Adults ≥6 years: 2 doses
  - If > 6 weeks elapse between doses primary course must start again
- Generally well tolerated
  - Occasional GI symptoms

**Dukoral - Boosters**

- Protection from ~1 week after primary immunisation completed
  - Ensure 2nd dose is taken at least 1 week before departure
- Protection lasts 2 years, but booster doses may be required every 3-6 months for persons at continuous high risk of contracting cholera
  - Booster (for Cholera protection): 1 dose every 3 months if at continuous significant risk
- Booster Doses for ETEC TD protection:
  - After primary course of 2 doses, a follow-up booster (1 dose) given at any time within 5 years from completion of the primary course (or within 5 years after any booster doses e.g. for cholera protection) should be sufficient for renewed protection against ETEC.
  - If >5 years has passed since the primary course or last booster dose, the full primary course (2 doses at least 1 week apart) should be given

**Adapted from NHMRC. The Australian Immunisation Handbook 10th Edition 2013.**
Strange Things ………

**Angiostrongylus cantonensis**
- Snails or snail contamination of food
- Outbreaks in China
- "Delicacies" in Thailand
- Salads in Hawaii
- Eosinophilic meningitis/mass lesions

**Chagas Disease (Trypanosoma cruzi)**
- Sugar cane, acai drinks
- Brazil, French Guiana, Venezuela,

**Unpasteurised milk & cheese**
- Brucellosis, Q fever, Tuberculosis etc

I found a worm in the toilet !!!

- Long white/grey worm in the toilet bowl
  - Most likely Ascaris lumbricoides
- Flat segment, moves like a leech
  - Tapeworm (beef or pork)
  - Taenia saginata or Taenia solium
  - Other

- Not a human pathogen?
  - Send to laboratory for identification

**Diphyllobothriasis Associated with Eating Raw Pacific Salmon**

Mosk Arias, Monica Yanes, Eduard Nakagawa, Khalina, and Karl Ohrn

Emerging Infections... www.cdc.gov/ncidod... Vol. 15, No. 6, June 2009

The incidence of human infection with the broad tapeworm Diphyllobothrium nihonkai is increasing in urban areas of Japan and in European countries. D. nihonkai is morphologically similar to but genetically distinct from D. latum and exploits agricultural rice, a Pacific coast staple, as its second intermediate host. Clinical signs in humans include diarrhea and discharge of the stools, which can last for 2-3 months. The natural life history and geographic range of the tapeworm remain to be elucidated, but recent studies have indicated that the tapeworm is common in the wild but not in the Pacific coast region as the natural host. A recent surge of clinical cases highlights a change in the epidemiologic trend of the tapeworm disease from one of rural populations to a disease of urban populations worldwide, who eat seafood as part of a healthy diet.
Salmon Aquaculture and Transmission of the Fish Tapeworm

FRN Santos*, 1 LUI de Faro

Senor de Parnaíba, Centro de Medicina Laboratorial, Av. Antônio Carlos Magalhães 4800, sala 5, 40280-909 Salvador, B.A. Brazil. 1Centro de Pesquisas Evandro Chagas, Salvador, BA, Brazil

Diphyllobothrium is an infection of the small intestine by the broad tapeworm, Diphyllobothrium latum. The associated zoonoscopy is nonspecific, but migratory pattern is a well described complication. Although the infection is seen in some regions in South America, its prevalence in Chile, Peru, and a few cases in Argentina. This paper presents the first confirmed Brazilian case of diphyllobothriasis. A 29-year-old woman living in Salvador (state of Bahia) apparently acquired the infection from eating sushi. The diagnosis was based on fecal examination that revealed a large quantity of ova related to eggs. A single dose of praziquantel (600 mg) was sufficient to cure the infection.

US salmon may carry Japanese tapeworm, scientists say

By Susan Scotti, CNN

Eat Sushi ...

The End!!